Honoapi'ilani Highway Improvements Project
West Maui: Ukumehame to Launiupoko

Second Final Environmental Impact Statement

Submitted Pursuant to Chapter 343, Hawaii Revised Statutes (HRS)







Hawaii Department of Transportation (HDOT)

November 2025

Honoapi'ilani Highway Improvements

Volume 5

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HONOAPIʻILANI HIGHWAY IMPROVEMENTS PROJECT,
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Prepared for

Honoapiʻilani Highway Improvements

Prepared by

wsp

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H. T. HARVEY & ASSOCIATES
Ecological Consultants
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Honoapiʻilani Highway Improvement Project
Biological Survey Report

Project #4692-02

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November 2023

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Section 1.0 Introduction

1.1 Project Description

The Federal Highway Administration (FHWA), in cooperation with the State of Hawaiʻi Department of Transportation (HDOT), is planning the Honoapiʻilani Highway Improvements Project. The proposed project is in West Maui, in the areas served by the existing Honoapiʻilani Highway between milepost 11 and milepost 17 (Figure 1). Honoapiʻilani Highway, which is part of Maui's Belt Road system, is a two-lane principal arterial highway that provides the sole access between communities along the west coast of Maui and the rest of the island. The proposed southeastern terminus at milepost 11 is in Ukumehame, in the vicinity of Papalaua Beach Park, and the northwestern terminus of the project is at milepost 17 in Launiupoko, where Honoapiʻilani Highway currently intersects the southern terminus of the Lāhainā Bypass. This approximately six-mile long and 3/4-mile-wide Project Area is composed predominantly of a coastal plain that includes the ahupuaa of Ukumehame, Olowalu, and Launiupoko. Offshore, the Olowalu reef area, which extends from Ukumehame to Launiupoko, hosts about 1,000 acres of some of the healthiest and oldest living corals within the main Hawaiian Islands (MHI). The proposed project does not include work on the existing highway except where the new project joins the existing highway at the northern and southern connections points and potentially at connector roads to ensure continued access to residences, businesses, and public beaches. Additionally, there is no in-stream work planned for this project.

Project Alternatives

A Preferred Alternative has not yet been identified. Four draft "Build Alternatives" have been identified (Figure 2) and are being evaluated in the Draft Environmental Impact Statement (DEIS) currently underway. Each alternative involves the construction of a new highway, which is mainly along a new alignment, further inland from the ocean. Build Alternative 1 has been adapted from the County of Maui's Pali to Puamana Parkway 2005 coastal or makai concept. This alignment has been "modified" to apply American Association of State Highway and Transportation Officials (AASHTO) design standards, bypass erosion areas, and avoid cultural resources. This alternative is just mauka (mountain side or inland) of most inundation areas in Launiupoko and Olowalu and maximizes use of the existing right-of-way (ROW). Build Alternative 2 has been adapted from the County of Maui's Pali to Puamana Parkway 2005 "middle" concept (R.M. Towill Corporation 2005). The alignment was "modified" to apply AASHTO standards, bypass erosional areas, and avoid cultural resources. Build Alternative 3 has been adapted from the County of Maui's Pali to Puamana Parkway 2005 mauka concept. The alignment was "modified" to apply AASHTO standards, bypass erosional areas, and avoid cultural resources. Build Alternative 4 was also adapted from the County of Maui's Pali to Puamana Parkway 2005 mauka concept. The alignment has been "corrected" to apply AASHTO standards, bypass erosional areas, and avoid cultural resources. The route through Olowalu town, which distinguishes this alignment, is based on landowner input provided in 2007. This alignment meets the 55 miles per hour (mph) design speed (with speed signs to be posted at 45 mph), while minimizing curves. The alignments converge at several points and there are two distinct areas where the alignments all differ from one another: one in Olowalu and the other in

Ukumehame. The preferred alternative may be selected from two proposed alternatives, one in each of the two differing areas.

None of the Build Alternatives discussed below involve work in the ocean. Additionally, there is no in-stream work planned for this project, but they may require bridges over the streams. All project alternatives will incorporate Best Management Practices (BMPs) as prescribed by FHWA, U.S. Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration (NOAA) and other agencies participating in the review and approval of the proposed project. It is also noted that no night work is anticipated during construction, and construction duration is anticipated to be no longer than two years. However, should night work be required, additional coordination will be conducted with USFWS and the Hawai'i Department of Land and Natural Resources (DLNR) to agree upon any other appropriate conservation measures.

1.2 Biological Studies – Purpose and Scope

The objectives of this biological study were to:

- Conduct a reconnaissance-level wildlife survey to detect and record the wildlife species (birds and mammals) within the study area.
- Conduct a reconnaissance-level botanical survey to identify and document vegetation communities and plant species within the study area.
- Identify and document biological issues of concern, including the presence of any taxa state or federally listed as threatened or endangered, candidate species for listing, or sensitive habitats.
- Identify the potential impacts of implementing the Project and conservation measures that may be considered for inclusion into the planning and design phase if any listed taxa, candidate species for listing, or sensitive habitats are found.

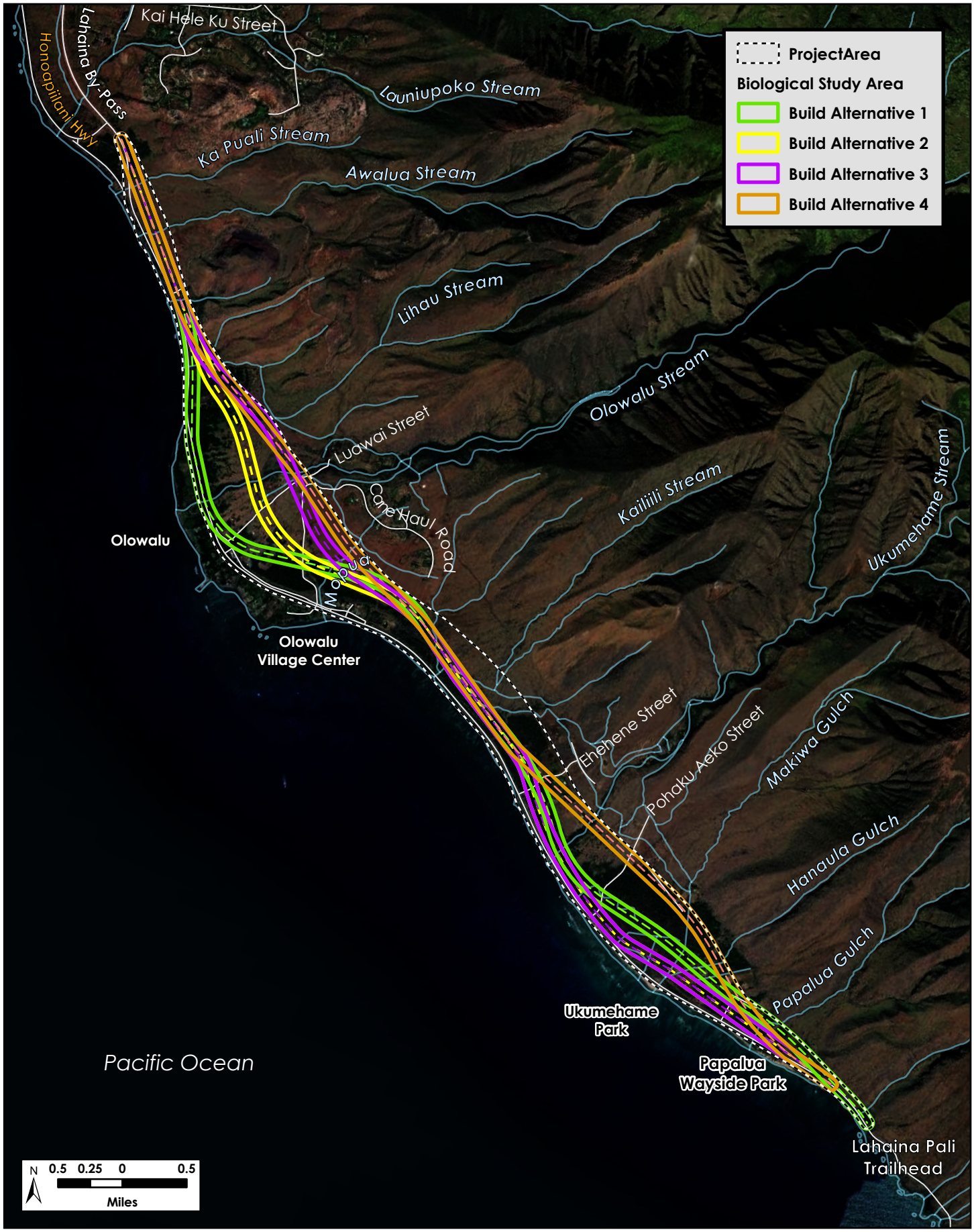
As mentioned in Section 1.1 HDOT and FHWA are currently preparing a DEIS to evaluate the four alternative highway alignments. All four alternative alignments will, for the most part, be built inland of the existing highway, away from the existing coastline and projected sea level rise exposure areas. Each alternative alignment is being designed as a 140-foot-wide cross section including the median, two-lane roadway and with sufficient ROW width to accommodate up to four lanes in the future. To account for ROW variability, the Biological Study Area (BSA) for this assessment was defined as a 150-foot-wide swath centered on each of the four alignments.



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Figure 1. Project Vicinity
Honoapiilani Highway (4692)
September 2023



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Figure 2. Biological Study Area
Honoapiilani Highway (4692)
September 2023

1.3 Background Information

The climate at the Project Area is typical of leeward West Maui – warm subtropical with average temperatures (°F) over a given year ranging from the low 60s to upper 80s. Situated on the leeward lowlands of West Maui, the entire Project Area is very dry and according to Giambelluca et al. (2013), receiving mean annual rainfall levels of approximately 30 inches with most of the annual precipitation occurring during the winter months from November through March and the least amount of precipitation during the summer. Typically, the predominant trade winds blow from east to west; this pattern changes during the winter months when meteorological conditions shift in response to approaching North Pacific cold fronts, causing winds to become more westerly ("kona winds") and delivering increased precipitation to leeward areas. Severe storms have historically been infrequent in this region of Maui.

The Project Area generally consists of undeveloped land, historic agricultural uses, open space, rural residential, and state conservation land uses. The commercial and tourist center of Lāhainā is about 4 miles north of the northern end of the Project Area. Toward Lāhainā to the north and west of the Project Area, the land use is more residential along and mauka (inland) of Lāhainā Bypass. To the south and east, no developed land uses are along Honoapiʻilani Highway until the central Maui community of Māʻalaea. The Project Area is rural in character and comprises the mostly open lands along with historic settlements in Olowalu and newer low-density residential development mauka of the existing highway corridor at the base of the mountains. Olowalu and Ukumehame areas were heavily influenced by the development of large-scale plantation agriculture that dramatically changed and still influences much of the existing landscape in the Project Area. Mauka (inland) of the Project Area there are limited residential uses, cultural sites, and reserve areas, and sparse residential uses. Into the mountains, land use is predominantly undeveloped open space as part of the West Maui Nature Reserve and recently approved DLNR Wildlife Reserve.

Section 2.0 Methods

The BSA for the flora and fauna studies consisted of a 150 feet swath centered around each Build Alternative (Figure 2). Prior to the field survey, H. T. Harvey & Associates' biologists reviewed aerial photographs and topographic maps of the BSA and conducted a thorough literature review to identify any ecological concerns and biological resources present in the BSA and its vicinity. In particular, we reviewed the resource list of threatened and endangered species in USFWS's Information for Planning and Consultation database (USFWS 2023a), which lists species either known or expected to be within or near the BSA (Appendix A). In addition, other species of concern in the vicinity of the BSA were identified during informal preconsultation meetings with USFWS staff (Appendix B). H. T. Harvey & Associates biologists also conducted a project site visit with U. S. Fish & Wildlife staff on March 22, 2023 to help familiarize staff with the scope of this highway realignment project and document any concerns that they might identify with regard to species and habitats.

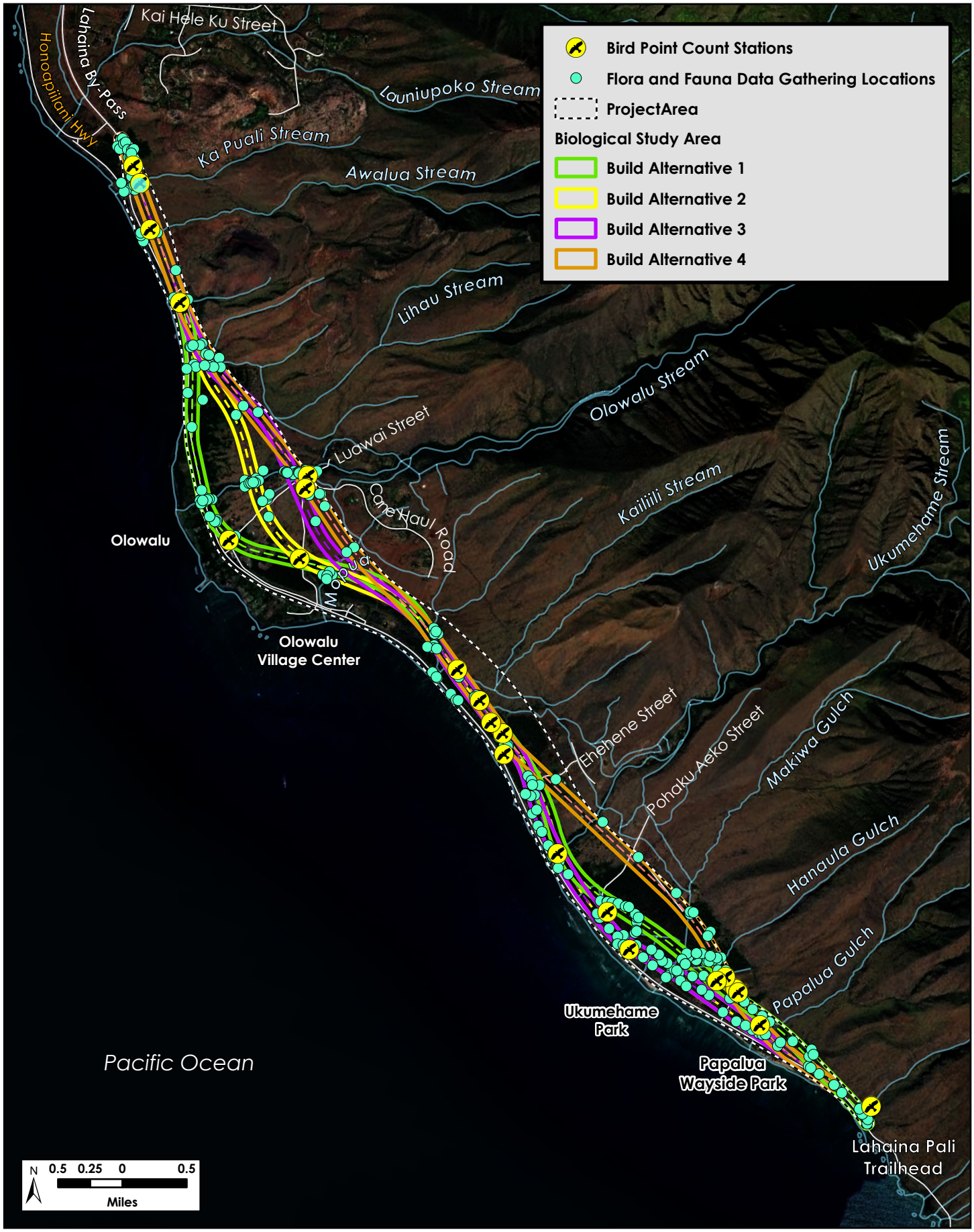
A reconnaissance-level survey of the BSA was conducted on the following dates in 2023: January 2, 3, 4, 5, 6 and 7; March 21, 22, 23, 24, and 25; April 28; May 1, 9, 14, 16, and 22; and July 13 and 18. Sunny skies with mild trade winds prevailed during the survey. Two botanists and one wildlife biologist (hereafter referred to as biologists) conducted the survey together. The biologists walked the accessible areas of the BSA and documented the vegetation communities, plants, birds, and mammals observed. A handheld Global Positioning System device preloaded with spatial data (e.g., BSA boundary) was used to navigate during the survey and record field observations. In general, rocky outcrops, shaded areas, and topographic depressions, which are more likely to support native plant species, were surveyed more extensively.

The wildlife biologist recorded observations of birds and mammals in the BSA. Visual and auditory detection, as well as secondary indicators (e.g., nests) were used to identify the bird species present. To survey for birds, 10-minute point counts were made from 21 locations in the BSA; the data was mostly gathered between 6:00 a.m. to 11:00 a.m. The 21-point count locations were spread out to cover different representative habitats in the BSA (Figure 3). Point count surveys included tallying all birds seen or heard by a single observer from a fixed point over a period of 8 minutes. Binoculars (e.g., Eagle Optics 10×50) were used to assist with visual identifications. In addition to these focused point-count surveys, incidental detections of birds were recorded throughout the duration of the survey. An avian species list was compiled, which includes common and scientific names of the individual species, the legal regulatory status, the average number of individuals detected per count station, and how many count stations were occupied. The last two metrics were used to provide a qualitative relative abundance of observed bird species.

The only native Hawaiian terrestrial mammal, the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), is known to occur on Maui (Tomich 1986, DLNR 2015a). For the purpose of this biological study, it is assumed that Hawaiian hoary bats may use the Project Area and therefore, surveys to identify or quantify their presence were not conducted. Observations of non-native mammal species in the BSA were made incidentally. These

were based on visual and auditory detection, coupled with visual observation of scat, tracks, and other animal signs. An inventory was kept of all vertebrate species observed and heard during the survey.

Hawaiʻi does not have native amphibians and terrestrial reptiles. Furthermore, because the Project is entirely terrestrial, marine turtles (*Chelonia mydas* and *Eretmochelys imbricata*) are not anticipated to experience any direct exposure due to Project activities.



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Figure 3. Data Gathering Locations
Honoapiilani Highway (4692)
September 2023

Section 3.0 Results

3.1 Flora

The taxa recorded during the reconnaissance-level survey are indicative of the season (i.e., spring) and the environmental conditions at the time of the survey. No rare native Hawaiian plant species or taxa that are state or federally listed as threatened, endangered, or taxa that are candidates for listing were observed in the Project Area. Table 1 provides a list of the plant species observed and their relative abundance in the Project Area. A total of 56 plant taxa were found, of which eight (~14%) are native (indigenous) and 48 (~86 %) are either Polynesian introduced or alien species (Wagner et al. 1999, Imada 2019).

Table 1. Plant Species Observed in the Honoapiʻilani Highway Improvement Project Biological Study Area

Family	Scientific Name	Common Name	Status[1]	Relative[2] Abundance
Aizoaceae	*Sesuvium portulacastrum*	Akuiluli	Native	Common
Amaranthaceae	*Amaranthus viridis* L.	Slender amaranth	Alien	Common
	Chenopodium murale	Nettleleaf goosefoot	Alien	Uncommon
Anacardiaceae	*Mangifera indica* L.	Mango	Alien	Rare
Areceaea	*Cocos nucifera* L.	Coconut	Pol	Uncommon
	Washingtonia robusta H. Wendl.	Mexican fan palm	Alien	Uncommon
Asteraceae	*Bidens alba*	Florida beggartick	Alien	Uncommon
	Pluchea indica (L.) Less.	Indian fleabane	Alien	Abundant
	Pluchea x *fosbergii* Cooperr. & Galang	Marsh fleabane	Alien	Abundant
	Tridax procumbens L.	Coat buttons	Alien	Uncommon
	Xanthium strumarium	cocklebur	Alien	Common
	Zinnia peruviana (L.) L.	Zinnia	Alien	Rare
Bataceae	*Batis martima*	Pickleweed	Alien	Abundant
Bromeliaceae	*Ananas comosus* L. Merr	Pineapple	Alien	Rare
Convolvulaceae	*Ipomoea triloba* L.	Little bell	Alien	Uncommon
	Merremia tuberosa (L.) Rendle	Woodrose	Alien	Common
Cucurbitaceae	*Cucumis dipsaceus* Ehrenb. Ex Spach	Wild cucumber	Alien	Uncommon
	Momordica charantia L.	Bitter melon vine	Alien	Common
Cyeraceae	*Cyperus rotundus*	Purple nutsedge	Alien	Uncommon
Euphorbiaceae	*Euphorbia hirta* L.	Hairy spurge	Alien	Uncommon
Fabaceae	*Chamaecrista nictitans*	Partridge pea	Alien	Uncommon
	Crotalaria pallida	Smooth rattlepod	Alien	Uncommon
	Desmanthus pernambucanus	Slender mimosa	Alien	Uncommon
	Leucaena leucocephala (Lam.) de Wit	Haole koa	Alien	Abundant

Family	Scientific Name	Common Name	Status[1]	Relative[2] Abundance
	Macroptilium atropurpureum (DC.) Urb.	Vining cow pea	Alien	Common
	Peltophorum pterocarpum (DC.) K.Heyne	Copper pod	Alien	Rare
	Pithecellobium dulce(Roxb.) Benth.	Opiuma	Alien	Abundant
	Prosopis pallida (Humb. & Bonpl. Ex Willd.)	Kiawe	Alien	Abundant
	Samanea saman (Jacq.) Merr.	Monkey pod	Alien	Common
Goodeniaceae	*Scaevola taccada* (Gaertn.) Roxb.	Naupaka	Native	Rare
Heliotropiaceae	*Heliotropium amplexicaule* Vahl	Heliotrope	Alien	Uncommon
Lamiaceae	*Leonotis nepetifolia* (L.) R.Br.	Lion's ear	Alien	Uncommon
Malvaceae	*Abutilon grandifolium* (Willd.) Sweet	Hairy abutilon	Native	Rare
	Abutilon incanum (Link) Sweet	Hoary abutilon	Alien	Uncommon
	Sida fallax	ʻilima	Native	Uncommon
	Sida rhombifolia L.	Cuban jute	Alien	Rare
	Thespesia populnea (L.) Sol. Ex Corrêa	Milo	Native	Rare
	Waltheria indica L.	Uhaloa	Native	Common
Moraceae	*Artocarpus altilis* (Parkinson ex Z) Fozberg	Breadfruit	Pol	Rare
Myrtaceae	*Syzygium cumini* (L.) Skeels	Java plum	Alien	Common
Nyctaginaceae	*Boerhavia sp.*	Alena	Alien	Uncommon
	Bougainvillea spectabilis Willd.	Bougainvillea	Alien	Uncommon
Passifloraceae	*Passiflora foetida* L.	Love in a mist	Alien	Uncommon
Poaceae	*Cenchrus ciliaris*	Buffel grass	Alien	Abundant
	Cenchrus ciliaris L.	Buffel grass	Alien	Abundant
	Cenchrus echinatus	Sandbur	Alien	Rare
	Chloris gayana Kunth	Rhodes grass	Alien	Abundant
	Cynodon dactylon (L.) Pers.	Bermuda grass	Alien	Common
	Digitaria abyssinica (Hochst. Ex. A.Rich.) Stapf	Finger grass	Alien	Common
	Eragrostis amabilis	lovegrass	Alien	Common
	Megathyrsus maximus	Guinea grass	Alien	Abundant
Portulacaceae	*Portulaca oleracea*	pigweed	Alien	Rare
Santalaceae	*Santalum ellipticum*	Sandalwood	Native	Rare
Solanaceae	*Nicotiana glauca* Graham	Tree tobacco	Alien	Rare
Sapindaceae	*Dodonaea viscosa*	ʻaʻaliʻi	Native	Rare
Zygophyllaceae	*Tribulus terrestris* L.	Puncture vine	Alien	Uncommon

[1] **Status Notes:** alien = introduced or alien (all those plants brought to the Hawaiian Islands by humans, intentionally or accidentally, after Western contact [i.e., Cook's arrival in the islands in 1778]). Native = species that occur naturally in the Hawaiian Islands including indigenous species that have a wider distribution outside of Hawaiʻi.

[2] **Qualitative Relative Abundance of Observed Species in Study Area:** A = abundant—forming a major part of the vegetation in the Biological Study Area. C = common—widely scattered throughout the Biological Study Area or locally abundant in a portion of it. U = uncommon—scattered sparsely throughout the Biological Study Area or occurring in a few small patches. R = rare—only a few isolated individuals in the Biological Study Area.

In general, the vegetation of the BSA can be characterized as a mix of coastal dry community (sensu Gagne and Cuddihy 1999). During most of the year, these community types, which are typical of the leeward sides of most of the MHI, intercept little rainfall to maintain forest cover and are generally open to semi-open shrublands or woodlands. The vegetation throughout the Project Area has been heavily modified by pre-historic and modern human activities and is now largely dominated by alien species (Table 1). Fifteen habitat or vegetation types were identified in the BSA (Figure 4). Detailed below is the distribution and composition of these vegetation communities within the BSA starting from the northern Lāhainā side to the southern end where all the proposed Build Alternatives merge with the existing alignment near the Pali (Figure 4).

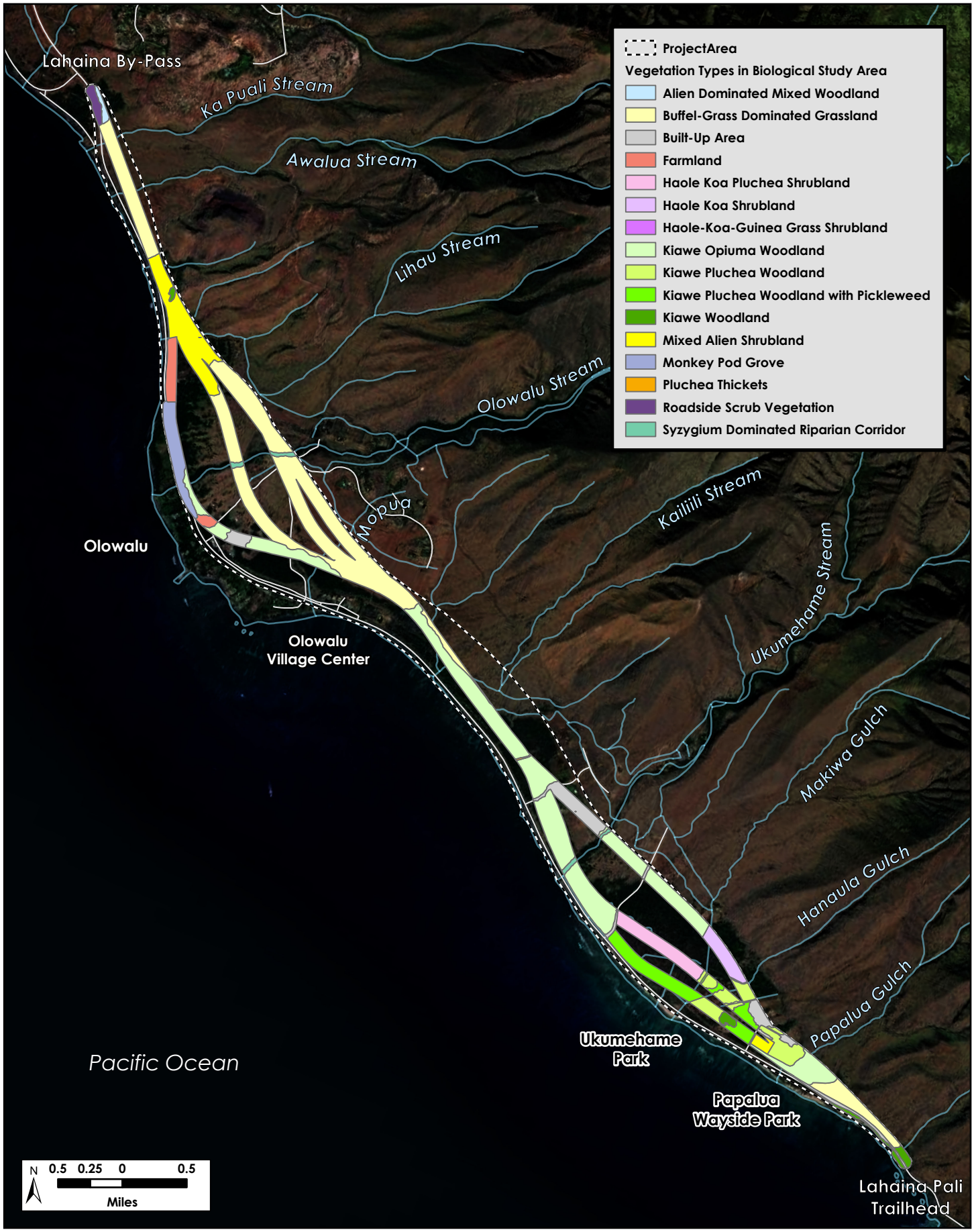
3.1.1 Vegetation – Olowalu Area

3.1.1.1 North of Olowalu Peninsula – Lāhainā Bypass to Near Lihau Stream

The northern half of the Project Area is a stretch of about three miles from the Lāhainā Bypass through the Olowalu Peninsula. All four Build Alternatives overlap for about 0.61 mile from the Lāhainā Bypass end to just north of Lihau Stream; here the vast majority of the vegetation was Buffel Grass Dominated Grassland (Figure 4, Photo 1). Scattered amongst this vast almost monotypic expanse of buffel grass (*Cenchrus ciliaris*) were scattered shrubs of haole koa (*Leucaena leucocephala*) and kiawe (*Prosopis pallida*) trees (Photo 1).

About two acres in the northeast corner of the Project Area can be characterized as Alien Dominated Mixed Woodland. A mix of kiawe, opiuma (*Pithecellobium dulce*), and Mexican fan palms (*Washingtonia robusta*) formed the canopy species with thickets of *Pluchea* spp.—marsh fleabane (*Pluchea x fosbergii*) and Indian fleabean (*Pluchea indica*) in the understory (Figure 4, Photo 2). On the opposite southwestern corner, the Project Area overlaps the existing Honoapiʻilani Highway with Roadside Scrub Vegetation, which was composed of a variety of small, prostrate herbaceous weeds such as alani (*Boerhavia repens*), little bell (*Ipomoea triloba*), and puncture vine (*Tribulus terrestris*); and grasses such as buffel grass, Bermuda grass (*Cynodon dactylon*), and swollen finger grass (*Chloris barbata*).

In the stretch from the Olowalu Residential Recycling and Refuse Center to Lipau Stream, where the four Build Alternatives continue to overlap, the Project Area is composed of Haole Koa-Guinea Grass Shrubland (Figure 4, Photos 3 and 4). This vegetation type was somewhat patchy with some areas being either predominantly guinea grass or short (~2-4 feet) haole koa shrubs while other areas with a mix of these species. Other commonly seen shrubs here included uhaloa (*Waltheria indica*), castor bean (*Ricinus communis*), and *Pluchea* spp. Tall Mexican fan palms, kiawe and opiuma trees were also seen scattered in this shrubland.



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Figure 4. Habitat/Vegetation Types
Honoapiilani Highway (4692)
September 2023



Photo 1. Grassland Habitat Overlapping All Four Proposed Build Alternatives in the Western Stretch of the Biological Study Area Between Lāhainā End and Lihau Stream



Photo 2. Alien Dominant Mixed Woodland Overlapping in the Northwest Corner of the Biological Study Area Ovelapping all Four Build Alternatives



Photo 3. Mixed Alien Shrubland Ovelapping all Four Build Alternatives in the Vicintiy of Olowalu Residential Recycling and Refuse Center



Photo 4. Mixed Alien Shrubland Ovelapping all Four Build Alternatives in the Vicintiy of Lipau Stream

In the central eastern portion of this Haole Koa Guinea Grass Shrubland, there is about 0.7 acres stand of kiawe trees. This Kiawe Woodland (Figure 4) overlapped what appeared to be an abandoned and dry ditch in the east-west direction that was once probably fed by a tributary of Lihau Stream. Each of the four Build Alternatives in this northernmost stretch of the Project Area cross three intermittent streams: Ka Puali, Awalua, and Lipau. Vegetation in the bed and banks of these narrow and mostly dry stream gulches was predominantly haole koa, kiawe, and buffel grass.

3.1.1.2 Olowalu Peninsula – Near Lihau Stream to Vicinity of Kailiili Stream

South of Lihau Stream, in the remaining 2.41 miles of the northern half of the Project Area, the proposed Build Alternatives start to separate and are distinguishable as four distinct alignments through the Olowalu Peninsula. For the most part, Build Alternative 1 overlaps the existing highway and the vegetation types observed here were: Farmland, Monkey Pod Grove, and Kiawe-Opiuma Woodland (Figure 4). Build Alternative 1 passes through Olowalu Village Center with businesses and some residences and the vegetation in this stretch is highly disturbed. Large monkey pods (*Samanea saman*) as avenue trees line both sides of the existing highway alignment that passes through the Village Center forming a Monkey Pod Tunnel (Photo 5). Weedy species such as vining cow pea (*Macroptilium atropurpureum*) and guinea grass were abundant behind the row of these trees.



Photo 5. Monkey Pod Tunnel - Row of Monkey Pod (*Samanea saman*) Trees in Build Alternative 1 Through the Olowalu Village Center

A stretch of cultivated lands characterized here as Farmland vegetation occur to the north as well as to the south of this Monkey Pod Tunnel (Figure 4). While the Farmland to the north appeared to be limited to growing vegetable species (Photo 6), the Farmland to the south of the tunnel and in closer proximity to the businesses

had a variety of fruit and ornamental species such as bananas (*Musa* sp.), pineapple (*Ananas* sp), breadfruit (*Artocarpus altilis*), papaya (*Carica papaya*), and bougainvillea (*Bougainvillea* sp.) (Photo 6).



Photo 6. Farmland with Cultivated Crop and Ornamental Species Overlapping Build Alternative 1 in the Northern Part (Left Picture) and Southern Parts of the Olowalu Peninsula

The Olowalu Stream and a narrow riparian corridor on the banks of this perennial stream intersect Build Alternative 1 just north of the Olowalu Village Center (Figure 4). Above (and east of) the Olowalu Stream bridge and the existing highway, the riparian corridor was dominated by java plum and opiuma trees while dense thickets of guinea grass and haole koa along with a variety of weedy species such as hairy abutilon (*Abutilon grandifolium*) and bitter melon vine (*Momordica charantia*) were present behind the row of monkey pod trees below (and west of) the bridge and the existing highway (Photo 7).

A stretch of Build Alternative 1 that is mauka (or to the east) of the monkey pod trees and between the Olowalu Stream and the businesses in the Olowalu Village Center can be characterized as Kiawe Opiuma Woodland (Figure 4). This vegetation type also occurred in the long stretch between the southern Farmland area and Mapua Stream except in two acres that mostly was Built Up area (Figure 4, Photo 8). The large kiawe and opiuma trees in some portions of this woodland were dense stands with barely any understory vegetation, while in the other areas these trees were scattered with mostly weedy grasses and other herbaceous species such as lion's ear (*Leonotis nepetifolia*), hairy spurge (*Euphorbia hirta*), slender amaranth (*Amaranthus viridis*), wild cucumber (*Cucumis dipsaceus*), and the indigenous uhaloa in the understory. The southernmost stretch of Build Alternative 1 in the Olowalu Peninsula is composed of Buffel Grass Dominated Grassland (Figure 4).

A stretch of about 0.3 miles of Build Alternative 2, just south of (the northern tributary of) Lipau Stream, the vegetation continues to be Mixed Alien Shrubland (Figure 4). A variety of short (about 2-6 feet) statured shrubs of kiawe, opiuma, haole koa, *Pluchea* spp., and castor bean, were characteristic of this vegetation type (Photo 9). Love in a mist (*Passiflora foetida*) vines were abundant here and draped over the shrubs. Uhaloa was also abundant with some scattered shrubs of the native ʻilima (*Sida fallax*).

Other than an approximately six-acre patch of Kiawe Opiuma Woodland, vegetation in the remaining stretch of Build Alternative 2 in the Olowalu Peninsula can be characterized as Buffel Grass Dominated Grassland (Figure 4). Other than scattered trees of species such as kiawe, opiuma, and scattered shrubs of species such as

haole koa and uhaloa the vegetation in this vegetation was largely a continuous and dense stand of dry buffel grass (Photo 10).



Photo 7. Dense Thickets of Guinea Grass (*Megathyrsus maximus*) Haole Koa (*Leucaena leucocephala*) West of the Olowalu Stream Bridge in Build Alternative 1



Photo 8. Kiawe Opiuma Woodland Overlapping Build Alternative 1 Near the Olowalu Village Center (Left Picture) and Around Luawai Street (Right Picture)



Photo 9. Mixed Alien Shrubland Overlapping Build Alternative 2 in Northern Portion of the Olowalu Peninsula



Photo 10. Buffel Grass Dominated Grassland Overlapping Build Alternative 2 in Olowalu Peninsula

Starting from Lihau Stream, for a stretch of about 1000 feet in the northern portion of the Olowalu Peninsula, both Build Alternatives 3 and 4 are composed of Mixed Alien Shrubland (Figure 4, Photo 11). The composition of the vegetation type here is like that described in the paragraph above for Build Alternative 2. In addition, there was a grove of coconut trees toward the southern end of this vegetation type, which appeared to have been planted by the private landowner to the east (Photo 11). The remaining approximately 1.4 miles of Build Alternatives 3 and 4, which mostly overlap in the Olowalu Peninsula, are composed of Buffel Grass Dominated Grassland (Figure 4, Photo 12).

As in Build Alternative 1, the Olowalu Stream also intersects with the Project Area overlapping Build Alternatives 2, 3, and 4 (Figure 4). In these three Build Alternatives there was a narrow riparian corridor dominated by java plum trees (Photo 13). Opiuma and kiawe trees were also common along the banks and the herbaceous with guinea grass abundance in the understory.



Photo 11. Coconun Grove in the Eastern Corner of the Mixed Alien Shrubland Overlapping Build Alternatives 3 and 4 in the Olowalu Peninsula



Photo 12. Buffel Grass Dominaed Grassland Overlapping Build Alternatives 3 and 4 in the Olowalu Peninsula



Photo 13. Representative Olowalu Stream Riparian Corridor Dominated by Java Plum (*Syzygium cumini*) Trees and Guinea Grass (Megathyrsus maximus) that Overlaps Build Alternatives 2, 3, and 4

3.1.2 Vegetation – Ukumehame Area

3.1.2.1 Kailiili Stream to Ehehene Street

The southern half of the Project Area is a stretch of about 3.13 miles starting from the southern end of Olowalu Peninsula, in the vicinity of Kailiili Stream, to the southernmost merge point with the existing Honoapiʻilani Highway near the Lāhainā Pali Trailhead. (Figure 2). Here, all four Build Alternatives overlap for a stretch of about 0.61 miles, between Kailiili Stream to just north of Ehehene Street (Figure 2).

There were several crisscrossing dirt paths in this 0.61-mile stretch and the western portion, in particular, was highly disturbed with many places being used as dumpsites and homeless encampments. Three vegetation types were seen here: Kiawe Opiuma Woodland, Buffel Grass Dominated Grassland, and Pluchea Thicket with most of the Project Area covered by the Kiawe Opiuma Woodland vegetation type. Toward the southern part there is a ditch that intersects this Woodland in an east west direction. Pluchea Thicket – composed of monotypic stand of *Pluchea* shrubs covers both banks of this narrow ditch (Figure 4, Photo 14). The Kiawe Opiuma Woodland surrounding the ditch was much denser than farther to the north where mostly dry buffel grass was abundant under the scattered kiawe and opiuma trees (Photos 15 and 16).



Photo 14. Pluchea Thicket Along the Southern Bank of the Ditch Just North of Ehehene Street that Intersects all Four Build Alternatives

In the northeastern area, in the vicinity of the Kailiili tributaries, the Kiawe Opiuma Woodland transitions upland into a vast expanse of Buffel Grass Dominated Grassland (Figure 4, Photo 17). The terrain here is undulating, and the presence of rocks and boulders was characteristic of the Grassland. Shrubs of the native species such as uhaloa and ʻilima, as well as a few individuals of the hairy abutilon were usually seen in relatively rocky areas and where the buffel grass was not as dense.



Photo 15. Kiawe Opiuma Woodland Representative of the Area Just North of Ehehene Street Overlapping All Four Build Alternatives



Photo 16. Kiawe Opiuma Woodland Representative of the Project Area Just South of the Olowalu Peninsula where All Four Alternatives Overlap



Photo 17. Buffel Grass Dominated Grassland in the Northeastern Stertch of the Proejct Area in the Vicinityo of Kailiili Stream Tributaries

3.1.2.2 Vicinity of Ehehene Street to Sedimentation Basin

Just north of Ehehene Street, the proposed alignments start to separate. Approximately 1.66 miles from Ehehene Street to the northern border of HDOT's sedimentation basin in Ukumehame, Build Alternatives 1 and 2 continue to overlap while Build Alternatives 3 and 4 for the most part follow distinct alignments that are more inland (and east) of the first two (Figure 2). Several different vegetation types were seen in this 1.66 miles stretch of the Project Area. Kiawe Opiuma Woodland vegetation type continued to overlap Build Alternatives 1 and 2 in the Project Area here between Ehehene and Pohaku Aeko Streets (Figure 4). The woodland here was composed of tall dense thickets of opiuma trees, which in most places were dominant in the canopy than the kiawe trees (Photo 18). Ukumehame Stream intersects the Project Area in this stretch and was dominated by java plum trees along its banks (Photo 19).

South of Pohaku Aeko Street, for a stretch of about 800 feet, the vegetation overlapping Build Alternatives 1 and 2 can be characterized as Kiawe Pluchea Woodland (Figure 4). This relatively open woodland mostly had scattered kiawe as canopy trees with the understory dominated by scattered shrubs of *Pluchea* spp. Several kiawe trees appeared to be dead in the woodland. (Photo 20). Sandy soils covered the westernmost stretch of the habitat type and salt crust was also visible in many places in the Woodland in part of the Project Area. Haole koa shrubs were mixed in with the *Pluchea* spp. Ground vegetation in the woodland here was patchy with open areas of bare dirt. Herbaceous species such as pickleweed (*Batis maritima*), salt bush (*Atriplex suberecta*), radiate finger grass (*Chloris* spp.), and the native akulikuli (*Sesuvium portulacastrum*) were common in this woodland.



Photo 18. Kiawe Opiuma Woodland in the Project Area Overlapping Build Altenatives 1 and 2 Between Ehehene and Pohaku Aeko Streets



Photo 19. Monkey Pod Tunnel - Row of Monkey Pod (*Samanea saman*) Trees in Build Alternative 1 Through the Olowalu Village Center



Photo 20. Kiawe Pluchea Woodland with Several Dead Kiawe Trees in the Project Area Overlapping Build Alternatives 1 and 2 to the South of Pohaku Aeko Street

Moving further south along Build Alternatives 1 and 2 for a stretch of about 0.3 miles, the vegetation in the Project Area can be characterized as Kiawe Pluchea Woodland with Pickleweed (Figure 4). This vegetation type overlaps some of the northwestern corner of the Ukumehame Firing Range. There were several ditches in this stretch of the Project Area that intersect the Build Alternatives and also one ditch that ran north-south. These ditches, bed and banks were covered with thickets of pickleweed (Photo 21). The ground vegetation surrounding the ditches and under the canopy of the mostly dead kiawe trees was also predominantly pickleweed mixed in with salt bush, and several weedy grass species such as guinea grass, buffel grass, and radiate finger grass. Haole koa shrubs were also common in the Kiawe Pluchea Woodland with Pickleweed vegetation type.

Three distinct vegetation types were seen in the Project Area overlapping Build Alternatives 1 and 2 in the approximately 0.3 mile stretch from Ukumehame Firing Range to the road next to (north of) the HDOT sedimentation basin that leads to the County of Maui Firing Range facility (Figure 4). There are about 1.6 acres of Kiawe Woodland in the center just south of the County of Maui firing range. Pluchea shrubs were common in the area to the north of this woodland and the vegetation here can be described as Kiawe Pluchea Woodland while the vegetation to the south and surrounding most of this woodland was an open habitat with scattered kiawe trees, *Pluchea* shrubs, and dense cover of pickleweed patches as the ground cover – this vegetation can be described as Kiawe Pluchea Woodland with Pickleweed (Photo 22).



Photo 21. Kiawe Pluchea Woodland with Pickleweed in Project Overlapping Build Alternatives 1 and 2 in the Vicinity of Ukumehame Firing Range



Photo 22. Kiawe Pluchea Woodland (Left) and Kiawe Pluchea Woodland with Pickleweed (Right) in the Project Area Overlapping Build Alignments1 and 2 South of the Maui County Firing Range

Inland of Build Alternatives 1 and 2, vegetation in the Project Area overlapping Build Alternative 3 was mostly composed of Haole Koa Pluchea Shrubland. The ground vegetation in the dense shrubland was sparse and mostly composed of weedy grass species such as radiate finger grass, guinea grass, and buffel grass. Large portions in the shrubland had dead haole koa surrounded by otherwise healthy trees and the cause of this phenomenon was not obvious in the field (Photo 23). The other two vegetation types in the remaining stretch of the Project Area overlapping Build Alternative 3 in the vicinity of Ukumehame Firing Range were Kiawe Pluchea Woodland and Kiawe Pluchea Woodland with Pickleweed (Figure 4) with similar composition as described above for Build Alternative 1.



Photo 23. Haole Koa Pluchea Shrubland in the Project Area Overlapping Build Alternative 3 in the Vicinity of Ukumehame Firing Range

The most inland Build Alternative 4 in the Project Area in the Ukumehame region, passes through privately owned lots in the north, that were under construction, and the Ukumehame Firing Range in the southern part; these areas have been described here as Built-Up areas (Figure 4). In this stretch, Kiawe Opiuma Woodland overlaps the Project Area along a paved road that runs through the residential lots being developed (Photo 24). This paved transitions to unpaved dirt road and the vegetation surrounding this dirt road was composed of dense Haole Koa Shrubland (Photo 24). The portion of the Project Area here that overlaps the Ukumehame Firing Range is composed of Kiawe Pluchea Woodland with similar composition of species as described above for the other three Build Alternatives.



Photo 24. Kiawe Opiuma Woodland (Left) and Haole Koa Shrubland (Right) in the Project Area Overlapping Build Alternative 4 in the Vicinity of Ukumehame Residential Subdivision

3.1.2.3 Sedimentation Basin to the Pali

Near the northern end of the HDOT sedimentation basin next to the Ukumehame Firing Range, to the southern end of the Project Area by the Pali, all four Build Alternatives once again overlap. Vegetation in the northern portion of the sedimentation basin can be described as Mixed Alien Shrubland (Figure 4). In September, this portion of the sedimentation basin was mostly bare dirt with little to no vegetation. However, after the rains in March, it was covered with variety of alien shrubs such as castor, pluchea, haole koa, smoothe rattle pod (*Crotalaria pallida*), with cocklebur shrubs being the most abundant (Photo 25). The central part of the sedimentation basin as well as the vegetation to its east here can be described as Kiawe Pluchea Woodland. The composition of the understory was mostly dominated by pluchea shrubs (Photo 26). The southern portion

of the sedimentation basin overlaps the braided stream system in the Papalaua gulch that funnels water into the basin. The vegetation here and along the western berm of the sedimentation basin can be described as Kiawe Opiuma Woodland. The vegetation here is sparser with numerous alien species in the understory of scattered kiawe and opiuma trees (Photo 27). The native ʻaʻaliʻi shrubs were seen in this habitat in the floodplain of the streams.



Photo 25. Mixed Alien Shrubland in the Northern Part of the Sedimentation Basin in Ukumahame



Photo 26. Kiawe Pluchea Woodland Overlapping the Central Portion of the Sedimentation Basin
Note: Understory in the north here was composed of dense thickets of *Pluchea* spp. while toward the south was mostly composed of guinea grass.

Vegetation in the final stretch of the Project Area, west of the Papalaua gulch to where the Build Alternative meets up with the existing highway near the Pali, was Buffel Grass Dominated Grassland (Photo 28). Naive ʻilima shrubs were commonly seen in this grassland habitat (Photo 29).



Photo 27. Kiawe Opiuma Woodland in the Southern Portion of the Sedimentation Basin



Photo 28. Buffel Grass Dominated Grassland Representative of the Southern Most Part of the Project Area Overlapping All Build Alternatives



Photo 29. Ilima (*Sida fallax*) Shrubs were Common in the Grassland

3.2 Fauna

3.2.1 Birds

During the surveys, skies were mostly sunny, with less than 25% cloud cover, light winds less than 10 mph, and no precipitation. Point-count surveys were conducted in all representative habitat types discussed in Section 3.1. including along natural streams, wetlands, and man-made canals. Bird calls and sounds were more difficult to detect at locations close to the existing Honoapiʻilani Highway due to high traffic noise. Point count surveys identified 301 individuals representing 16 species (Table 2).

Table 2. Avian Species Observed in the Honoapiʻilani Highway Improvement Project Biological Study Area

Scientific Name	Common Name	Status[1]	Average per Count Station (n=21)	Proportion of Stations Occupied	Qualitative Relative Abundance[2]
Acridotheres tristis	Common myna	X	2.38	0.57	Common
Branta sandvicensis	Hawaiian goose (Nēnē)	ES, I, M	0.19	0.05	Rare
Bubulcus ibis	Cattle egret	X, IW, M	0.10	0.10	Rare
Cardinalis cardinalis	Northern cardinal	X, M	1.00	0.52	Common
Carpodacus mexicanus	House finch	X, M	1.29	0.67	Common
Estrilda astrild	Common waxbill	X	1.14	0.19	Common
Francolinus pondicerianus	Grey francolin	X	0.62	0.43	Uncommon
Gallus gallus	Red junglefowl	X	0.33	0.24	Rare
Geopelia striata	Zebra dove	X	1.00	0.52	Common
Himantopus mexicanus knudseni	Hawaiian stilt	ES, I, M	0.19	0.05	Rare
Mimus polyglottos	Northern mockingbird	X, M	0.10	0.10	Rare
Nycticorax nycticorax hoactli	Black-crowned night-heron	I, M	0.05	0.05	Rare
Paroaria coronata	Red-crested cardinal	X, M	0.81	0.43	Uncommon
Passer domesticus	House sparrow	X	0.48	0.19	Rare
Streptopelia chinensis	Spotted dove	X, IW	0.38	0.19	Rare
Zenaida macroura	Mourning dove	X, M	0.19	0.10	Rare
Zosterops japonicus	Warbling whiteeye	X, IW	4.29	0.86	Abundant

[1] Status
ES = state or federally listed as Threatened or Endangered
I = indigenous (native to the Hawaiian Islands and elsewhere)
IW = State (HAR 12-124, Exhibit 5) or Federal (18 U.S.C. 42) injurious wildlife species
X = introduced or alien (non-native species)
M= Listed as a Migratory Bird Treaty Act Protected Species (10.13 List)

[2] Abundance indices based on the proportion of point count stations where species were observed, as follows: Abundant = ≥ 0.75; Common = 0.50-0.74; Uncommon = 0.25-0.49; Rare = ≤ 0.24

Two Endangered Species Act (ESA) listed bird species were observed a few times in the BSA: Hawaiian goose or nēnē (*Branta sandvicensis*) and Hawaiian stilt or aeʻo (*Himantopus mexicanus knudseni*). These species were observed during and outside of the point-count stations. On January 3, 2023, nēnē and Hawaiian stilts were seen for the first time during this study at the Ukumehame Firing Range (Photo 30). Four nēnē were seen loafing near the classroom building in Ukumehame Firing Range and in a shallow muddy pond (Photos 30 and 31) that appeared to have been recently formed due to the heavy rains. Two of the four nēnē were banded individuals. Three Hawaiian stilts were seen feeding and loafing at the same ponded location next to the nēnē (Photo 30). Nēnē and Hawaiian stilts were also seen again on January 4 at this same location in Ukumehame Firing Range (Photo 32). Two additional nēnē (a total of six individuals) were seen again at the same location in Ukumehame Firing Range on March 22 and April 28, 2023. The birds were seen loafing near the classroom building.

One individual nēnē was also seen loafing in the open grassy area in Ukumehame subdivision at the intersection of Pohaku Aeko Street and Paekii Place (Photo 33). This individual was also a banded bird. Although we did not see any nēnē in the Olowalu area, we learned that nēnē are often seen here in the grasslands here, and particularly near the water reservoir (outside of the Project Area) (Larse pers. com. 2023). A second siting of the Hawaiian stilt was made on March 23, 2023 when conducting wetland delineation at a ditch in Ukumehame. A single individual was seen feeding in the ponded ditch.



Photo 30. Nēnē (*Branta sandvicensis*) and Hawaiian Stilt or aeʻo (*Himantopus mexicanus knudseni*) at Ukumehame Firing Range on January 3, 2023



Photo 31. Nēnē (*Branta sandvicensis*) Resting Under the Shade of the Classroom Building in Ukumehame Firing Range on January 3, 2023



Photo 32. Hawaiian Stilt or aeʻo (*Himantopus mexicanus knudseni*) at Ukumehame Firing Range on January 4, 2023



Photo 33. Nēnē (*Branta sandvicensis*) in the Grassy Area at the Intersection of Pohaku Aeko Street and Paekiii Place in the Ukumehame Subdivision on March 23, 2023

One indigenous species, the Black-crowned night heron (*Nycticorax nycticorax*), was observed at Ukumehame Stream, perched on a branch above the flowing water. The typical habitat for this species is streams, lowland ponds and estuaries, so it has the potential to occur in other areas along Honoapiʻilani where stream flow and ponding is present.

No native or indigenous birds were observed exhibiting nesting behavior and no nests were documented during the surveys.

The most common and abundant avian species across all habitat types in the BSA was the warbling white-eye (*Zosterops japonicus*), an introduced species. They were most common in trees in the kiawe opiuma woodland habitats, or in the occasional trees that occur in the grassland habitats. The birds were vocal and observed flying between trees in small groups. The warbling white eye is on the State of Hawaiʻi Injurious Wildlife list and is known to be harmful to agriculture, aquaculture, or indigenous wildlife or plants, or to constitute a nuisance or health hazard (DLNR 2015a).

Northern Cardinals (*Cardinalis cardinalis*) and House Finches (*Haemorhous mexicanus*) were also common across all habitat types and seen at 10 of 17-point count stations. Both were observed in trees or woodland habitat types dominated by trees. The common waxbill (*Estrilda astrild*) was considered common, but were only seen at three of the point-count stations. This species tends to flock in sizable groups, and smaller groups of the

waxbills were only seen infrequently. Common mynah (*Acridotheres tristis*) and Zebra doves (*Geopelia striata*) were also seen frequently across most habitat types, but preferred trees or electrical wires for perching. Gray francolins (*Francolinus pondicerianus*) were regularly heard calling in the grassland habitats.

3.2.2 Mammals

Four feral mammal species. or signs indicating their presence. were observed during the biological survey. Most common were signs of Axis deer (*Axis axis*), which are an invasive ungulate species in Hawai'i. Deer tracks and droppings were abundant in the wetland area at the Ukumehame Firing Range, and deer bones were also found throughout the BSA. Wallows of feral pig, scat and evidence of rooting were seen in the BSA, but no pigs were seen. One mongoose (*Herpestes javanicus*) was observed along the roadway. Several presumably feral cats (*Felis catus*) were observed in the dry grass areas. We did not incidentally observe any Hawaiian hoary bats during this field study.

Section 4.0 Biological Resources Discussion and Recommendations

4.1 Flora

This study did not find any botanical concerns in the BSA. It is unlikely that the proposed Project would result in a substantial adverse effect on any plant species that is state or federally listed as threatened or endangered, a candidate species for listing, a rare native plant species, or a native plant species of concern. The BSA encompasses a highly disturbed area, and all but 7 plant species — ʻilima (*Sida fallax*), iliahialoe (*Santalum ellipticum*), ʻaʻaliʻi (*Dodonaea viscosa*), hoary abutilon (*Abutilon incanum*), akulikuli (*Sesuvium portulacastrum*), milo (*Thespesia populnea*), and naupaka (*Scaevola taccada*) found in the BSA are non-native. Removal of any of these 7 plant species is not expected to have an adverse effect on species' populations locally or regionally as these native species are known to have a widespread distribution on Maui as well as in the State (Wagner et al. 1999).

The USFWS Information for Planning and Consultation (IPaC) database (USFWS 2023a) lists nine plant species that may occur on or near the BSA; these are ʻenaʻena (*Pseudognaphalium sandwicensium* var. *molokaiense*), awiwi (*Schenkia sebaeʻoides*), Carter's Panicgrass (*Panicum fauriei* var. *carteri*), Dwarf Naupaka (*Scaevola coriacea*), Ihi (*Portulaca villosa*), Koʻoloaʻula (*Abutilon menziesii*), Ohai (*Sesbania tomentosa*) and two Round-leaved Chaff-flower (*Achyranthes splendens* var. *rotundata*).

- *Pseudognaphalium sandwicensium* var. *molokaiense* or ʻenaʻena is a perennial herb in the Asteraceae family. Its stems are very densely white woolly pubescent over the entire plant, with stems prostrate to sometimes erect, 4-12 inches long (Wagner et al. 1999). It occurs on the strand and consolidated dunes of western Molokaʻi and west Maui and was historically known from ridges on Molokaʻi at Alanuipuhipaka and from Lānaʻi and Oʻahu, in 15 populations. Currently, the four populations on Molokaʻi total fewer than 300 individuals and one population on west Maui is approximately 20 individuals in Kahakuloa between Puʻukoaʻe and Puʻukāhuliʻanapa, over 12 miles to the northeast of the project area. No critical habitat has been designated for this species. Threats to ʻenaʻena include browsing by deer and goats, competition with invasive weeds, and possibly off-road vehicles (USFWS 2021a).
- *Schenkia sebaeʻoides* or awiwi is an erect, 2-8 inches tall, glabrous, annual herb in the gentian family (Gentianaceae). It is scattered and rare in volcanic or clay soil in dry, rocky, coastal sites from scattered localities on Kauaʻi, Oʻahu, Molokaʻi, Lānaʻi, and west Maui (Wagner et al. 1999). Currently there were over 100 individuals observed over the last five years on Kauaʻi, Oʻahu, Molokaʻi, Lānaʻi, and Maui, but thousands have been estimated. Accurate population numbers are difficult to determine due to rarity of observations, dependency on precipitation, and the plant's annul life cycle (Medeiros et al. 2000). Although final critical habitat has been designated for *Schenkia sebaeʻoides,* it does not

overlap with the project (USFWS 2016). The closest critical habitat for awiwi is over 11 miles to the northeast and consists of 147 acres of State land and 26 acres of privately owned land, from Kahakuloa Head to Waihee Point on the northeastern coast of west Maui (USFWS 2016). Threats to awiwi include browsing and trampling from ungulates, competition from invasive plants, drought, fire, damage from off-road vehicles, trampling by people, reduced viability due to low population numbers, and climate change (USFWS 2019).

- *Panicum fauriei* var. *carteri* or Carter's Panicgrass is a low, tufted annual grass that is a 0.8 to 11.8 inches tall in the Poaceae family (Wagner et al. 1999). It is known from the islands of Oʻahu, Molokaʻi, and Maui. In 2018, there were estimated to be five occurrences of *Panicum fauriei* var. *carteri* on the Kalaupapa Peninsula on Molokaʻi, totaling fewer than 100 individuals. Currently, one population exists at the Kūkaʻiwaʻa Peninsula on Molokaʻi with approximately 150-300 individuals. Mokoliʻi islet on Oʻahu, was surveyed extensively in 2018, and no individual plants remain. On Maui, a newly discovered population on private land was monitored, and contained approximately 75 individuals. In addition, there are currently two populations near Māliko Bay on Maui, one population with 50 individuals and another with approximately 800-900 individuals (USFWS 2023b). Critical habitat was designated in a single unit consisting of the entire islet of Mokoliʻi (Chinaman's Hat) and on the island of Oʻahu, totaling about 13 acres, and does not overlap with the project area (USFWS 1983). The main threats to Carter's Panicgrass are nonnative plants, introduced ungulates, rodents, nonnative insects, fire, or other catastrophic events (e.g., erosion, tsunami, etc.), direct human disturbance, climate change, and inadequate regulatory mechanisms (USFWS 2023b).

- *Scaevola coriacea* or Dwarf Naupaka is a prostrate perennial herb in the Goodeniaceae (goodenia) family, with stems barely woody in older portions, and with succulent, obovate or spatulate leaves (Wagner et al. 1999). It is endemic to Niʻihau, Kauaʻi, Oʻahu, Lānaʻi, Maui, Hawaiʻi, and two offshore islets off Maui and Molokaʻi (USFWS 1997), but is currently only found on Maui and offshore islets off Maui and Molokaʻi. Currently, there are 5 wild populations totaling 85 individuals, and 11 outplanted populations totaling 47 individuals. The 2 largest wild populations are both located on Maui, and account for 72 of the wild individuals (Plant Extinction Prevention Program 2020). In addition, seven wild individuals of *S. coriacea* occur on ʻŌkala Islet and 2 wild individuals on Moku Hoʻoniki Islet, both islets off of Molokaʻi (USFWS 2021b). No critical habitat has been designated for this species. Threats to Dwarf Naupaka include degradation of habitat by ungulates, invasive plants, drought, fire, development and off-road vehicles, herbivory or predation from rodents, insects and slugs, reduced viability due to low population numbers, and climate change (USFWS 2021b).

- *Portulaca villosa* or Ihi is a perennial succulent herb in the Portulacaceae (purslane) family, with a fleshy to woody, tuberous taproot (Wagner et al. 1999). It naturally occurs on dry, rocky, clay, lava, or coralline reef sites, from sea level up to 5,250 feet elevation, on Nihoa, Kaʻula, and has been documented from all the main islands except Niʻihau and Kauaʻi (Wagner et al. 1999). *Portulaca villosa* was known from all of the islands of Maui Nui (Lānaʻi, Molokaʻi, Maui, and Kahoʻolawe), including two offshore islets. There are estimated to be 300 to 500 wild individuals of *Portulaca villosa* on Nihoa

in the Northwestern Hawaiian Islands (NWHI) but only 15 on Molokaʻi and 10 on the island of Hawaiʻi (USFWS 2021c). On both east and west Maui, populations were scattered along the southern side of the island and one individual was last observed at Līhau (west Maui) in 2007 (USFWS 2021c). The only recently confirmed population among the islands of Maui Nui is within Kalaupapa National Historic Park on Molokaʻi (15 individuals) and one translocated population within Haleakala National Park near ʻOheʻo (Maui) (USFWS 2021c). No critical habitat has been designated for this species. Threats to Ihi include destruction and degradation of habitat by ungulates, destruction and degradation of habitat by established ecosystem-altering invasive plants, by fire, landslides and rockfalls, herbivory and predation by feral ungulates, reduced viability and low numbers, hybridization with other *Portulaca* species, and climate change (USFWS 2021c).

- *Abutilon menziesii* or Koʻoloaʻula is a long-lived perennial shrub up to 6(-10) feet tall in the Malvaceae (mallow) family. It is uncommon and local in dry forest, from 650-1706 feet elevation, on Oʻahu, Lānaʻi, East Maui, and Hawaiʻi (USFWS 2023c, Wagner et al. 1999). Currently, there are two wild populations on Oʻahu, three wild populations on Lānaʻi, and three wild populations on Maui. On east Maui, wild individuals may still occur at Puʻuokali and Kalialinui Gulch with the last counts of 200 and 8 individuals (respectively) in 2018, but an historic occurrence on west Maui could not be relocated. Another occurrence was found in a nearby area at Pōhākea and is estimated to total 15 to 30 individuals (USFWS 2023c). No critical habitat has been designated for this species. Threats to Koʻoloaʻula include degradation and destruction of habitat by feral ungulates, by competition and degradation of habitat from established ecosystem altering invasive plant species, drought, agricultural and urban development, climate change, fire, predation and herbivory by ungulates, rodents, and invertebrates, lack of adequate hunting regulations, lack of adequate biosecurity legislation and reduced viability due to low numbers (USFWS 2023c).

- *Sesbania Jtomentosa* or Ohai is a long-lived perennial shrub with decumbent or sprawling branches up to 46 feet long, or sometimes a small erect tree from 8-20 feet tall, in the Fabaceae (pea) family (Wagner et al. 1999). It formerly occurred widely in lower elevation, dry habitats on all the main islands and at least on Necker and Nihoa of the NWHI, but now, because of destruction of lowland habitats, is restricted to remnant populations on sandy beaches, dunes, soil pockets on lava, and along pond margins (only Mana, Kauaʻi), from sea level to 2700 feet elevation (Wagner et al. 1999). In the previous 5-year review for 2015, there were estimated to be 1,600 to 2,000 individuals of *Sesbania tomentosa* in the MHI, with an additional estimate of as many as 5,500 distributed on the NWHI of Nihoa and Mokumanamana. Wild individuals currently occur only on Nihoa, Mokumanamana (Necker), Kauaʻi, Oʻahu, Molokaʻi, Maui, and Hawaiʻi (USFWS 2021d). On west Maui, there were 18 wild individuals reported from Honanana and 65 wild individuals reported from Poʻelua (Papanalahoa Point) in 2019, and on east Maui in 2016, the population at Kanaio consisted of 24 seedlings and two saplings and later the same year there were 11 mature and 25 immature plants (Plant Extinction Prevention Program 2016). There is final critical habitat for this species, but the proposed project area does not overlap the critical habitat. The closest critical habitat for *Sesbania*

tomentosa occurs approximately 0.8 miles upslope of the project area on State land, and 43 acres of privately owned land, from Panaewa to Manawainui on the western and southern slopes of west Maui (USFWS 2016). Threats to Ohai include degradation and destruction of habitat by feral ungulates, by competition and degradation of habitat from established ecosystem altering invasive plant species, agricultural and urban development, drought, fire, overutilization by collection, predation and herbivory by rodents, and invertebrates, human disturbance from hiking and trail maintenance, off-road vehicles, reduced viability due to low numbers, and climate change (USFWS 2021d).

- *Achyranthes splendens* var. *rotundata* or Round-leaved Chaff-flower is a short-lived perennial shrub, 1.6-6.5 feet tall, in the Amaranthaceae (amaranth) family (Wagner et al. 1999). Scattered populations have been documented to occur in low elevation, open, dry forest remnants, and open thickets, on talus or rocky slopes, and on coralline plains, 0-98 (-1640 on Maui) feet elevation, known from the western coast of Oʻahu; Kalaupapa, Molokaʻi; near Manele and Maunalei Gulch, Lānaʻi; West Maui, and Kula, East Maui (Wagner et al. 1999). Currently, *Achyranthes splendens* var. *rotundata* only occurs on Oʻahu, with some reintroduced plants on Molokaʻi (USFWS 2020a). In 2012, 17 critical habitat units in the coastal, lowland dry, and dry cliff ecosystems were designated for *Achyranthes splendens* var. *rotundata* on Oʻahu, which does not overlap with the proposed project area (USFWS 2012). Threats to Round-leaved Chaff-flower include habitat conversion for industrial and agricultural developments, deposition of trash and construction material into exclosures, degradation and destruction by drought, degradation and destruction of habitat, and competition by nonnative invasive plants, climate change degradation or loss of habitat, and mortality of wild and reintroduced individuals due to predation by insects and due to insect farming by ants (USFWS 2020a).

- *Vigna o-wahuensis* (no common name) is a short-lived, slender twining perennial vine in the Fabaceae (pea) family (Wagner et al. 1999). It is found primarily in dry grassland and shrubland, 32-4,500 feet elevation, on the islands of Hawaiʻi, Maui, Kahoʻolawe, and Molokaʻi, with historic occurrences on Lānaʻi, Oʻahu, and Niʻihau (USFWS 2020b, Wagner et al. 1999). Currently, between 180 and to as many as 500 wild individuals of *Vigna o-wahuensis* occur within Pohakuloa Training Area on the island of Hawaiʻi, only 12 individuals on Molokaʻi, approximately 10 individuals on Maui, and possibly one individual remaining on Kahoʻolawe (USFWS 2020b). In 2016, critical habitat was designated for *Vigna o-wahuensis* on the islands of Maui, Molokaʻi, and Kahoʻolawe, none of which overlaps with the proposed project area (USFWS 2016). The nearest critical habitat on Maui consists of 356 acres of State land at Kamanamana on the southern coast of East Maui, which is over 17 miles away from the proposed project area (USFWS 2016). Threats to *Vigna o-wahuensis* include ungulate destruction and degradation of habitat, ungulate herbivory, competition from invasive plants, drought, fire, climate change, slug herbivory, rodent predation and herbivory, and game bird predation (USFWS 2020b).

In conclusion, no threatened, endangered, or rare plants were observed in the BSA. The BSA is highly disturbed with a history of vegetation disturbance and landscape level modification. The BSA has an almost 100 percent cover of non-native and invasive plants and contains other direct threats to the nine endangered plants described above, such as feral ungulates, rodents, non-native snails and slugs, fire, and is regularly subject to

drought. Based on these findings, it is highly unlikely that the Project Area contains the nine endangered plant taxa identified in the IPaC resource list (and none were detected during the surveys for this report) and therefore no mitigation measures are proposed at this time.

4.2 Fauna

The USFWS IPaC database (USFWS 2023a) lists 11 threatened or endangered animal species that are either known or expected to be on or near the BSA; these are—Hawaiian hoary bat; four Hawaiian waterbird taxa—Hawaiian stilt (*Himantopus mexicanus knudseni*), Hawaiian coot (*Fulica alai*), Hawaiian duck (*Anas wyvilliana*), and the threatened Hawaiian goose or nēnē (*Branta sandvicensis*); three Hawaiian seabirds—Hawaiian petrel (*Pterodroma sandwichensis*), Band-rumped-storm-petrel (*Hydrobates castro*), and the threatened Newell's shearwater (*Puffinus newelli)*; one reptile—the green sea turtle or honu (*Chelonia mydas*), and one insect—Blackburn's sphinx moth (BSM) (*Manduca blackburni*). Other than the nēnē and Hawaiian stilt, none of the other nine endangered animals were observed in the BSA during this study This section addresses the likelihood of impact of Project activities on the listed species identified in the IPaC database for this Project.

The IPaC resource list does not identify any rare or native migratory bird species in the Project Area. The Northern cardinal (*Cardinalis cardinalis*) and the House finch (*Carpodacus mexicanus*) seen during this field study are species protected under the Migratory Bird Treaty Act, but they are common on Maui as well as on other MHI (DLNR 2015a). Thus, it is unlikely that the proposed Project would have an adverse impact on the population of these species.

4.2.1 Mammals

4.2.1.1 Hawaiian Hoary Bat

Although the Hawaiian hoary bat was not surveyed for during this reconnaissance-level survey, there are numerous records for this species on Maui (Tomich 1986, DLNR 2015a). Hawaiian hoary bats are known to roost in large (typically greater than 15-foot-tall) dense-canopy trees, sometimes at the edges of water bodies, such as streams and lakes (USFWS 1998). Hawaiian hoary bats may hunt for flying insect prey along roadways, gulches, and open areas and occasionally roost in large, dense-foliage trees such as those within the Project Area. There are numerous large trees in the Project Area that could potentially provide suitable day roosting habitat for Hawaiian hoary bats and the possibility that they are present within or utilize the Project Area cannot be ruled out. H. T. Harvey & Associates recommends Project activities that involve removal of large (> 15 feet) trees should, if possible, be conducted outside of the June 1 to September 15 bat breeding season. It is also recommended that to the greatest extent possible, large trees such as those in the Olowalu area are preserved in place. USFWS recommended general project guidelines to avoid and minimize impacts to Hawaiian hoary bats are included in Appendix B. If the project sponsors (HDOT and FHWA) include implementation of USFWS guidance as part of the environmental commitments of the Project then, these conservation measures coupled with the availability of suitable roosting elsewhere (outside of the Project Area) would minimize and avoid adverse impact to the population of Hawaiian hoary bat whether locally or on Maui.

4.2.1.2 Hawaiian Monk Seal

Hawaiian monk seals (*Neomonachus schauinslandi*) are endemic to the Hawaiian Archipelago. They are protected under the Marine Mammal Protection Act and were first listed under the ESA as endangered in 1976. They are found and breed throughout the NWHI and the MHI although the vast majority are in the NWHI (National Marine Fisheries Service [NMFS] 2007, Carretta et al. 2023). Hawaiian monk seals spend roughly 2/3 of their time in marine waters. They forage in benthic habitats and offshore in waters up to 500 m deep (most typically between 0 and 200 m) in a wide range of habitat types, including sea mounts, banks, marine terraces and reefs (Parrish et al. 2002, Parrish 2004). Hawaiian monk seals are generalists and forage on a wide range of prey, including teleosts, cephalaopods, and crustaceans. Terrestrial habitats are used to haul-out, with preferred haul-out areas that include sandy beaches, sand spits or low shelving rock reefs where they can rest, pup, molt and have social interactions. Haul-out habitats are generally near adequate foraging habitat; however, virtually all substrates could be used (NMFS 2007).

Critical habitat for the Hawaiian monk seal was first designated in 1986 and was most recently updated in 2015 (NMFS 2015). In the MHIs designated critical habitat exists in marine habitats between the 200-m depth contour line through the water's edge and 5 m onto terrestrial environments from the shoreline (p. 50926 *in* NMFS 2015). The essential features of critical habitat include areas for haul-out, nursery grounds for pupping and nursing, and marine foraging areas. The waters and beach fronting (but outside of) this Honoapiʻilani project area and the BSA are part of the Hawaiian monk seal marine and terrestrial critical habitat (NMFS 2015). No surveys were specifically conducted for Hawaiian monk seals and no inadvertent sightings of the Hawaiian monk seal were made during this study. However, Hawaiian monk seals have been sighted by others in Maui including in waters and on beach areas fronting the Honoapiʻilani project area (Hawaiʻi News Now 2017, Hawaiian Paddle Sports 2023, Marine Animal Identification Network 2023). Sedimentation caused by inland development, in general is identified as a concern impacting Hawaiian monk seal marine and terrestrial habitats (National Marine Sanctuary Foundation 2018). In recent years, diseases such as toxoplasmosis and leptospirosis particularly carried from inland water runoff has been noted as a cause of death in Hawaiian monk seals in the MHI (National Marine Sanctuary Foundation 2018). No in-water stream work is proposed for this project, and if the project implements conservation measures recommended by NOAA NMFS (NOAA 2023, FHWA 2023) then the project can avoid and minimize impacts to the Hawaiian monk seal.

4.2.2 Birds

Two endangered waterbirds, Hawaiian stilt and nēnē were seen multiple times within the Project Area during the reconnaissance-level surveys for this Project. Nēnē have been observed with goslings at the Ukumehame Firing Ranch (Appendix B).

4.2.2.1 Hawaiian Stilt (aeʻo)

The aeʻo was listed under the ESA as an endangered species on October 13, 1970 (USFWS 1970). A five-year status review was completed in 2010 (USFWS 2010). Critical habitat has not been designated for the stilt. Hawaiian stilts are currently found on all the main islands except Kahoʻolawe.

The stilt nesting season normally extends from mid-February through August, with peak nesting varying among years (Robinson et al. 1999). Stilts usually lay three to four eggs that are incubated for 23 to 26 days. Stilts are opportunistic feeders that use a variety of aquatic habitats but are limited by water depth and vegetation cover (USFWS 2011). Hawaiian stilts are known to use ephemeral lakes, anchialine ponds, prawn farm ponds, marshlands, and tidal flats. This species prefers to nest on freshly exposed mudflats interspersed with low growing vegetation (USFWS 2011). Nesting also occurs on islands in freshwater or brackish ponds.

Threats are similar for most Hawaiian waterbird species. The primary causes of the decline of the Hawaiian waterbirds were initially over-hunting in the late 1800s and early 1900s and has been exacerbated by loss of wetland habitat, predation by introduced animals, disease, and environmental contaminants (USFWS 2011). Significant amounts of Hawaiian wetlands have been lost due to human activities, including filling and draining for agriculture, houses, hotels, and golf courses (USFWS 2011). Many of the remaining wetlands are degraded by altered hydrology, invasive species, human encroachment, and contaminants (USFWS 2011). Hydrologic alterations of wetlands, including flood control and channelization, often make wetland habitat less suitable by altering water depth and timing of water level fluctuations (USFWS 2011). The depletion of freshwater aquifers can cause salt-water intrusion into coastal ground water, altering the salinity of affected wetlands, and reducing habitat suitability (USFWS 2011).

Introduced alien predators are a primary factor limiting Hawaiian waterbird populations. Indian mongoose (*Herpestes auropunctatus*), cats (*Felis catus*), dogs (*Canis lupus familiaris*), rats (*Rattus sp.*), cattle egret (*Bubulcus ibis*), Black-crowned night heron (*Nycticorax nycticorax*), non-native fish, and bull frog (*Rana catesbeiana*) are all presently found within wetlands and pose a serious threat to Hawaiian waterbird reproductive success by taking eggs, young birds, and even adults (USFWS 2011).

There is suitable habitat for Hawaiian stilts in the vicinity of the Project Area, as evidenced by the incidental observation of this species during the field surveys. Hawaiian stilts were observed to be either feeding or loafing and no nests were found. Although, given the availability of potentially suitable habitats, nesting within the Project Area cannot be ruled out, USFWS recommends general project guidelines to avoid and minimize impacts to Hawaiian waterbirds, including Hawaiian stilts, and these are included in Appendix B. H. T. Harvey & Associates recommends that these guidelines be adopted during the planning, design, and implementation of this Project to avoid and minimize impacts to Hawaiian stilts. We also recommend that, to the greatest extent possible, the Project should preserve suitable habitat such as wetlands, streams, and open water features in their natural condition to further avoid and minimize impacts to Hawaiian stilts. HDOTs commitment to adhere to USFWS guidance concerning conservation measures (Appendix C) aimed at safeguarding the Hawaiian stilt population and their habitat, combined with the fact that suitable habitat also occurs elsewhere on Maui (e.g. Kealia Pond National Wildlife Refuge), would indicate that Project activities are not likely to adversely affect the Hawaiian stilt population locally or on Maui.

4.2.2.2 Nēnē

The Hawaiian goose, or nēnē (*Branta sandvicensis*), is a federally and state listed Threatened Species, native to Hawaiʻi. A recent statewide population estimate was 2,855 individuals with 1,095 on the island of Hawaiʻi, 616 on Maui, 35 on Molokaʻi, 1,107 on Kauaʻi, and 2 individuals on Oʻahu (USFWS 2018). Nēnē were once widely distributed among the MHI (Hawaiʻi, Maui, Lānaʻi, Molokaʻi, Kauaʻi, and Kahoʻolawe).

Nēnē are non-migratory with daily flights typically in early morning and late afternoon. Their flight is typically slow, and at an altitude of less than 100 m (Banko et al. 1999). They have an extended breeding season with eggs being laid from August to April (Banko et al. 1999). Nesting typically peaks in December, with the majority of the goslings hatching in December and January (USFWS 2004, 2018) and most nēnē in the wild primarily nest between October and March (USFWS 2004). Nēnē nest on the ground in a shallow scrape in the shade of dense shrubs or other vegetation. A nēnē clutch typically contains three to five eggs, and incubation ranges from 29 to 32 days. Once hatched, the young may remain in the nest for 1 to 2 days; all hatchlings depart the nest after the last egg is hatched (USFWS 2004, 2018). Goslings are flightless for 10 to 12 weeks and adults are flightless for a period of 4 to 6 weeks during their molt, which occurs about the same time. During this period when adults and goslings remain flightless, between February to May, both are extremely vulnerable to predators such as cats, dogs, and mongoose. During June to September, after molting and fledging, family groups frequently congregate in post-breeding flocks, often far from nesting areas (USFWS 2004, 2018). Nēnē reach sexual maturity at 1 year of age, but usually do not form pair bonds until the second year. Females are highly philopatric (loyal to their place of birth) and nest near their natal area, while males more often disperse (USFWS 2018).

Nēnē appear to exhibit seasonal movements in response to foraging opportunities, shifting to grasslands during periods of low native browse and berry production and when wet conditions produce grass with high-water content and resultant higher protein content. Nēnē grazing appears to be opportunistic (Banko et al. 1999). It is speculated that the nēnē adaptability to changes in the availability of grazing food allows them to survive in marginal habitats (Banko et al. 1999). Historical reports from the island of Hawaiʻi indicate that nēnē bred and molted primarily in the lowlands during winter months and moved upslope in the hotter and drier summer months (USFWS 2004, 2018). Reproductive success is relatively low in upland habitats on the islands of Hawaiʻi and Maui, higher in mid-elevations, and is very successful in lowland habitats on Kauaʻi. The Kauaʻi Island population is presently the largest in the State (USFWS 2018).

Although the endangered Hawaiian coot (*Fulica alai*), Hawaiian duck (*Anas wyvilliana*), and Hawaiian common gallinule (*Gallinula galeata sandvicensis*) were not seen during this biological survey, it should be noted that the Hawaiian coot does occur on Maui. The Hawaiian duck is considered rare, and very difficult to distinguish from mallard hybrid taxa which have genetically "swamped out" Hawaiian ducks on most islands other than Kauaʻi. Birds reported as Hawaiian ducks on Maui are likely Mallard-Hawaiian duck hybrids, and currently pure Hawaiian ducks are considered restricted to Kauaʻi and (via reintroductions) the island of Hawaiʻi. Hawaiian ducks were re-established on the islands of Oʻahu and Maui through captive propagation and release programs,

but populations now almost entirely comprise hybrids with introduced Mallard. The Hawaiian common gallinule (*Gallinula galeata sandvicensis*) generally occurs in wetland habitats below 125 meters (410 feet) elevation on the islands of Kauaʻi and Oʻahu, and although there have been reports from Keʻanae Peninsula on Maui and from the island of Hawaiʻi, as far as we know, there is no documentation to support the identification of the reported gallinules on Maui (two reports in June 2013). On Kauaʻi, the largest populations of Hawaiian common gallinules occur in the Hanalei and Wailua river valleys, but they also occur in irrigation canals on the Mana Plains of western Kauaʻi and in taro fields. On Oʻahu, the species is widely distributed with most birds found between Haleʻiwa and Waimanalo; small numbers occur at Pearl Harbor and the leeward coast at Lualualei Valley. Historically, the Hawaiian common gallinule formerly occurred on all the MHI except for Lānaʻi and Kahoʻolawe. The apparent absence of this species, or extreme rarity, on Maui makes it very unlikely to occur in the project area.

General measures provided by USFWS to avoid and minimize impacts to endangered Hawaiian waterbirds are included in Appendix C.

4.2.2.3 Seabirds

No specific night-time surveys were conducted to for seabirds in the Project Area. The endangered Hawaiian petrel (*Pterodroma sandwichensis*) and the threatened Newell's Shearwater (*Puffinus newelli)* are known to have a limited breeding distribution on Maui (DLNR 2015a, Spencer et al. in press). The band-rumped-storm-petrel (*Hydrobates castro*) may, at times, be detected in the vicinity of Maui, typically offshore, but thus far are not known to nest on the island. All three of these seabirds are inland nesting species that favor deep valleys, ridges, and mountainous areas. Movement of these seabirds over land, both inland and seaward, usually occurs nocturnally. These species may traverse over the Project Area at night during the breeding, nesting, and fledging seasons (March 1 to December 15). Both the Hawaiian petrel and the Newell's shearwater are known to be affected by sources of artificial light, which can distract the birds and cause them to become grounded. This phenomenon is referred to as "fallout" and it particularly affects fledglings that are leaving the nest for the first time on their way to sea.

A fourth seabird species, the Endangered Short-tailed albatross (*Phoebastria albatrus*), largest of the three North Pacific albatrosses, is a highly pelagic species and rare visitor to Hawaiian waters that is considered unlikely to be encountered anywhere in the vicinity of the Project Area. The Short-tailed albatross is considered endangered throughout its range and no critical habitat has been designated for the species. In the North Pacific, Short-tailed albatross is known to have nested on islands in Japan and Taiwan. Midway Atoll, near the western end of the NWHI, the only area within U.S. jurisdiction where short-tailed albatross has attempted to breed (averaging one pair per year) is a National Wildlife Refuge managed by the USFWS for the conservation of seabirds and other fish and wildlife and their habitats (USFWS 2008). Lack of suitable habitat, the pelagic foraging behavior and the absence of any data to suggest their occurrence in the vicinity of Maui. The only records of Short-tailed Albatrosses from the Southeastern Hawaiian Islands (as of 2017) involved birds on Kauaʻi, among Laysan Albatrosses, at Pacific Missile Range Facility on March 28, 2000 and flying over Kilauea

Point National Wildlife Refuge on March 4, 2006 (Pyle and Pyle 2017). No Short-tailed Albatrosses had been reported from Hawaiian waters as of 2017, and there are no records for the main islands or surrounding waters listed in eBird as of October 2023 (eBird 2023). This status indicates that the Short-tailed albatross is extremely unlikely to be adversely affected by the Project.

If the proposed Project activities will involve night time work then lighting should be configured to be "dark sky friendly", in compliance with Hawai'i Revised Statute § 201-8.5, and may require only the use of full cut off or appropriately shielded lights and reducing or turning off non-essential outdoor lighting during the seabird fledgling season from September 15 to December 15. General measures provided by USFWS to avoid and minimize impacts to endangered seabirds are included in Appendix B.

4.2.3 Reptiles

4.2.3.1 Hawaiian Green Sea Turtle or Honu

The Hawaiian green sea turtle or honu is identified as the Central North Pacific Distinct Population Segment (DPS) and is listed as threatened. The IPaC database (USFWS 2023a) identifies honu as either known or expected to be in or near the Project Area. The range of this Central North Pacific DPS includes the entire Hawaiian archipelago where they complete their lifecycle feeding in the MHI and nesting mainly in the NWHI.

All proposed alignments of the Project are inland from the existing highway and do not overlap beach or coastal habitats used by honu. Furthermore, map guides published by NOAA Pacific Island Fisheries Science Center do not identify the shoreline adjacent to the Project Area as preferred basking or nesting areas for honu (Parker and Balazs 2015). Therefore, it is unlikely that the Project activities would impact honu. USFWS recommended general project guidelines to avoid and minimize impacts to Hawaiian green sea turtles are included in Appendix B. Implementation of these conservation measures should be considered if Project activities (e.g. staging during construction) are likely to occur along the beach; either along or south of the existing highway.

4.2.3.2 Hawksbill Sea Turtle or Honu'ea

The hawksbill sea turtle was classified as endangered in 1970 (USFWS 1970). Critical habitat has been designated for the species but includes only nesting islands in Puerto Rico (NMFS and USFWS 1998). Hawksbill turtles are one of the rarest of the seven extant species of marine turtles and their scarcity has been recognized by the government of the U.S. and other nations, as well as by international resource management institutions. After being listed as endangered, the official U.S. Recovery Plans were subsequently developed for the species in both the Pacific and Atlantic Oceans (NMFS and USFWS 1998). When the U.S. Recovery Plan for Pacific hawksbill populations was developed in 1998, limited information existed on hawksbills in Hawai'i and thus the species received limited recognition (NMFS and USFWS 1998).

Small numbers of hawksbill sea turtles (probably no more than 20 nesting females annually) nest in Hawai'i, primarily along the southeastern coast of the island of Hawai'i, with small numbers reported on Maui, Moloka'i, and O'ahu (Seitz et al. 2012). Population trends are not well understood, but the results of tagging of adult

females suggest that recruitment of new nesters continues (Seitz et al. 2012). Hawksbill sea turtles also are present in the NWHI in small numbers, although nesting has not been confirmed (Van Houtan et al. 2012). The nesting season extends from April through February, with peak egg laying occurring from late July through mid-September (Seitz et al. 2012). Nesting females in Hawaiʻi lay up to six clutches of eggs per year (mean of 3.3 clutches), with a mean clutch size of 175 eggs (Seitz et al. 2012).

Even though no Hawksbill sea turtles were observed in the BSA during the reconnaissance level surveys performed in January, March, and July 2023, it is possible the species at times may visit the nearshore reefs along the coast adjacent to the Project Area. However, map guides published by NOAA-PIFSC do not identify the beaches between Ukumehame and Olowalu as important basking or nesting sites for Hawksbill sea turtles (Parker and Balazs 2015). In the event that Hawksbill sea turtles are seen anywhere in the vicinity of the Project Area, H. T. Harvey & Associates recommends that HDOT consult with USFWS for further guidance. USFWS recommended general project guidelines to avoid and minimize impacts to sea turtles are included in Appendix B.

4.2.4 Fish

The Atlas of Hawaiian Watersheds & Their Aquatic Resource (Parham et al. 2008) indicates the following species in association with Ukumehame and Olowalu Stream, respectively.

Ukumehame Stream		Olowalu Stream	
Common name	Scientific name	Common name	Scientific name
ʻOʻopu nākea	*Awaous guamensis*	ʻOʻopu nakea	*Awaous guamensis*
ʻOʻopu akupa	*Eleotris sandwicensis*	Hawaiian ʻoʻopu	*Lentipes concolor*
Hawaiian ʻoʻopu	*Lentipes concolor*	ʻOʻopu nopili	*Sicyopterus stimpsoni*
Āholehole	*Kuhlia* spp.		
ʻOʻopu nopili	*Sicyopterus stimpsoni*		

Hawaiian gobies are amphidromous in many Hawaiian streams, their larval life stages occur in marine habitats and adults occupy either freshwater or brackish habitats. The freshwater and brackish habitats they occupy are species specific, some species cannot climb waterfalls (*Eleotris sandwicensis* and *Stenogobius hawaiiensis*), and some can (*Awaous guamensis* and *Lentipes concolor*, *Sicyopterus stimpsoni*) affecting where in a stream system they occur. The Aholehole is a coastal shallow water species that can also occur in tide pools and estuaries. Threats affecting all Hawaiian gobies include habitat degradation resulting from water diversion, stream channelization, dams, pollution, and the introduction of exotic species and parasites (DLNR 2015b).

Within the scope of this biological survey, no directed effort to characterize the fish community composition was conducted because no in-water work is planned in the Project Area. Although the biologists were watchful for the presence of fish in streams, none were documented.

4.2.5 Crustaceans

Mountain shrimp, or Opaekalaole (*Atyoida bisulcate*) is a spineless shrimp that grows to about two inches in length. The species is known to occur on Maui. The species feeds by filtering small food items from the water column in fast stream flow habitats and scavenging material from the bottom in slower flow environments. Reproduction is year-round with females carrying up to 3000 eggs on their swimmeret legs. The incubation period is about two months. After hatching, larvae are washed downstream into the ocean where they spend a few months developing to a size of about five millimeters (one-fifth of an inch) long before they return to stream habitats to mature. Peak recruitment coincides with the rainy season. They are excellent climbers, climbing artificial structures and waterfalls of moderate size. Numbers are typically high in good quality streams, although due to stream quality degradation over the years due to alterations and changes in flow regimes, the abundance of *Atyoida bisulcate* appears to have correspondingly declined (DLNR 2015b). The species has been documented in both Ukumehame Stream and Olowalu Stream (Hawai'i Division of Aquatic Resources 2008).

Key threats to *Atyoida bisulcate* include habitat degradation and pollution from development and agriculture, stream channelization, and diversions which reduce stream flow and in-stream obstructions can prevent their movement upstream. Within the scope of this Project Area, no directed effort to survey for *Atyoida bisulcate* was conducted, and none were documented incidentally during the present study.

4.2.6 Insects

The order Hymenoptera is large and diverse. It is best known because of the social behavior of ants, bees, and wasps. Hawaii's native Hymenoptera fauna, however, comprises non-social bees and wasps. Several species of the genera *Hylaeus* (Colletidae) are common and relatively abundant. The native *Hylaeus,* or yellow-faced bees, are important pollinators for many native plants. The 63 species in the bee genus *Hylaeus* occur on all the MHI and Nihoa. They nest in hollow stems, holes in trees, under bark, in crevices, or in burrows in soil. Potential threats include non-native bees (*Ceratina* spp.) found in the native coastal habitats used by *Hylaeus* species, and competition with the European honeybee (*Apis mellifera*) for nectar and pollen. Confirmed threats include introduced ants (Formicidae) which compete with *Hylaeus* for nesting sites, and the big-headed ant (*Pheidole megacephala*) and Argentine ant (*Linepithema humile*) which prey on the native bees. Since *Hylaeus* bees pollinate native plants, their loss would be detrimental to recovery of native plants (DLNR 2015b). Within the scope of this Project Area, no directed effort to survey for *Hylaeus* was conducted, although the biologists were watchful for any indications of their presence. None were documented during the present study.

The Orangeblack Hawaiian damselfly (*Megalagrion xanthomelas*), a relatively small slender damselfly, has been documented outside of, but not far from the Project Area. Males are red on the head, thorax, and tip of the abdomen, and black across most of the abdomen; females are patterned similarly but with pale brown instead of red. Adults are found in the vicinity of standing pools or slow-moving stream sections that serve as breeding sites, usually not straying far from the breeding habitat. It occurs primarily in lowland areas, and is one of the most adaptable native damselflies, capable of breeding in brackish anchialine ponds, basal spring wetlands, pools in slow-moving streams, and artificial water bodies. Threats include habitat loss or degradation caused by

development, stream diversion and alteration, and alien aquatic plants in addition to depredation by non-native predators, including invasive fish, frogs, ants, birds, and reptiles. Within the scope of this Project Area, no directed effort to survey for *Megalagrion xanthomelas* was conducted, although the biologists were watchful for any indications of their presence. None were documented during the present study.

Eggs and larvae of the BSM have been observed on host plants between August and May with substantial variation in the larval length throughout this "season" (USFWS 2005, Rubinoff and San Jose 2010). The primary constituent elements required by BSM larvae for foraging, shelter, and maturation are the two documented host plant species in the genus Nothocestrum (*N. latifolium* and *N. brevifolium*) (USFWS 2005). Neither of these primary constituent elements required by BSM larvae was found in the Project Area. BSM larvae are also known to feed on tree tobacco plants and have been documented on commercial tobacco, eggplant, tomato, and the indigenous popolo. Although a few tree tobacco plants and one plant of the indigenous popolo were found in the Project Area, no BSM eggs or larvae and no signs of feeding damage indicative of the presence of the BSM moth were found. Although it is unlikely that Project activities will have an adverse impact on BSM adults or larvae, ongoing threats include habitat loss and degradation due to ranching, introduced plants and animals, human development, and wildfire. Given that the species inhabits dry habitats, natural variation in rainfall can result in reduced food availability and negatively affect BSM populations.

Tree tobacco is a weedy species that readily recruits in disturbed environments and is widespread on Maui and therefore it is not out of the realm of possibility for more plants to recruit in the Project Area and serve as host to BSM. The USFWS recommended general measures to avoid and minimize impacts to BSM and are included in Appendix B. H. T. Harvey & Associates recommends these conservation measures be adopted into the planning, design, and construction phases of the Project to avoid any potential impacts to BSM.

4.3 Invasive Species

A potential impact of implementing the Project is the introduction and spread of invasive species during the construction phase. There are several invasive species that occur on Maui but are restricted in distribution and are targeted for containment or eradication (e.g. fountain grass [*Cenchrus setaceus*], little fire ants [*Wasmannia auropunctata*], and coqui frogs [*Eleutherodactylus coqui*]) as well as invasive species that are not yet present on Maui (e.g. Coconut rhinoceros beetle [*Oryctes rhinoceros*] on Oʻahu) but that could be introduced or inadvertently spread to or from the Project Area. H. T. Harvey & Associates recommends that the Project plan and design incorporate specifications that will result in the adoption of BMPs to minimize the introduction and spread of invasive species in the Project Area. These BMPs may include the following:

- All construction equipment and vehicles should arrive at the work site for the first time in clean condition and free of: any soil; plants or plant parts, including seeds; insects, including eggs; and reptiles and amphibians, including their eggs. Similarly, all construction equipment and vehicles should be cleaned after use in the Project Area and before leaving the site. This would be particularly important for equipment movement between the Project Area and the other islands.

- All materials imported to the Project Area, including gravel, soil, rock, and sand, should be certified weed free. Invasive species found on stockpiled materials should be removed either chemically or mechanically.
- Only weed-free seed mixtures should be used for hydroseeding and hydromulching on the Project Area. A qualified botanist should inspect the seeded areas a minimum of 60 days after the hydroseed/hydromulch is applied. Any species of plant other than those intended to be in the hydroseed/hydromulch should be removed. In particular, plant species that are not known to occur on Maui and those that are actively being controlled on the island should be removed.
- To the extent feasible the Project should use native plants for revegetation or landscaping purposes. Potential native plants that are ecologically suitable for landscaping at the Project Area include species such as naupaka kahakai (*Scaevola taccada*), akia (*Wikstroemia uva-ursi*), pohinahina (*Vitex rotundifolia*), koaiʻa (*Acacia koaia*), hala (*Pandanus tectorius*), kou (*Cordia subcordata*), papala (*Charpentiera obovata*), ʻaʻaliʻi (*Dodonea viscosa*), ulei (*Osteomeles anthyllidifolia*), and alahee (*Psydrax odorata*). If native plants do not meet landscaping objectives, plants with a low risk of becoming invasive may be substituted. Additional information on selecting appropriate plants for landscaping can be obtained from the Plant Pono website (http://www.plantpono.org/) and following County of Maui Planting Guidelines (https://www.mauicounty.gov/242/Maui-Planting-Guidelines).
- Only plants grown on Maui should be used for landscaping purposes. If locally grown plants are unavailable, then imported plants may be used, but they should be thoroughly inspected or quarantined if necessary to ensure that they are free from invasive pests such as little fire ants and invasive plant seeds and seedlings that could arrive inadvertently.

The Coordination Group on Alien Pest Species (CGAPS) in Hawaiʻi has outlined BMPs for projects in the state. H. T. Harvey & Associates recommends that HDOT follow BMPs recommended provided by CGAPS which are included in Appendix D.

Section 5.0 References

Banko, P. C., J. M. Black, and W. E. Banko. 1999. Hawaiian goose (Nēnē), No. 434 *In* A. Poole and F. Gill, editors, The Birds of North America. Philadelphia, Pennsylvania.

Carretta, J. V., E. M. Oleson, K. A. Forney, D. W. Weller, A. R. Lang, J. Baker, A. J. Orr et al. 2023. U.S. Pacific Marine Mammal Stock Assessments: 2022. NOAA Technical Memorandum NMFS. July. NOAA-TM-NMFS-SWFSC-684. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Fisheries Science Center.

[DLNR] Hawai‘i Department of Land and Natural Resources. 2015a. Hawai‘i Wildlife Action Plan. <https://dlnr.hawaii.gov/wildlife/files/2016/12/HI-SWAP-2015.pdf>. Accessed May 31, 2023.

[DLNR] Hawai‘i Department of Land and Natural Resources. 2015b. Hawai‘i Administrative Rules, Chapter 124, Indigenous Wildlife, Endangered and Threatened Wildlife, Injurious Wildlife, Introduced Wild Birds, and Introduced Wildlife. <http://dlnr.hawaii.gov/dofaw/files/2013/09/Chap124a.pdf>. Accessed May 31, 2023.

FHWA [Federal Highways]. 2023. Letter to Gerry Davis, Assistant Regional Administrator, National Oceanic and Atmospheric Administration Inouye Regional Center dated October 6, 2023 addressing conservation recommendations for Essential Fish Habitat. Reference: HAD-HI.

Parham, J. E., G. R. Higashi, E. K. Lapp, D. G. K. Kuamoo, R. T. Nishimoto, S. Hau, J. M. Fitzsimons, D. A. Polhemus, and W. S. Devick. 2008. Atlas of Hawaiian Watersheds and Their Aquatic Resources. A Joint Project between the Hawaii Division of Aquatic Resources and Bishop Museum. <http://hawaii watershedatlas.com/watersheds/oahu/36006.pdf>.

Ebird (2023). An online database of bird distribution and abundance [web application]. eBird, Ithaca, New York. <http://www.ebird.org> Accessed August 18, 2023.

Gagne, W. C., and L. W. Cuddihy. 1999. Vegetation. Pages 45–114 *In* W. L. Wagner, D. R. Herbst, and S. H. Sohmer, Manual of the Flowering Plants of Hawai‘i. Revised edition. Bishop Museum Special Publication, University of Hawai‘i Press, Honolulu.

Giambelluca, T. W., Q. Chen, A. G. Frazier, J. P. Price, Y.-L. Chen, P.-S. Chu, J. K. Eischeid, and D. M. Delparte. 2013. Online rainfall atlas of Hawai‘i. Bulletin of the American Meteorological Society 94:313–316.

Hawaiʻi News Now. 2017. Hawaiian monk seal causes traffic backlog in Olowalu. June 22. <https://www.hawaiinewsnow.com/story/35727234/source-of-traffic-sealed-in-maui/>. Accessed October 2023.

Hawaiian Paddle Sports. 2023. Hawaiian monk seals in Maui. <https://hawaiianpaddlesports.com/maui/hawaiian-monk-seals-maui/>. Accessed October.

Imada, C. T. 2019. Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). Bishop Museum Technical Report 69. <http://hbs.bishopmuseum.org/publications/pdf/tr69.pdf>. Accessed August 25, 2023.

Larse, M. Land Manager. Olowalu Greenway. July 13, 2023—conversation with Shahin Ansari of H. T. Harvey & Associates regarding presence of nene in the Olowalu area.

Marine Animal Identification Network. 2023. Sighting list for Hawaiian monk seal (*Monachus schauinslandi*). <https://whoicf.whoi.edu/science/B/main-prod/sightings.cfm?flag=species&sid=42>. Accessed October.

Medeiros, A. C., C. G. Chimera, L. L. Loope, S. M. Joe, and P. D. Krushelnycky. 2000. Notes on status and ecology of the endangered Hawaiian annual awiwi, *Centaurium sebaeʻoides* (Gentianaceae). Pacific Science 54(4):417–422.

National Marine Sanctuary Foundation. 2018. Hawaiian monk seal – An endangered marine species. March 16. <https://marinesanctuary.org/blog/endangered-hawaiian-monk-seal/?gad_source=1&gclid=CjwKCAjwv-2pBhB-EiwAtsQZFClDKswbaMERKVM02w6FkE93eqKbmAblKD5BK4_YMyVhWU4PfayGVRoC3gMQAvD_BwE>. Accessed October 25, 2023.

[NMFS] National Marine Fisheries Service and [USFWS] U.S. Fish and Wildlife Service. 1998. Recovery Plan for U.S. Pacific Populations of the Hawksbill Turtle (*Eretmochelys imbricata*). Silver Spring, Maryland.

[NMFS] National Marine Fisheries Service. 2007. Recovery Plan for the Hawaiian Monk Seal (*Monachus schauinslandi*). August 2022. Second revision. Silver Spring, Maryland.

[NMFS] National Marine Fisheries Service. 2015. Threatened and Endangered Species: Final Rulemaking To Revise Critical Habitat for Hawaiian Monk Seals. Federal Register 80(162):50926–50988.

[NOAA] National Oceanic and Atmospheric Administration. 2023. Letter from Gerry Davis, Assistant Regional Administrator, Habitat Conservation Plan to Federal Highways dated July 26, 2023 in response to Essential Fish Habitat consultation.

Parrish, F. A. 2004. Foraging Landscape of the Hawaiian Monk Seal. Dissertation. University of Hawaiʻi, Honolulu.

Parrish, F. A., K. Abernathy, G. J. Marshall, and B. M. Buhleier. 2002. Hawaiian monk seals (*Monachus schauinslandi*) foraging in deep-water coral beds. Marine Mammal Science 18(1):244–258.

Parker, D., and G. Balazs. 2015. Map Guide to Marine Turtle Nesting and Basking in the Hawaiian Islands. Data mapping product by NOAA-PIFSC Marine Turtle Research Program. <https://georgehbalazs.com/wp-content/uploads/2018/11/HawaiianIs_2015-PIFSCDataMappingProduct.pdf>. Accessed August 18, 2023.

Plant Extinction Prevention Program. 2016. Plant Extinction Prevention Program FY 2016 Annual Report (Oct 1, 2015-Sep 30, 2016). USFWS CFDA Program #15.657. Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F14AC00174. December 24. University of Hawai'i, Manoa.

Plant Extinction Prevention Program. 2020. Report on Field Monitoring of Listed Species, as Designated under the U.S. Endangered Species Act. Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawai'i.

Pyle, R. L., and P. Pyle 2017. Short-tailed albatross. <http://hbs.bishopmuseum.org/birds/rlp-monograph/pdfs/02-galliformes-procellariiformes/stal.pdf>. Accessed October 2023.

R. M. Towill Corporation. 2005. Pali to Puamana Parkway Master Plan. Island of Maui, Hawai'i. Prepared for Planning Department County of Maui. <https://www.mauicounty.gov/DocumentCenter/View/83453/Pali-to-Puamana-Parkway-Master-Plan-Feb-2005?bidId=>.

Robinson, J. A., J. M. Reed, J. P. Skorupa, and L. W. Oring. 1999. Black-necked stilt (*Himantopus mexicanus*), No. 449 *In* A. Poole and F. Gill, editors, The Birds of North America Philadelphia, Pennsylvania.

Rubinoff, D. and M. San Jose 2010. Life History and host Rane of Hawaii's Endangered Blackburn Sphinx Moth (*Maduca blackburni* Butler). Proceedings of Hawaiian Entomological Society 42:53-59.

Tomich, P. Q. 1986. Mammals in Hawai'i. Second edition. Bishop Museum Special Publication 76. Bishop Museum Press, Honolulu, Hawai'i.

Seitz, W. A., K. M. Kagimoto, B. Luehrs, and L. Katahira. 2012. Twenty Years of Conservation and Research Findings of the Hawai'i Island Hawksbill Turtle Recovery Project, 1989–2009. January. Technical Report 178. The Hawaii-Pacific Islands Cooperative Ecosystem Studies Unit & Pacific Cooperative Studies Unit, University of Hawaii, Honolulu.

Spencer, G., Craig, M., Yuen, B. & Ainley, D. 2023. Establishment of an incipient Newell's Shearwater *Puffinus newelli* colony on Maui. *Marine Ornithology,* in press.

[USFWS] U.S. Fish and Wildlife Service. 1970. United States List of Endangered Native Fish and Wildlife. Federal Register. 35 FR 16047-16048.

[USFWS] U.S. Fish and Wildlife Service. 1983. Endangered and threatened wildlife and plants; rule to list *Panicum carteri* (Carter's panicgrass) as an endangered species and determine its critical habitat. Federal Register 46(20):9976–9979.

[USFWS] U.S. Fish and Wildlife Service. 1997. Recovery Plan for the Maui Plant Cluster. U.S. Fish and Wildlife Service, Portland, Oregon.

[USFWS] U.S. Fish and Wildlife Service. 1998. Recovery Plan for the Hawaiian Hoary Bat (*Lasiurus cinereus semotus*). U.S. Fish and Wildlife Service, Portland, Oregon. <http://ecos.fws.gov/docs/recovery_plan/980511.pdf>. Accessed June 20, 2023.

[USFWS] U.S. Fish and Wildlife Service. 2004. Draft Revised Recovery Plan for the Nēnē or Hawaiian Goose (*Branta sandvicensis*). U.S. Fish and Wildlife Service, Portland, Oregon.

[USFWS] U.S. Fish and Wildlife Service. 2005. Recovery plan for the Blackburn's Sphinx Moth (*Manduca blackburni*). Portland, Oregon.

[USFWS] U.S. Fish and Wildlife Service. 2008. Short-Tailed Albatross Recovery Plan. Anchorage, AK, 105 pp.

[USFWS] U.S. Fish and Wildlife Service. 2010. U.S. Fish and Wildlife Service. Aeʻo 5 Year Review Summary and Evaluation. Pacific Islands Fish and Wildlife Office. Honolulu, Hawaiʻi.

[USFWS] U.S. Fish and Wildlife Service. 2011. Recovery Plan for Hawaiian Waterbirds. Second revision. U.S. Fish and Wildlife Service, Portland, Oregon.

[USFWS] U.S. Fish and Wildlife Service. 2012. Endangered and threatened wildlife and plants; Endangered status for 23 species on Oʻahu and designation of critical habitat for 124 species. Federal Register 77(181):57648–57862.

[USFWS] U.S. Fish and Wildlife Service. 2016. Endangered and threatened wildlife and plants; Designation and nondesignation of critical habitat on Molokaʻi, Lānaʻi, Maui, and Kahoʻolawe for 135 species. Federal Register 81(61):17790–18110.

[USFWS] U.S. Fish and Wildlife Service. 2018. Endangered and threatened wildlife and plants; Reclassifying the Hawaiian goose from endangered to threatened with a 4(d) rule. Federal Register 83(63):13919–13942.

[USFWS] U.S. Fish and Wildlife Service. 2019. *Schenkia sebaeʻoides* (awiwi) 5-Year Review Short Form Summary. U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawaiʻi. <https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/3543.pdf>. Accessed September 15, 2023.

[USFWS] U.S. Fish and Wildlife Service. 2020a. *Achyranthes splendens* var. *rotundata* (Round-Leaved Chaff Flower; Ewa hinahina). 5-Year Review Short Form Summary. U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawaiʻi. <https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/3149.pdf>. Accessed September 17, 2023.

[USFWS] U.S. Fish and Wildlife Service. 2020b. *Vigna o-wahuensis* (No Common Name). 5-Year Review Short Form Summary. U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawaiʻi. <https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/3149.pdf. Accessed September 17, 2023.

[USFWS] U.S. Fish and Wildlife Service. 2021a. *Pseudognaphalium sandwicensium* var. *molokaiense* (ʻenaʻena). 5-Year Review Summary and Evaluation. U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawaiʻi. <https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/3419.pdf>. Accessed September 15, 2023.

[USFWS] U.S. Fish and Wildlife Service. 2021b. *Scaevola coriacea* (dwarf naupaka). 5-Year Review. Short Form Summary. U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawaiʻi. <https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/3540.pdf>. Accessed September 16, 2023.

[USFWS] U.S. Fish and Wildlife Service. 2021c. *Portulaca villosa* (ihi). 5-Year Review Summary and Evaluation. U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawaiʻi. <https://ecos.fws.gov/ecp/species/4886>. Accessed September 16, 2023.

[USFWS] U.S. Fish and Wildlife Service. 2021d. *Sesbania tomentosa* (ohai) 5-Year Review. Short Form Summary. U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawaiʻi. <https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/3540.pdf>. Accessed September 17, 2023.

[USFWS] U.S. Fish and Wildlife Service. 2023a. Official letter from USFWS on "*List of threatened and endangered species that may occur in your project location or maybe affected by your proposed project.*" February 3, 2023. Project Code: 2023-0041712.

[USFWS] U.S. Fish and Wildlife Service. 2023b. *Panicum fauriei* var. *carteri (Carter's panicgrass)*. 5-Year Review Short Form Summary. <https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/7932.pdf>. Accessed September 16.

[USFWS] U.S. Fish and Wildlife Service. 2023c. *Abutilon menziesii* (kooloaula). 5-Year Review Short Form Summary. U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawaiʻi. <https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/3560.pdf>. Accessed September 16.

Van Houtan, K. S., J. N. Kittinger, A. L. Lawrence, C. Yoshinaga, V. Ray Born, and A. Fox. 2012. Hawksbill sea turtles in the Northwestern Hawaiian Islands. Chelonian Conservation and Biology 11:117–121.

Wagner, W. L., D. R. Herbst, and S. H. Sohmer. 1999. Manual of the Flowering Plants of Hawaiʻi. Two volumes. Revised edition. University of Hawaiʻi Press and Bishop Museum Press, Honolulu.

Appendix A. U.S. Fish and Wildlife Service's Information for Planning and Conservation – Official Resource List

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish And Wildlife Office
300 Ala Moana Boulevard, Box 50088
Honolulu, HI 96850-5000
Phone: (808) 792-9400 Fax: (808) 792-9580

In Reply Refer To: February 03, 2023
Project Code: 2023-0041712
Project Name: Honoaliilani Highway Improvements

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened and endangered species, as well as designated critical habitat that may occur within the boundary of your proposed project and that may be affected by project related actions. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Please contact the Service's Pacific Islands Fish and Wildlife Office (PIFWO) at 808-792-9400 if you have any questions regarding your IPaC species list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may adversely affect threatened and endangered species and/or designated critical habitat.

Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a Biological

Evaluation, similar to a Biological Assessment, be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment or Biological Evaluation are described at 50 CFR 402.12.

Due to the significant number of listed species found on each island within PIFWO's regulatory jurisdiction, and the difficulty in accurately mapping ranges for species that we have limited information about, your species list may include more species than if you obtained the list directly from a Service biologist. We recommend you use the species links in IPaC to view the life history, habitat descriptions, and recommended avoidance and minimization measures to assist with your initial determination of whether the species or its habitat may occur within your project area. If appropriate habitat is present for a listed species, we recommend surveys be conducted to determine whether the species is also present. If no surveys are conducted, we err on the side of the species, by regulation, and assume the habitat is occupied. Updated avoidance and minimization measures for plants and animals, best management practices for work in or near aquatic environments, and invasive species biosecurity protocols can be found on the PIFWO website at: https://www.fws.gov/office/pacific-islands-fish-and-wildlife/library.

If a Federal agency determines, based on the Biological Assessment or Biological Evaluation, that a listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: http://www.fws.gov/endangered/esa-library/index.

Non-federal entities can also use the IPaC generated species list to develop Habitat Conservation Plans (HCP) in accordance with section 10(a)(1)(B) of the Act. We recommend HCP applicants coordinate with the Service early during the HCP development process. For additional information on HCPs, the Habitat Conservation Planning handbook can be found at https://www.fws.gov/sites/default/files/documents/habitat-conservation-planning-handbook-entire.pdf.

Please be aware that wind energy projects should follow the Service’s wind energy guidelines (http://www.fws.gov/windenergy) for minimizing impacts to migratory birds. Listed birds and the Hawaiian hoary bat may also be affected by wind energy development and we recommend development of a Habitat Conservation Plan for those species, as described above. Guidance for minimizing impacts to migratory birds for projects including communications towers can be found at:

- http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers
- http://www.towerkill.com
- http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation actions that benefit threatened and endangered species into their project planning to further the purposes of the Act in accordance with section 7(a)(1). Please include the Consultation Tracking Number associated with your IPaC species list in any

request for consultation or correspondence about your project that you submit to our office. Please feel free to contact us at PIFWO_admin@fws.gov or 808-792-9400 if you need more current information or assistance regarding the potential impacts to federally listed species and federally designated critical habitat.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Pacific Islands Fish And Wildlife Office
300 Ala Moana Boulevard, Box 50088
Honolulu, HI 96850-5000
(808) 792-9400

Project Summary

Project Code: 2023-0041712
Project Name: Honoaliilani Highway Improvements
Project Type: New Constr - Above Ground
Project Description: The primary purpose of this project is to provide a reliable transportation facility in West Maui by reducing the highway's vulnerability to coastal hazards. Specifically, the project will look at ways to address existing and future erosion and flooding from Ukumehame, at approximately milepost 11, in the vicinity of Pāpalaua Wayside Park to Launiopoko, at milepost 17, the existing southern terminus of Lāhainā Bypass. Currently, there are four alternatives being considered, which would realign the highway further mauka of the existing Honoapiilani Highway. The EIS process is on-going and also includes a no-build option.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@20.8136205,-156.6175240199674,14z



Counties: Maui County, Hawaii

Endangered Species Act Species

There is a total of 20 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Hawaiian Hoary Bat *Lasiurus cinereus semotus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/770 General project design guidelines: https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/6477.pdf	Endangered

Birds

NAME	STATUS
Band-rumped Storm-petrel *Oceanodroma castro*	Endangered
Population: USA (HI) No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1226 General project design guidelines: https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/6939.pdf	
Hawaiian (=koloa) Duck *Anas wyvilliana*	Endangered
No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7712 General project design guidelines: https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/6934.pdf	
Hawaiian Coot *Fulica americana alai*	Endangered
No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7233 General project design guidelines: https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/6934.pdf	
Hawaiian Goose *Branta (=Nesochen) sandvicensis*	Threatened
No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1627 General project design guidelines: https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/6925.pdf	
Hawaiian Petrel *Pterodroma sandwichensis*	Endangered
No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6746 General project design guidelines: https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/6939.pdf	
Hawaiian Stilt *Himantopus mexicanus knudseni*	Endangered
No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2082 General project design guidelines: https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/6934.pdf	
Newell's Townsend's Shearwater *Puffinus auricularis newelli*	Threatened
No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2048 General project design guidelines: https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/6939.pdf	

NAME	STATUS
Short-tailed Albatross *Phoebastria (=Diomedea) albatrus*	Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/433

Reptiles

NAME	STATUS
Green Sea Turtle *Chelonia mydas*	Threatened

Population: Central North Pacific DPS
No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/6199
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/6929.pdf

Insects

NAME	STATUS
Blackburn's Sphinx Moth *Manduca blackburni*	Endangered

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/4528
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/6926.pdf

Flowering Plants

NAME STATUS

`ena`ena *Pseudognaphalium sandwicensium var. molokaiense* Endangered
No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/5993
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/7051.pdf

Awiwi *Schenkia sebaeoides* Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/7103
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/7051.pdf

Carter's Panicgrass *Panicum fauriei var. carteri* Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/5578
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/7060.pdf

Dwarf Naupaka *Scaevola coriacea* Endangered
No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/4669
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/7060.pdf

Ihi *Portulaca villosa* Endangered
No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/4886

Ko`oloa`ula *Abutilon menziesii* Endangered
No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/3268
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/7051.pdf

Ohai *Sesbania tomentosa* Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/8453
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/7051.pdf

Round-leaved Chaff-flower *Achyranthes splendens var. rotundata* Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/4709
General project design guidelines:

NAME STATUS

https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/7051.pdf

Vigna o-wahuensis Endangered

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.

Species profile: https://ecos.fws.gov/ecp/species/8445

General project design guidelines:

https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/7051.pdf

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

IPaC User Contact Information

Agency:	Hawaii Department of Transportation
Name:	Matthew Small
Address:	1001 Bishop Street
Address Line 2:	Suite 2400
City:	Honolulu
State:	HI
Zip:	96813
Email	matthew.small@wsp.com
Phone:	8085662228

Lead Agency Contact Information

Lead Agency:	Federal Highway Administration
Name:	Lisa Powell
Email:	lisa.powell@dot.gov
Phone:	8085412305

Appendix B. U.S. Fish and Wildlife Service Refined Species List for Honoapiʻilani Highway Project May 2, 2023 Memo

Refined species list for Honoapiʻilani HWY Project

Date: 2 May 2023

Prepared by: Carrie Harrington USFWS

For: Federal DOT, state DOT, HT Harvey (consultants) for project

ANIMALS

Hawaiian waterbirds: **Hawaiian stilt** and **Hawaiian coot**; the **Hawaiian stilt** has been recorded recently in several locations within the project footprint.

Nēnē: nēnē with goslings at the Ukumehame firing range.

Megalagrion xanthomelas: confirmed a little mauka of Ukumehame firing range in valley along stream, out of the project footprint, but it could be present downstream from the recorded sites.

Hawaiian hoary bat: recorded in area

Seabirds: **Short-tailed Albatross**, **Newell's Townsend's Shearwater**, and **Band-rumped Storm Petrel**. May transit the area so lighting (permanent and temporary) is primary factor to consider here.

Blackburn's sphinx moth: Maui is not well surveyed for the Blackburn's sphinx moth, so if there is a tree tobacco plant (or aiea...although unlikely to be found in project fotover 3 feet tall in the Project Area, we recommend including the blackburn's sphinx moth avoidance and minimization measures.

Sea turtles (we recommend incorporating our BMPs for work in and around aquatic environments and relavent sea turtle avoidance and minimzation measures into the project description).

PLANTS

According to current (April 2023) USFWS records, no listed plants have been recorded in the project action area. However, while we do not have records of listed plants within the project action area, the listed plants on the IPAC generated species list could be present in the project action area. IPAC generates a list of species with current potential ranges for the species. We

understand that you have contracted botanical surveys for the project action area, which are already underway, and that the botanical expert has a copy of the IPAC generated species list.

Additionally, USFWS plant records show there are several federally listed plants documented less than a mile from project action area:

Portulacca villosa: recorded mauka of Avalua Beach, a little outside of the most mauka alternative's Project Area (but this small population thought to be washed away by a flood), also along the corridor of northern most segment of the most mauka alternative, and just east of the southern most segment of the Lāhainā bypass.

Spermolepis hawaiiensis: mauka of the southern most segment of the existing Lāhainā bypass, where the new road will connect to the bypass.

Psittirostra psittacea (observed in area historically, mauka of Ukumehame in valley)

Gouania hillebrandii (documented occurence just east of the south end of the existing Lāhainā bypass and could therefore potentially occur in the mauka side of the northern most segment of the new highway where it will connect to the existing bypass.

At-risk* endemic plants in vicinity (mostly a little more mauka from most inland alternative) *not listed, conservaiton actions would help prevent the potential need to list in the future):

Gossypium tomentosum (in valley mauka of Olowalu, just behind the housing development)

Erythrina sandwicensis (in valley mauka of Ukumehame)

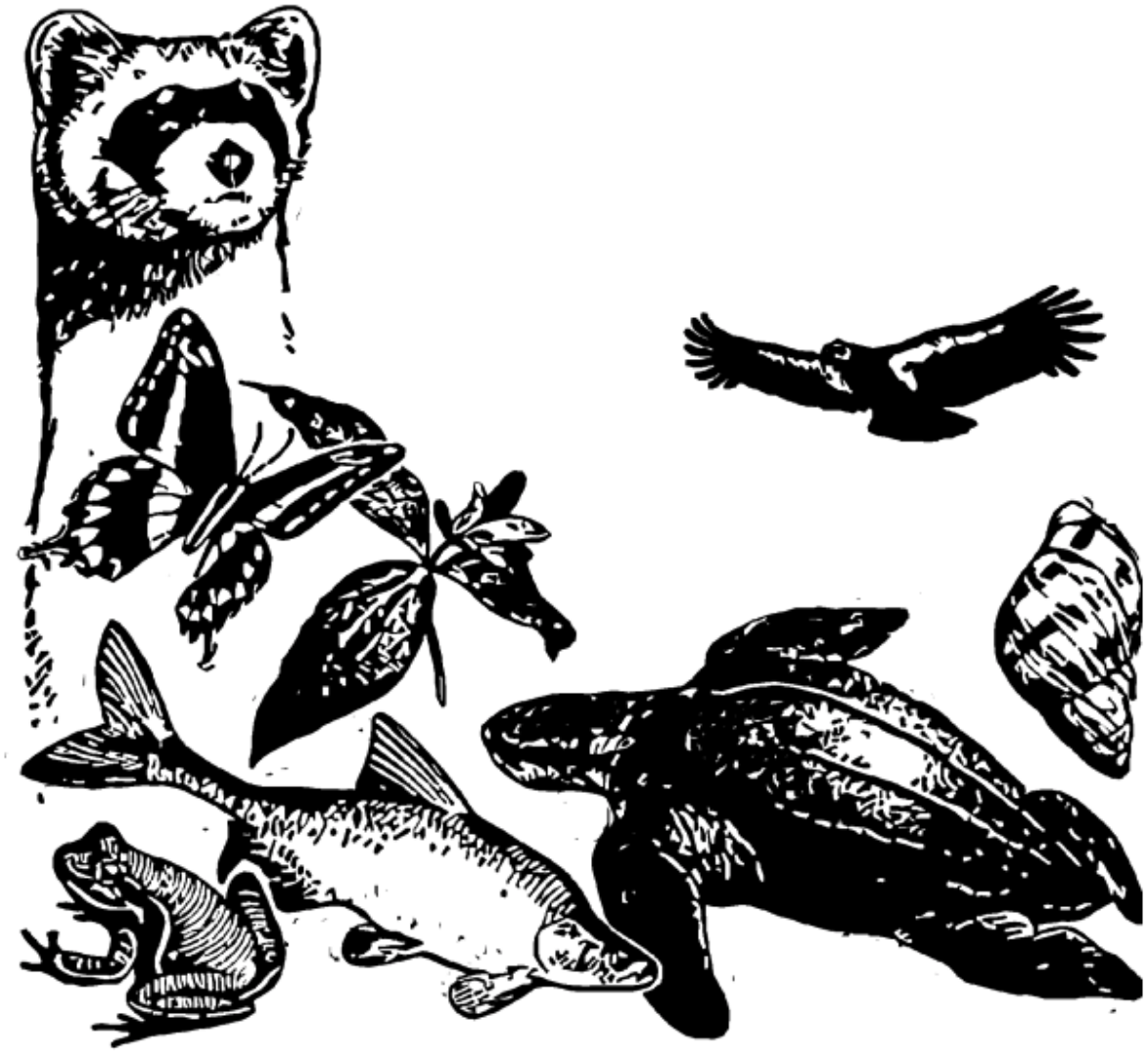
Appendix C. General Project Design Guidelines for Endangered Hawaiian Goose, Waterbirds, Seabirds, Hawaiian Hoary Bat, and Green Sea Turtle

U.S. Fish & Wildlife Service

Hawaiian hoary bat

Hawaiian Hoary Bat

Generated July 03, 2023 01:32 AM UTC, IPaC v6.94.0-rc4



IPaC - Information for Planning and Consultation (https://ipac.ecosphere.fws.gov/): A project planning tool to help streamline the U.S. Fish and Wildlife Service environmental review process.

Hawaiian hoary bat (*Lasiurus cinereus semotus*): The Hawaiian hoary bat roosts in both exotic and native woody vegetation across all islands and will leave young unattended in trees and shrubs when they forage. If trees or shrubs 15 feet or taller are cleared during the pupping season, there is a risk that young bats could inadvertently be harmed or killed since they are too young to fly or may not move away. Additionally, Hawaiian hoary bats forage for insects from as low as 3 feet to higher than 500 feet above the ground and can become entangled in barbed wire used for fencing.

To avoid and minimize impacts to the endangered Hawaiian hoary bat we recommend you incorporate the following applicable measures into your project description:

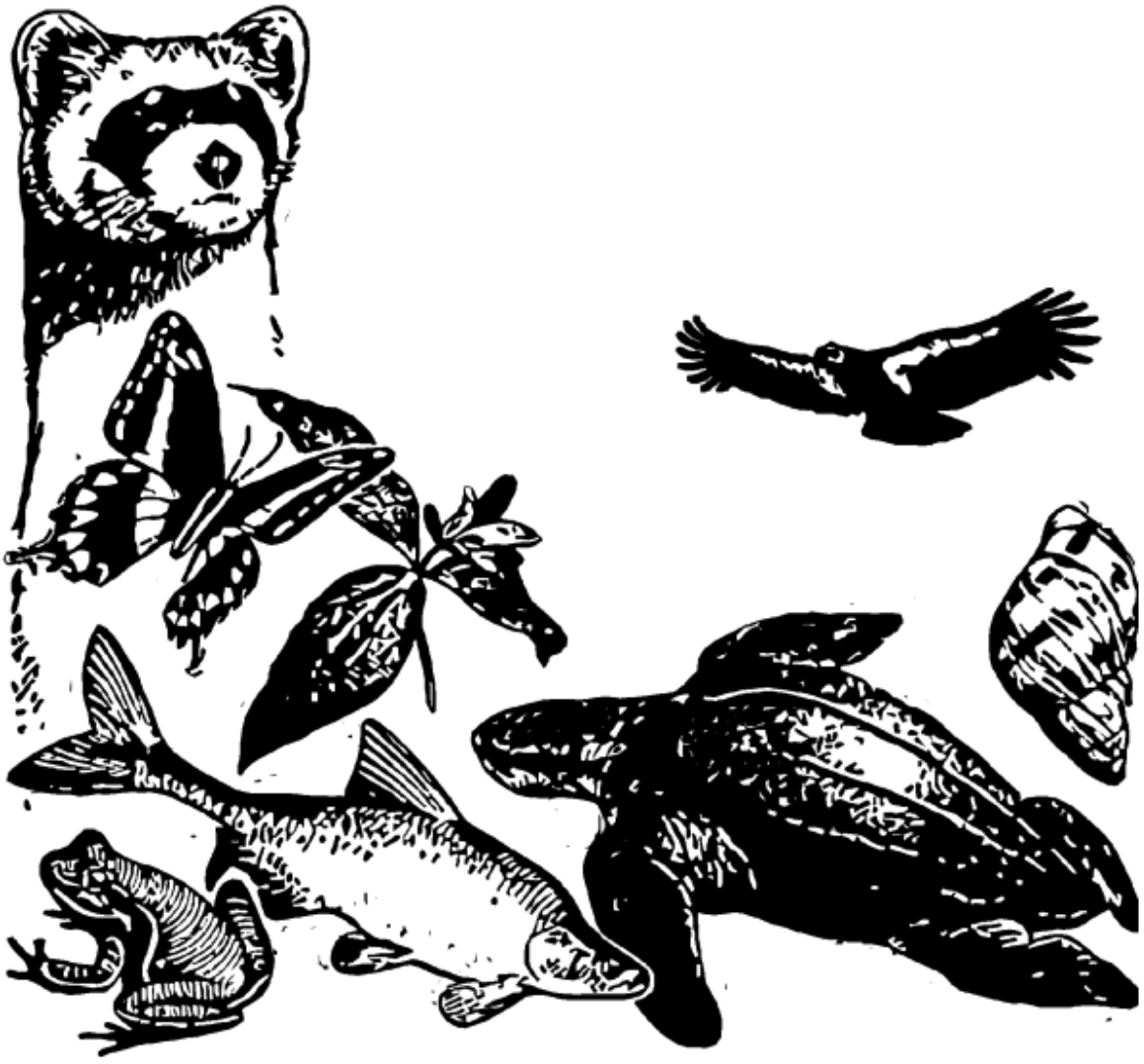
- Do not disturb, remove, or trim woody plants greater than 15 feet tall during the bat birthing and pup rearing season (June 1 through September 15).
- Do not use barbed wire for fencing.

U.S. Fish & Wildlife Service

Hawaiian goose

Hawaiian Goose

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Hawaiian goose (nene), (*Branta (Nesochen) sandvicensis*): Nene are found on the islands of Hawaii, Maui, Molokai, and Kauai. They are observed in a variety of habitats, but prefer open areas, such as pastures, golf courses, wetlands, natural grasslands and shrublands, and lava flows. Threats to the species include introduced mammalian and avian predators, wind facilities, and vehicle strikes.

To avoid and minimize potential project impacts to nene we recommend you incorporate the following measures into your project description:

- Do not approach, feed, or disturb nene.
- If nene are observed loafing or foraging within the project area during the breeding season (September through April), have a biologist familiar with nene nesting behavior survey for nests in and around the project area prior to the resumption of any work. Repeat surveys after any subsequent delay of work of 3 or more days (during which the birds may attempt to nest).
- Cease all work immediately and contact the Service for further guidance if a nest is discovered within a radius of 150 feet of proposed project, or a previously undiscovered nest is found within the 150-foot radius after work begins.
- In areas where nene are known to be present, post and implement reduced speed limits, and inform project personnel and contractors about the presence of endangered species on-site.

nene 4(d) rule: A 4(d) rule was established at the time the nene was downlisted to threatened status. Under the 4(d) rule, the following actions are not prohibited under the Act, provided the additional measures described in the downlisting rule are adhered to:

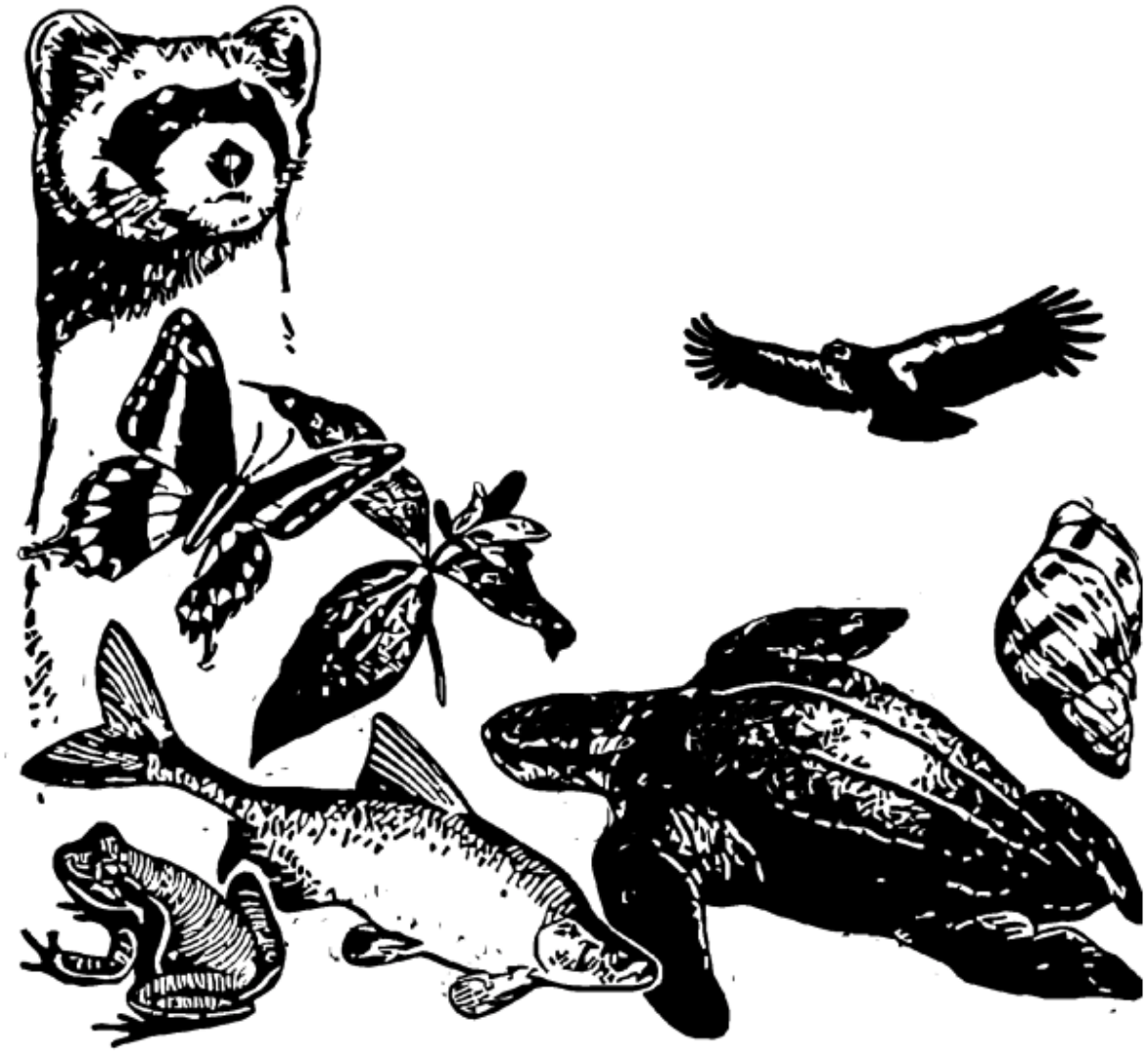
- Take by landowners, or their agents, conducting intentional harassment in the form of hazing or other deterrent measures not likely to cause direct injury or mortality, or nene surveys.
- Take that is incidental to conducting lawful control of introduced predators or habitat management activities for nene.
- Take by authorized law enforcement officers for the purpose of aiding or euthanizing sick, injured, or orphaned nene; disposing of dead specimens; and salvaging a dead specimen that may be used for scientific study.

U.S. Fish & Wildlife Service

Hawaiian waterbirds

Hawaiian (=koloa) Duck and 3 more species

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IPaC - Information for Planning and Consultation (https://ipac.ecosphere.fws.gov/): A project planning tool to help streamline the U.S. Fish and Wildlife Service environmental review process.

General Project Design Guidelines - Hawaiian (=koloa) Duck and 3 more species

Published by Pacific Islands Fish And Wildlife Office - Publication Date: February 1, 2022 for the following species included in your project

- Hawaiian (=koloa) Duck *Anas wyvilliana*
- Hawaiian Common Gallinule *Gallinula galeata sandvicensis*
- Hawaiian Stilt *Himantopus mexicanus knudseni*
- Hawaiian Coot *Fulica americana alai*

Hawaiian waterbirds (Hawaiian stilt, *Himantopus mexicanus knudseni*; Hawaiian coot, *Fulica alai*; Hawaiian common gallinule, *Gallinula galeata sandvicensis*; Hawaiian duck, *Anas wyvilliana*):
Listed Hawaiian waterbirds are found in fresh and brackish-water marshes and natural or man-made ponds. Hawaiian stilts may also be found wherever ephemeral or persistent standing water may occur. Threats to these species include non-native predators, habitat loss, and habitat degradation. Hawaiian ducks are also subject to threats from hybridization with introduced mallards.

The creation of standing or open water may result in the attraction of Hawaiian waterbirds to a site (creative nuisance or habitat sink). In particular, the Hawaiian stilt is known to nest in sub-optimal locations (e.g. any ponding water), if water is present. Hawaiian waterbirds attracted to sub-optimal habitat may suffer adverse impacts, such as predation and reduced reproductive success, and thus the project may create an attractive nuisance. Therefore, we recommend you work with our office during project planning so that we may assist you in developing measures to avoid impacts to listed species (e.g., fencing, vegetation control, predator management).

To avoid and minimize potential project impacts to Hawaiian waterbirds we recommend you incorporate the following applicable measures into your project description:

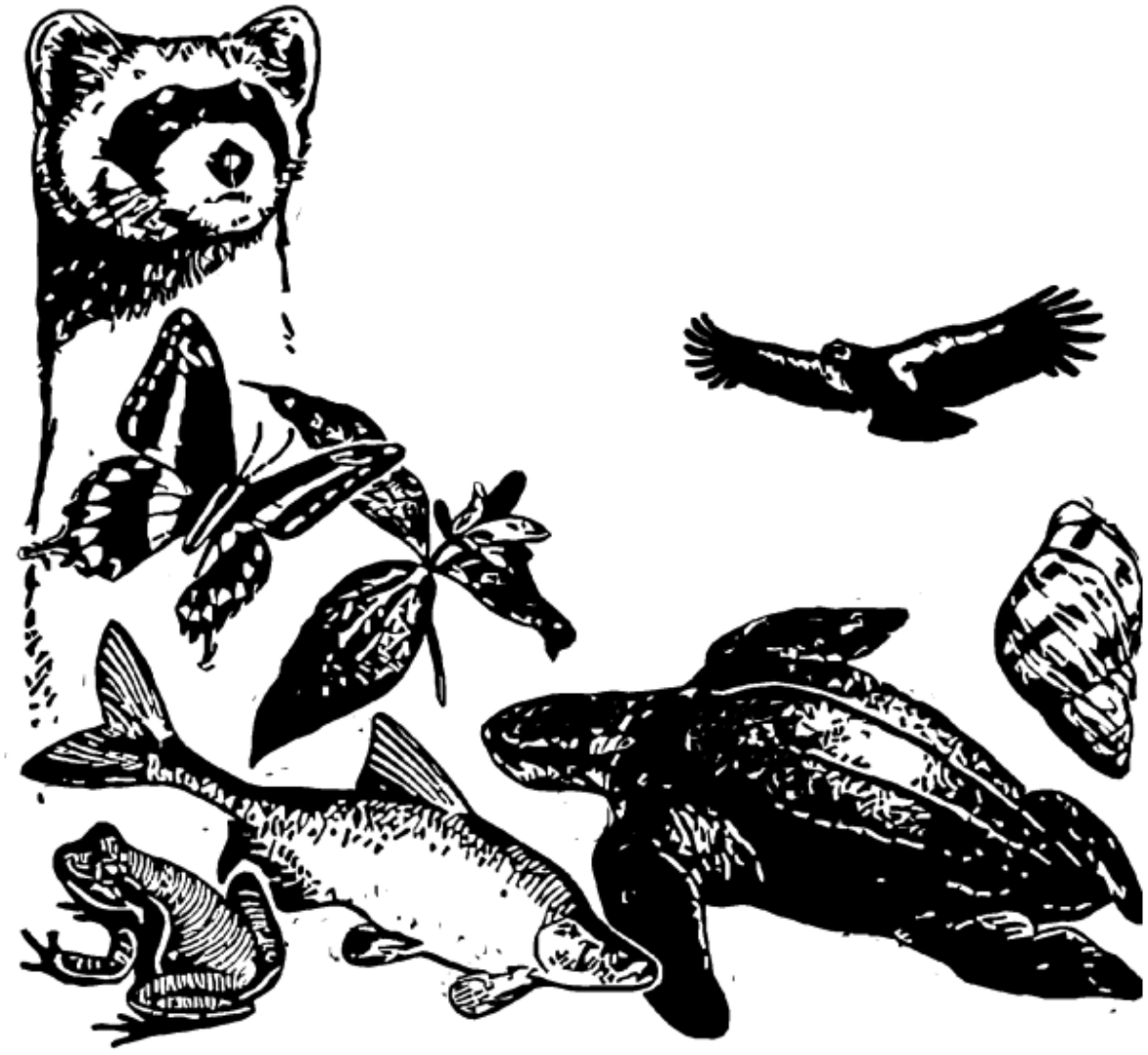
- In areas where waterbirds are known to be present, post and enforce reduced speed limits, and inform project personnel and contractors about the presence of endangered species on-site.
- Incorporate the Service's Best Management Practices for Work in Aquatic Environments into the project design.
- Have a biological monitor that is familiar with the species' biology conduct Hawaiian waterbird nest surveys, where appropriate habitat occurs within the vicinity of the proposed project site, prior to project initiation. Repeat surveys again within 3 days of project initiation and after any subsequent delay of work of 3 or more days (during which the birds may attempt to nest). If a nest or active brood is found:
    - Contact the Service within 48 hours for further guidance.
    - Establish and maintain a 100-foot buffer around all active nests and/or broods until the chicks/ducklings have fledged. Do not conduct potentially disruptive activities or habitat alteration within this buffer.
    - Have a biological monitor that is familiar with the species' biology present on the project site during all construction or earth moving activities until the chicks/ducklings fledge to ensure that Hawaiian waterbirds and nests are not adversely impacted.

U.S. Fish & Wildlife Service

Hawaiian seabirds

Hawaiian Petrel and 2 more species

Generated July 03, 2023 01:25 AM UTC, IPaC v6.94.0-rc4



IPaC - Information for Planning and Consultation (https://ipac.ecosphere.fws.gov/): A project planning tool to help streamline the U.S. Fish and Wildlife Service environmental review process.

General Project Design Guidelines - Hawaiian Petrel and 2 more species

Published by Pacific Islands Fish And Wildlife Office - Publication Date: February 1, 2022 for the following species included in your project

- Hawaiian Petrel *Pterodroma sandwichensis*
- Newell's Townsend's Shearwater *Puffinus auricularis newelli*
- Band-rumped Storm-petrel *Oceanodroma castro*

Endangered Hawaiian petrel (*Pterodroma sandwichensis*), Threatened Newell's shearwater (*Puffinus auricularis newelli*), and Endangered Hawaii Distinct Population Segment of the band-rumped storm-petrel (*Oceanodroma castro*):
Hawaiian seabirds may traverse the project area at night during the breeding, nesting and fledging seasons (March 1 to December 15). Outdoor lighting could result in seabird disorientation, fallout, and injury or mortality. Seabirds are attracted to lights and after circling the lights they may become exhausted and collide with nearby wires, buildings, or other structures or they may land on the ground. Downed seabirds are subject to increased mortality due to collision with automobiles, starvation, and predation by dogs, cats, and other predators. Young birds (fledglings) traversing the project area between September 15 and December 15, in their first flights from their mountain nests to the sea, are particularly vulnerable to light attraction.

To avoid and minimize potential project impacts to seabirds we recommend you incorporate the following measures into your project description:

- Fully shield all outdoor lights so the bulb can only be seen from below.
- Install automatic motion sensor switches and controls on all outdoor lights or turn off lights when human activity is not occurring in the lighted area.
- Avoid nighttime construction during the seabird fledging period, September 15 through December 15.

Listed seabirds have been documented colliding with communication towers, particularly in areas of high seabird passage rate. In general, self-supporting monopoles are the least likely to result in collisions, whereas lattice towers, particularly those that rely on guy-wires, have a greater risk.

To avoid and minimize the likelihood that towers will result in collisions by listed seabirds we recommend you incorporate the following measures into your project description:

- The profile of the tower should be as small as possible, minimize the extent of the tower that protrudes above the surrounding vegetation layer, and avoid the use of guywires.
- If the top of the tower must be lit to comply with Federal Aviation Administration regulations, use a flashing red light verses a steady-beam red or white light.
- If possible, co-locate with existing towers or facilities.

Seabirds have been known to collide with fences, powerlines, and other structures near nesting colonies. To avoid and minimize the likelihood of collision we recommend you incorporate the following measures into your project description:

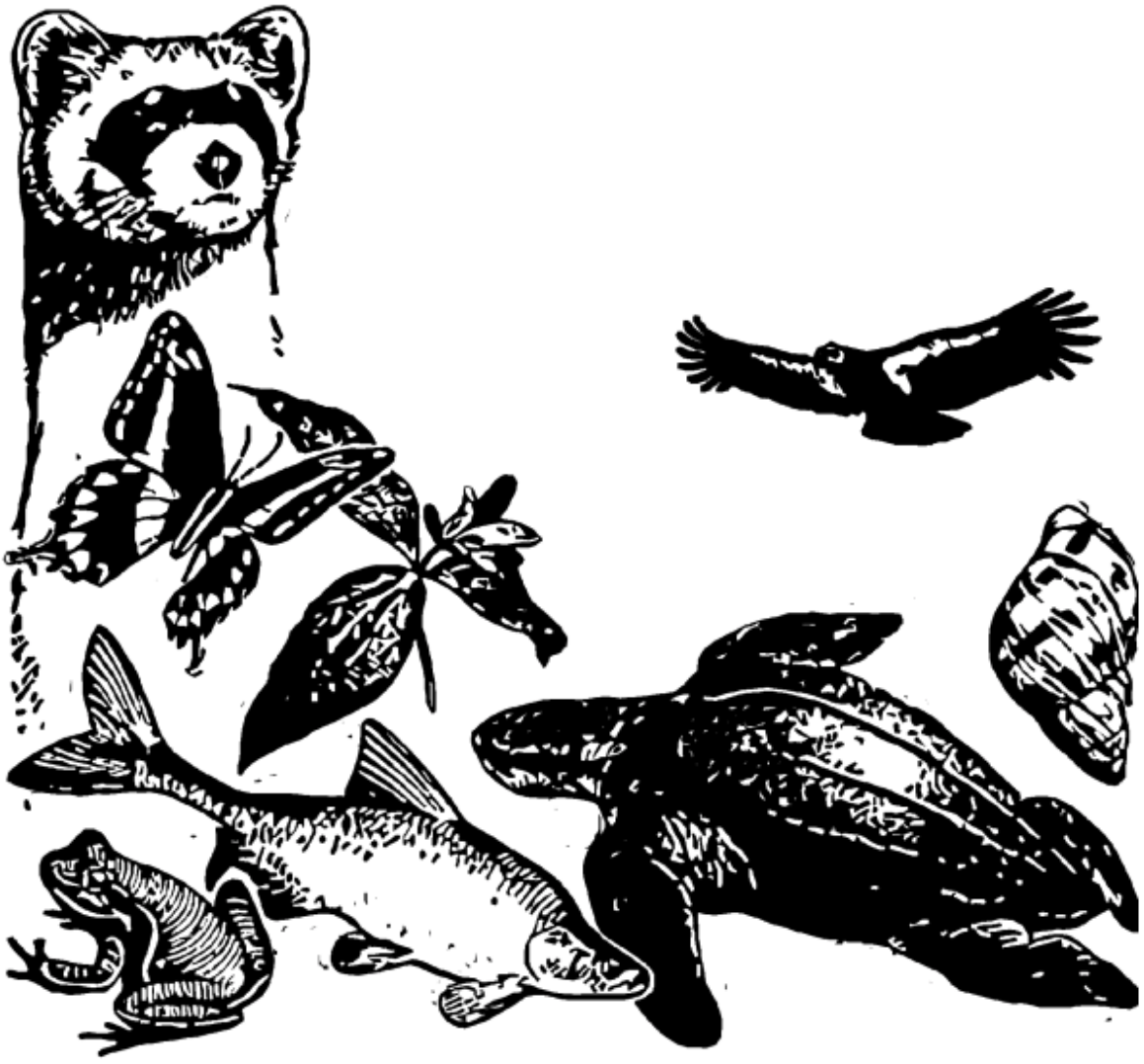
- Where fences extend above vegetation, integrate three strands of polytape into the fence to increase visibility.
- For powerlines, guywires and other cables, minimize exposure above vegetation height and vertical profile.

U.S. Fish & Wildlife Service

Sea turtles

Green Sea Turtle and 2 more species

Generated July 03, 2023 06:43 AM UTC, IPaC v6.94.0-rc4



IPaC - Information for Planning and Consultation (https://ipac.ecosphere.fws.gov/): A project planning tool to help streamline the U.S. Fish and Wildlife Service environmental review process.

General Project Design Guidelines - Green Sea Turtle and 2 more species

Published by Pacific Islands Fish And Wildlife Office - Publication Date: February 1, 2022 for the following species included in your project

- Green Sea Turtle *Chelonia mydas*
- Green Sea Turtle *Chelonia mydas*
- Green Sea Turtle *Chelonia mydas*

Pacific sea turtles: Green sea turtles (*Chelonia mydas*) (Central North Pacific DPS - Hawaii and Johnston Atoll), (Central West Pacific DPS - Mariana Archipelago and Wake NWR) and (Central South Pacific DPS - American Samoa, Palmyra, Kingman, Howland, Baker and Jarvis NWR), and Hawksbill sea turtle (*Eretmochelys imbricata*):
The Service consults on sea turtles and their use of terrestrial habitats (beaches where nesting and/or basking is known to occur), whereas the National Marine Fisheries Service (NMFS) consults on sea turtles and their use of off-shore and open ocean habitats. We recommend that you consult with NMFS regarding the potential impacts from the proposed project to sea turtles in off-shore and open ocean habitats.

Green sea turtles may nest on any sandy beach area in the Pacific Islands. Hawksbill sea turtles exhibit a wide tolerance for nesting substrate (ranging from sandy beach to crushed coral) with nests typically placed under vegetation. Both species exhibit strong nesting site fidelity. Nesting occurs on Hawaiian beaches from May through September, peaking in June and July, with hatchlings emerging through November and December. Sea turtle nesting in the Western Pacific, Marianas, and South Pacific Islands can occur year-round; peaking in April and July. Nesting in American Samoa is from October to March).

Construction on, or in the vicinity of, beaches can result in sand and sediment compaction, sea turtle nest destruction, beach erosion, contaminant and nutrient runoff, and an increase in direct and ambient light pollution which may disorient hatchlings or deter nesting females. Off-road vehicle traffic may result in direct impacts to sea turtles and nests, and also contributes to habitat degradation through erosion and compaction.

Projects that alter the natural beach profile, such as nourishment and hardening, including the placement of seawalls, jetties, sandbags, and other structures, are known to reduce the suitability of on-shore habitat for sea turtles. These types of projects often result in sand compaction, erosion, and additional sedimentation in nearshore habitats, resulting in adverse effects to the ecological community and future sea turtle nests. The hardening of a shoreline increases the potential for erosion in adjacent areas, resulting in subsequent requests to install stabilization structures or conduct beach nourishment in adjacent areas. Given projected sea level rise estimates, the likelihood of increase in storm surge intensity, and other factors associated with climate change, we anticipate that beach erosion will continue and likely increase.

Whenever possible, projects should consider alternatives that avoid the modification or hardening of coastlines. Beach nourishment or beach hardening projects should evaluate the long-term effect to sea turtle nesting habitat and consider the cumulative effects.

To avoid and minimize project impacts to sea turtles and their nests we recommend you incorporate the following applicable measures into your project description:

- No vehicle use on, or modification of, the beach/dune environment during the sea turtle nesting or hatching season, or on beaches where sea turtles are known to bask.
- Do not remove or destroy native dune vegetation.
- Incorporate applicable Best Management Practices for Work in Aquatic Environments into the project design.

- Have a biologist familiar with sea turtles conduct a visual survey of the project site to ensure no basking sea turtles are present.
    - If a basking sea turtle is found within the project area, cease all mechanical or construction activities within 100 feet until the animal voluntarily leaves the area.
    - Cease all activities between the basking turtle and the ocean.
- Remove any project-related debris, trash, or equipment from the beach or dune if not actively being used.
- Do not stockpile project-related materials in the intertidal zone, reef flats, or stream channels.

Lighting: Optimal nesting habitat is a dark beach free of barriers that restrict sea turtle movement. Nesting turtles may be deterred from approaching or laying successful nests on lighted or disturbed beaches. They may become disoriented by artificial lighting, leading to exhaustion and placement of a nest in an inappropriate location (such as at or below the high tide line). Hatchlings that emerge from nests may also be disoriented by artificial lighting. Inland areas visible from the beach should be sufficiently dark to allow for successful navigation to the ocean.

To avoid and minimize project impacts to sea turtles from lighting we recommend incorporating the following applicable measures into your project description:

- Avoid nighttime work during the nesting and hatching season.
- Minimize the use of lighting and shield all project-related lights so the light is not visible from any beach.
    - If lights can’t be fully shielded or if headlights must be used, fully enclose the light source with light filtering tape or filters.
- Incorporate design measures into the construction or operation of buildings adjacent to the beach to reduce ambient outdoor lighting such as:
    - tinting or using automatic window shades for exterior windows that face the beach;
    - reducing the height of exterior lighting to below 3 feet and pointed downward or away from the beach; and
    - minimize light intensity to the lowest level feasible and, when possible, include timers and motion sensors.

Appendix D. Best Management Practices for Invasive Species Prevention

Best Management Practices (BMPs) for Invasive Species Prevention

General Prevention (for Little Fire Ant, coqui frogs, Coconut Rhinoceros Beetles, and others)
When contracting, purchasing, or conducting projects, there is a very real risk of bringing or moving invasive species with the movement of equipment, materials, and commodities. To reduce risk, please consider implementing or incorporating the following BMPs:

- Institute contract specifications that require mitigation for potential introductions. This can include requiring equipment cleaning and materials inspection prior to work and site inspections to assess compliance efficacy prior to job completion/payment.
- Ask if the contractor or vendor follows BMPs for invasive species, and ask for a copy to review.
- Ask about a contractor or vendor's previous job location/s and the known invasive species in that area. Coqui, Little Fire Ants (LFA), Coconut Rhinoceros Beetles (CRB), and weeds have all been moved to new locations on heavy equipment and materials from infested job sites.
- When purchasing or selecting materials, source plants, planting materials, and similar supplies from uninfested areas and/or from vendors that implement pest BMPs, or ones that are working under official pest mitigation compliance agreements.
- Quarantine and survey all new plants and materials for pests before outplanting, e.g. listen at night for coqui, look for CRB and damage (see below), test all new plants for LFA (see how at https://stoptheant.org/report-little-fire-ants/).

Coconut Rhinoceros Beetle (Any of palms, mulch, compost, etc. coming from Oahu or Kauai should be considered high risk!)
If ordering or working with greenwaste, mulch, loose or bagged compost, or similar materials, be aware that CRB lay their eggs and their grubs (larvae) develop in compost, mulch, greenwaste, manure, etc.). Specify in your contract or purchase agreement that the materials receive proper treatment (e.g., chipping, grinding, heat treatment, or fumigation), and also specify that the vendor/shipper must comply with all applicable laws and rules when moving these items.

- Inspect upon receiving and while working with or managing/maintaining these materials and installation sites. Conduct regular searches/inspections (at least every 4 months/quarterly) of the material for any signs of CRB grubs or pupa (in mulch, greenwaste, and soil mixes/growing media, or damage to the leaves or crowns of coconut trees or any type of palm, banana, and hala.
- If working with tree trimmers, landscapers, or similar, consider asking that all personnel be trained on what to watch for and how to report it. Adult CRB bore golfball-sized holes in coconut and other palms and the leaves may show signs of beetle damage. CRB can also bore into banana plants, hala trees, and many other trees. Text or call (808) 679-5244 or info@crbhawaii.org. For more information, see https://www.crbhawaii.org/.

Fire-promoting and Invasive Plants & Landscaping

- Consider selecting native plants or non-native plants that are low risk for becoming invasive in Hawaii at www.plantpono.org. If a particular plant you are interested in has not been screened for invasiveness, request a screening which is a free service and the results are non-regulatory. The website also features nurseries on Kauai and Hawaii island that have invasive species BMPs in place, see the "Pono Businesses" tab for the lists.
- Consider also staying away from plants that are particularly risky because they are fire-promoting or fire-adapted. See the resources at the Pacific Fire Exchange: https://pacificfireexchange.org/resource/weed-fire-risk-assessment-for-hawaii-2/

Mahalo for considering these suggestions! Please contact any of these groups as resources:
Coordinating Group on Alien Pest Species (CGAPS): christym@hawaii.edu; (808) 722-0995
Kaua'i Invasive Species Committee (KISC): kisc@hawaii.edu
O'ahu Invasive Species Committee (OISC): oisc@hawaii.edu
Maui Invasive Species Committee (MISC): miscpr@hawaii.edu
Moloka'i-Maui Invasive Species Committee (MoMISC): molokaiinvasive@gmail.com
Big Island Invasive Species Committee (BIISC): biisc@hawaii.edu
CRB Response Team: info@crbhawaii.org or (808) 679-5244
Hawai'i Ant Lab (HAL): info@littlefireants.com or (808) 315-5656
State Pest Hotline (808) 643-PEST (7378) or online at www.643PEST.org

Honoapiʻilani Highway Improvements Project

Endangered Species Act Biological Survey Report Supplement

On behalf of the Federal Highway Administration,
in cooperation with the State of Hawaii,
Department of Transportation

October 7, 2024

Prepared by

H.T. Harvey and Associates
Ecological Consultants

and

WSP USA, Inc.

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Acronyms

AA	Action Area
AMM	Avoidance and Minimization Measure
BMP	Best Management Practice
BSM	Blackburn's Sphinx Moth
DEIS	Draft Environmental Impact Statement
ESA	Endangered Species Act
FHWA	Federal Highway Administration
HDOT	State of Hawaii, Department of Transportation
NLAA	Not Likely to Adversely Affect
O&M	Operations and Maintenance
ROW	Right-Of-Way
USFWS	U.S. Fish and Wildlife Service

1. Executive Summary

The Federal Highway Administration (FHWA), in cooperation with the State of Hawaii, Department of Transportation (HDOT), is proposing the Honoapiʻilani Highway Improvements Project (Project). This Project is situated in West Maui, Hawaii, in the area served by the existing Honoapiʻilani Highway between milepost 11 and milepost 17 (Figure 1).

The Draft Environmental Impact Statement (DEIS) for this project is analyzing four alternatives. The proposed action for purposes of this consultation, is the "preferred alternative" that is identified in the DEIS.

H.T. Harvey & Associates obtained an official species list from the U.S. Fish and Wildlife Service (USFWS) via the Information for Planning and Consultation (IPaC) database and conducted biological surveys during 2023 in the Project's Action Area (AA) for ESA-listed species. Results of this survey, along with effects analysis, were incorporated into a 2023 Biological Survey Report. This 2023 report was transmitted to USFWS in November 2023, along with a request for informal consultation under Section 7 of the Endangered Species Act of 1973 (ESA).

USFWS responded via email on February 23, 2024 with a request for supplemental information for the consultation, including additional information to support the analysis of effects to two ESA-listed species: Hawaiian stilt or ae'o (*Himantopus mexicanus knudseni*) and Hawaiian goose or nēnē (*Branta sandvicensis*). On February 29, 2024, USFWS posed a series of additional questions and suggested additional avoidance and minimization measures (AMMs).

This document provides the information requested by USFWS to support the Section 7 consultation. Specifically, the following information has been provided:

- additional detail regarding the proposed action;
- aerial images of the proposed action including the proposed viaduct structure;
- typical cross sections of the proposed highway;
- a summary of al proposed AMMs, including those additionally provided by USFWS;
- an analysis of potential effects of the proposed action on five of the ESA-listed species under USFWS jurisdiction that were addressed in the initial consultation request: Hawaiian Hoary Bat *(Lasiurus cinereus semotus)*, Hawaiian coot (*Fulica alai*), Hawaiian Goose (*Branta sandvicensis*), Hawaiian stilt (*Himantopus mexicanus knudseni*), and Blackburn's Sphinx moth (BSM) (*Manduca blackburni*).

The findings presented in this supplemental analysis support the effect determinations of "**may affect, not likely to adversely affect**" that were presented in the initial request.[1]

2. Proposed Action

As defined in the ESA Section 7 regulations (50 CFR § 402.02), "action" means "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies in the United

[1] A separate Section 7 consultation has already been completed with NMFS for ESA-listed species and critical habitats under their jurisdiction. NMFS issued a Letter of Concurrence on this consultation (PIRO-2022-03611, I-PI-23-2170-DG) on November 27, 2023.

States or upon the high seas." The action area (AA) is defined as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action."

As described in the initial consultation request, FHWA and HDOT have developed four preliminary Project alternatives. These alternatives would be further refined as the DEIS is prepared, leading to the selection of a preferred alternative. The "proposed action" for purposes of this consultation is the "preferred alternative" that is being analyzed in the National Environmental Policy Act (NEPA) DEIS. It is also referred to in this document as the "new highway".

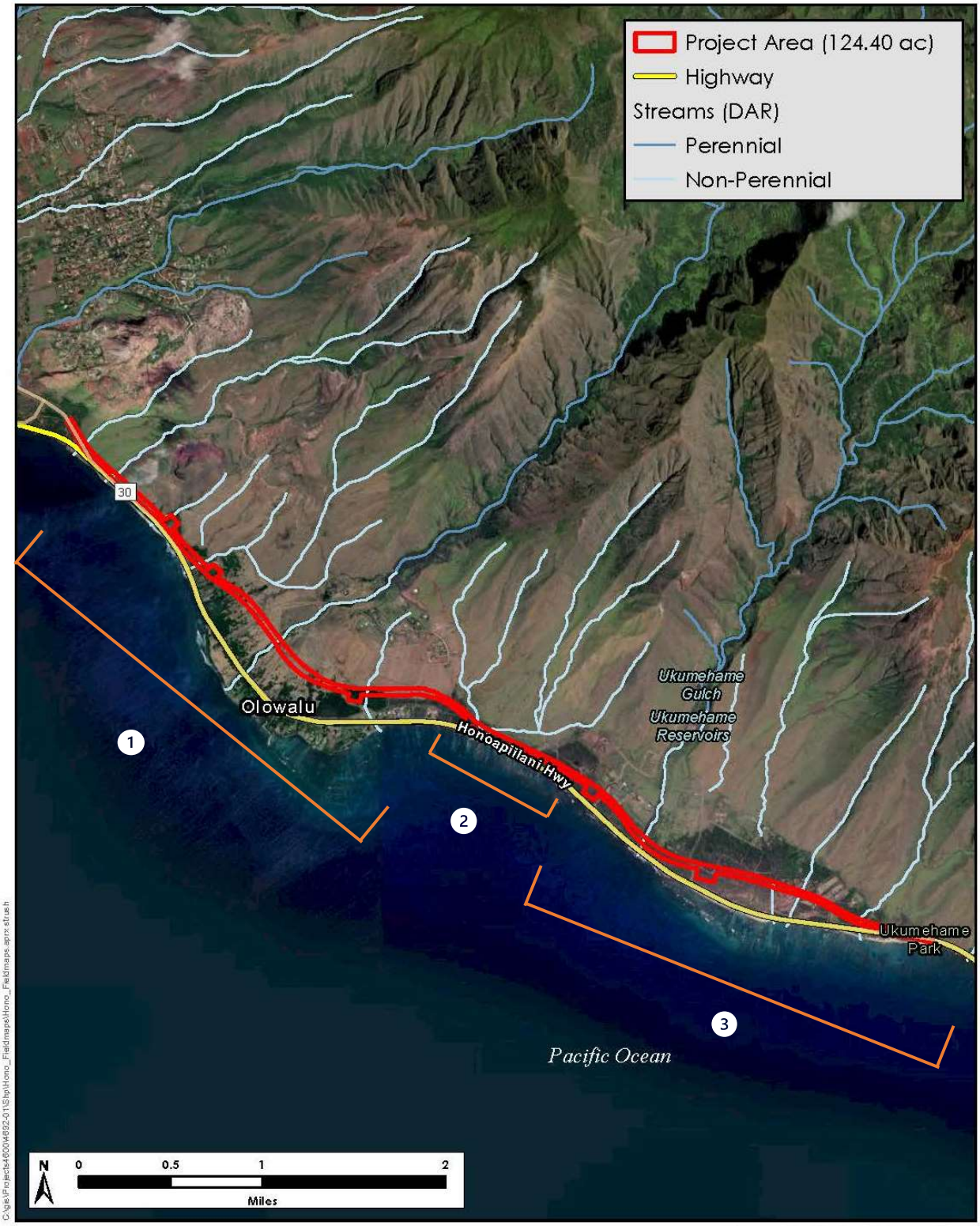
The project site and AA for the proposed action are located approximately 235 feet (72m) mauka and generally parallel with the existing Honoapiʻilani Highway (see Figures 1 and 2). The AA is composed of three portions, listed below (corresponding to numeric labeling in Fig. 2.).

1. *Olowalu – Northern Connection to Existing Lahaina Bypass*—Starting at the northern end, the new highway would tie into the Lahaina Bypass where it partially overlaps the existing highway before moving mauka through Launiupoko and behind existing businesses and residences to the south and east in the Olowalu Peninsula for about three miles.
2. *Ukumehame – Northern Connection to Olowalu*—In the central portion, a 0.6-mile stretch of the new highway connects the northernmost section of Ukumehame to the Olowalu Peninsula.
3. *Ukumehame – Pali Connection through Ukumehame Firing Range*—In the southernmost stretch, the new highway is a two-lane alignment from the southern Pali connection through to the north side of the Ukumehame firing range. A single viaduct structure would be constructed to carry the new highway across the HDOT detention basin and the firing range. Accessing the firing range and public beaches would be from the new highway's intersections with existing cross streets (Pohaku Aeko Street and Ehehene Street) in Ukumehame. No driveways or intersections are proposed further north entering the Olowalu area.



H. T. HARVEY & ASSOCIATES
Ecological Consultants

Figure 1. Project Vicinity Map
Honoapiilani Highway, Biological and Wetland Constraints Analysis (4692-01)
May 2024



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Figure 2. Project Area Map
Honoapiilani Highway, Biological and Wetland Constraints Analysis (4692-01)
May 2024

2.2.1 Construction

At-Grade Right of Way—The new highway would have a Right-Of-Way (ROW) width of 140 feet with two (in-bound and out-bound direction) 11-foot-wide travel lanes, 6-foot-wide shoulders, and a 42-foot-wide median. While the new highway would be built as a two-lane highway, the ROW and assessment of potential effects is based on the ability to provide a four-lane highway configuration (two lanes in each direction) in the future. The outer lanes would be constructed for the two-lane highway and inner lanes would be built in the future as warranted by traffic demand and the availability of funding. Figure 3 shows the typical ROW sections with two lanes, and Figure 4 shows the typical ROW sections with four lanes. Additional ROW at eight natural low points close to the proposed highway alignment would be set aside for permanent stormwater Best Management Practices ("permanent BMPs" as defined in the next paragraph). Other than intersections with existing cross streets that provide access to the existing Honoapi'ilani Highway and therefore the new highway as well, there would not be additional intersections.

Figure 3. Typical ROW Sections with Two Lanes

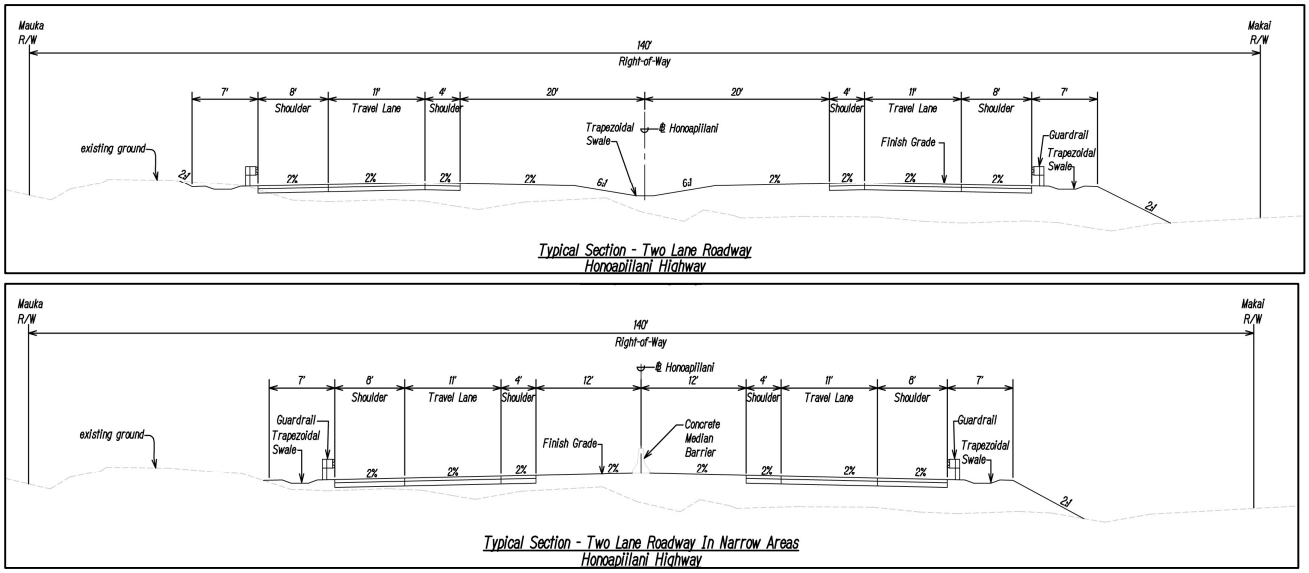
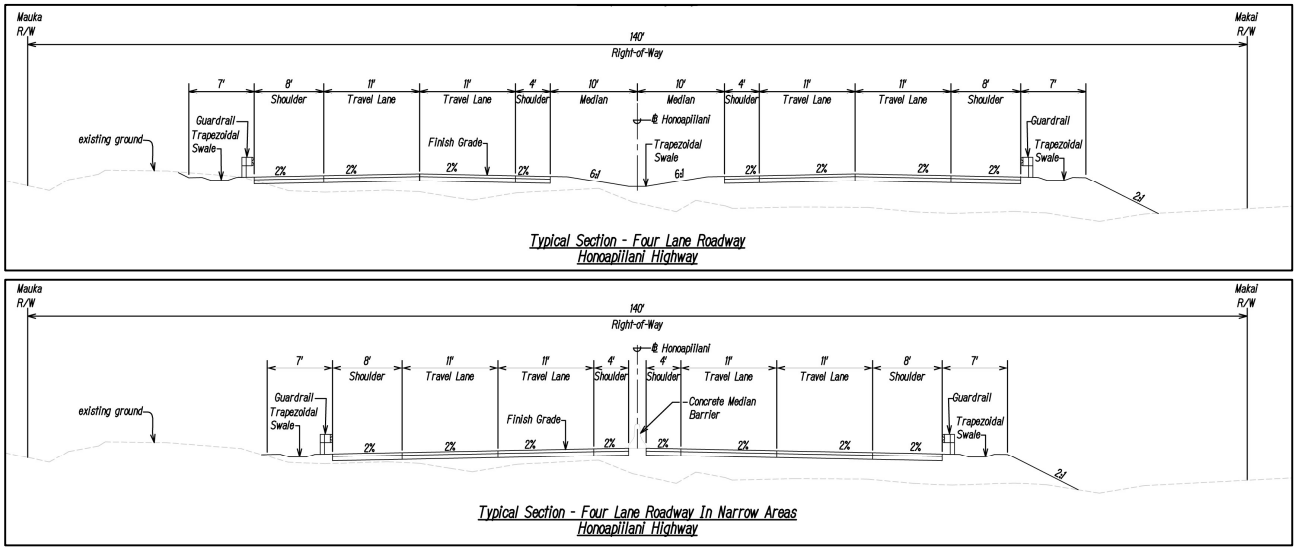


Figure 4. Typical ROW Sections with Four Lanes



Permanent BMPs—Each Build Alternative would set aside additional ROW at several natural low points close to proposed alignments for permanent stormwater Best Management Practices (permanent BMPs) with an average size of approximately one acre. Proposed locations can be seen in Figure 2 as square structures abutting the project area. Between the Draft and Final EIS, additional design considerations would be assessed for the Preferred Alternative, including potential additional effects of using additional ROW for permanent BMPs if not previously evaluated. Biological surveying of potential permanent BMP locations by trained biologists would occur between the Draft and Final EIS as part of these additional considerations. These set asides are conservatively sized for a maximum potential area of disturbance and the final number, locations, and size of the infrastructure may vary depending on the treatment strategies as established through final design as part of the design build process. The Record of Decision (ROD) establishes this environmental footprint within which the design build team must stay. Excavation, potential clearing, temporary construction equipment use, and all other construction activities in final locations of permanent BMPs are required to adhere to the USFWS-provided AMMs (Sections 3 and 5), which could support biological determinations described in Section 4. This includes monitoring by dedicated personnel during construction, protocol if nests are discovered, vegetation clearing protocol, adhering to temporal work-restrictions associated with mating and nesting behavior, signage if-necessary, buffer zones and use of non-barbed wire fencing to avoid any listed species entering the work site, and work stoppage should species be observed during the work period.

Construction Activities— The typical stages of construction activities are summarized below and would be further detailed by the design build contractor and developed in conformance with HDOT Construction and Post Construction Manuals, as well as the USFWS-provided AMMs:

- Pre-Construction, Staging, and Lay Down Yards: In coordination with and as approved by HDOT, the contractor would identify appropriate construction staging areas for storage, equipment, and materials. The contractor would prioritize previously disturbed and bare areas to use for these activities to limit ground disturbance and any potential vegetation clearing. As described in the 2023 Biological Survey Report, the AA is dominated by a nearly monotypic expanse of buffel grass (*Cenchrus ciliaris*) with scattered alien shrublands (H.T. Harvey & Associates, 2024). Such

areas are numerous and well suited for the above activities as they are highly disturbed with a history of vegetation disturbance and landscape level modification, and not suitable for listed species. The contractor could identify disposal and borrow sites (that is, where excavated material would be excavated and stockpiled for application in later stages or removed for off-site disposal). The use of disposal and borrow sites would be subject to standard HDOT specifications and policies, as well as County of Maui and State of Hawai'i environmental regulations and permit requirements. Another pre-development siting element would be the contractor determining whether there is a need to establish a concrete batch plant (where raw materials of aggregate, sand, cement, and water are stored and mixed as needed for highway construction).

- Demolition, Clearing and Grubbing, and Grading: The contractor would develop a schedule that identifies where construction would start and how it would proceed for additional segments. To prepare for new construction activities, the ROW land requiring grading or disturbance would be cleared of existing structures to be demolished and existing vegetation would be removed (grubbing). Grubbing would adhere to USFWS-provided AMMs, including preservation in place of large [> 15 foot tall (4.6m)] trees to avoid and minimize effects to Hawaiian hoary bats (*Lasiurus cinereus semotus*). If they must be removed, they would be cut down outside of the bat birthing and pup rearing season of June 1 to September 15. Additionally, conservation measures below concerning non-native tree tobacco (*Nicotiana glauca)* would be implemented to minimize potential effects to Blackburn's sphinx moth (*Manduca blackburni*) (BSM). The roadway and adjacent areas would then be graded.

- Roadway Substructure and Top Layers: Once the roadway is cleared and grubbed, subsurface utilities would be installed, including drainage infrastructure and the ROW would have rough grading where the alignment and profile of the new roadway would be constructed. As the rough grading gets closer to the finish grade, signal light and streetlight and other future use conduits and pull boxes are installed. The final roadway layers would be based on the contractor's Pavement Design Report, which would indicate the precise thickness of the pavement structure to use and where it would be needed. The USFWS-provided AMMs would be implemented throughout roadway substructure and top layer installation/construction including dedicated monitors during all work, species signage and temporary speed limits for construction vehicles enforced by dedicated personnel – if necessary, and use of buffers and non-barbed wire fencing to avoid species entering the work site.

- New Bridge and Viaduct Construction: While the final design of the new bridges, culverts, and viaduct portions of the Project would be developed by the design build team, for the purposes of the Draft EIS, it is assumed that new structures would be supported on pile foundations. Drilled shaft foundations would be used in areas sensitive to vibration and noise and would be an efficient technique at selected pier bents. Abutment and wingwall footings would also be on piles. Construction of the bridge and viaduct portions of the Project would involve completing piers, columns, deck, roadway finishes, and lighting. The designer would determine the type of superstructure and construction methods that would best meet the requirements of the Project. These methods would adhere to the USFWS-provided AMMs, listed in Section 3 and Section 5.

- Completion and Build Out: Once the roadway prism is installed and the final layer of concrete has achieved strength to support construction vehicles, striping would be installed. Guardrail would be used to prevent vehicles from departing the roadway onto unrecoverable slopes and to shield roadside obstructions. Guardrails may be installed before the final pavement layer is installed. Throughout completion and build out, dedicated personnel would monitor the work site (where work is currently being done) for any listed species, as well as enforcing temporary

speed limits to avoid collisions with listed species. However, collisions with listed species would be avoided as buffer zones and non-barbed wire fencing would keep listed species away from the work site.

Culverts, Bridges, and Viaduct Structures—The highway design includes culverts, bridges, and viaduct structure (a viaduct is a longer multi-span bridge) that allow for stream crossings and avoid or minimize potential adverse environmental effects. The ultimate determination of culvert and bridge specifications, or the use of viaducts to span larger areas, would be based on the length of the span required, and in consideration of avoiding and minimizing effects to mapped wetlands and recorded Hawaiian goose (*Branta sandvicensis)* and Hawaiian stilt (*Himantopus mexicanus knudseni*) loafing areas, as well as avoiding the sea-level rise exposure area (SLR-XA). Constructability and cost would also play a role in culvert, bridge, and viaduct specifications.

Two bridge structures would be provided over the perennial Olowalu Stream and the Ukumehame Stream with abutments and piers located outside the Ordinary High Water Mark elevation to ensure that the critical structural components of the bridge are not intruding into the stream's natural course. Bridges, culverts, and/or a viaduct would be required for crossing another five non-perennial streams and ditches in Olowalu and six non-perennial streams and ditches in Ukumehame. Per HDOT drainage design standards, during the design build phase of the Project, all culverts and bridges would be designed for a 50-year storm and a 100-year storm would be used to analyze crossings within mapped floodways on Federal Emergency Management Agency Flood Insurance Rate Maps. Each crossing would have a separate bridge crossing per two-lane segments and a typical elevation and section (which would vary by span length and height) is shown in Figure 5 for a short-span bridge and Figure 6 for a long-span bridge.

In the Ukumehame area, the Project would include a two-lane viaduct (see Figure 7). The locations of the piers for the viaduct were assumed. The designer of record would determine the final locations. The conceptual design viaduct in the Ukumehame area is approximately 3,678 feet long (1,121m) with approximate varying elevations of 10 feet (3m) near take-off and up to 20 feet (6m) (Figure 8). The above ground height of the viaduct over the wetlands and nearest the Hawaiian goose and Hawaiian stilt loafing areas would be 20 feet (6m). This above ground height would allow waterbirds to traverse the low-lying Ukumehame area safely (under the viaduct) without need to cross the new highway, as well as permit maintenance vehicles to work within the detention basin and allow for the continued use of the firing range driveway from the existing highway, which would pass underneath the viaduct structure.

Existing Honoapi'ilani Highway—The Project would not make any changes to the existing Honoapi'ilani Highway, although it is proposed to become the jurisdiction of County of Maui. Following this jurisdictional change, the operation and maintenance of the existing highway is outside the scope of this proposed action.

Figure 5. Typical Short Span Bridge Elevations and Sections

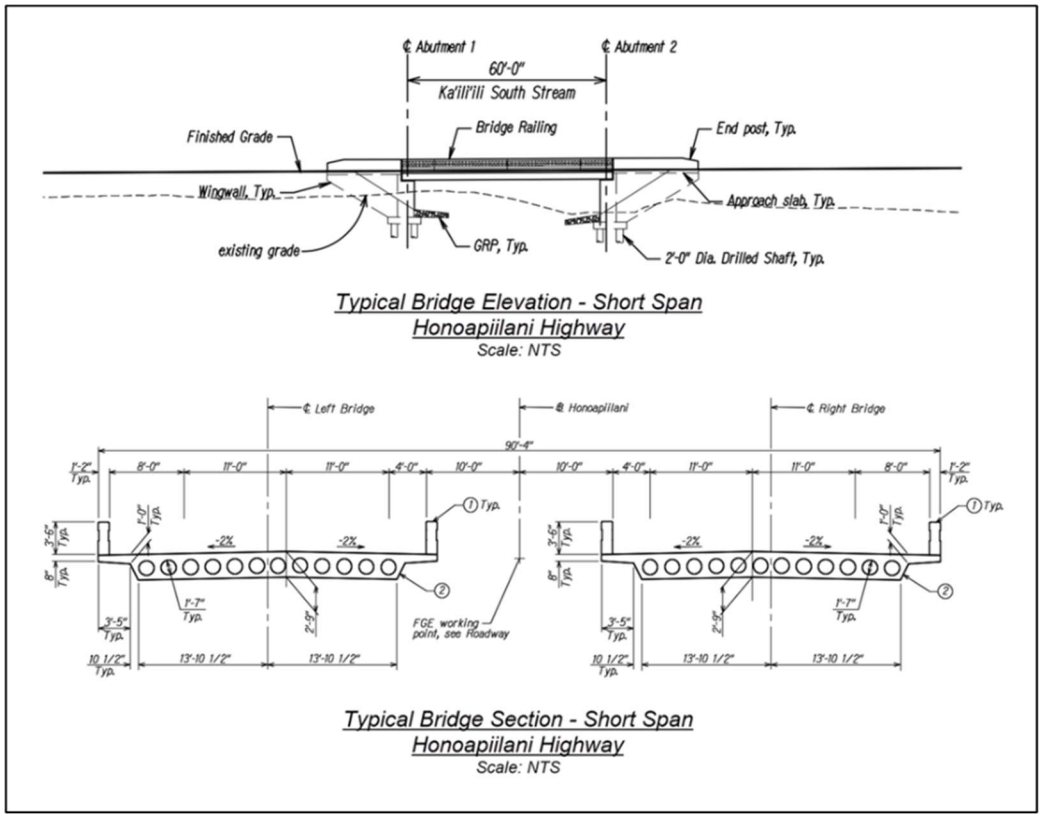


Figure 6. Typical Long Span Bridge Elevation and Section

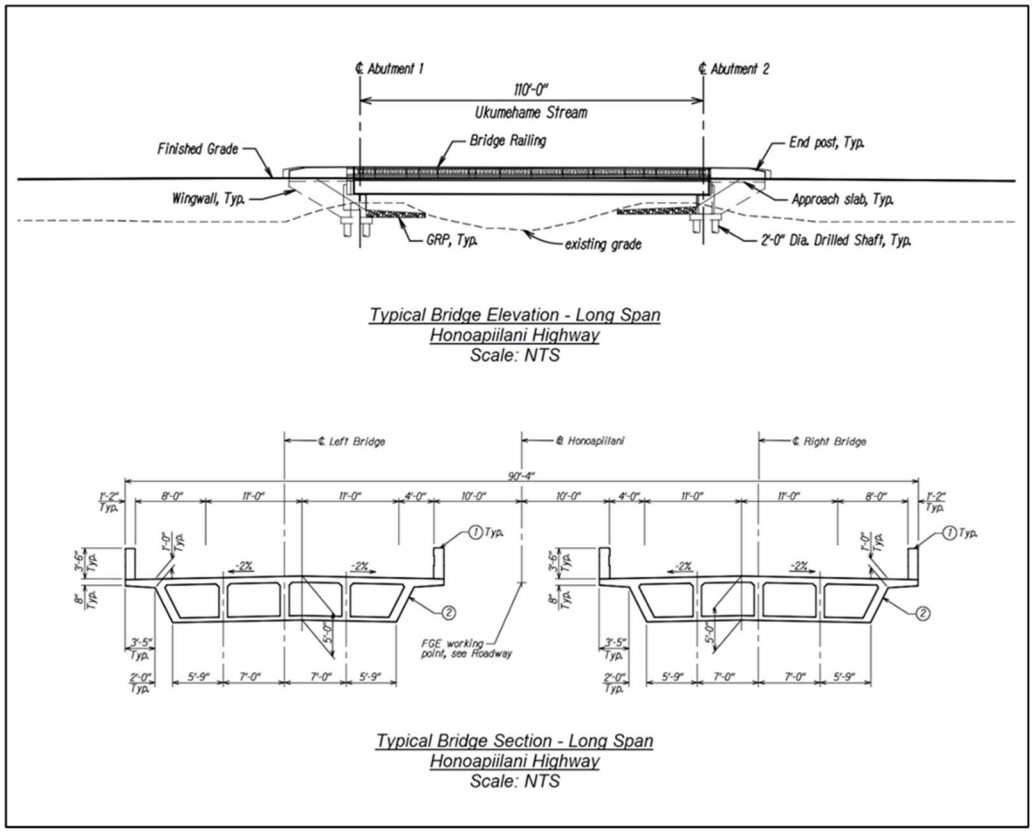
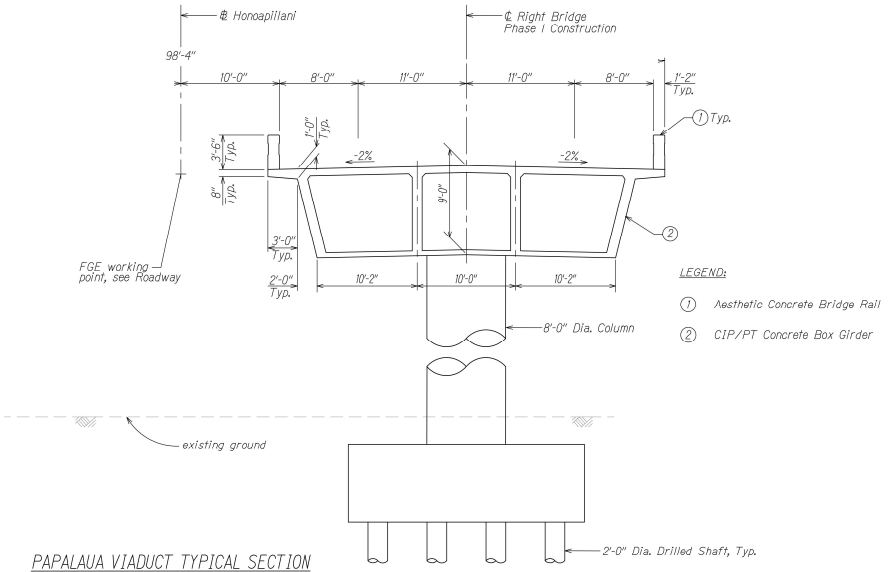


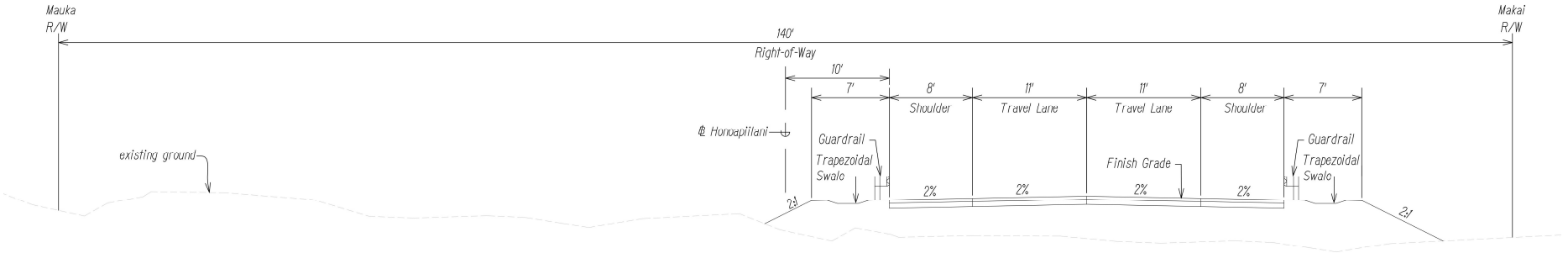
Figure 7. Preliminary Viaduct Structure - Ukumehame



Figure 8. Typical Viaduct Section and Elevation



PAPALAUA VIADUCT TYPICAL SECTION
Scale: 3/16"=1'-0"
Sta. 257+00 to Sta. 288+00



Typical Section - Two Lane Roadway
Honoapiilani Highway
Scale: 1"=5'

Sta. 250+00 to Sta. 257+00
Sta. 288+00 to Sta. 302+01

2.2.2 Operations and Maintenance

The maximum directional operational volume is estimated at 1,900 vehicles per hour (vph) for the new highway, 325 vph more than the existing highway. This higher maximum directional operational volume for the new highway is projected because of better management of the number of accesses and improved roadway segment and intersection configurations. Traffic control devices would be a mixture of two-way stops and traffic signals at various locations along the new highway. There are five intersections planned for the new highway. One would provide access to the Olowalu Recycling and Refuse Convenience Center as well as a former cinder mining quarry currently used as a temporary storage site for ash and debris from the Lāhainā wildfire just west of mile marker 16. In Olowalu, other intersections include an unsignalized t-intersection planned at North Road - halfway between mile markers 16 and 15, and a signalized four-legged intersection at Luawai Street – halfway between mile markers 15 and 14. This area is highly disturbed and is composed of buffel grass dominated grassland (H.T. Harvey & Associates, 2024). In Ukumehame, two signalized four-legged intersections are planned at Ehehene Street and Pohaku Aeko Street – east and west of mile marker 13. A single lane viaduct structure would carry the new highway across the HDOT detention basin and the firing range, east of mile marker 12, allowing for the continued use of the firing range driveway from the existing highway, which would pass underneath the viaduct structure.

Guardrails would be used to prevent vehicles from departing the roadway onto unrecoverable slopes and to shield roadside obstructions. These guardrails would also deter wildlife from attempting to cross the road. The viaduct structure in Ukumehame would allow for wildlife to more easily pass underneath than to fly up and onto the new highway. Setback of vegetation maintenance would be approximately 15-feet off the edge of the shoulder such that the new highway would have a vegetation-free shoulder.

Maintenance activities include roadway resurfacing and repair, drainage system maintenance, traffic control device maintenance, vegetation control, bridge and structure inspection, and emergency response. Typical inspection and maintenance intervals by HDOT crews can be found in Table 1. As-needed maintenance addresses critical items that are fond during these more frequent, less detailed inspections – pothole repairs, guardrail repairs, sign replacement, etc. Large scale maintenance projects, such as full roadway resurfacing, would be done approximately every 10-15 years.

Table 1. Typical Maintenance and Inspection Activities During Operation

Infrastructure Category	Inspection Interval	Typical Maintenance Interval
Vegetation Control	weekly	5 weeks
Traffic Control Devices (signs, striping etc.)	weekly	As needed
Bridges / Structures	2-years	As needed
Drainage Systems (Culverts)	As needed	As needed
Roadway Pavement	weekly	As needed

3. Avoidance and Minimization Measures

This section describes the avoidance and minimization measures (AMMs) that would be implemented as part of the proposed action to further reduce the extent of effects on ESA-listed species. Additional information regarding species-specific AMMs are provided in the writeup for each species in Section 5.

Daily visual surveys by trained competent observers, dedicated personnel on the construction staff who have been trained by the on-site biologist, would be conducted prior to the start of and during construction work to check for presence of listed species nests. Should nests be observed, then species-specific conservation measures listed in Section 5 would be implemented.

Additional conservation measures for the five species (Hawaiian Hoary Bat, Hawaiian coot, Hawaiian goose, Hawaiian stilt, and BSM) include presence of an on-site biologist during construction activities, and monitoring by trained competent observers prior to the start of and during construction, use of buffer zones and non-barbed wire fencing around active work sites to avoid species interaction with humans, minimizing unnecessary noise at the project site through prohibiting music if listed birds are observed during daily monitoring and noise reducing construction BMPs, incorporating permanent highly visible signs throughout the Ukumehame area alerting workers of the presence of listed waterbirds in the project area to reduce the chance of vehicle collisions (Figure 6.), posting and enforcing reduced speed limits by dedicated personnel during construction in the Ukumehame area, and prohibition of cat feeding stations in the AA (enforced by dedicated personnel during daily surveys). The contractor would also secure all temporary structures to avoid them blowing over during heavy winds and hitting listed bird species.

Figure 6. Example of Highly Visible Hawaiian Goose Sign



Worker Environmental Awareness Training (WEAT) for ESA-listed species would be performed prior to work by personnel on the project for both construction and O&M phases. The crew would be instructed on Hawaiian coot, Hawaiian stilt, and Hawaiian goose identification, behavior, including nesting behavior and ecology and would be instructed on daily monitoring protocol and ecology and biology and to contact a qualified biologist if any ESA-listed species is seen on or near the work site during the daily monitoring conducted while construction is occurring. Work would be postponed in the interim until the biologist can advise on next steps. The daily monitoring protocol would include designated personnel to walk the project site every morning prior to the start of construction work to determine if any ESA-listed species nests are present at the work site and note if any listed individuals were present. Construction crews are not allowed to haze Hawaiian coots or Hawaiian stilts from or near the construction site. Under the 2019 USFWS 4(d) rule, hazing of Hawaiian geese is allowed in certain circumstances. If deemed necessary to prevent nesting by the USFWS, the dedicated on-site biological monitor may perform hazing or other deterrent measures as long as such actions conform to said rule (USFWS, 2019).

3.1 Aquatic BMPs

Tables 2 and 3 below provide a list of aquatic BMPs that would be incorporated into the proposed action.

Table 2. Aquatic BMPs To Be Incorporated into Proposed Action

Topic	BMP
Waste Management	Concrete wastes, solid wastes, and any sanitary/septic wastes would be located away from and managed to assure no contamination to the ocean or critical habitats.
Vehicle and Equipment Management	All vehicles and equipment cleaning, maintenance, and refueling would be located away from and managed to assure no contamination to the critical habitats. Invasive species controls shall be maintained to ensure that all materials transported from off-site are free of such species.
Stormwater Management and Erosion Control	The project would require an NPDES permit with a SWPPP. The Contractor would be required to install and maintain BMPs as part of the proposed project. Site-specific stormwater BMPs would be implemented and/or installed at the staging and work areas to prevent water quality degradation associated with stormwater runoff. Stormwater BMPs would include maintaining equipment in good working order, storing equipment and materials away from the ocean or stream bank with strategic placement of absorbent material, such as fiber rolls, as a buffer between equipment and nearby waterbodies. Drip pans shall also be maintained beneath construction equipment. The Contractor would be required to prevent any debris from falling into the water.
Water Pollution	The HDOT Standard Specifications for Road and Bridge Construction Section 209 Temporary Water Pollution, Dust, and Erosion Control would be followed.
Construction	The project would require temporary construction laydown areas. Stockpiling, storage, and equipment staging would utilize appropriate BMPs to prevent potential surface runoff from entering the stream. No stockpiling, storage, or heavy equipment would be placed in the streams.
For Physical Impacts to Benthic Communities	1. Prevent trash and debris from entering the marine environment during the project. 2. For anticipated stream crossings, all temporary structures must be removed at the completion of in-water work. 3. For anticipated stream crossings, do not stockpile or stage materials in the marine environment unless absolutely necessary. Place material that is stored in the marine environment on unconsolidated sediments devoid of coral and seagrass.
For Increase in Sedimentation and/or Turbidity	1. Install sediment, turbidity, and/or pneumatic curtains, and use real-time monitoring (automated or manual) to detect failure and implement stop-work processes if pre-determined project thresholds are reached (use standards from Clean Water Act 401 water quality certification). In areas of soft sediment, consider partial length turbidity curtains to reduce resuspension of sediment during high winds and currents. 2. Maintain baseline water flow, volume, and velocity of the waterbody. 3. Use natural or bio-engineered solutions when feasible. 4. Fully stabilize disturbed upland areas prior to removing silt fences and erosion prevention measures.

	5. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction conditions and elevations. 6. Minimize disturbances to stream banks, and place abutments outside of the floodplain whenever possible. Seek to maintain baseline water flow volume and velocity within the system. 7. Design the structure to maintain or replicate natural stream channel and flow conditions to the greatest extent practicable. 8. Revegetate shoreline areas with appropriate native species and fully stabilize disturbed upland areas prior to removing silt fences and erosion prevention measures.
For Increase in Nutrients, Pollution, Contaminants, and Freshwater	1. Conduct work during the dry season when possible; stop work during storms or heavy rains. 2. Prevent discharges into the water. 3. Inspect all equipment prior to beginning work each day to ensure the equipment is in good working condition, and there are no contaminant (e.g., oil, fuel) leaks. Work must be stopped until leaks are repaired, and equipment is cleaned. Equipment should always be stored in appropriate staging area designed to be preventative in terms of containing unexpected spills when equipment is not in use or during fueling. 4. All fueling or repairs to equipment must be done in a location with the appropriate controls that prevent the introduction of contaminants to marine environment. 5. Fueling of project-related vehicles and equipment shall take place at least 50 feet, or the maximum distance possible, from the water and within a containment area, preferably over an impervious surface. 6. Use of treated wood that would be in contact with the water is not authorized. 7. Use materials that are nontoxic to aquatic organisms, such as untreated wood, concrete, or steel (avoid pressure treated lumber). 8. Prevent bentonite and other drilling fluids from contacting benthic organisms. 9. Prevent discharges of chemicals and other fluids dissimilar from seawater into the water column.
Observations and Monitoring	Contractors would monitor for the presence of ESA-listed species during all aspects of the permitted action. - A responsible party, i.e., permittee/site manager/project supervisor, would designate a competent observer to be trained by a qualified biologist and to search/monitor work sites and the areas adjacent to the authorized work area for ESA-listed species. - Trained competent observers would survey the area before the start of work each day, including before resumption of work following any break of more than one-half hour.
Monitoring Plan	The Action Agency would ensure that a monitoring plan identifies the methods, equipment, communication, and all necessary measures to adequately observe ESA-listed species in the affected areas and communicate with workers. -The Action Agency would ensure that trained competent observers are exclusively looking for ESA-listed species at the work site and not assigned to other tasks. - Trained competent observers shall report to the workers when motile ESA-listed marine species are within 50 meters (54.7 yards, 164 feet) of the proposed work and halt work and shall only begin/resume after the animals have voluntarily departed the area. - If listed species are noticed in the area after work has already begun, that work may continue only if, in the best judgment of the project supervisor, there is no way for the activity to adversely affect the animal(s).
Human Interaction	Project-related personnel would NOT attempt to disturb, touch, ride, feed, or otherwise intentionally interact with any protected species.

Inspections	The project manager or heavy equipment operators would perform daily pre-work equipment inspections for leaks. Detection of leaks would result in postponing or halting the use of heavy equipment until the leak is repaired and the equipment cleaned. - The Action Agency would ensure that trained competent observers are exclusively looking for ESA-listed species at the work site and not assigned to other tasks. - The worksite would have sufficient materials to contain and clean possible spills. - Equipment storage would occur in an appropriate staging area designed to prevent unexpected spills when equipment is not in use or during fueling. - Drip pans would also be maintained beneath construction equipment. The contractor must keep the water free of debris.
Night Work	Avoid nighttime work during the nesting and hatching season, which extends from May through December.
Turbidity and Sedimentation Control	Turbidity and sediment from project-related work would be minimized and contained to the immediate vicinity of the project through the appropriate use of effective sediment containment devices and the curtailment of work during adverse tidal and weather conditions. - All silt fences, curtains, and other structures would be installed properly and maintained in a functioning manner for the life of the construction period and until the impact area is permanently stabilized, self-sustaining, and/or turbidity levels, elevated due to construction, return to ambient levels. - Use real-time monitoring (automated or manual) to detect failure and implement stop-work processes if predetermined project thresholds are reached (use standards from Clean Water Act 401water quality certification). - In areas of soft sediment, consider partial-length turbidity curtains to reduce the resuspension of sediment during high winds and currents.
Streambank Disturbance	Minimize disturbances to stream banks. Seek to maintain baseline water flow volume and velocity within the system.
Revegetation	Revegetate shoreline areas with appropriate native species and fully stabilize disturbed upland areas before removing silt fences and erosion prevention measures.
Material Handling	Project construction-related materials (fill, revetment rock, pipe, etc.) would not be stockpiled in or near aquatic habitats, to prevent materials from being carried into waters by wind, rain, or high surf.
Stream Crossings	For anticipated stream crossings, removal of all temporary structures would occur at the completion of in-water work.
Stream Crossing and Construction Materials	For anticipated stream crossings, do not stockpile or stage materials in the marine environment unless necessary.
Wood Material	The use of treated wood for in-water work is not authorized.
Discharge into Water	Prevent discharges of chemicals and other fluids dissimilar from seawater into the water column. - Concrete wastes, solid wastes, and any sanitary/septic wastes would be located away from and managed to ensure no contamination of the ocean or critical habitats. - Site-specific storm water BMPs would be implemented and/or installed at the road staging and work areas to prevent water quality degradation associated with storm water runoff. - Project-related materials and equipment placed in the water would be free of pollutants.

Table 3. USFWS Recommended Standard BMPs for Aquatic Environments

BMP	Description
1.	Construction staff would be informed of the potential presence of threatened and endangered species, including being provided materials to assist in species identification and appropriate actions if a species enters the work area.
2.	Good housekeeping practices and erosion-control device(s) shall be employed at the job site to prevent debris and soil from leaving the site.
3.	Upon completion of the Project, all construction-related debris and sediment containment devices shall be removed and disposed of at an approved site.
4.	A litter-control plan shall be developed and implemented to prevent attraction and introduction of nonnative species.
5.	Invasive species controls shall be maintained to ensure that all materials transported from off-site are free of such species.
6.	Project construction-related materials shall not be stockpiled in, or in proximity to aquatic habitats and shall be protected from erosion (for example, with filter fabric) to prevent materials from being carried into waters by wind, rain, or high surf.
7.	Fueling of Project-related vehicles and equipment shall take place away from the aquatic environment. A contingency plan to control petroleum products accidentally spilled during the Project shall be developed. The plan shall be retained on-site with the person responsible for compliance with the plan. Absorbent pads and containment booms shall be stored on-site to facilitate the clean-up of accidental petroleum releases.
8.	All deliberately exposed soil or under-layer materials used in the Project near water shall be protected from erosion and stabilized as soon as possible with geotextile, filter fabric or native or noninvasive vegetation matting, hydroseeding, etc.

3.2 Invasive Species BMPs

Table 4 below provide a list of invasive-species BMPs that would be incorporated into the proposed action.

Table 4. Invasive Species BMPs

Description
All construction equipment and vehicles should arrive at the work site for the first time in clean condition and free of: any soil; plants or plant parts, including seeds; insects, including eggs; and reptiles and amphibians, including their eggs. Similarly, all construction equipment and vehicles should be cleaned after use in the project area and before leaving the site. This would be particularly important for equipment movement between the project area and the other islands.
All materials imported to the project area, including gravel, soil, rock, and sand, should be certified weed free. Invasive species found on stockpiled materials should be removed either chemically or mechanically.
Only weed-free seed mixtures should be used for hydroseeding and hydromulching on the project area. A qualified botanist should inspect the seeded areas a minimum of 60 days after the hydroseed/hydromulch is applied. Any species of plant other than those intended to be in the

hydroseed/hydromulch should be removed. In particular, plant species that are not known to occur on Maui and those that are actively being controlled on the island should be removed.
To the extent feasible the Project should use native plants for revegetation or landscaping purposes. These species are included in Appendix D of the 2023 Biological Resources Report and. If native plants do not meet landscaping objectives, plants with a low risk of becoming invasive may be substituted. Additional information on selecting appropriate plants for landscaping can be obtained from the Plant Pono website and following County of Maui Planting Guidelines.
Only plants grown on Maui should be used for landscaping purposes. If locally grown plants are unavailable, then imported plants may be used, but they should be thoroughly inspected or quarantined if necessary to ensure that they are free from invasive pests such as little fire ants and invasive plant seeds and seedlings that could arrive inadvertently.

4. Species Presence and Status

A total of 20 ESA-listed species under USFWS jurisdiction were identified on the IPaC species list as having the potential to occur within the Action Area (see Table 4). As discussed in Section 1, a separate consultation has been conducted with NMFS for ESA-listed species and critical habitats and Essential Fish Habitat under their jurisdiction.

The eleven species of wildlife identified on the IPAC list includes eight bird species, one species of bat, one species of marine turtle, and one species of moth. FHWA's consultation request documented that with the incorporation of Avoidance and Minimization Measures into the proposed action, the proposed action **may affect, but is not likely to adversely affect** these 11 species. Additional analysis of effects for five of these species are provided in Section 5 of this document.

Nine ESA-listed plant species were identified on the IPAC list. However, none of these species were found during field surveys conducted in 2023 and habitat suitability is limited for these species within the AA (H.T. Harvey & Associates 2024). For this reason, these species are unlikely to occur within the AA and the proposed action would have **no effect** on any ESA-listed plant species.

Critical habitat has been designated for one species of moth (Blackburn's sphinx moth), and for seven of the species of plants identified on the IPaC list. However, none of this critical habitat occurs within the AA. For this reason, the proposed action would have **no effect** on any designated critical habitat for species under USFWS jurisdiction.

Table 4. ESA-Listed Species with Potential to Occur Within the Action Area.

Common Name	*Scientific Name*	ESA Status	Effect Determination
Hawaiian hoary bat	*Lasiurus cinereus semotus*	E	NLAA
Band-rumped storm petrel	*Hydrobates castro*	E	NLAA
Hawaiian coot	*Fulica alai*	E	NLAA
Hawaiian duck	*Anas wyvilliana*	E	NLAA
Hawaiian goose	*Branta sandvicensis*	T	NLAA
Hawaiian petrel	*Pterodroma sandwichensis*	E	NLAA
Hawaiian stilt	*Himantopus mexicanus knudseni*	E	NLAA
Newell's shearwater	*Puffinus newelli*	T	NLAA

Short-tailed albatross	*Phoebastria albatrus*	E	NLAA
Green sea turtle	*Chelonia mydas*	T	NLAA
Blackburn's sphinx moth	*Manduca blackburni*	E	NLAA
ʻenaʻena	*Pseudognaphalium sandwicensium* var. *molokaiense*	E	No Effect
Awiwi	*Schenkia sebaeoides*	E	No Effect
Carter's panicgrass	*Panicum fauriei* var. *carteri*	E	No Effect
Dwarf Naupaka	*Scaevola coriacea*	E	No Effect
Ihi	*Portulaca villosa*	E	No Effect
Koʻoloaʻula	*Abutilon menziesii*	E	No Effect
Ohai	*Sesbania tomentosa*	E	No Effect
Round-leaved Chaff-flower	*Achyranthes splendens* var. *rotundata*	E	No Effect
Vigna o-wahuensis	*Vigna o-wahuensis*	E	No Effect

T = threatened, E = endangered.

5. Supplemental Effects Analysis

This section provides additional analysis of effects of the proposed action for five of the species identified in FHWA's consultation request. For analysis regarding the other species not addressed in this document, please refer to the consultation request.

5.1 Hawaiian Hoary Bat

5.1.1 Species Background

The Hawaiian hoary bat *(Lasiurus cinereus semotus)* was listed as endangered pursuant to the ESA in 1970 without critical habitat. The species uses a variety of habitats that include open pastures and forested areas in both native and non-native habitats (DLNR 2005). Hawaiian hoary bats are known to roost in large [typically greater than 15-foot-tall (4.6m)] dense-canopy trees, sometimes at the edges of water bodies, such as streams and lakes (USFWS 1998). Typically, this species feeds over streams, bays, along the coast, over lava flows, or at forest edges. The Hawaiian hoary bat is an insectivore and prey items include a variety of native and non-native night-flying insects, including moths, beetles, crickets, mosquitoes, and termites (Whitaker and Tomich 1983). Hawaiian hoary bats may hunt for flying insect prey along roadways, gulches, and open areas and occasionally roost in large, dense-foliage trees. Hoary bats birthing and pup rearing season is July 1 to September 15. Mother bats stay with the pups until they are at least six or seven weeks old during which time the pups are completely dependent on the mother (DLNR 2015).

5.1.2 Presence in Action Area

No formal surveys were conducted for Hawaiian hoary bat during the reconnaissance-level biological studies for the project. However, there are records for this species on Maui and it is therefore assumed that this species may potentially occur within the AA (Tomich 1986, DLNR 2015).

The vast majority of the AA overlaps grassland habitat with few scattered large trees. Some large trees could provide suitable habitat for the Hawaiian hoary bat (H.T. Harvey & Associates, 2024).

5.1.3 Avoidance and Minimization Measures

In addition to the avoidance and minimization measures described in Section 3, which would avoid and minimize impacts broadly for all habitats and species, the following avoidance and minimization measures would specifically serve to further reduce the potential for effects to Hawaiian hoary bats.

- To the greatest extent possible, large [> 15 foot tall (4.6m)] trees would be preserved in place. If they must be removed, they would be cut down outside of the bat birthing and pup rearing season of June 1 to September 15.
- The Project would not use barbed wire for fencing.

5.1.4 Effects Analysis

It is assumed that hoary bat may potentially be in the AA, and that potentially suitable habitat does occur. However, this species is largely active at night and there would be no night work or night lighting during construction or operations and maintenance (O&M). The USFWS-recommended AMMs described in Section 5.1.3 would be incorporated for the proposed action, which would further reduce the potential for any effect to individuals. It is possible that some potentially suitable habitat would be affected, however the extent of any effect associated with the habitat impact would be minimal, and would not result in adverse effect.

5.2 Hawaiian Coot

5.2.1 Species Background

The Hawaiian coot (*Fulica alai*) was listed under the ESA as an endangered species in October 1970 (USFWS 1970) without critical habitat. The species' distribution on Maui is mostly limited to Kanaha Pond (~14 miles from AA southern terminus), Kealia Pond (~12 miles from AA southern terminus) and Nuu pond (~50 miles from AA southern terminus). Hawaiian coots are usually found in coastal plain wetlands below 1,320 feet (400m) and feed on land and in water on a wide variety of food items including seeds, leaves, crustaceans, insects, tadpoles, and small fish. Their nesting habitat includes freshwater and brackish water ponds, irrigation ditches, and taro fields. They construct floating nests made from aquatic vegetation on open water or anchored to emergent vegetation. Hawaiian coots nest yearlong but mostly between March and September. The start of nesting is usually associated with rainfall because water levels are critical to nest success (DLNR 2024).

5.2.2 Presence in Action Area

Hawaiian coots were not observed during the field studies conducted in 2023 for the Project, though potentially suitable habitat in the form of agricultural reservoirs (in Olowalu Reservoir) and taro fields and ditches (in Ukumehame region) do exist within the AA. (H.T. Harvey & Associates 2024). Altering wetland habitats for flood control or to allow them to serve as municipal water sources makes them generally unsuitable for Hawaiian coots (DLNR 2015). There are documented records of Hawaiian coots in the vicinity of Lahaina (~ 6.5 miles to the northern terminus) and in the vicinity of Maalaea (~9.4 miles to the southern terminus) (ebird 2024). On July 4, 2024, there was an incidental observation of Hawaiian coot in the southern end of the AA along the existing highway (ebird 2024).

5.2.3 Avoidance and Minimization Measures

In addition to the avoidance and minimization measures described in Section 3, which would avoid and minimize impacts broadly for all habitats and species, the following avoidance and minimization measures would specifically serve to further reduce the potential for impacts to Hawaiian coots:

- A qualified biological monitor familiar with the species' identification and biology would conduct a pre-construction survey for Hawaiian coot nests where appropriate habitat occurs (listed above) within the vicinity of the work site, within three days of the initiation of project work. These nest surveys would be repeated within three days of project initiation, and after any subsequent delay of work of three or more days following the initiation of project construction (during which the birds may attempt to nest).
- If a nest or active brood is found the biological monitor would contact the Service, or would immediately inform the Project manager, either of which would:
    - Contact the Service within 48 hours upon discovery of the nest for further guidance.
    - Upon discovery of an active nest or nests, immediately establish and maintain a 100-foot buffer around all active nests and/or broods until the chicks have fledged. No potentially disruptive activities or habitat alteration would occur within this buffer.
    - Have a biological monitor that is familiar with the species' biology present on the project site during all construction or earth moving activities until the chicks/ducklings fledge to ensure that Hawaiian waterbirds and nests are not adversely impacted.
- Reduced speed limit signs of 15 mph through the Olowalu area and 10 mph in the Ukumehame area would be posted at the project site during construction.
- If observed during daily visual surveys or after work has begun, work in the vicinity of a loafing or foraging Hawaiian coot can begin only after the birds have left on their own and a 100-foot buffer maintained until that time.

5.2.4 Effects Analysis

Hawaiian coots have not been observed within the AA, though wetlands and aquatic habitats in the AA and vicinity represent potentially suitable habitat. The wetlands associated with this project do not appear to provide quality nesting habitat and it is most likely that a Hawaiian coot on site would be utilizing the wetlands as merely a temporary foraging area if water depths are suitable. The extent of anticipated habitat suitability is as temporary foraging habitat, in areas and at times of year when water depths are suitable.

Adverse effects to wetlands would reduce the availability of foraging habitat for coots, which would represent a potential effect. However, any adverse effects to wetlands would require permit authorizations from the U.S. Army Corps of Engineers, and compensatory mitigation would be required as part of these permits to ensure no net loss of wetlands or wetland function. With the implementation of avoidance and minimization measures listed above, the proposed action may affect, but is not likely to adversely affect Hawaiian coot.

5.3 Hawaiian Goose

5.3.1 Species Background

The Hawaiian goose (*Branta sandvicensis*) was protected as an endangered species in 1967 before being downlisted to a threatened species in 2019 with a 4(d) rule (USFWS 1967, 2019). USFWS has not designated critical habitat for the Hawaiian goose. A 2018 statewide population estimate was 2,855 individuals with 616 on Maui (USFWS 2018). The species is non-migratory with daily flights typically in early morning and late afternoon. Their extended breeding season has eggs being laid from August to April with the majority of the goslings hatching in December and January (Banko et al. 1999;USFWS 2004, 2018). Hawaiian geese nest on the ground in a shallow scrape in the shade of dense shrubs or

other vegetation. Goslings are flightless for 10 to 12 weeks and adults are flightless for a period of 4 to 6 weeks during their molt, which occurs between February to May. During June to September after molting and fledging, family groups frequently congregate in post-breeding flocks often far from nesting areas (USFWS 2004, 2019). Hawaiian geese appear to exhibit seasonal movements in response to foraging opportunities, shifting to grasslands during periods of low native browse and berry production and when wet conditions produce grass with high-water content and resultant higher protein content.

5.3.2 Presence in Action Area

Hawaiian geese were observed on three occasions in the AA during field surveys conducted for the proposed action (H.T. Survey & Associated 2024). The observed individuals were foraging or loafing, and neither nesting behavior nor eggs, nests, or goslings were documented in the AA (H.T. Survey & Associated 2024).

On January 3, 2023, four individuals were spotted at the Ukumehame Firing Range (see Figure 7) near the classroom building in a shallow muddy pond formed by recent rains. Two of these individuals were banded. The assumed same four individuals were observed the next day, January 4, 2023, in the same location. On March 22 and April 28, 2023, two additional Hawaiian geese were sighted again at the firing range, near the classroom. One individual was also seen loafing in the open grassy area in Ukumehame subdivision at the intersection of Pohaku Aeko Street and Paekii Place on March 23, 2023 (see Figure 7). This individual was also a banded bird. In total, seven Hawaiian geese have been observed in the Ukumehame area of the AA, three of which were banded. No Hawaiian geese were observed in the Olowalu area; however, a landowner reported that the birds can be present in grassy areas, particularly near the water reservoir (outside of the AA) (Larse *pers. comm.* 2023). However, Larse (2023) had not seen them as frequently as in past years.

Most Hawaiian geese on Maui do not frequent the AA, as National Park Service (NPS) reports the elevational range of the Hawaiian goose population on the West Maui Mountains to be between 3,000-4,000 feet (914m-1219m) (well above the AA).

5.3.3 Avoidance and Minimization Measures

In addition to the avoidance and minimization measures described in Section 3, which would avoid and minimize impacts broadly for all habitats and species, the following avoidance and minimization measures would specifically serve to further reduce the potential for impacts to Hawaiian Goose:

- Crew would not approach, feed, or disturb Hawaiian geese, if observed in the AA.
- If a Hawaiian goose is observed loafing or foraging within the project site during the breeding season (September through April), then a biologist familiar with Hawaiian goose nesting behavior would survey for nests in and around the project site prior to the resumption of any work. Repeat surveys would be performed after any subsequent delay of work of three or more days (during which the birds may attempt to nest).
- If a nest or active brood is found the biological monitor would contact the Service, or would immediately inform the Project manager, either of which would:
    - Contact the Service within 48 hours upon discovery of the nest for further guidance.
    - Upon discovery of an active nest or nests, immediately establish and maintain a 150-foot buffer around all active nests and/or broods until the chicks have fledged. No work would occur within this buffer.
- The project site would be adequately signposted with high visibility signs alerting crew to presence of Hawaiian geese in Ukumehame (Fig. 6).

- As noted above: if necessary to prevent nesting, the dedicated on-site biological monitor (not construction crew) may perform hazing or other deterrent measures as long as such actions conform to said rule (USFWS, 2019).
- Work within 150 feet of a loafing or foraging Hawaiian goose can begin only after the birds have left on their own.
- For alignment activities near an observed Hawaiian goose, fencing around the work site would be used where practicable to maintain a distance buffer and reduce vehicle strikes. If observations occur within an identified buffer, the contractor would assign a dedicated monitor to alert construction vehicle drivers of their presence and reduce accidental vehicle strikes.

5.3.4 Effects Analysis

Hawaiian geese have been observed within the AA and are likely present at times within the AA, though not in great numbers. Grassland habitats in the AA and vicinity represent potentially suitable foraging and/or nesting habitat for this species. There are also opportunities for nesting around the grassy edges of homesteads, maintained lawns and woodland areas in the Olowalu portion of the AA. However breeding Hawaiian goose were not observed in the AA, and no nests, eggs, or fledglings were observed during the biological surveys conducted for the project.

Hawaiian Geese, if present within the AA during construction, could potentially be affected by the presence of humans and construction equipment. However, the minimization measures described above would avoid the potential for any Hawaiian goose to be directly harmed or injured during construction. Effects associated with direct interactions during construction would be limited to temporary behavioral modification, but it is not expected to result in individual Hawaiian geese abandoning or leaving nests exposed for extended periods.

Impacts to grassland habitats would represent a loss of potentially suitable habitat for Hawaiian geese. However, there are abundant similar grassland habitats both within and outside of the AA that provide a comparable level of habitat suitability, and any effects to potentially suitable habitat would not result in an adverse effect to Hawaiian goose.

With the implementation of conservation measures listed above, therefore, the proposed action may affect but is not likely to adversely affect Hawaiian goose.

5.4 Hawaiian Stilt

5.4.1 Species Background

The Hawaiian stilt (*Himantopus mexicanus knudseni*) was listed under the ESA as an endangered species in October 1970 (USFWS 1970) without critical habitat. USFWS estimates there are typically 350 – 500 stilts present on Maui in a given year (1,500–2,000 individuals statewide). On Maui, the species congregates in Kanaha Pond State Wildlife Sanctuary (~14 miles from AA southern terminus) and Kealia Pond National Wildlife Refuge (~12 miles from AA southern terminus). Hawaiian stilts were observed on two occasions in the AA during the biological surveys that were conducted for the proposed action.

Hawaiian stilts usually lay three to four eggs that are incubated for 23 to 26 days. Stilts are opportunistic feeders that use a variety of aquatic habitats but are limited by water depth and vegetation cover (USFWS 2011). Hawaiian stilts are known to use ephemeral lakes, anchialine ponds, prawn farm ponds, marshlands, and tidal flats. The Hawaiian stilt nesting season normally extends from mid-February through August, with peak nesting varying among years (Robinson *et al.* 1999). This species prefers to nest on freshly exposed mudflats interspersed with low growing vegetation (USFWS 2011). Nesting also occurs on islands in freshwater or brackish ponds. Hydrologic alterations of wetlands, including flood

control and channelization, often make wetland habitat less suitable by altering water depth and timing of water level fluctuations (USFWS 2011). The depletion of freshwater aquifers can cause salt-water intrusion into coastal ground water, altering the salinity of affected wetlands, and reducing habitat suitability (USFWS 2011).

5.4.2 Presence in Action Area

On January 3, 2023, three stilts were seen feeding and loafing in a shallow ponded area by the classroom building at the Ukumehame Firing Range (where Hawaiian geese were also spotted). Three additional stilts, assumed to be the same three, were observed again the following day, January 4, 2023. An individual stilt was again spotted in the Ukumehame area on March 23, 2023, feeding in a ponded ditch. It is uncertain whether this individual was one of the three observed in January. Hawaiian stilts were observed to be either feeding or loafing and no nests were found during the field studies in 2023 (H.T. Harvey & Associates). Given the availability of potentially suitable nesting habitats, however, nesting within the AA cannot be ruled out.

5.4.3 Avoidance and Minimization Measures

In addition to the avoidance and minimization measures described in Section 3, which would avoid and minimize impacts broadly for all habitats and species, the following avoidance and minimization measures would specifically serve to further reduce the potential for impacts to Hawaiian stilt:

- A qualified biological monitor familiar with the species' identification and biology would conduct a pre-construction survey for Hawaiian stilt nests where appropriate habitat occurs (listed above) within the vicinity of the work site, within three days of the initiation of project work. These nest surveys would be repeated within three days of project initiation, and after any subsequent delay of work of three or more days following the initiation of project construction (during which the birds may attempt to nest).
- If a nest or active brood is found the biological monitor would contact the Service, or would immediately inform the Project manager, either of which would:
    - Contact the Service within 48 hours upon discovery of the nest for further guidance.
    - Upon discovery of an active nest or nests, immediately establish and maintain a 100-foot buffer around all active nests and/or broods until the chicks have fledged. No potentially disruptive activities or habitat alteration would occur within this buffer.
    - Have a biological monitor that is familiar with the species' biology present on the project site during all construction or earth moving activities until the chicks/ducklings fledge to ensure that Hawaiian waterbirds and nests are not adversely impacted.
- Reduced speed limit signs of 15 mph through the Olowalu area and 10 mph in the Ukumehame area would be posted at the project site during construction.
- If observed during daily visual surveys or after work has begun, work in the vicinity of a loafing or foraging Hawaiian stilt can begin only after the birds have left on their own and a 100-foot buffer maintained until that time.

5.4.4 Effects Analysis

Hawaiian stilts have been observed within the AA and are likely present at times within the AA, though not in great numbers. Wetland habitats in the AA and vicinity represent potentially suitable foraging and/or nesting habitat for this species. However nesting Hawaiian stilts were not observed in the AA, and no nests, eggs, or fledglings were observed during the biological surveys conducted for the project.

Hawaiian stilts, if present within the AA during construction, could potentially be affected by the presence of humans and construction equipment. However, the minimization measures described above would avoid the potential for any Hawaiian stilts to be directly harmed or injured during construction. Effects associated with direct interactions during construction would be limited to temporary behavioral modification, but it is not expected to result in individual Hawaiian stilts abandoning or leaving nests exposed for extended periods.

At construction sites where work has been temporarily halted, Hawaiian stilts have been known to nest in mud puddles and other ephemeral ponded areas at the construction site. The avoidance and minimization measures described above would be implemented to monitor for the presence of any actively nesting Hawaiian stilts, and if any are observed, to avoid any adverse effect.

Impacts to wetland habitats would represent a loss of potentially suitable habitat for Hawaiian stilts. However, any impacts to wetlands would require permit authorizations from the U.S. Army Corps of Engineers, and compensatory mitigation would be required as part of these permits to ensure no net loss of wetlands or wetland function.

With the implementation of conservation measures listed above, therefore, the proposed action may affect but is not likely to adversely affect Hawaiian stilts.

5.5 Blackburn's Sphinx Moth

5.5.1 Species Background

The Blackburn's Sphinx Moth (BSM) (*Manduca blackburni*) was listed pursuant to the ESA as an endangered species in 2000 with designated critical habitat in 2003 (USFWS 2000, 2003). Once distributed across all main Hawaiian Islands, the BSM's current range is limited to the islands of Maui, Molokai, Lanai, and Hawaii with the largest populations occurring on Maui and Hawaii. The 2005 USFWS Recovery Plan for BSM identifies management units on Maui for BSM, none of which are within 14 miles of the AA. These units are at Waihee (~14.5 miles away), Kanaha Pond (~14 miles away), Puu O Kali (~30 miles away), and Ahihi-Kinau (~24 miles away) (USFWS 2005). The species' short life span as an adult, rarity, and mobility makes estimating the BSM population sizes difficult. Despite this, it is believed that populations have declined over the past 100 years since the moth no longer occurs on several islands on which it had been recorded. The BSM can be found across a broad elevational gradient from sea level to 5,000 feet (1,540m) and the have been documented to occur in West Maui (USFWS 2023).

The BSM is the largest native Hawaiian insect with a wingspan of up to 15 cm (5 inches). Adult BSMs are found year-round but may be most active between January and April and again between September and November, especially after rain events. Adults have been observed feeding on the nectar of koaliawa (*Ipomoea indica*), while other species of Ipomoea, maiapilo (*Capparis sandwichiana*), and iliee (*Plumbago zeylancia*) are also thought to be food plants for the adult moth. The BSM lay eggs on and the larvae or caterpillars feed on plants in the nightshade family (Solanaceae), especially native trees in the genus *Nothocestrum*, but also on non-native solanacious plants such as commercial tobacco (*Nicotiana tabacum*), tree tobacco (*N. glauca*), eggplant (*Solanum melongena*), tomato (*Lycopersicon esculentum*), and Jimson weed (*Datura stramonium*). Development from egg to adult may be as short as 56 days, but pupae may aestivate (i.e., period of dormancy during hot or dry conditions) in the ground for as long as a year (DLNR 2015). Although BSM larvae feed on the non-native tree tobacco, USFWS does not consider this plant to be a necessary biological requirement for this species due to the ephemeral nature of this plant species and its intolerance to drought.

5.5.2 Presence in Action Area

The BSM was not observed in the AA during the biological field surveys for this proposed action. However, on March 25, 2023, three individual host plants of tree tobacco (*Nicotiana glauca*) about 5-6 feet tall (1.5m-1.8m) were observed in the Mixed Alien Shrubland in the vicinity of Olowalu Residential Recycling and Refuse Center of the AA. No BSM caterpillars were seen on these plants and no signs of feeding damage were observed either. A close inspection of the leaves did not reveal the presence of BSM eggs. Except for three tree tobacco plants in the Olowalu area, none of the adult food plants or larvae host plants were found in the AA. Larval host plants such as the tree tobacco, tomato, and Jimson weed are widespread on Maui and can establish, particularly after ground disturbance activities at the Project site.

It is possible but unlikely, that BSM occur within the AA with any regularity, and the habitat suitability for this species is low, being limited to the three observed host plants. Nevertheless, it is possible that BSM could potentially occur within the AA.

5.5.3 Avoidance and Minimization Measures

In addition to the avoidance and minimization measures described in Section 3, which would avoid and minimize impacts broadly for all habitats and species, the following avoidance and minimization measures would specifically serve to further reduce the potential for impacts to BSM.

- A biologist familiar with BSM would survey for the species and its larval host plants during the wettest portion of the year (November–April or several weeks after a significant rain) and within 4-6 weeks prior to construction. Surveys would include searches for eggs, larvae, and signs of larval feeding (chewed stems, frass, or leaf damage).
- If aiea or tree tobacco over three feet (0.9m), or adult BSM moths are found during surveys, then USFWS would be informed for additional guidance. Sometimes the pupating larvae are less visible on mature plants and when uprooting the mature plant larvae could also dislodge and remain in the ground typically within 33 ft (10m) of the parent plant. In this scenario the Project would create a 33-ft (10m), disturbance-free buffer in which no work activities at all would be performed around the woody host plant to prevent disturbance to any pupating larvae. The plant roots would be removed 90 days following the initial survey to prevent resprouting.
- If no BSM, aiea, or tree tobacco are found during survey, then the Project site staff would take measures to ensure that tree tobacco plants do not establish in the Project site. If tree tobacco grows more than three feet (0.9m) tall it may become a host plant for BSM larvae, which can occur in as few as six weeks. Therefore, to ensure that tree tobacco does not get established in the Project site, the on-site biologist would survey for tree tobacco every six weeks during construction and before ground disturbing construction activities within a 33-foot (10m) buffer. If tree tobacco is found, the on-site biologist would remove and dispose of the pulled tree tobacco.

5.5.4 Effects Analysis

It is possible but unlikely, that BSM occur within the AA with any regularity, and the habitat suitability for this species is low, being limited to the three observed host plants. Nevertheless, it is possible that BSM could potentially occur within the AA.

By implementing the avoidance and minimization measures described above, including timely surveys and monitoring, the establishment of tree tobacco at the project site can be prevented and impacts to BSM can be avoided. Because the surveys would involve a thorough search by a biologist for eggs, larvae, and signs of larval feeding (chewed stems, frass, or leaf damage) the likelihood of eggs or larvae on the host plant being destroyed is also discountable.

With the implementation of conservation measures listed above, therefore, the proposed action may affect but is not likely to adversely affect BSM.

6. References Cited

Banko, P.C., J.M. Black, and W.E. Banko. 1999. Hawaiian goose (Nene), No. 434 *In* A. Poole and F. Gill, editors, The Birds of North America. Philadelphia, Pennsylvania.

[COM] County of Maui. 2024. Wetland Restoration and Protection Project. <https://www.mauicounty.gov/2724/Wetlands-Restoration-and-Protection-Proj>. Accessed June 14.

[DLNR] Hawaii Department of Land and Natural Resources. 2015. Hawaii Wildlife Action Plan. <https://dlnr.hawaii.gov/wildlife/files/2016/12/HI-SWAP-2015.pdf>. Accessed May 31, 2023.

-----. 2024. Division of Forestry and Wildlife. Wildlife Program. Native Birds of Hawaii. Alae keokeo. <https://dlnr.hawaii.gov/wildlife/birds/alae-keokeo/>. Accessed June 13.

ebird. 2024. Hawaiian Coot. <https://ebird.org/species/hawcoo/US-HI>. Accessed June 6.

ebird. 2024. Hawaiian Coot. https://ebird.org/checklist/S185380182. Accessed October 7.

H.T. Harvey & Associates. 2024. Findings of a biological survey along Honoapi'ilani Highway, West Maui. A report submitted to WSP USA, Inc. and the State of Hawaii, Department of Transportation.

Larse, M. Land Manager. Olowalu Greenway. July 13, 2023—conversation with Shahin Ansari of H.T. Harvey & Associates regarding presence of the Hawaiian goose in the Olowalu area.

Robinson, J.A., J.M. Reed, J.P. Skorupa, and L.W. Oring. 1999. Black-necked stilt (*Himantopus mexicanus*), No. 449 *In* A. Poole and F. Gill, editors, The Birds of North America Philadelphia, Pennsylvania.

Tomich, P.Q. 1986. Mammals in Hawaii. Second edition. Bishop Museum Special Publication 76. Bishop Museum Press, Honolulu, Hawaii.

[USFWS] U.S. Fish and Wildlife Service. 1970. United States list of endangered native fish and wildlife. Federal Register 35: 16047–16048.

-----. 1998. Recovery Plan for the Hawaiian Hoary Bat (*Lasiurus cinereus semotus*). U.S. Fish and Wildlife Service, Portland, Oregon. <http://ecos.fws.gov/docs/recovery_plan/980511.pdf>. Accessed June 20, 2023.

-----. 2000. Determination of Endangered Status for Blackburn's Sphinx Moth from the Hawaiian Islands. Federal Register 65 (21): 4770-4779. <https://www.govinfo.gov/content/pkg/FR-2003-06-10/pdf/03-14144.pdf#page=1>. Accessed July, 2024.

-----. 2003. Endangered and threatened wildlife and plants; designatin of critical habitat for the Blackburn's sphinx moth; Final Rule. Federal Register 68 (111): 34710-34766. <https://www.govinfo.gov/content/pkg/FR-2000-02-01/pdf/00-2135.pdf#page=1>. Accessed July, 2024.

-----. 2004. Draft Revised Recovery Plan for the Nene or Hawaiian Goose (*Branta sandvicensis*). U.S. Fish and Wildlife Service, Portland, Oregon. < https://ecos.fws.gov/docs/recovery_plan/040924a.pdf>. Accessed July 2024.

-----. 2005. Recovery Plan for the Blackburn's Sphinx Moth (*Manduca blackburni*). U.S. Fish and Wildlife Service, Portland, Oregon. <https://ecos.fws.gov/docs/recovery_plan/050926.pdf>. Accessed July 2024.

-----. 2011. Recovery Plan for Hawaiian Waterbirds. Second revision. U.S. Fish and Wildlife Service, Portland, Oregon.

-----. 2018 Endangered and threatened wildlife and plants; Reclassifying the Hawaiian goose from endangered to threatened with a 4(d) rule. Federal Register: Proposed Rule. Federal Register 83(63): 13919-13942. <https://www.fws.gov/policy/library/2018/2018-06571.html>. Accessed July 2024.

-----. 2019 Endangered and threatened wildlife and plants; Reclassifying the Hawaiian goose from endangered to threatened with a 4(d) rule: Final Rule. Federal Register 84(244): 69918-69947. <https://www.govinfo.gov/content/pkg/FR-2019-12-19/pdf/2019-26548.pdf>. Accessed July 2024.

[USFWS] U.S. Fish and Wildlife Service. 2023. Official letter from USFWS on "*List of threatened and endangered species that may occur in your project location or may be affected by your proposed project*." February 3, 2023. Project Code: 2023-0041712.

-----. 2024. Environmental Conservation Online System. Blackburn's Sphinx Moth (*Manduca blackburni*). <https://ecos.fws.gov/ecp/species/4528>. Accessed June 16.

Whitaker, J.O., Jr., and P.Q. Tomich. 1983. Food habits of the hoary bat, *Lasiurus cinereus*, from Hawaii. Journal of Mammalogy 64: 151–152.

HT Harvey & Associates
Addendum to the Biological Survey Report

November 2025

H. T. HARVEY & ASSOCIATES
Ecological Consultants
50 years of field notes, exploration, and excellence

Memorandum

Project No. 4692-02

April 18, 2025

To: **James Sullivan, Environmental Planner, WSP USA**

From: **Shahin Ansari, Senior Ecologist, H. T. Harvey & Associates**

CC: **Scott Terrill, Principal in Charge, H. T. Harvey & Associates**
Jamie Bents, Project Manager, WSP USA

Subject: **Addendum to the November 2023 Honoapiilani Highway Improvements Project—Biological Survey Report**

Introduction

The Federal Highway Administration (FHWA), in cooperation with the State of Hawaii, Department of Transportation (HDOT), is proposing the Honoapiilani Highway Improvements Project (Project). This Project is situated in West Maui, Hawaii, in the area served by the existing Honoapiilani Highway between milepost 11 and milepost 17 and generally overlaps the ahupuaa of Ukumehame and Olowalu (Figure 1). Honoapiilani Highway is the primary transportation route for people and goods between West Maui and the rest of the island. Climate change and sea-level rise are already contributing to damage along this coastal stretch of the Highway. In the last decade, Honoapiilani Highway has been repaired several times after storm and high-wave events undermined pavement sections and overtopped the highway, making the roadway impassable. Furthermore, comprehensive modeling of the future impacts of sea-level rise have indicated that much of the Honoapi'ilani Highway in the project area (51% in Olowalu and 73% in Ukumehame) is within the projected 3.2-foot Sea Level Rise Exposure Area (SLR-XA) and confirms that road disruptions and emergency repairs will increase over time as a result of more frequent and severe flooding. The purpose of the Project is to reduce the highway's exposure to the SLR-XA, where feasible, and provide a reliable transportation facility in West Maui that can serve the community with increased reliability and safety to withstand coastal hazards.

A draft environmental impact statement (DEIS) for the Project was published in December 2024. H. T. Harvey & Associated completed biological studies in support of the environmental planning for the Project in 2023, the results of which are published in the DEIS. The Biological Study Area (BSA) encompassed an area of about 902 acres overlapping the four proposed Highway alignments that were evaluated for the DEIS (Figure 2). These alternatives were further refined as the DEIS was prepared, leading to the selection of a preferred alternative. While the vast majority of the BSA surveyed in 2023 overlaps the preferred alternative, there are a

few scattered parcels along the preferred alternative that were not part of the 2023 field studies. These unsurveyed parcels are illustrated in Figure 2 and collectively referred to here as the 2025 BSA. This memorandum describes the methods and results of the flora and fauna studies we conducted in the 2025 BSA.

Biological Study Scope and Objectives

The scope of the flora and fauna field studies were limited to the 13 separate 2025 BSA parcels encompassing a total of 31.6 acres. The 2023 botanical surveys documented the habitat types, and the plant and vertebrate (birds and mammals) species found in the BSA overlapping the four proposed alignments. The 2025 BSA parcels are next to the 2023 BSA and the habitat in these 13 parcels generally are a continuum of those already surveyed and therefore expected to have a similar suite of plant and animal species. This rationale formed the basis for the following objectives for these 2025 field surveys.

- Conduct a reconnaissance survey to document additional plant species not previously documented during the 2023 surveys, in particular, any plant taxa that are state or federally listed as threatened or endangered, or candidate species for listing.
- Conduct a reconnaissance-level wildlife survey to document native bird species, in particular, this study focused on scanning the habitat in the 2025 BSA parcels for the threatened Hawaiian goose (*Branta sandvicensis*) and Hawaiian stilt (*Himantopus mexicanus knudseni*). This is because both these species were observed at multiple locations during the 2023 BSA.
- Identify sensitive habitats (e.g., suitable breeding habitat for nene or Hawaiian stilts for foraging or nesting) that should be avoided as part of the Project design and provide the information to the engineers to support their design considerations.
- Consistent with the scope of the 2023 biological surveys, this study did not include surveys for invertebrates (insects), Hawaii's only terrestrial native mammals, the Hawaiian hoary bat (Lasiurus cinereus semotus), Hawaiian listed seabirds—Hawaiian petrel (*Pterodroma sandwichensis*), Band-rumped-storm-petrel (*Hydrobates castro*), and the threatened Newell's shearwater (*Puffinus newelli*). An assessment of potential impacts to these taxa are addressed in the DEIS published in 2024.

Methods

Prior to the survey, we reviewed the vegetation and wildlife data from the completed 2023 surveys. The habitats surveyed provided a good indication of what we might expect in the 2025 BSA parcels. Prior to the field survey we also coordinated closely with WSP and HDOT to get safe access to the 2025 BSA parcels. The field surveys for the 2025 BSA parcels were conducted on March 19, March 25, April 2 and April 3. In general, clear skies, and hot and humid conditions with mild trade winds were present on all four of the field studies. The biologists walked through the accessible areas of the 2025 BSA parcels searching for the presence of rare, threatened, or endangered plants. A handheld Global Positioning System device preloaded with spatial data (e.g., BSA boundary) was used to navigate during the survey and record field observations. In general, rocky outcrops,

shaded areas, and topographic depressions, which are more likely to support native plant species, were surveyed more extensively. To survey birds, visual and auditory detection, as well as secondary indicators (e.g., nests) were used to identify the species present. Bird point counts were not conducted because the quantitative data gathered in 2023 is representative of the bird species in the general vicinity of the Project Area. Each parcel was carefully scanned to look for nene and other Hawaiian waterbirds in addition to making casual observations throughout the survey.

Results

No rare, threatened, or endangered plant species were observed in the 2025 BSA parcels. Also, no native bird species were observed in or around the 2025 BSA parcels. The narrative below describes observations made at each of the 13 2025 BSA parcels during the survey regarding habitat type, plants, birds, and mammals. The numbering below corresponds to the parcel numbers on Figures 2 and 3. The photos referenced in the narrative below are included as an attachment to this memo (Attachment 1).

1. Parcel 1 in Ukumehame is about 0.6 acres and is intersected in the east-west direction by the County Road that leads to the Maui County Firing Range. The triangular area to the north of the County Road is Kiawe Woodland with dense ground cover of pickle weed (*Batis maritima*) (Photo 1). The kiawe trees appeared to be stressed with mostly bare or leafless branches. The portion south of the County Road overlaps HDOT's sedimentation basin. The top of the bank was mostly bare ground with the outer slopes sparsely vegetated with kiawe trees and weedy grasses such as guinea grass and buffel grass. The small slither of the bed of the basin was mostly covered with cocklebur (*Xanthium strumarium*) shrubs (Photo 2).
2. Parcel 2 is about 2.7 acres, on the opposite side of Pohaku Aeko Street from Parcel 4 and to the south of it. Vegetation here can be characterized as Haole Koa Pluchea Shrubland. Large stretches of haole koa stand here were dead although the reason was not obvious in the field (Photo 3). *Pluchea* shrubs were common with kiawe and opiuma trees scattered throughout and buffel grass was abundant as ground cover. An old irrigation ditch enters this parcel from the southwest corner and terminates somewhat in the center. Salt bush (*Atriplex suberecta*) was common in the moist bed of this ditch with several weedy species such as radiate finger grass (*Chloris spp.*), and scattered plants of the native akulikuli (*Sesuvium portulacastrum*) on the banks.
3. Parcel 3 is about 0.4 acres with Pohaku Aeko Street intersecting it in the east-west direction. The portion to the north of the Street was a dense stand of kiawe opiuma woodland. However, on the opposite side of the street, in the southern portion, the vegetation had been cleared and there were a few large logs piled up next to the street (Photo 4).
4. Parcel 4 is a small, about 0.2 acre parcel along Pohaku Aeko Street, just before it terminates at the existing Honoapiilani Highway. Vegetation here is a somewhat open kiawe opiuma woodland with a dense understory of dry buffel grass (Photo 5). Kiawe trees in this parcel appeared stressed with dry leafless branches.

5. Parcel 5 is about 0.6 acres and mostly overlap the intersection of the existing Honoapiilani Highway with Ehehene Street (Photo 6). The concrete culverts under Ehehene Street border the north and southern borders of this parcel. Vegetation bordering this parcel is mostly composed of weedy species such as haole koa, guinea grass, and vining cow pea (*Macroptilium atropurpureum*) (Photo 6).

6. Parcel 6 is approximately 0.9 acres and is situated behind an old agricultural ditch that runs parallel to the existing Honoapiilani Highway. Dense vegetation precluded ground surveys for most of this parcel. Surveys from a higher vantage point with binoculars indicated a 100 percent vegetative cover of mostly *Pluchea* shrubs. There are also a few scattered trees of kiawe, milo (*Thespesia populnea*) trees, and haole koa shrubs (Photo 7). A small stretch of the ditch enters the northwestern corner of this parcel. The parcel was accessible from the northern end for a limited stretch where a few additional dry and disjointed ditches were found amidst the thick understory.

7. Parcel 7 is approximately 10.7 acres in the transition stretch from Olowalu to Ukumehame region. Except for a rectangular-shaped portion in the west, vegetation in this parcel can be characterized as kiawe opiuma woodland (Photo 8). The understory was patchy and varied from being just bare ground or buffer grass or a mix of shrubs such as haole koa and *Pluchea* spp. along with buffel grass. There were several crisscrossing dirt paths in this parcel, and it is highly disturbed with many places being used as dumpsites and homeless encampments. Rock piles and rock walls were also seen at several places toward the center of this parcel. Two gray francolins (*Francolinus pondicerianus*) were flushed from the buffel grass when surveying this parcel.

   The rectangular-shaped area in the western portion of this parcel is covered with dense shrubs of *Pluchea* spp. (Photo 9) and there is a small ditch that enters the southwestern corner. There is also a small, cleared area here under a grove of Mexican fan palms (Photo 9) with signs of human habitation. Northern cardinals (*Cardinalis cardinalis*) were seen when surveying this area.

8. Parcel 8 is approximately 4.9 acres and intersects Luawai Street that passes through private undeveloped residential lots in the Olowalu peninsula. There is another paved road that runs perpendicular to Luawai Street and meanders through the southern portion of this parcel toward Mopua Stream. Other than for these built-up linear alignments, vegetation in the majority of this parcel can be characterized as buffel grass grassland with kiawe woodland along the southwestern border (Photo 10). In the southeastern corner, at the intersection of the two roads there is a small garden with several native plants such as koa (*Acacia koa*), ilima, pohinahina (*Vitex rotunda*), and naupaka (*Scaevola taccada*). Also, at several locations in the southern portion, native plants such as pohinahina have been outplanted and are watered by an underground irrigation system.

9. Parcel 9 in the Olowalu regions is just east of parcel 10, separated by the proposed alignment and about 1.6 acres. The entire parcel is buffel grass dominated grassland with scattered kiawe trees (Photo 11). Shrubs of the native uhaloa were common in this parcel.

10. Parcel 10 in the Olowalu region is small, about 0.4 acre parcel and overlaps a dirt road that extends mauka from the inner cane haul road. There is dry buffel grass on both sides of this road (Photo 12).

11. Parcel 11 is a rectangular area of about 1.7 acres overlapping a mixed alien shrubland with 100 percent vegetative cover. Vegetation was somewhat patchy with some areas being either predominantly guinea grass (*Megathyrsus maximus*) or short (~2-4 feet) haole koa shrubs, or a mix of several shrub species such as haole koa, *Pluchea* spp. (*Pluchea indica* and *Pluchea x fosbergii*), castor bean (*Ricinus communis*), uhaloa and ilima (Photo 13). Tall Mexican fan palms (*Washingtonia robusta*), kiawe and opiuma trees were also seen scattered in this shrubland. The southeastern corner overlaps a portion of kiawe woodland that stretches further mauka from this parcel (Photo 13). Signs of browsing and grazing, deer droppings, and deer skeletal remains suggest that axis deer (*Axis axis*) were on this parcel. Warbling white-eyes (*Zosterops japonicus*) were commonly seen flying between trees in small groups.

12. Parcel 12 is a small area, approximately 0.3 acre, that largely overlaps an existing paved road that services the dump site for the Lahaina fire debris (Photo 14). Limited vegetation along the edges of this parcel is mostly composed of kiawe trees with an understory of buffel grass with other herbaceous weedy species.

13. Parcel 13 is approximately 6.6 acres toward the northern end the preferred alignment, near the Lahaina Bypass. The entire parcel is highly disturbed roadside habitat with the existing Honoapiilani Highway intersecting this parcel into a smaller northwestern portion and a relatively larger southeastern slither. The northwest portion makai (ocean side) of the existing Highway mostly overlaps an old and abandoned road dirt road with limited vegetated areas dominated with kiawe (*Prosopis pallida*) and buffel grass (*Cenchrus ciliaris*) in the understory (Photo 15). Uhaloa (*Waltheria indica*) a native shrub species was common along the roadside and few individuals of the native ilima (*Sida fallax*) were also present scattered amongst the buffel grass. A couple individuals of jungle fowl (*Gallus gallus*) were seen in the homeless encampment, makai of this portion of the parcel.

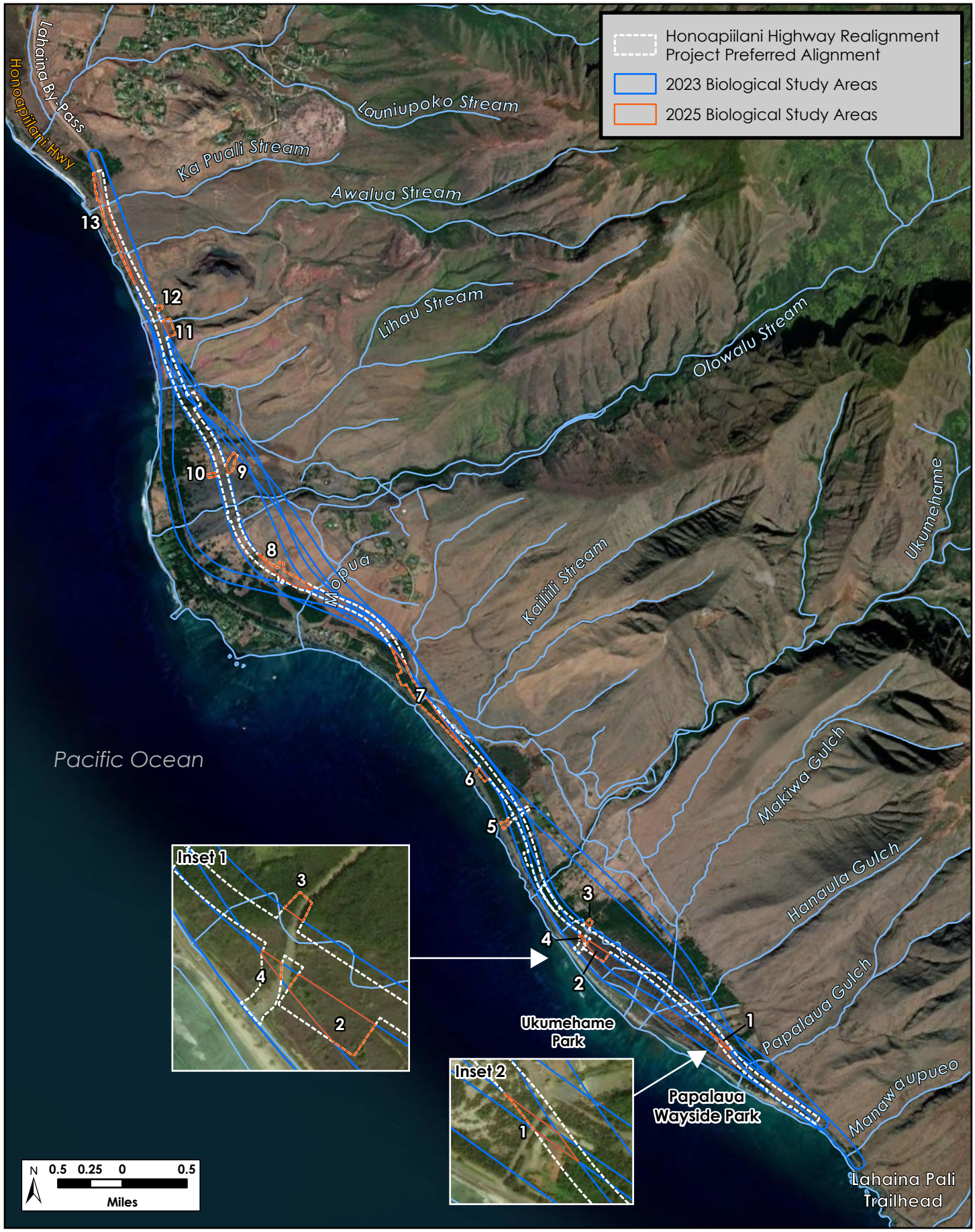
    The southeastern slither on the mauka side (mountain side) of the existing Highway overlaps a high (about 20 feet) berm at the top of which is a paved road that runs parallel to the existing Highway and appeared to be newly built to service the dumpsite for the Lahaina fire debris (Photo 16). This road was sign-posted for nene (Photo 17). The buffel grass grassland mauka of this road (but outside of the parcel) was scanned for nene on March 19 and again on March 25 but no birds were seen. Vegetation throughout the southeastern section of the parcel is also predominantly a buffel-grass grassland. Scattered shrubs of native uhaloa and ilima stood out in this otherwise alien dominated dry grassland. One individual of the native aalii (*Dodonaea viscosa*) was also found along the upper paved road. At the bottom on the berm there is a fenced-in area along the roadside that had thickets of kiawe, opiuma (*Pithecellobium dulce*), haole koa (*Leucaena leucocephala*) trees with an understory of mostly uhaloa and buffel grass. Other weedy species in this parcel were alani (*Boerhavia repens*), little bell (*Ipomoea triloba*), puncture vine (*Tribulus terrestris*), and swollen finger grass (*Chloris barbata*).



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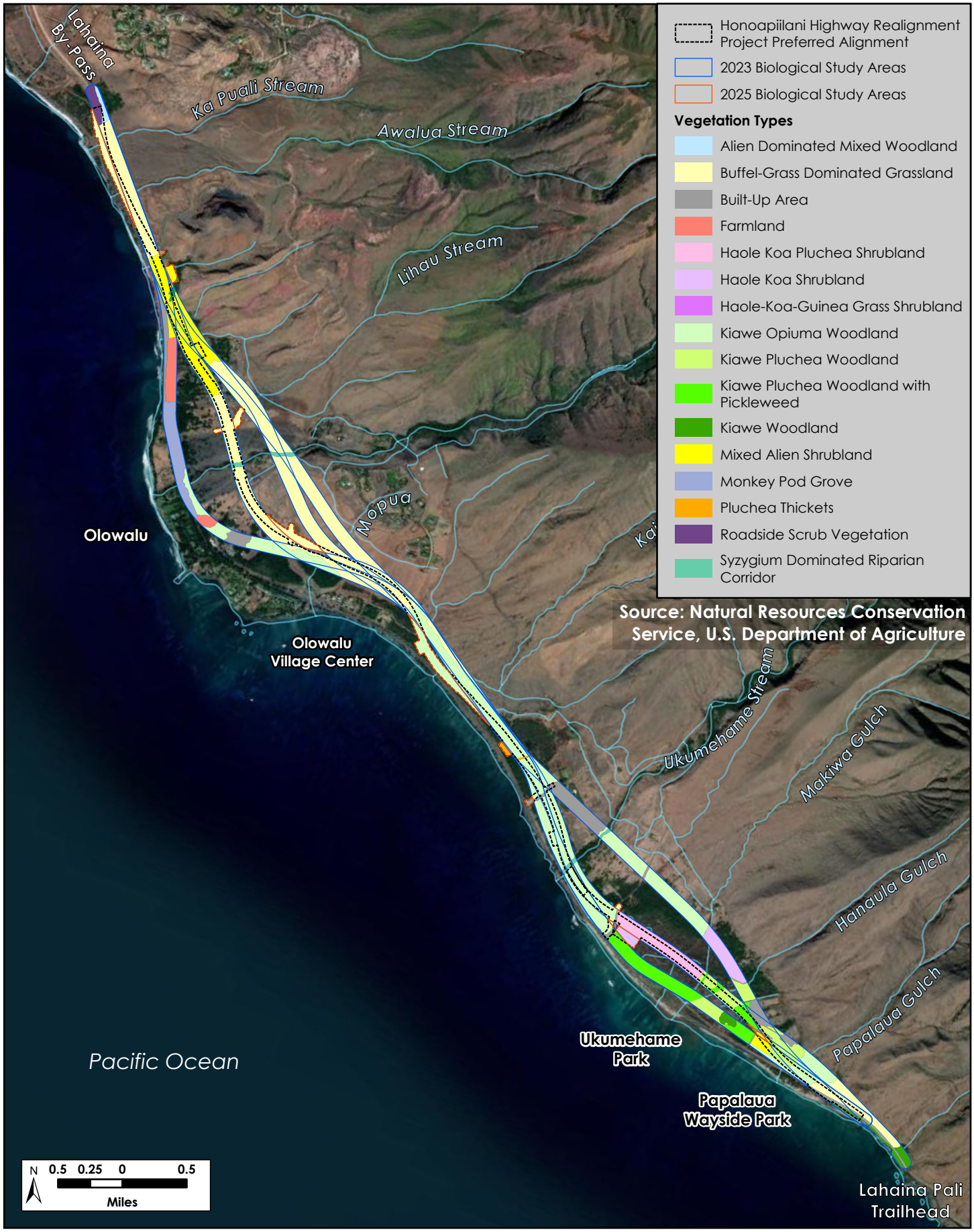
Figure 1. Project Vicinity
Honoapiilani Highway Improvements Project
Biological Survey of Additional Areas for the Preferred Alignment (4692-02)
April 2025



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Figure 2. Honoapiilani Highway Realignment Project Biological Study Area
Honoapiilani Highway Improvements Project
Biological Survey of Additional Areas for the Preferred Alignment (4692-02)
April 2025



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Figure 3. Habitat/Vegetation Types
Honoapiilani Highway Improvements Project
Biological Survey of Additional Areas for the Preferred Alignment (4692-02)
April 2025

Conclusion

In conclusion, this study did not find any botanical concerns in the BSA. No plant species that are state or federally listed as threatened or endangered, a candidate species for listing, a rare native plant species, or a native plant species of concern were found in the BSA. All 13 additional parcels of the 2025 BSA are highly disturbed with a history of vegetation disturbance and landscape level modification. The native plant species—uhaloa, ilima, aalii, and milo that were found to naturally occur in the BSA are not likely to be adversely affected because these species have a wider distribution on Maui and elsewhere in the state. The endemic koa trees seen in the vicinity of the undeveloped Olowalu residential lots were planted for landscaping and did not occur naturally there.

No bird species that are rare, state or federally listed as threatened or endangered, or a candidate species for listing, were seen during this study. However, it is possible that nene, which are known to occur in the vicinity of the Project Area, may use the buffel grass grassland habitat seen in some of the 2025 BSA parcels. No open bodies (ditches seen were heavily vegetated) of water were present in the 2025 BSA and no suitable habitat for Hawaiian stilts was found in the 2025 BSA but, as the 2023 biological studies indicated, these birds are generally known to occur in the vicinity of the Project Area.

Attachment 1. Photos of the 2025 Biological Study Area Parcels



Photo 1. Parcel 1 – Northern Portion with Mostly Stressed and Dead Kiawe Trees and a Dense Ground Cover of Pickleweed (*Batis maritima*)



Photo 2. Parcel 1 – Southern Portion Overlap the Berm (Foreground) of the Sedimentation Basin with Kiawe Trees and Weedy Grasses with Mostly Cocklebur (*Xanthium strumarium*) in the Basin



Photo 3. Parcel 2 - Haole Koa Pluchea Shrubland with a Stretch of Dead Haole Koa (*Leucaena leucocephala*) Trees



Photo 4. Parcel 3 – Kiawe Opiuma Woodland to the North of Pohaku Aeko Street (Left) and Cleared Vegetation in the Portion to the South



Photo 5. Parcel 4 – Kiawe Opiuma Woodland with Buffel Grass in the Understory



Photo 6. Parcel 5 – The Built-Up Portion of the Existing Honoapiilani Highway and Ehehene Street Overlap Parcel 5



Photo 7. Parcel 6 – Pluchea Thickets with Scattered Trees of Kiawe (Prosopis pallida), Milo (*Thespesia populnea*), and Haole Koa (*Leucaena leucocephala*)



Photo 8. Parcel 7 – Kiawe Opiuma Woodland Along an Inner Dirt Road with Mostly Buffel Grass in the Understory



Photo 9. Parcel 7 – Vegetation in the Western Portion, Thickets of *Pluchea* Shrubs (Left) and Grove of Mexican Fan Palms (*Washingtonia robusta*)



Photo 10. Parcel 8 – Luawai Street and Buffel Grass Grassland with a Small Native Plant Garden (Circled in Red)



Photo11. Parcel 9 – Buffel Grass Dominated Grassland with Kiawe (*Prosopis pallida*) Trees



Photo 12. Parcel 10 – Dirt Road Overlaps Most of This Small Parcel with Dry Buffel Grass and Other Herbaceous Weeds Bordering this Road



Photo 13. Parcel 11 – Mixed Alien Shrubland in the Foreground with Kiawe Wood in the Background Overlapping the Southeastern Corner of this Parcel



Photo 14. Parcel 12 – Overlaps a Paved Road with Kiawe (*Prosopis pallida*) Trees and Buffel Grass (*Cenchrus ciliaris*) Along the Vegetated Edges



Photo 15. Parcel 13 – Northwest Section Mostly Overlaps a Dirt Road with Kiawe (*Prosopis pallida*) and Buffel Grass (*Cenchrus ciliaris*) in the Vegetated Portions



Photo 16. Parcel 13 – Southeast Section Overlaps the Roadside Berm Dominated with Buffel Grass Grassland; Transmission Lines (Upper Left Coner) Are Along an Inner Paved Road Leading to a Debris Dumpsite



Photo 17. Parcel 13 – Signpost to Watch Out for Nene (*Branta sandvicensis*) Along the Inner Paved Road in Parcel 13 that Cuts Through the Buffel Grass Grassland

Agency Correspondence

U.S. Department of Transportation
Federal Highway Administration

Hawaii Federal-Aid Division

June 30, 2023

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In Reply Refer To:
HDA-HI

Ms. Sarah Malloy
Regional Administrator (Acting), Pacific Islands Regional Office
National Oceanic and Atmospheric Administration
NOAA Inouye Regional Center, NMFS/PIRO
1845 Wasp Boulevard, Building 176
Honolulu, HI 96818

Subject: Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat Consultation
Honoapiilani Highway Improvements, West Maui, Ukumehame to Launiupoko
Lahaina, Island of Maui, State of Hawaii
Federal-aid Project No. RAEM-030-1(059)

Dear Ms. Malloy:

The Federal Highway Administration (FHWA), in cooperation with the State of Hawaii Department of Transportation (HDOT), is planning to improve Honoapiilani Highway (State Route 30) between milepost 11 and milepost 17 with State and federal funds. Pursuant to Section 305(b)(2)(4) of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), the FHWA is requesting essential fish habitat (EFH) consultation with the National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS) for the proposed project. FHWA appreciates the early participation by NMFS and the initial feedback provided.

In this letter, the project team is providing an Essential Fish Habitat Analysis (EFHA) containing a description of the proposed action, an assessment of potential adverse effects, proposed ways to mitigate for any adverse effects, and a determination as to how the action would potentially affect EFH.

Description of the Proposed Action

The proposed project is in West Maui, in the areas served by the existing Honoapiilani Highway between milepost 11 and milepost 17. Honoapiilani Highway, which is part of Maui's Belt Road system, is a two-lane principal arterial highway that provides the sole access between communities along the west coast of Maui and the rest of the island. The proposed southeastern terminus at milepost 11 is in Ukumehame, in the vicinity of Papalaua Beach Park, and the northwestern terminus of the project is at milepost 17 in Launiupoko, where Honoapiilani

Highway currently intersects the southern terminus of the Lahaina Bypass. This approximately six-mile long and 3/4-mile-wide project area is composed predominantly of a coastal plain that includes the Ahupuaa of Ukumehame, Olowalu, and Launiupoko. Offshore, the Olowalu reef area, which extends from Ukumehame to Launiupoko, hosts about 1,000 acres of some of the healthiest and oldest living corals within the main Hawaiian Islands.

FHWA and HDOT developed four preliminary project alternatives. The project alternatives would be further refined as the Draft Environmental Impact Statement (EIS) is prepared, leading to the selection of a preferred alternative. The proposed project does not include work on the existing highway except where the new project joins the existing highway at the northern and southern connections points and potentially at connector roads to ensure continued access to residences, businesses, and public beaches. Depending on the selected alternative, there may be intersections at Luawai Street in Olowalu and Ehehene Street, Pohaku Aeko Street as well as a new driveway connect for direct access to the Ukumehame Firing Range. It is anticipated that there will be little or no new construction at the existing highway since these primary connector roads all have existing intersections with considerable infrastructure including left and right turn lanes on the existing highway as well as merge lanes for traffic turning from the side street onto the existing highway.

Additional information can be obtained at the project website, www.honoapiilanihwyimprovements.com.

Project Alternatives

A Preferred Alternative has not yet been identified. Four draft "Build Alternatives" have been identified and are being evaluated in the Draft EIS currently underway. Each alternative involves the construction of a new highway, which is mainly along a new alignment, further inland from the ocean. None of the alternatives involve work in the ocean. They may require bridges over the streams. All project alternatives would incorporate Best Management Practices (BMPs). Opportunities to avoid cultural and environmental constraints identified during the EIS technical studies would be considered in ongoing conceptual design work in support of the Draft EIS and determination of the Preferred Alternative.

The four alternatives are depicted in Figure 1 and brief descriptions are as follows:

> **Build Alternative 1 (Red Line)** has been adapted from the County of Maui's Pali to Puamana Parkway 2005 coastal or makai concept. This alignment has been "modified" to apply American Association of State Highway and Transportation Officials (AASHTO) design standards, bypass erosion areas, and avoid cultural resources. This alternative is just mauka of most inundation areas in Launiupuoko and Olowalu and maximizes use of the existing right-of-way (ROW).
>
> **Build Alternative 2 (Yellow Line)** has been adapted from the County of Maui's Pali to Puamana Parkway 2005 "middle" concept. The alignment was "modified" to apply AASHTO standards, bypass erosional areas, and avoid cultural resources.

Build Alternative 3 (Bright Green Line) has been adapted from the County of Maui's Pali to Puamana Parkway 2005 "mauka" concept. The alignment was "modified" to apply AASHTO standards, bypass erosional areas, and avoid cultural resources.

Build Alternative 4 (Purple Line) was also adapted from the County of Maui's Pali to Puamana Parkway 2005 mountain-ward or mauka concept. The alignment has been "corrected" to apply AASHTO standards, bypass erosional areas, and avoid cultural resources. The route through Olowalu town, which distinguishes this alignment, is based on landowner input provided in 2007. This alignment meets the 55 miles per hour (mph) design speed (with speed signs to be posted at 45 mph), while minimizing curves.

The alignments converge at several points and there are two distinct areas where the alignments all differ from one another: one in Olowalu and the other in Ukumehame. The preferred alternative may be selected from two proposed alternatives, one in each of the two differing areas.

The No-Build Alternative reflects future conditions if the proposed project were not constructed. Future conditions are based on projections of land-use and development that are likely to occur in 2045 Build Analysis timeframe. The roadway would continue to operate in its current location and condition, including at the several locations along the existing highway where the highway has been protected by various emergency stabilization projects. Additional stabilization efforts could be required in the future under the No Build Alternative.

For the proposed project, none of the four alternatives would require any disturbance or work in the ocean. While it is intended that the existing highway right-of-way would be transferred from the State to Maui County (where, consistent with Maui County park planning, it would be used to provide continued access to beaches and local residential and commercial uses) the proposed project does not include any work on the existing highway in the areas where prior emergency stabilizations have occurred.

It is also noted that no night work is anticipated during construction, and construction duration is anticipated to be no longer than two years. However, should night work be required, additional coordination would be conducted with NMFS to agree upon any other appropriate conservation measures.

Analysis of Potential Adverse Effects on EFH and Managed Species

The Western Pacific Regional Fishery Management Council (Council) has established EFH for Bottomfish and Seamount Groundfish, as well as Crustaceans, and Coral Reef Ecosystems as generally beginning in the marine water column at the shoreline, including tidally influenced stream areas surrounding all islands of Hawaii. Other Management Unit Species (MUS) include Precious Coral and Pelagic species; however, these specific EFH are too geographically distant to experience potential adverse effects from the proposed action.

The 2009 Hawaii Fishery Ecosystem Plan (FEP) describes the physical limits of EFH for each MUS and possible sources of adverse impacts to the EFH from non-fishing activities. These possible sources identified in the FEP which may be relevant to this project include coastal

construction and nutrient loading. Potential adverse impacts of these activities as discussed below, include turbidity plumes, biological availability of toxic substances, contaminant runoff, and sediment runoff.

The Olowalu reef area offshore of the project is a major marine resource proximate to the project footprint and the potential effect from the proposed action on its resources is evaluated in this EFHA. Olowalu Reef has long been considered Maui's 'crown jewel' and one of the Hawaiian Island's greatest treasures. This thousand-acre coral reef is home to an incredible diversity of marine life including large populations of manta rays, sea turtles, reef sharks, and a multitude of tropical fish species. Olowalu Reef is vitally important to the surrounding underwater ecosystems of Maui, Molokai and Lanai, serving as a nursery to replenish and populate nearby reefs.

The proposed project is being evaluated as a potential source of environmental stressors of concern to the Olowalu reef area including: physical damage to the benthos (e.g., corals and seagrass), sedimentation and turbidity, introduction of chemical contaminants, introduction of invasive species, and noise. There may also be cumulative impacts from the highway reconstruction and other human activities on the West Maui coast.

Physical damage to the benthos (e.g., corals and seagrass)

Physical damage to corals can occur due to abrasion or breaking of colonies. Activities that may impart physical damage from the construction projects can include dredging, filling discharge (e.g., rocks, dirt, cement, etc.), anchoring vessels/barges and silt curtains, and using heavy equipment in-water.

The proposed project does not include any work in the ocean so would not impart physical damage to the corals or other ocean life. It is not anticipated to have cumulative effects based on any reasonably foreseeable actions.

Sedimentation and Turbidity

Increased sedimentation and turbidity can cause smothering of benthic species and block sunlight necessary for species that rely on photosynthesis. For fish, sedimentation is less likely to cause significant impacts because of their mobility, but some effects are still possible.

Sedimentation and turbidity are potential adverse effects. Use of proper BMPs, as detailed below, would avoid or minimize potential adverse effects and no additional mitigation would be anticipated. It is not anticipated to have cumulative effects based on any reasonably foreseeable actions. The project would require a National Pollutant Discharge Elimination System (NPDES) permit and the associated Stormwater Pollution Prevention Plan (SWPPP) to minimize sedimentation and turbidity effects.

Hui O Ka Wai Ola (huiokawaiola.com) and the Hawaii Department of Health regularly sample water quality, including turbidity, along the project area coast. Their work since 2006 provides a valuable record of nearshore water quality conditions. During construction, their monitoring data

would allow HDOT to evaluate the effectiveness of the construction BMPs and quickly respond if there are any abnormal turbidity results.

Introduction of Nutrients, Chemical Contaminants, and Freshwater

Increases in nutrients (i.e., from earthmoving, land use changes, and runoff), pollutants and contaminants (i.e., from earthmoving and equipment), and freshwater to the marine environment can reduce fitness and cause mortality of exposed organisms. Increases of land-based runoffs and discharges can subject benthic communities to adverse exposures and potential degradation of condition and mortality. Water conditions around coral reefs are often oligotrophic, and introduction of nutrients can change water conditions from a clear, nutrient limited baseline. The construction site's primary potential sources of nutrient loading are sediment runoff from ground disturbance and the storage and use of construction equipment. When not properly maintained, equipment could release contaminants (oil, fuel, etc.) into the marine environment. Accidental releases or spills due to unanticipated circumstances are also possible. Contaminant runoff could be generated from storage and use of construction equipment that is leaking fuel or oil, and/or improperly stored construction materials being exposed to stormwater runoff.

The release of contaminants such as oil or fuel and the introduction of nutrients are potential adverse effects addressed by proposed BMPs which would avoid or minimize potential adverse effects and no additional mitigation would be anticipated. It is not anticipated to have cumulative effects based on any reasonably foreseeable actions.

Introduction of Invasive Species

Introduced species are organisms that have been moved, intentionally or unintentionally, into areas where they do not naturally occur. Species can be introduced to new biogeographies, typically via transport on vessel hulls, in ballast waters, or on equipment. Invasive species can rapidly increase in abundance to the point that they come to dominate their new environment, creating adverse ecological effects to other species of the ecosystem and the functions and services it may provide. Invasive species can decrease species diversity, change trophic structure, and diminish physical structure, but adverse effects are highly variable and species-specific.

Invasive species are both a threat to the ocean and the land ecosystems. Specific BMPs to prevent invasive species from being spread by the project would avoid or minimize potential adverse effects and no additional mitigation would be anticipated. It is not anticipated to have cumulative effects based on any reasonably foreseeable actions.

Noise

Construction noise has been shown to have a broad range of potential effects. However, no noise would be directly generated in the ocean by this project. BMPs suggested are directed at any bridge construction on the streams entering the ocean.

Given the proposed implementation of BMPs and minimization measures, which are described further below, potential adverse effects would be avoided and no additional mitigation would be anticipated. Noise is not anticipated to have cumulative effects based on any reasonably foreseeable actions.

Project Best Management Practices and Avoidance and Minimization Measures

BMPs would be implemented during construction to minimize the potential for impacts to water quality. BMPs for in-water and land-based construction would be implemented in accordance with the documented approach, "*An Integrated Storm Water Management Approach and a Summary of Clear Water Diversion and Isolation Best Management Practices for Use in the State of Hawaii*" by the Federal Highway Administration and Hawaii Department of Transportation Practitioners Guide (2016) or the *Construction Best Management Practices Field Manual* by the State of Hawaii Department of Transportation (2008).

Specific BMPs and minimization measures to be implemented include:

1. Waste Management – Concrete wastes, solid wastes, and any sanitary/septic wastes would be located away from and managed to assure no contamination to the ocean or critical habitats.

2. Vehicle and Equipment Management – All vehicles and equipment cleaning, maintenance, and refueling would be located away from and managed to assure no contamination to the critical habitats. Invasive species controls shall be maintained to ensure that all materials transported from off-site are free of such species.

3. Stormwater Management and Erosion Control – The project would require an NPDES permit with a SWPPP. The Contractor would be required to install and maintain BMPs as part of the proposed project. Site-specific stormwater BMPs would be implemented and/or installed at the staging and work areas to prevent water quality degradation associated with stormwater runoff. Stormwater BMPs would include maintaining equipment in good working order, storing equipment and materials away from the ocean or stream bank with strategic placement of absorbent material, such as fiber rolls, as a buffer between equipment and nearby waterbodies. Drip pans shall also be maintained beneath construction equipment. The Contractor would be required to prevent any debris from falling into the water.

4. The HDOT Standard Specifications for Road and Bridge Construction Section 209 Temporary Water Pollution, Dust, and Erosion Control would be followed.

5. The project would require temporary construction laydown areas. Stockpiling, storage, and equipment staging would utilize appropriate BMPs to prevent potential surface runoff from entering the stream. No stockpiling, storage, or heavy equipment would be placed in the streams.

In addition, NMFS provided a list of standard BMPs (Enclosure: Initial BMPs to Consider for Road Construction Projects Version 27 Feb 2023). These BMPs have been evaluated for applicability to the proposed project and those that are appropriate are presented below and would be used in the design and construction of the Project.

Specific BMPs and minimization measures to be implemented include:

A. For Physical Impacts to Benthic Communities (most of these are not considered applicable since there is no anticipated construction in the marine environment).
   1. Prevent trash and debris from entering the marine environment during the project.
   2. For anticipated stream crossings, all temporary structures must be removed at the completion of in-water work.
   3. For anticipated stream crossings, do not stockpile or stage materials in the marine environment unless absolutely necessary. Place material that is stored in the marine environment on unconsolidated sediments devoid of coral and seagrass.

B. For Increase in Sedimentation and/or Turbidity
   1. Install sediment, turbidity, and/or pneumatic curtains, and use real-time monitoring (automated or manual) to detect failure and implement stop-work processes if pre-determined project thresholds are reached (use standards from Clean Water Act 401 water quality certification). In areas of soft sediment, consider partial length turbidity curtains to reduce resuspension of sediment during high winds and currents.
   2. Maintain baseline water flow, volume, and velocity of the waterbody.
   3. Use natural or bio-engineered solutions when feasible.
   4. Fully stabilize disturbed upland areas prior to removing silt fences and erosion prevention measures.
   5. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction conditions and elevations.
   6. Minimize disturbances to stream banks, and place abutments outside of the floodplain whenever possible. Seek to maintain baseline water flow volume and velocity within the system.
   7. Design the structure to maintain or replicate natural stream channel and flow conditions to the greatest extent practicable.
   8. Revegetate shoreline areas with appropriate native species and fully stabilize disturbed upland areas prior to removing silt fences and erosion prevention measures.

C. For Increase in Nutrients, Pollution, Contaminants, and Freshwater
   1. Conduct work during the dry season when possible; stop work during storms or heavy rains.
   2. Prevent discharges into the water.
   3. Inspect all equipment prior to beginning work each day to ensure the equipment is in good working condition, and there are no contaminant (e.g., oil, fuel) leaks. Work must be stopped until leaks are repaired, and equipment is cleaned. Equipment should always be stored in appropriate staging area designed to be preventative in terms of containing unexpected spills when equipment is not in use or during fueling.
   4. All fueling or repairs to equipment must be done in a location with the appropriate controls that prevent the introduction of contaminants to marine environment.
   5. Fueling of project-related vehicles and equipment shall take place at least 50 feet, or the maximum distance possible, from the water and within a containment area, preferably over an impervious surface.
   6. Use of treated wood that would be in contact with the water is not authorized.

7. Use materials that are nontoxic to aquatic organisms, such as untreated wood, concrete, or steel (avoid pressure treated lumber).
8. Prevent bentonite and other drilling fluids from contacting benthic organisms.
9. Prevent discharges of chemicals and other fluids dissimilar from seawater into the water column.

As provided by NMFS, these remaining BMPs and minimization measures do not apply to the project primarily since there is no anticipated in-water ocean construction associated with the Project.

A. For Physical Impacts to Benthic Communities
    1. Restrict all physical contact with the bottom to unconsolidated sediments devoid of coral and seagrass.
    2. Perform pre-deployment reconnaissance (e.g., divers, drop cameras) to ensure that all anchors are set on hard or sandy bottom devoid of corals and seagrass and that chosen anchor locations take into consideration damage that could occur from the anchor chain if the vessel swings due to currents or tides.
    3. Prior to mobilizing, ensure all equipment, ballast, and vessel hulls do not pose a risk of introducing new invasive species and will not increase abundance of invasive species present at the project location.
    4. Relocate infrastructure materials (e.g., riprap, piles, boulders) that are colonized with benthic communities according to an approved relocation plan. If infrastructure materials (e.g., riprap, piles, boulders) that are colonized with benthic communities will be removed or destroyed as part of permitted activities, relocate these materials to an appropriate receiving site. Equipment, anchors, structures, or fills shall not be deployed in project areas containing live corals, seagrass beds, or visible benthic organisms. Perform pre-deployment reconnaissance (e.g., divers, drop cameras, etc.) to ensure these resources are avoided.
    5. Minimize direct impact (direct or indirect contact causing damage) by divers and construction related tools, equipment, and materials with benthic organisms, regardless of size, especially corals and seagrass.
    6. Maintain all structures, gears, instruments, mooring lines, and equipment to prevent failures.
    7. All objects lowered to the bottom shall be lowered in a controlled manner. Note: This can be achieved using buoyancy controls such as lift bags, or the use of cranes, winches, or other equipment that affect positive control over the rate of descent. This often requires skilled in-water observation.
    8. Select work platforms based on the following preferential hierarchy:
        A. conduct all work from land or an existing structure;
        B. use a barge with auto-positioning systems where thrusters will not cause increased turbidity;
        C. anchor barges to (1) shoreline infrastructure; (2) nearby existing moorings; and, (3) anchors or spuds on sand only (as possible, have SCUBA divers lay anchors by hand in sand areas).
    10. Ensure new structures minimize shading impacts to marine habitats.
    11. Mooring systems (e.g., buoys, chains, ropes) must:
        A. be kept taut to the minimum length necessary.

   B. employ the minimum line length necessary to account for expected fluctuations in water depth due to tides or waves.
   C. use a mid-line floats or other buoyancy devices to prevent contact with the ocean floor.
   D. be properly maintained.
12. Ensure structures are properly weighted to prevent movement from currents or waves and implement a maintenance plan to ensure integrity over time.
13. Require a long-term maintenance plan for gear, instruments, and equipment to prevent failures leading to permanent adverse effects to EFH (e.g. scour or vessel groundings).

B. For Increase in Sedimentation and/or Turbidity
   1. Collect all accumulated sediment and/or debris and remove them entirely from the water and place onto a surface vessel; debris should not be towed outside a containment.
   2. Debris and sediment that is removed from the water shall be disposed of at an appropriate upland location. Sediment and debris must be contained while in transit or on the shore.
   3. Project operations must cease under unusual conditions, such as large tidal events, storms, and high surf conditions.
   4. Conduct intertidal work at low and/or slack tide to the greatest extent feasible.
   5. To minimize impacts to coral larvae, you should avoid in-water work during mass-coral spawning times or peak coral spawning seasons. Permittees should coordinate with local NMFS Habitat Conservation Division representatives to determine the exact period when coral spawning would occur for the given year at the project site.
   6. Use cofferdams to dewater the project impact site for activities.
   7. Utilize environmental clamshell buckets for mechanical dredging.

C. For Increase in Nutrients, Pollution, Contaminants, and Freshwater
   1. Use diffusers on the end of subtidal discharge pipes to minimize impacts from discharges.

D. For Increase in Acoustic Impacts
   1. Use a vibratory hammer to install piles when possible. Under conditions where impact hammers are required, drive as deep as possible with a vibratory hammer prior to the use of an impact hammer.
   2. Implement measures to attenuate the sound or minimize impacts to aquatic resources during pile installation. Methods to mitigate sound impacts include but are not limited to the following: surround the pile with a dewatered cofferdam and/or air bubble curtain system.

Conclusion

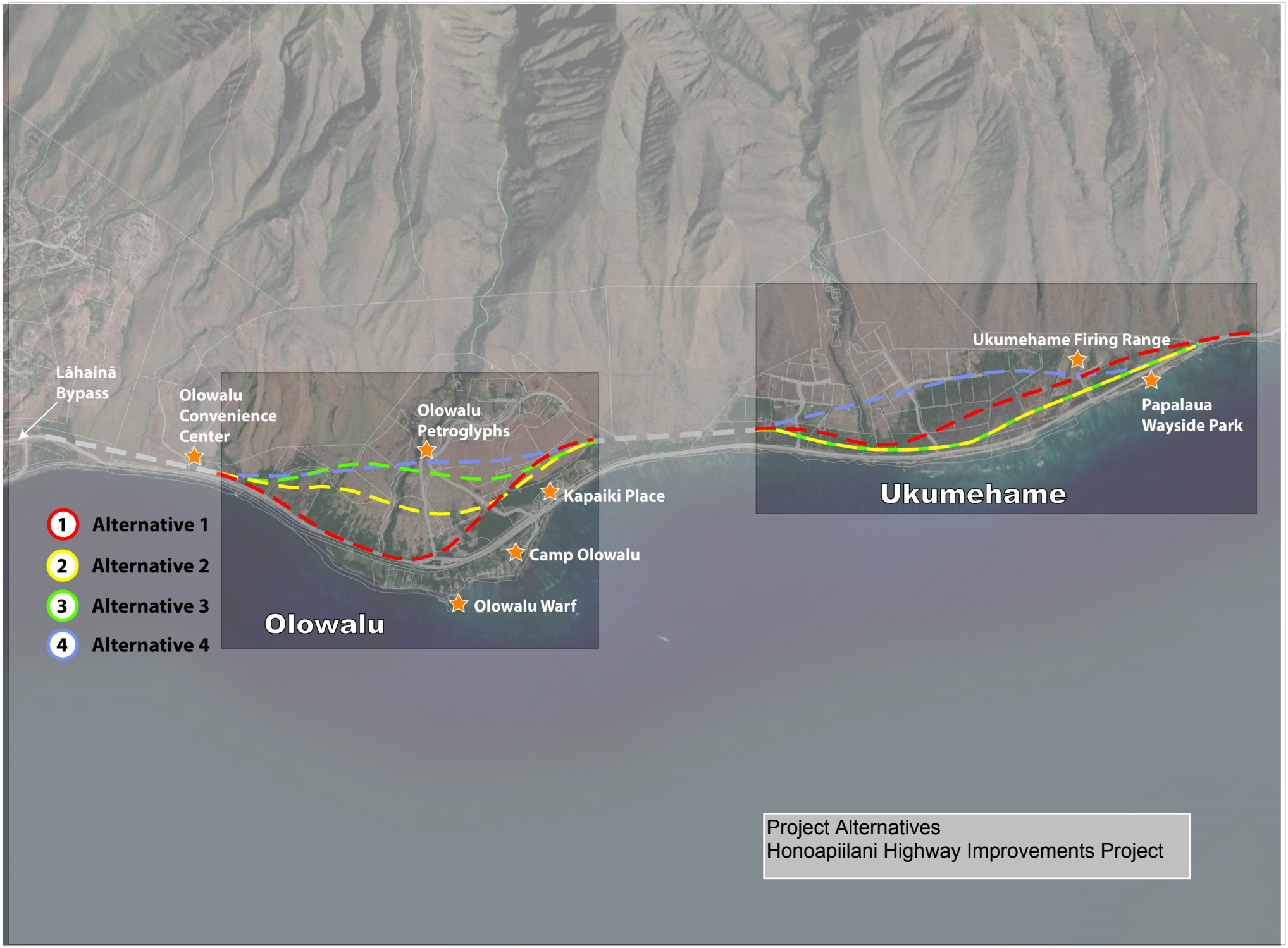
Based on the nature of the proposed work and implementation of the proposed BMPs, the FHWA believes there will be no more than minimal adverse effects to EFH and managed species. We are seeking concurrence that the proposed action will have no more than minimal adverse effects to EFH and managed species. We respectfully request your response within 30 days of receipt of this letter.

If you have any questions, please feel free to contact Meesa Otani, Environmental Engineer, at (808) 541-2316 or by email at meesa.otani@dot.gov. Thank you for your assistance.

Sincerely yours,

for Richelle M. Takara, P.E.
Division Administrator

Enclosures


Lāhainā Bypass
Olowalu Convenience Center
Olowalu Petroglyphs
Kapaiki Place
Camp Olowalu
Olowalu Warf
Olowalu
Ukumehame Firing Range
Papalaua Wayside Park
Ukumehame
1 Alternative 1
2 Alternative 2
3 Alternative 3
4 Alternative 4
Project Alternatives
Honoapiilani Highway Improvements Project

Enclosure: Initial BMPs to Consider for Road Construction Projects
Version 27 Feb 2023

A. For Physical Impacts to Benthic Communities

1. Restrict all physical contact with the bottom to unconsolidated sediments devoid of coral and seagrass.

2. Perform pre-deployment reconnaissance (e.g., divers, drop cameras) to ensure that all anchors are set on hard or sandy bottom devoid of corals and seagrass and that chosen anchor locations take into consideration damage that could occur from the anchor chain if the vessel swings due to currents or tides.

3. Prior to mobilizing, ensure all equipment, ballast, and vessel hulls do not pose a risk of introducing new invasive species and will not increase abundance of invasive species present at the project location.

4. Relocate infrastructure materials (e.g., riprap, piles, boulders) that are colonized with benthic communities according to an approved relocation plan. If infrastructure materials (e.g., riprap, piles, boulders) that are colonized with benthic communities will be removed or destroyed as part of permitted activities, relocate these materials to an appropriate receiving site. Equipment, anchors, structures, or fills shall not be deployed in project areas containing live corals, seagrass beds, or visible benthic organisms. Perform pre-deployment reconnaissance (e.g., divers, drop cameras, etc.) to ensure these resources are avoided.

5. Minimize direct impact (direct or indirect contact causing damage) by divers and construction related tools, equipment, and materials with benthic organisms, regardless of size, especially corals and seagrass.

6. Prevent trash and debris from entering the marine environment during the project.

7. Maintain all structures, gears, instruments, mooring lines, and equipment to prevent failures.

8. All objects lowered to the bottom shall be lowered in a controlled manner. Note: This can be achieved using buoyancy controls such as lift bags, or the use of cranes, winches, or other equipment that affect positive control over the rate of descent. This often requires skilled in-water observation.

9. Select work platforms based on the following preferential hierarchy:

A. conduct all work from land or an existing structure;

B. use a barge with auto-positioning systems where thrusters will not cause increased turbidity;

C. anchor barges to (1) shoreline infrastructure; (2) nearby existing moorings; and, (3) anchors or spuds on sand only (as possible, have SCUBA divers lay anchors by hand in sand areas).

10. Ensure new structures minimize shading impacts to marine habitats.

11. Mooring systems (e.g., buoys, chains, ropes) must:

A. be kept taut to the minimum length necessary.

B. employ the minimum line length necessary to account for expected fluctuations in water depth due to tides or waves.

C. use a mid-line floats or other buoyancy devices to prevent contact with the ocean floor.

D. be properly maintained.

12. Ensure structures are properly weighted to prevent movement from currents or waves and implement a maintenance plan to ensure integrity over time.

13. Require a long-term maintenance plan for gear, instruments, and equipment to prevent failures leading to permanent adverse effects to EFH (e.g. scour or vessel groundings).

14. All temporary structures must be removed at the completion of in-water work.

15. Do not stockpile or stage materials in the marine environment unless absolutely necessary. Place material that is stored in the marine environment on unconsolidated sediments devoid of coral and seagrass.

B. For Increase in Sedimentation and/or Turbidity

1. Install sediment, turbidity, and/or pneumatic curtains, and use real-time monitoring (automated or manual) to detect failure and implement stop-work processes if pre-determined project thresholds are reached (use standards from Clean Water Act 401 water quality certification). In areas of soft sediment, consider partial length turbidity curtains to reduce resuspension of sediment during high winds and currents.
2. Collect all accumulated sediment and/or debris and remove them entirely from the water and place onto a surface vessel; debris should not be towed outside a containment.
3. Debris and sediment that is removed from the water shall be disposed of at an appropriate upland location. Sediment and debris must be contained while in transit or on the shore.
4. Project operations must cease under unusual conditions, such as large tidal events, storms, and high surf conditions.
5. Conduct intertidal work at low and/or slack tide to the greatest extent feasible.
6. To minimize impacts to coral larvae, you should avoid in-water work during mass-coral spawning times or peak coral spawning seasons. Permittees should coordinate with local NMFS Habitat Conservation Division representatives to determine the exact period when coral spawning would occur for the given year at the project site.
7. Maintain baseline water flow, volume, and velocity of the waterbody.
8. Use natural or bio-engineered solutions when feasible.
9. Fully stabilize disturbed upland areas prior to removing silt fences and erosion prevention measures.
10. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction conditions and elevations.
11. Use cofferdams to dewater the project impact site for activities.
12. Utilize environmental clamshell buckets for mechanical dredging.
13. Minimize disturbances to stream banks, and place abutments outside of the floodplain whenever possible. Seek to maintain baseline water flow volume and velocity within the system.
14. Design the structure to maintain or replicate natural stream channel and flow conditions to the greatest extent practicable.
15. Revegetate shoreline areas with appropriate native species and fully stabilize disturbed upland areas prior to removing silt fences and erosion prevention measures.

C. For Increase in Nutrients, Pollution, Contaminants, and Freshwater

1. Conduct work during the dry season when possible; stop work during storms or heavy rains.
2. Prevent discharges into the water.
3. Inspect all equipment prior to beginning work each day to ensure the equipment is in good working condition, and there are no contaminant (e.g., oil, fuel) leaks. Work must be stopped until leaks are repaired, and equipment is cleaned. Equipment should always be stored in appropriate

staging area designed to be preventative in terms of containing unexpected spills when equipment is not in use or during fueling.

4. All fueling or repairs to equipment must be done in a location with the appropriate controls that prevent the introduction of contaminants to marine environment
5. Fueling of project-related vehicles and equipment shall take place at least 50 feet, or the maximum distance possible, from the water and within a containment area, preferably over an impervious surface.
6. Use of treated wood that would be in contact with the water is not authorized.
7. Use materials that are nontoxic to aquatic organisms, such as untreated wood, concrete, or steel (avoid pressure treated lumber).
8. Use diffusers on the end of subtidal discharge pipes to minimize impacts from discharges.
9. Prevent bentonite and other drilling fluids from contacting benthic organisms.
10. Prevent discharges of chemicals and other fluids dissimilar from seawater into the water column.

D. For Increase in Acoustic Impacts

1. Use a vibratory hammer to install piles when possible. Under conditions where impact hammers are required, drive as deep as possible with a vibratory hammer prior to the use of an impact hammer.
2. Implement measures to attenuate the sound or minimize impacts to aquatic resources during pile installation. Methods to mitigate sound impacts include, but are not limited to the following: surround the pile with a dewatered cofferdam and/or air bubble curtain system.

Sullivan, James

From: Jamie Marchetti - NOAA Federal <jamie.marchetti@noaa.gov>
Sent: Friday, July 7, 2023 2:51 PM
To: Otani, Meesa (FHWA)
Subject: Re: RAEM-030-1(059) Honoapiilani Highway Improvements ESA and EFH Consultation

CAUTION: This email originated from outside of the Department of Transportation (DOT). Do not click on links or open attachments unless you recognize the sender and know the content is safe.

Hello Meesa,

While reviewing your submission, I had several questions and comments that came up that I wanted to mention/ address for your review.

1. For the species that May be Affected/ Not Likely Adversely Affected, I would recommend limiting this to species found in coastal waters as any pollution/ waste/ turbidity concerns are not likely to affect pelagic waters. I would suggest that this list only needs to include Central North Pacific green sea turtles, Hawksbill sea turtles, Hawaiian monk seals, and monk seal critical habitat. Does that work for you?
2. Since an alternative has not yet been determined, but they are all likely to produce the same stressors, we would likely review all four alternatives as part of this action.
3. For the four alternatives, it looks like the new highway construction will join up with the old highway at some point along the coast (or use sections of the old highway). Since this will likely result in construction along coastal areas there may be the potential for disturbances from human activity. I would suggest including the following BMPs:

- Constant vigilance will be kept for the presence of ESA-listed species during all aspects of the permitted action. A responsible party, i.e., permittee/site manager/project supervisor, will designate a competent observer to search/monitor work sites and the areas adjacent to the authorized work area for ESA-listed species.
- All work will be postponed or halted when ESA-listed marine species are within 50 m of the proposed work and will only begin/resume after the animals have voluntarily departed the area.
- Project-related personnel will NOT attempt to disturb, touch, ride, feed, or otherwise intentionally interact with any protected species.

Please feel free to reach out if you have any further concerns, and I will let you know when I initiate the consultation.

Thanks
Jamie Marchetti

On Fri, Jun 30, 2023 at 11:46 AM 'Otani, Meesa (FHWA)' via _NMFS PIR ESHESA <efhesaconsult@noaa.gov> wrote:

> Hello,
>
> Attached is the Endangered Species Act and Essential Fish Habitat consultation for the Honoapiilani Highway Improvements, Ukumehame to Launiupoko project on the Island of Maui.

Please let me know if you have any questions.

Thank you!

Meesa Otani

Environmental Engineer

Federal Highway Administration, Hawaii Division

300 Ala Moana Blvd., Room 3-229

Honolulu, Hawaii 96850

(808) 541-2316

meesa.otani@dot.gov

Think before you print

From: Jamie Marchetti - NOAA Federal <jamie.marchetti@noaa.gov>
Sent: Monday, July 31, 2023 1:33 PM
To: Otani, Meesa (FHWA) <meesa.otani@dot.gov>
Cc: Powell, Lisa (FHWA) <lisa.powell@dot.gov>
Subject: Re: RAEM-030-1(059) Honoapiilani Highway Improvements ESA and EFH Consultation

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Hello Meesa,

Sorry for the continued questions, just trying to gather enough information to do a proper exposure-analysis.

Though the initial submitted ESA letter states, *no noise would be directly generated in the ocean by this project,* I am attempting to determine if any in-stream work may produce noise isopleths which may reach the ocean, or monk seal habitat. From the provided list above, would any of the following activities occur in-stream (and as a result may produce in-water noise)?

- Geotechnical drilling
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- Land-based, wetland environment installation or proofing of steel or concrete pilings and/or sheet pile via impact hammer
- Construction of new bank stabilization and any maintenance/reconstruction

I realize many indicate land-based, but I wanted to ensure that this also did not include within streams.

Thanks again for your continued work on this.

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> Please see list of construction activities and schedule details below.
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- Raise Grant Obligation Expenditure deadline is 9/27/29. However, the funds from the Raise Grant are unlikely to be enough for building project so construction may continue after the Raise Grant Obligation Expenditure deadline.

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Yes,
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I just wanted to do a quick check-in on this as I was informed the EFH component of this project has been completed. Once I have more information I should be able to finish the ESA document and send it for internal review.

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Are there any activities on this list that are unlikely to occur as a part of this action? Are there other activities associated with this action that need to be added?

Thanks

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Thanks for your help.

Regards,
Sean

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> **Sent:** Friday, July 7, 2023 2:47 PM
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> ***Meesa Otani***
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> Federal Highway Administration, Hawaii Division
> 300 Ala Moana Blvd., Room 3-229
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> **Think before you print**

--

Sean F. Hanser, PhD.

Resource Management Specialist, Habitat Conservation Division

Pacific Islands Regional Office

National Marine Fisheries Service | U.S. Department of Commerce

(808) 725-5091

www.fisheries.noaa.gov

On Fri, Oct 6, 2023 at 1:43 PM Otani, Meesa (FHWA) <meesa.otani@dot.gov> wrote:

Hi Jamie,

Sorry for not getting back to you quicker regarding the Section 7 consultation. Below, we tried to capture the different questions and noted the date of the email.

For the specific questions, the responses are in red.

Please let me know if you have any additional questions.

Thank you!!!
Meesa

July 31, 2023 email

Based on currently available information, we do not anticipate any in-water work.
To protect monk seal and ocean habitat, all applicable laws would be used in design and construction and enforced throughout the lifetime of the project. These include the Marine Mammal Protection Act, Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act, and NOAA/NMFS conservation recommendations, in accordance with the Recovery Plan for the Hawaiian monk seal.

Regarding potential noise isopleths, we are confident that our proposed actions will not cause any adverse effects for the following reasons:

1. Project Location – Our project area is inland of the coast, avoiding crossing into any critical habitat.
2. NMFS Conservation Measures – NMFS provided conservation recommendations pursuant to 50 CFR 600.920 that, when implemented, will help ensure that potential adverse effects are avoided and minimized. We are committing to those conservation recommendations.
3. USWFS Conservation Guidelines – Our Biological Resources Report recommended following a suite of USWFS conservation guidelines for various fauna. While monk seal were not listed on the IPaC Species List or observed in the field during official field surveys, we are committing to all conservation guidelines recommended by USFWS.
4. Construction Methods: Most construction noise and vibrations come from pile driving. We are using drilled shafts for piers, rather than pile driving, which eliminates much of the noise associated with piers construction.
5. Stream conditions - Noise isopleths from proposed actions radiate in all direction but diminish in intensity (attenuate) as the sound wave spreads over a larger area. Waves are also attenuated or blocked by encountering obstructions such as shallow water, land masses, or rocks. As both the Olowalu and Ukumehame Streams are shallow and rocky with numerous riffles, potential effects on monk seal and ocean habitat diminish with distance from construction activities. The project area is inland of the beach, providing a buffer distance to attenuate sound waves. The likelihood of any noise going linearly along the shallow rocky streams far enough to reach the ocean are very minimal. And if they do, they will immediately fan out and diminish along with being further attenuated by reefs.

We are aware of the critical habitat along the Maui coastline, but given the existing conditions, our current mitigation measures and proposed construction activities minimize and are likely to avoid any potential adverse effects migrating from our inland project area to marine waters.
Below are specific activities and their anticipated status of in-stream work:

- Geotechnical drilling – No, geotechnical drilling for soil exploration is not anticipated to be done in streams.
- Spread footings and drilled shafts with pile caps (i.e. large caps combining multiple drilled shafts) – There may be piers constructed in the stream channel above the OHWM in some locations, but it is not anticipated to involve in-water work based on currently available information.
- Sheet driving for temporary excavations – It is possible that sheet driving to limit excavation area for pier cap construction would be in the stream channel, but it is not anticipated to be done in-water based on currently available information.
- The use of land-based, wetland environment cofferdams – Inland wetland areas have been identified in parts of the project (Ukumehame, near the Ukumehame Firing Range) that are isolated from the shoreline and not connected to any stream features. The project currently anticipates spanning over these areas utilizing viaducts which will require construction of foundations for bridge piers. To limit the disturbance within the wetland areas the use of cofferdams may be employed. If this measure is applied, it would be isolated from the streams themselves.
- Land-based, wetland environment installation or proofing of steel or concrete pilings and/or sheet pile via impact hammer – Concrete pile driving is not anticipated. Concrete pile driving is generally not done for

bridge construction these days as, in general, drilled shafts are preferred because they are more efficient. Sheet piles for cofferdam installation are addressed above.

- Construction of new bank stabilization and any maintenance/reconstruction – It is possible that scour protection extends into stream channels, most likely dumped riprap, but as noted, this is anticipated to be above the OHWM based on currently available information. Should scour design extend into any stream channel, we will follow "An Integrated Storm Water Management Approach and a Summary of Clear Water Diversion and Isolation Best Management Practices for Use in the State of Hawaii" by the FHWA and HDOT Practitioners Guide (2016).
- Construction of box culverts – Culverts on the project are limited to smaller drainage areas that are generally dry, where concentrated flows will be carried across the roadway corridor. In these areas culverts would be either preformed pipe, precast concrete box or cast-in-place concrete box culverts. At stream locations, bridges are anticipated in lieu of culverts, to provide greater flow capacity and to avoid in-water work.

July 14, 2023 email

We have another activity that needs to be added to my July 31, 2023 response.

- Construction of culverts

July 7, 2023 email

1. For the species that May be Affected/ Not Likely Adversely Affected, I would recommend limiting this to species found in coastal waters as any pollution/ waste/ turbidity concerns are not likely to affect pelagic waters. I would suggest that this list only needs to include Central North Pacific green sea turtles, Hawksbill sea turtles, Hawaiian monk seals, and monk seal critical habitat. Does that work for you? Yes
2. Since an alternative has not yet been determined, but they are all likely to produce the same stressors, we would likely review all four alternatives as part of this action. Yes, the stressors are basically the same for all four alternatives.
3. For the four alternatives, it looks like the new highway construction will join up with the old highway at some point along the coast (or use sections of the old highway). Since this will likely result in construction along coastal areas there may be the potential for disturbances from human activity. I would suggest including the following BMPs:

- Constant vigilance will be kept for the presence of ESA-listed species during all aspects of the permitted action. A responsible party, i.e., permittee/site manager/project supervisor, will designate a competent observer to search/monitor work sites and the areas adjacent to the authorized work area for ESA-listed species.
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- Project-related personnel will NOT attempt to disturb, touch, ride, feed, or otherwise intentionally interact with any protected species.

  Yes, these can be added to the list of project BMPs.

From: Jamie Marchetti - NOAA Federal <jamie.marchetti@noaa.gov>
Sent: Monday, August 21, 2023 10:10 AM
To: Otani, Meesa (FHWA) <meesa.otani@dot.gov>
Subject: Re: RAEM-030-1(059) Honoapiilani Highway Improvements ESA and EFH Consultation

CAUTION: This email originated from outside of the Department of Transportation (DOT). Do not click on links or open attachments unless you recognize the sender and know the content is safe.

Hi Meesa,

With the ongoing unfolding events in Maui, I wanted to check in and see if we needed to do anything regarding this consultation? If we need to pause it, or withdraw it for resubmittal at a later date please let me know. Or we can just continue so this is ready when necessary for implementation (I'm still holding related to some pending questions about in-water work).

If the FHWA needs to do any emergency consultations related to the disaster please let us know and we can assist.

Hope all is well.
JM

On Mon, Jul 31, 2023 at 1:32 PM Jamie Marchetti - NOAA Federal <jamie.marchetti@noaa.gov> wrote:

> Hello Meesa,
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> Sorry for the continued questions, just trying to gather enough information to do a proper exposure-analysis.
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Please let me know if you have any questions.

Thank you!
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Yes,
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Resource Management Specialist, Habitat Conservation Division
Pacific Islands Regional Office
National Marine Fisheries Service | U.S. Department of Commerce
(808) 725-5091
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"Facts are meaningless. You could use facts to prove anything that's even remotely true." - Homer Simpson

Sullivan, James

From: Otani, Meesa (FHWA) <meesa.otani@dot.gov>
Sent: Thursday, October 19, 2023 2:12 PM
To: Jamie Marchetti - NOAA Federal
Cc: Powell, Lisa (FHWA); Darden, Richard (FHWA); Vaughn, Colleen (FHWA)
Subject: RE: RAEM-030-1(059) Honoapiilani Highway Improvements ESA and EFH Consultation

Hi Jamie,

Yes, that would be great.

Thank you!
Meesa

From: Jamie Marchetti - NOAA Federal <jamie.marchetti@noaa.gov>
Sent: Thursday, October 19, 2023 9:01 AM
To: Otani, Meesa (FHWA) <meesa.otani@dot.gov>
Cc: Powell, Lisa (FHWA) <lisa.powell@dot.gov>; Darden, Richard (FHWA) <richard.darden@dot.gov>; Vaughn, Colleen (FHWA) <colleen.vaughn@dot.gov>
Subject: Re: RAEM-030-1(059) Honoapiilani Highway Improvements ESA and EFH Consultation

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Hello,
I am nearly finished with your consultation and will shortly be sending it off for internal review.
From the time this project was submitted until now, Green sea turtle critical habitat has become something that we have begun conferencing on. It is at the action agency's discretion. As you mentioned in your prior email: *We are aware of the critical habitat along the Maui coastline, but given the existing conditions, our current mitigation measures and proposed construction activities minimize and are likely to avoid any potential adverse effects migrating from our inland project area to marine waters.*
I can include this as a conference if you like and would concur with an NLAA determination.

Just let me know either way.

Thanks
Jamie Marchetti

On Tue, Oct 10, 2023 at 3:23 PM Jamie Marchetti - NOAA Federal <jamie.marchetti@noaa.gov> wrote:

> Hello,
> Thank you for the followup email. I now have all the information needed to initiate your consultation request. The initiation date is today 10/10/23 and we will have a response within 60 days, though we strive to respond sooner. I will reach out if I have any further questions.
>
> Thank you
> Jamie
>
> On Fri, Oct 6, 2023 at 1:43 PM Otani, Meesa (FHWA) <meesa.otani@dot.gov> wrote:

Hi Jamie,

Sorry for not getting back to you quicker regarding the Section 7 consultation. Below, we tried to capture the different questions and noted the date of the email.

For the specific questions, the responses are in red.

Please let me know if you have any additional questions.

Thank you!!!

Meesa

July 31, 2023 email

Based on currently available information, we do not anticipate any in-water work.

To protect monk seal and ocean habitat, all applicable laws would be used in design and construction and enforced throughout the lifetime of the project. These include the Marine Mammal Protection Act, Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act, and NOAA/NMFS conservation recommendations, in accordance with the Recovery Plan for the Hawaiian monk seal.

Regarding potential noise isopleths, we are confident that our proposed actions will not cause any adverse effects for the following reasons:

1. Project Location – Our project area is inland of the coast, avoiding crossing into any critical habitat.
2. NMFS Conservation Measures – NMFS provided conservation recommendations pursuant to 50 CFR 600.920 that, when implemented, will help ensure that potential adverse effects are avoided and minimized. We are committing to those conservation recommendations.
3. USWFS Conservation Guidelines – Our Biological Resources Report recommended following a suite of USWFS conservation guidelines for various fauna. While monk seal were not listed on the IPaC Species List or observed in the field during official field surveys, we are committing to all conservation guidelines recommended by USFWS.
4. Construction Methods: Most construction noise and vibrations come from pile driving. We are using drilled shafts for piers, rather than pile driving, which eliminates much of the noise associated with piers construction.
5. Stream conditions - Noise isopleths from proposed actions radiate in all direction but diminish in intensity (attenuate) as the sound wave spreads over a larger area. Waves are also attenuated or blocked by

encountering obstructions such as shallow water, land masses, or rocks. As both the Olowalu and Ukumehame Streams are shallow and rocky with numerous riffles, potential effects on monk seal and ocean habitat diminish with distance from construction activities. The project area is inland of the beach, providing a buffer distance to attenuate sound waves. The likelihood of any noise going linearly along the shallow rocky streams far enough to reach the ocean are very minimal. And if they do, they will immediately fan out and diminish along with being further attenuated by reefs.

We are aware of the critical habitat along the Maui coastline, but given the existing conditions, our current mitigation measures and proposed construction activities minimize and are likely to avoid any potential adverse effects migrating from our inland project area to marine waters.

Below are specific activities and their anticipated status of in-stream work:

- Geotechnical drilling – No, geotechnical drilling for soil exploration is not anticipated to be done in streams.
- Spread footings and drilled shafts with pile caps (i.e. large caps combining multiple drilled shafts) – There may be piers constructed in the stream channel above the OHWM in some locations, but it is not anticipated to involve in-water work based on currently available information.
- Sheet driving for temporary excavations – It is possible that sheet driving to limit excavation area for pier cap construction would be in the stream channel, but it is not anticipated to be done in-water based on currently available information.
- The use of land-based, wetland environment cofferdams – Inland wetland areas have been identified in parts of the project (Ukumehame, near the Ukumehame Firing Range) that are isolated from the shoreline and not connected to any stream features. The project currently anticipates spanning over these areas utilizing viaducts which will require construction of foundations for bridge piers. To limit the disturbance within the wetland areas the use of cofferdams may be employed. If this measure is applied, it would be isolated from the streams themselves.
- Land-based, wetland environment installation or proofing of steel or concrete pilings and/or sheet pile via impact hammer – Concrete pile driving is not anticipated. Concrete pile driving is generally not done for bridge construction these days as, in general, drilled shafts are preferred because they are more efficient. Sheet piles for cofferdam installation are addressed above.
- Construction of new bank stabilization and any maintenance/reconstruction – It is possible that scour protection extends into stream channels, most likely dumped riprap, but as noted, this is anticipated to be above the OHWM based on currently available information. Should scour design extend into any stream channel, we will follow “An Integrated Storm Water Management Approach and a Summary of Clear Water Diversion and Isolation Best Management Practices for Use in the State of Hawaii” by the FHWA and HDOT Practitioners Guide (2016).
- Construction of box culverts – Culverts on the project are limited to smaller drainage areas that are generally dry, where concentrated flows will be carried across the roadway corridor. In these areas culverts would be either preformed pipe, precast concrete box or cast-in-place concrete box culverts. At stream locations, bridges are anticipated in lieu of culverts, to provide greater flow capacity and to avoid in-water work.

July 14, 2023 email

We have another activity that needs to be added to my July 31, 2023 response.

- Construction of culverts

July 7, 2023 email

1. For the species that May be Affected/ Not Likely Adversely Affected, I would recommend limiting this to species found in coastal waters as any pollution/ waste/ turbidity concerns are not likely to affect pelagic waters. I would suggest that this list only needs to include Central North Pacific green sea turtles, Hawksbill sea turtles, Hawaiian monk seals, and monk seal critical habitat. Does that work for you? Yes
2. Since an alternative has not yet been determined, but they are all likely to produce the same stressors, we would likely review all four alternatives as part of this action. Yes, the stressors are basically the same for all four alternatives.
3. For the four alternatives, it looks like the new highway construction will join up with the old highway at some point along the coast (or use sections of the old highway). Since this will likely result in construction along coastal areas there may be the potential for disturbances from human activity. I would suggest including the following BMPs:

- Constant vigilance will be kept for the presence of ESA-listed species during all aspects of the permitted action. A responsible party, i.e., permittee/site manager/project supervisor, will designate a competent observer to search/monitor work sites and the areas adjacent to the authorized work area for ESA-listed species.
- All work will be postponed or halted when ESA-listed marine species are within 50 m of the proposed work and will only begin/resume after the animals have voluntarily departed the area.
- Project-related personnel will NOT attempt to disturb, touch, ride, feed, or otherwise intentionally interact with any protected species.

Yes, these can be added to the list of project BMPs.

From: Jamie Marchetti - NOAA Federal <jamie.marchetti@noaa.gov>
Sent: Monday, August 21, 2023 10:10 AM
To: Otani, Meesa (FHWA) <meesa.otani@dot.gov>
Subject: Re: RAEM-030-1(059) Honoapiilani Highway Improvements ESA and EFH Consultation

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Hi Meesa,

With the ongoing unfolding events in Maui, I wanted to check in and see if we needed to do anything regarding this consultation? If we need to pause it, or withdraw it for resubmittal at a later date please let me know. Or we can just continue so this is ready when necessary for implementation (I'm still holding related to some pending questions about in-water work).

If the FHWA needs to do any emergency consultations related to the disaster please let us know and we can assist.

Hope all is well.

JM

On Mon, Jul 31, 2023 at 1:32 PM Jamie Marchetti - NOAA Federal <jamie.marchetti@noaa.gov> wrote:

> Hello Meesa,
>
> Sorry for the continued questions, just trying to gather enough information to do a proper exposure-analysis.
>
> Though the initial submitted ESA letter states, *no noise would be directly generated in the ocean by this project,* I am attempting to determine if any in-stream work may produce noise isopleths which may reach the ocean, or monk seal habitat. From the provided list above, would any of the following activities occur in-stream (and as a result may produce in-water noise)?
>
> - Geotechnical drilling
> - Spread footings and drilled shafts with pile caps (i.e. large caps combining multiple drilled shafts)
> - Sheet driving for temporary excavations
> - The use of land-based, wetland environment cofferdams
> - Land-based, wetland environment installation or proofing of steel or concrete pilings and/or sheet pile via impact hammer
> - Construction of new bank stabilization and any maintenance/reconstruction
>
> I realize many indicate land-based, but I wanted to ensure that this also did not include within streams.
>
> Thanks again for your continued work on this.
>
> Jamie
>
> On Mon, Jul 31, 2023 at 9:34 AM Otani, Meesa (FHWA) <meesa.otani@dot.gov> wrote:

Hi Jamie,

Please see list of construction activities and schedule details below.

- Road construction with minor amounts of resurfacing, and/or reconstruction
- Bridge construction
- Grading and establishment of staging and storage areas
- Geotechnical drilling
- Establishment of new temporary access roads and traffic detours
- Saw cutting
- Spread footings and drilled shafts with pile caps (i.e. large caps combining multiple drilled shafts)
- Sheet driving for temporary excavations
- Enhancing existing scour protection and establishing new scour protection
- Establishing grated inlets, guardrails, curbs and curb ramps
- Clearing, grubbing
- Grading – cut and fill
- Installing pavement markings and signage and utility manholes
- The use of land-based, wetland environment cofferdams
- Land-based, wetland environment installation or proofing of steel or concrete pilings and/or sheet pile via impact hammer
- Construction of new bank stabilization and any maintenance/reconstruction
- Landscaping
- Traffic signals
- Street Lighting; Installing utility poles
- Constructing permanent BMPs

Schedule:

- NEPA complete July 2024
- Project is Design/Build with RFP scheduled for July 2024
- Raise Grant Obligation Expenditure deadline is 9/27/29. However, the funds from the Raise Grant are unlikely to be enough for building project so construction may continue after the Raise Grant Obligation Expenditure deadline.

Please let me know if you have any questions.

Thank you!

Meesa

From: Jamie Marchetti - NOAA Federal <jamie.marchetti@noaa.gov>
Sent: Monday, July 31, 2023 8:45 AM
To: Otani, Meesa (FHWA) <meesa.otani@dot.gov>
Subject: Re: RAEM-030-1(059) Honoapiilani Highway Improvements ESA and EFH Consultation

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Yes,

Thanks for the response.

Jamie

On Sat, Jul 29, 2023 at 11:16 AM Otani, Meesa (FHWA) <meesa.otani@dot.gov> wrote:

> Hi Jamie,
>
> We are working on getting back to you regarding the latest email sent about the activities. I assume the EFH consultation was shared with you?
>
> Thanks!
>
> Meesa

From: Jamie Marchetti - NOAA Federal <jamie.marchetti@noaa.gov>
Sent: Friday, July 28, 2023 10:28 AM
To: Otani, Meesa (FHWA) <meesa.otani@dot.gov>
Subject: Re: RAEM-030-1(059) Honoapiilani Highway Improvements ESA and EFH Consultation

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Hi Meesa,

I just wanted to do a quick check-in on this as I was informed the EFH component of this project has been completed. Once I have more information I should be able to finish the ESA document and send it for internal review.

Thanks,

Jamie

On Tue, Jul 18, 2023 at 10:52 AM Jamie Marchetti - NOAA Federal <jamie.marchetti@noaa.gov> wrote:

Hi Meesa,

As I work through the analysis, it would be helpful to have more specific information regarding the various activities that may be associated with the project. It is anticipated that based on the location all alignments will have a mix of raised roadways, bridge structures, and at-grade portions. Based on previous road work and bridge construction, I composed the following list of activities that may occur:

- Road construction, resurfacing, and/or reconstruction
- Bridge construction
- Grading and establishment of staging and storage areas
- Geotechnical drilling
- Establishment of new temporary access roads and traffic detours
- Saw cutting, pile and/or sheet driving
- Upgrading and repairing existing abutments
- Enhancing existing scour protection and establishing new scour protection
- Establishing grated inlets, guardrails, curbs and curb ramps,
- Clearing and grubbing,
- Installing pavement markings and signage and utility manholes.
- The use of cofferdams
- Installation or proofing of steel or concrete pilings and/or sheetpile via impact hammer.
- Construction of new bank stabilization and any maintenance/reconstruction
- Maintenance dredging

Are there any activities on this list that are unlikely to occur as a part of this action? Are there other activities associated with this action that need to be added?

Thanks

Jamie Marchetti

On Fri, Jul 14, 2023 at 11:48 AM Sean Hanser - NOAA Federal <sean.hanser@noaa.gov> wrote:

> Hi Meesa,
>
> We have another question for the project. As we are constructing our EFH Conservation Recommendations letter, we write a section that summarizes the action. We are realizing that we are unclear on the schedule for the project. We have a sense of the NEPA schedule, which we know is supposed to wrap up in June 2024 (with a ROD at that time, we assume). We don't know the basic schedule for construction. Will it start right away? We know it will take 2 years or less, but some more detail would be helpful. Is there anything you can share? Is it in the draft EIS?
>
> Thanks for your help.
>
> Regards,
>
> Sean
>
> On Fri, Jul 7, 2023 at 4:14 PM Otani, Meesa (FHWA) <meesa.otani@dot.gov> wrote:
>
> > Hi Sean,
> >
> > I will check with the project team and get back to you.
> >
> > Thanks!
> >
> > Meesa
> >
> > **From:** Sean Hanser - NOAA Federal <sean.hanser@noaa.gov>
> > **Sent:** Friday, July 7, 2023 2:47 PM
> > **To:** Otani, Meesa (FHWA) <meesa.otani@dot.gov>
> > **Cc:** kate.taylor@noaa.gov; Jamie Marchetti - NOAA Federal <jamie.marchetti@noaa.gov>; Powell, Lisa (FHWA) <lisa.powell@dot.gov>
> > **Subject:** Re: RAEM-030-1(059) Honoapiilani Highway Improvements ESA and EFH Consultation

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Hi Meesa,

After looking through the document, a few more questions have come to mind:

Your alternatives refer to the County of Maui's Pali to Puamana Parkway 2005 concepts. These concepts have not been built, is that correct? These are not ideas for modifying existing roadways, are they? Are these concepts illustrated in more detail in the EIS? If so, is there a draft we could look at for context? Or will the draft EIS be out for comment sometime soon?

It could be helpful for us to understand a little more about how right of ways work. They are on both sides of the highway or street, right? Will equipment or material be staged in these areas for the roads that you take over from the State?

You say in the document on pages 4 and 5 that "Hui O Ka Wai Ola (huiokawaiola.com) and the Hawaii Department of Health regularly sample water quality, including turbidity, along the project area coast." and "During construction, their monitoring data would allow HDOT to evaluate the effectiveness of the construction BMPs and quickly respond if there are any abnormal turbidity results." This is good to know and is encouraging regarding the monitoring you all tap into. Can you explain a little more about how their data would be used and the rate at which a questionable measurement could be detected and responded to?

Thanks in advance for your help with our questions.

Regards,

Sean

On Wed, Jul 5, 2023 at 2:58 PM Sean Hanser - NOAA Federal <sean.hanser@noaa.gov> wrote:

> Hi Meesa,

I cut the list of people down a bit, because I figure that questions don't need to bother everyone if they can be taken care of quickly with you.

In the EFHA (and the ESA) consultation document that you sent, it refers to Figure 1. That label does not show up elsewhere in the document, but I am interpreting the figure on page 11 of the PDF to be Figure 1. Just because I have made the mistake of assuming before, I wanted to check and make sure that was a safe assumption. I did not see other figures in the document, but it is always worth checking.

Thanks for your help,

Sean

On Fri, Jun 30, 2023 at 11:46 AM 'Otani, Meesa (FHWA)' via _NMFS PIR ESHESA <efhesaconsult@noaa.gov> wrote:

> Hello,
>
> Attached is the Endangered Species Act and Essential Fish Habitat consultation for the Honoapiilani Highway Improvements, Ukumehame to Launiupoko project on the Island of Maui.
>
> Please let me know if you have any questions.
>
> Thank you!
>
> ***Meesa Otani***
>
> Environmental Engineer
>
> Federal Highway Administration, Hawaii Division
>
> 300 Ala Moana Blvd., Room 3-229
>
> Honolulu, Hawaii 96850
>
> (808) 541-2316

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Ms. Richelle M. Takara
Division Administrator, Hawaii Federal-Aid Division
Federal Highway Administration
300 Ala Moana Blvd, Rm 3-229
Box 50206
Honolulu, HI 96850-3229

July 26, 2023

Dear Ms. Takara,

The National Marine Fisheries Service, Pacific Islands Regional Office (NMFS), received the U.S. Department of Transportation, Federal Highway Administration's (hereafter, FHWA) essential fish habitat (EFH) consultation request and EFH Assessment for the improvements to Honoapi'ilani Highway between milepost 11 and milepost 17 on Maui (Federal-aid Project No. RAEM-030-1(059)) on June 30, 2023. In the package you submitted, you have outlined best management practices (BMPs) that, when adhered to and implemented, will avoid and minimize most adverse effects to EFH. We are providing a few conservation recommendations pursuant to the EFH provisions of the Magnuson-Stevens Fishery Conservation and Management Act (MSA; Section 305(b)(2) as described by 50 CFR 600.920). Implementing these recommendations will help you further avoid and minimize potential adverse effects to EFH.

Consultation History
On November 30, 2022, NMFS received an invitation from FHWA to become a Participating and Cooperating Agency for the Honoapi'ilani Highway Improvements project. The letter informed NMFS of a Notice of Intent to prepare an Environmental Impact Statement (EIS), published in the Federal Register on November 22, 2022, and a Hawaii Environmental Policy Act EIS Preparation Notice, published in Hawaii's The Environmental Notice on November 23, 2022. The publication of the two announcements started the scoping process in which the Hawaii Department of Transportation and FHWA were seeking input on of the project and information related to any environmental, social, or economic concerns about resources within the project footprint. NMFS replied in a letter agreeing to be a Cooperating Agency on December 27, 2022.

Members of NMFS Habitat Conservation Division (HCD) attended a meeting on February 16, 2023, hosted by FHWA that presented the background, purpose, and need for the project, a review of action alternatives, and the project schedule. NMFS provided early input on considerations regarding effects to endangered species and EFH. On February 27, 2023, HCD provided a letter of technical assistance to FHWA with suggestions and guidance on how to prepare an EFH Assessment and consult on potential effects to EFH. Lisa Powell at FHWA acknowledged the technical assistance letter and sent meeting minutes from the February 16

meeting on March 27, 2023. After reviewing the submitted EFHA, feedback from NMFS on EFH and the consultation process were incorporated into FHWA's submission.

Project Description

The proposed project is the construction of a new highway inland from the existing Honoapi'ilani Highway between mileposts 11 and 17. The project area is approximately six miles long and three quarters of a mile wide and is composed predominantly of a coastal plain that includes the ahupua'a of Ukumehame, Olowalu, and Launiupoko. The stretch of highway between milepost 11 and milepost 17 is within the Hawaii Climate Change Mitigation and Adaptation Commission's Sea Level Rise Exposure Area (SLR-XA). The purpose of the proposed project is to reduce the Honoapi'ilani Highway's vulnerability to coastal hazards, including sea level rise and coastal erosion, and to ensure safe movement of people and goods in West Maui. The coastal highway is currently the primary access route to and from West Maui.

There are four "Build Alternatives" drafts and a no-action alternative that are currently being evaluated under the National Environmental Policy Act (NEPA) process. A Preferred Alternative has not yet been identified. Bridge crossings would be needed to carry the highway over Launiupoko, Olowalu, and Ukumehame Streams and other small streams in the project corridor. As an overall project approach, bridge structures associated with Build Alternatives would either avoid filling placement of Waters within the U.S. by spanning the stream or conform to regional conditions for the U.S. Army Corps of Engineers (USACE) Clean Water Act section 404 Nationwide Permits. Build Alternatives may require dredging or filling of jurisdictional wetlands or other Waters of the U.S., which would also require a Clean Water Act section 404 permit from USACE. The four Build Alternatives were adapted from Maui County Pali to Paumana Parkway 2005 concepts. A brief description of each alternative is below:

> *Build Alternative 1.* This alignment has been "modified" from a County of Maui's Pali to Puamana Parkway 2005 concept to apply American Association of State Highway and Transportation Officials (AASHTO) design standards, bypass erosion areas, and avoid cultural resources. This alternative is just mauka (inland toward the mountains) of most inundation areas in Launiupuoko and Olowalu and maximizes use of the existing right-of-way. At Ukumehame Stream, the alignment returns closer to the existing highway (toward the ocean) to minimize potential impacts to a property identified as a Land Commission Award where cultural practices are conducted. This alternative crosses through the SLR-XA, but avoids a sediment basin, which is identified as a potential wetland area by the U.S. Fish and Wildlife Service's National Wetlands Inventory Mapper (NWI). Roughly 0.6 mile (about 3,330 feet) of this alignment would remain inside the SLR-XA.
>
> Build Alternative 2 has been adapted from the County of Maui's Pali to Puamana Parkway 2005 "middle" concept. The alignment was "modified" to apply AASHTO standards, bypass erosional areas, and avoid cultural resources. This alternative passes through a sediment basin below Ukumehame Firing Range that has been identified as a potential wetland area by the U.S. Fish and Wildlife Service's NWI, and follows a more makai (toward the ocean) route to maximize use of County and State-owned properties, staying close to the existing highway. Roughly 1.1 miles (about 6,000 feet) of this alignment would remain inside the SLR-XA.
>
> Build Alternative 3 has been adapted from the County of Maui's Pali to Puamana Parkway 2005 "mauka" concept. The alignment was "modified" to apply AASHTO standards, bypass erosional areas, and avoid cultural resources. It is identical to

Alternative 2, except in Olowalu, the alignment is further inland. The terrain underlying Alternative 3 may be more variable and challenging than Alternative 2. Roughly 1.1 miles (about 6,000 feet) of this alignment would remain inside the SLR-XA.

Build Alternative 4 was also adapted from the County of Maui's Pali to Puamana Parkway 2005 mauka concept. The alignment has been "corrected" to apply AASHTO standards, bypass erosional areas, and avoid cultural resources. The route through Olowalu town, which distinguishes this alignment, is based on landowner input provided in 2007. This alignment meets the 55 miles per hour (mph) design speed, while minimizing curves. Alternative 4 proposes to span a No Build Archaeological Buffer along Ukumehame Stream with a bridge to avoid impacts to an archaeological preservation area that was established as part of the Ukumehame Subdivision project. Roughly 0.3 mile (about 1,600 feet) of this alignment would remain inside the SLR-XA.

The four Build Alternatives converge in several areas, but have two distinct areas where they diverge: Olowalu and Ukumehame. No work will be conducted in the ocean for any of the alternatives. All Build Alternatives will also avoid work on the existing highway in areas where prior emergency stabilizations have occurred. No night work will be conducted without further coordination with NMFS. The NEPA process is expected to take until June 2024 when the final EIS is published. Preparation for construction will start at that time with construction projected to commence in August 2025.

Essential Fish Habitat

The marine water column from the surface to a depth of 3,280.8 feet (1,000 meters) from the shoreline to the outer boundary of the EEZ (200 nautical miles), and the seafloor from the shoreline out to a depth of 2,296.6 feet (700 meters) around each of the Hawaiian Islands, have been designated as EFH. As such, the water column and bottom of the Pacific Ocean around Maui are designated as EFH, and support various life stages for the management unit species (MUS) identified under the Western Pacific Fishery Management Council's Pelagic and Hawai'i Archipelago Fishery Ecosystem Plans. The MUS and life stages found in these waters include eggs, larvae, juveniles, and adults of Bottomfish, Crustacean, and Pelagic MUS. Specific types of habitat considered as EFH include coral reef, patch reefs, hard substrate, artificial substrate, seagrass beds, soft substrate, lagoon, estuarine, surge zone, deep-slope terraces and pelagic/open ocean.

Baseline Condition

Olowalu reef is directly offshore of the planned activities, extending from Ukumehame to Launiupoko. The reef is approximately 1,000 acres across and hosts some of Hawaii's healthiest and oldest living corals in the main Hawaiian Islands. The reef is the largest intact coastal fringing reef system on Maui and contains numerous large *Porites spp.* colonies in shallow water (Sparks et al. 2015). Olowalu reef was designated as the first Hawaiian Hope Spot, a place that is critical to the health the ocean, by Mission Blue, a national non-profit organization that is interested in supporting overall ocean health by conserving areas of concentrated, high-quality marine resources, highlighting its cultural and ecological significance.

West Maui has a history of degraded water quality characterized by high turbidity due to land-based runoff. Nearshore water sampling conducted by the nonprofit Hui O Ka Wai Ola shows a history of high turbidity levels off Olowalu and Ukumehame, regularly well above the Department of Health standards.

Adverse Effects
The proposed activities could result in adverse effects to EFH from sedimentation, turbidity, and introduction of chemical contaminants (e.g., petroleum). Sedimentation and turbidity reduces water quality and may cover and smother nearby habitat forming EFH, including corals and seagrass. Introduction of chemical contaminants may also reduce water quality and adversely affect organismal function, leading to degradation of state and mortality. Coastal erosion may increase due to the planned activities and lead to increased sedimentation and turbidity during or after construction is complete.

NMFS Concerns
With connection to the marine environment, changes or stress that occur nearshore can end up affecting aspects of EFH distant from where a project occurs. Stressors that affect water quality either through turbidity, contamination, or oxygen deprivation can, in turn, affect flora and fauna over time and space (Minton 2017). Land-based runoffs and discharges can subject nearshore benthic communities to adverse exposures and potential degradation of condition. When not properly maintained, equipment could release contaminants (oil, fuel, etc.) into the marine environment. Impacts from contaminants in the marine environment are dependent on the persistence of chemical compounds and their tendency to bio-accumulate in the food web (van Dam et al. 2011). Increase in nutrients, pollutants, and contaminants to the marine environment can reduce fitness and cause mortality of exposed organisms. Some pollutants are environmentally persistent and can take years or even decades to biodegrade (Minton 2017). Nearshore species may spend a portion of their lives in coral reefs, but many of these fish and invertebrates are pelagic spawners (Colin 2011) or broadcast spawners (see, for example Padilla-Gamiño and Gates 2012; Bird et al. 2011). Eggs and larvae are sensitive to water quality changes and can uptake contaminants (Von Westernhagen 1988). They can also spend time in the plankton community where they can be mobilized far offshore (Cowen and Sponaugle 2009; Lobel and Robinson 1988) and bring nutrients and accumulated contaminants to pelagic and benthic communities, including bottomfish, pelagic, and precious coral MUS.

All four Build Alternatives required stream crossings. NMFS is concerned that construction of these steam crossings could cause introduction of sediments and pollutants into the stream and ocean. The above paragraph explained some aspects of the connectivity between the nearshore and offshore habitat. It is important that action proponents recognize that projects that primarily have activities on land can also interact with conduits, such as riparian corridors, which can affect both nearshore and offshore marine environments (Sakamaki et al 2022).

Extreme weather in the Pacific is becoming more frequent and intense because of global climate change (for example, see Hu et al. 2021 and Cai et al. 2014). The project site is also near riparian corridors and rich coral resources, which could be affected by high runoffs, waves, and water levels. The project will also require several years to complete, thus providing a long window of time for one or more major weather events to occur during project execution. NMFS is precautionarily encouraging FHWA to consider the potential effects of extreme weather events on the project. While hurricane season in the Pacific is from June 1 to November 30, tropical storms can and do occur year-round.

FHWA-proposed BMPs
In the package submitted for the consultation, the FHWA provided a thorough list of BMPs which will be incorporated into the overall design and construction methods for the proposed action to minimize and reduce impacts to water quality under NMFS jurisdiction. Adherence to those BMPs during the proposed activities will be effective in addressing most of NMFS concerns about potential adverse effects.

Conservation Recommendations
NMFS provides the following conservation recommendations pursuant to 50 CFR 600.920 that, when implemented, will help to ensure that potential adverse effects are avoided and minimized:

Conservation Recommendation 1: If at all possible, avoid placing bridge footings, foundations, or other structural elements in streambeds. Seek engineering solutions that place bridge structural elements outside a streambed.

Conservation Recommendation 2: Although designs of alternatives will take into account potential future effects of inundation and sea level rise, also plan to accommodate increased water that could come from the land through riparian corridors and flooding pathways. Do not plan bridges or culverts that would restrict the flow of water and could raise water flow rates and increase scour. Consider incorporating low impact design elements into plans that slow water flow, impound sediment, and filter runoff from impermeable surfaces.

Conservation Recommendation 3: Develop a plan for managing equipment, materials, and job site conditions in the event of approaching foul weather (i.e., tropical storms and hurricanes). Equipment and materials may need to be removed from the project site or adequately secured. Stormwater runoff and erosion may require heightened management during storm events.

These conservation recommendations apply to whichever Build Alternative is chosen as the preferred alternative.

Conclusion
Your EFH consultation submission provided a sufficient description of the action needed for the BMPs for a project that will occur on land. We have found necessary to provide only a short list of Conservation Recommendations regarding potential construction over streams, in consideration of extreme weather during the activity period and the potential for increased erosion due to the proposed activity. When implemented and adhered to, these recommendations will help to further ensure that potential adverse effects to EFH are avoided and minimized. Please be advised that regulations (Section 305(b)(4)(B)) to implement the EFH provisions of the Magnuson-Stevens Act requires that federal agencies provide a written response to this letter within 30 days of its receipt, but a preliminary response is acceptable if more time is needed. The final response must include a description of measures to be required or actions to be taken to address the Conservation Recommendations. If the Conservation Recommendations cannot be adopted, an explanation of the reason for not implementing them must be provided at least 10 days prior to final approval of the activities.

Please contact me at alexandria.barkman@noaa.gov or (808) 725-5150 with any comments or questions you may have. Thank you for coordinating on this proposed action.

Sincerely,



Gerry Davis
Assistant Regional Administrator
Habitat Conservation Division

cc by e-mail:
Richard Darden, FHWA
Lisa Powell, FHWA
Meesa Otani, FHWA
Coleen Vaughn, FHWA
Pua Aiu, Hawaii DOT
Genevieve Sullivan, Hawaii DOT
Peter Liebowitz, WSP
Jan Reichelderfer, WSP
Wayne Yoshioka, WSP
Malia Chow, NMFS
David Delaney, NMFS
Giannina DiMaio, NMFS
Sean Hanser, NMFS
Jamie Marchetti, NMFS
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References

Bird, C. E., B. S. Holland, B. W. Bowen, and R. J. Toonen. 2011. Diversification of sympatric broadcast-spawning limpets (Cellana spp.) within the Hawaiian archipelago. *Molecular Ecology* 20(10): 2128-2141.

Cai, W., S. Borlace, M. Lengaigne, P. Van Rensch, M. Collins, G. Vecchi, A. Timmermann, A. Santoso, M. J. McPhaden, L. Wu, L. and M. H. England, M.H. 2014. Increasing frequency of extreme El Niño events due to greenhouse warming. *Nature climate change*, *4*(2), pp.111-116.

Colin, P. L. 2011. Timing and Location of Aggregation and Spawning in Reef Fishes. In Reef fish spawning aggregations: biology, research and management. Eds Y. Sadovy de Mitcheson and P. L. Colin. Dordrecht: Springer Netherlands. pp. 117-158.

Cowen, R. K., and S. Sponaugle. (2009). Larval dispersal and marine population connectivity. *Annual Review of Marine Science* 1: 443-466.

Falinski, K., D. Reed, T. Callender, E. Fielding, R. Newbold, Robin, and A. Yurkanin. 2023. Hui o ka Wai Ola Water Quality Data [Data set]. Zenodo. https://doi.org/10.5281/zenodo.7901115

Hu, K., G. Huang, P. Huang, Y. Kosaka, and S. P. Xie. 2021. Intensification of El Niño-induced atmospheric anomalies under greenhouse warming. *Nature Geoscience*, *14*(6), pp.377-382.

Lobel, P. S. and A. R. Robinson. (1988). Larval fishes and zooplankton in a cyclonic eddy in Hawaiian waters. *Journal of Plankton Research*, *10*(6), 1209-1223.

Minton D. 2017. Non-fishing effects that may adversely affect essential fish habitat in the Pacific Islands Regional. Prepared for the National Oceanic and Atmospheric

Administration, National Marine Fisheries Service, pacific islands regional office. Contract ab-133f-15-cq-0014.

Padilla-Gamiño, J. L., and R. D. Gates. 2012. Spawning dynamics in the Hawaiian reef-building coral *Montipora capitata*. *Marine Ecology Progress Series* 449: 145-160.

Sakamaki, T., A. Morita, S. Touyama, Y. Watanabe, S. Suzuki, and T. Kawai. 2022. Effects of watershed land use on coastal marine environments: A multiscale exploratory analysis with multiple biogeochemical indicators in fringing coral reefs of Okinawa Island. *Marine Pollution Bulletin* 183:114054.

Sparks, R., K. Stone, D. White, and M. Ross. 2015. Maui and Lanai Monitoring Report, 2015 (December), 35. https://dlnr.hawaii.gov/dar/files/2016/07/Maui_Mon_Report.pdf

van Dam J. W., A. P. Negri, S. Uthicke, and J. F. Mueller. 2011. Chemical pollution on coral reefs. Ecological impacts of toxic chemicals. p. 187-211.

Vargas-Ángel, B., D. White, C. Storlazzi, T. Callender, and P. Maurin . 2017. Baseline assessments for coral reef community structure and demographics on West Maui: data report. In *NOAA Data Report.* http://doi.org/10.7289/V5/SP-PIFSC-17-001

Von Westernhagen, H. 1988. 4 sublethal effects of pollutants on fish eggs and larvae. In *Fish Physiology*, vol. 11, pp. 253-346. Academic Press,

U.S. Department of Transportation
Federal Highway Administration

Hawaii Federal-Aid Division

October 6, 2023

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Phone: (808) 541-2700
FHWA-Hawaii.Intake@dot.gov

In Reply Refer To:
HDA-HI

Mr. Gerry Davis
Assistant Regional Administrator, Pacific Islands Regional Office
National Oceanic and Atmospheric Administration
NOAA Inouye Regional Center, NMFS/PIRO
1845 Wasp Boulevard, Building 176
Honolulu, HI 96818

Subject: Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat Conservation Recommendations
Honoapiilani Highway Improvements, West Maui, Ukumehame to Launiupoko
Lahaina, Island of Maui, State of Hawaii
Federal-aid Project No. RAEM-030-1(059)

Dear Mr. Davis:

Thank you for your letter dated July 26, 2023 in response to the Federal Highway Administration (FHWA)'s essential fish habitat (EFH) consultation request for the Honoapiilani Highway (State Route 30) Improvements project. In this letter, the FHWA and the State of Hawaii Department of Transportation (HDOT), are providing a description of measures to be required or actions to be taken to address the Conservation Recommendations in the July 26, 2023 letter.

Measures and Actions to Address Conservation Recommendations

Conservation Recommendation 1: If at all possible, avoid placing bridge footings, foundations, or other structural elements in streambeds. Seek engineering solutions that place bridge structural elements outside a streambed.

All abutments for the bridges over streams would be placed outside of the Ordinary High Water Mark (OHWM). This placement of abutments (the supporting structures at the ends of the bridge) outside of the stream bed, ensures that the critical structural components of the bridge are not intruding into the stream's natural course. This helps protect the streambed and its ecosystem from disruption.

In addition to abutments, longer bridges, which require additional support, would have piers placed outside the OHWM but, in some cases, within the stream channel. Based on currently available information, we do not anticipate any construction in-water. This approach minimizes the impact on the streambed and its surroundings, maintaining the natural flow and habitat for aquatic life.

Conservation Recommendation 2: Although designs of alternatives will take into account potential future effects of inundation and sea level rise, also plan to accommodate increased water that could come from the land through riparian corridors and flooding pathways. Do not plan bridges or culverts that would restrict the flow of water and could raise water flow rates and increase scour. Consider incorporating low impact design elements into plans that slow water flow, impound sediment, and filter runoff from impermeable surfaces.

Several low impact design elements would be incorporated into plans, as required by HDOT's Storm Water Post-Construction Best Management Practices Manual dated February 2022. These elements include appropriate storm event considerations, detention basins, vegetated swales, and minimized site-disturbance as much as practicable.

Off-site flow passing across the highway corridor would be handled by bridges and culverts. Bridges are being designed to allow the flow of existing streams for a 100-year storm event. Per HDOT drainage criteria, off-site bridge crossings would be analyzed for both 50 and 100-year storm events. Based on currently available information, the design of bridges would minimize impact on streams by ensuring that bridge abutments and piers remain positioned above the Ordinary High Water Mark.. The natural stream channels would be retained. Culverts are proposed only for non-stream locations where concentrated flows from smaller offsite drainage areas exist. Culverts would be designed for 50-year storm event and would typically be box culverts or preformed pipes. Per HDOT drainage criteria, culverts would be analyzed for 50-year events. When within FEMA flood zones, culverts would be analyzed for 100-year storm events. When appropriate, culvert slopes would be kept low to reduce the potential for erosion at culvert exits. When slopes are anticipated to be steeper, velocity dissipation strategies would be employed for culverts to eliminate the potential for erosion at culvert outfalls. Designing bridges and culverts to accommodate specific storm events ensures that the structures can handle increased water flow during such events without causing disruptions to the natural water flow.

Drainage from on-site (the roadway) would be designed to accommodate a 25-year storm event. Detention basins, vegetated buffers and vegetated swales would be used as permanent BMPs to filter on-site drainage of pollutants before discharging into State waters. Designing on-site drainage to handle a 25-year storm event and incorporating permanent BMPs help slow water flow, impound sediment, and filter runoff from impermeable surfaces.

These design elements focus on accommodating increased water flow without causing disruptions or restricting natural watercourses while contributing to a more sustainable and ecologically sensitive highway design that mitigates potential impacts from inundation, sea level rise, and increased water flow from adjacent areas.

Conservation Recommendation 3: Develop a plan for managing equipment, materials, and job site conditions in the event of approaching foul weather (i.e., tropical storms and hurricanes). Equipment and materials may need to be removed from the project site or adequately secured. Stormwater runoff and erosion may require heightened management during storm events.

All HDOT projects are subject to the guidelines set forth in the Construction Best Management Practices Field Manual (October 2021), which outlines a plan for the management of equipment, materials and construction activities for projects. Contractors

are also required to comply with requirements of the 2005 Hawaii Standard Specifications for Road and Bridge Construction and Special Provisions, as well as Hawaii Administrative Rules (HAR) Title 11, Chapter 55. These guidelines and requirements form the foundation for the development of a comprehensive plan for management of construction activities and their potential impacts to the environment.

The project would require a Notice of General Coverage (NGPC) for the National Permit Elimination Discharge System (NPDES) including a Storm Water Pollution Prevention Plan (SWPPP) to ensure that the project complies with all relevant stormwater management regulations. The SWPPP outlines how project design would prevent sediment and other pollutants from entering water bodies during construction. In the SWPPP template for the Hawaii Department of Transportation, Attachment H (and presented below) instructs the contractor what to do in the event a large storm event is approaching. These documents serve to guide management activities during storm events, ensuring that stormwater runoff and erosion are properly controlled to protect the environment and nearby water bodies from potential pollutants and impacts.

SEVERE STORM CONTINGENCY PLAN

The following plan would be implemented by the General Contractor to prevent/respond to polluted discharges resulting from a severe storm or natural disaster. It is the General Contractor's responsibility to abide by the following plan as well as any other binding plan, agreement, regulation, rule, law, or ordinance applicable.

*All contactors associated with the following construction project**: Project Name** would follow this plan when a severe storm is either forecast or anticipated or as directed by the Engineer.*

General Contractors shall:

a. Regularly monitor local weather reports for forecasted and/or anticipated severe storm events, advisories, watches, warnings or alerts. The Contractor shall inspect and document the condition of all erosion control measures on that day prior, during, and within 24 hours after the event. The Contractor shall prepare for forecasted and/or anticipated severe weather events to minimize the potential for polluted discharges.

b. Secure the construction site. Securing the site shall include at a minimum:
   - *i. Removing or securing equipment, machinery, construction materials, and portable toilets. If portable toilets are to remain on-site, they shall be pumped the day prior to the event.*
   - *ii. Cleaning up all construction debris.*
   - *iii. Stopping scheduled material deliveries.*
   - *iv. Locating and turning off jobsite utilities, including electricity, water, and gas.*
   - *v. Implementing all Best Management Practices detailed in the SWPPP. This includes BMPs for materials management, spill prevention, and erosion and sediment control. To protect human health, the Engineer will use their discretion as to whether to remove BMPs which may impede flow into*

inlets causing ponding on the roadway. These changes shall be noted on the SWPPP.

vi. *Work crews shall finalize securing the project site, and evacuate until the severe weather condition has passed.*

c. *Upon return to the Site, all BMPs shall be inspected, repaired and/or re-installed as needed. If repair or reinstallation of removed BMPs is necessary, it shall be initiated within 24 hours of the inspection. Note the changes on the SWPPP. To facilitate repair or replacement, the Contractor shall be required to store surplus material on the project site if the site is located where replacement materials will not be readily available.*

d. *When there has been a discharge which violates Hawaii Water Pollution rules and regulations OR there is an imminent threat of a discharge which violates Hawaii Water Pollution rules and regulations and/or endangers human and/or environmental health, the Engineer shall, at a minimum, execute the following steps:*

i. *Assess whether construction needs to stop or if additional BMPs are needed to stop or prevent a violation.*

ii. *Direct the Contractor to take all reasonable measures to protect human health and the environment.*

iii. *Notify responsible parties listed below and immediately notify the DOH of the incident. The notification shall also include the identity of the pollutant sources and the implemented control or mitigation measures.*

1. *Owner Contact/Emergency Contact Number: **XXX, XXX-XXXX***
2. *Owner Contact/ Emergency Contact Number: **XXX, XXX-XXXX***
3. *Contractor/ Emergency Contact Number: **XXX, XXX-XXXX***
4. *Department of Health Clean Water Branch (During regular working hours): 808-586-4309 Hawaii State Hospital Operator (After hours): 808-247-2191*

iv. *Document corrective actions, take photographs of discharge and receiving waters.*

v. *Evaluate the effectiveness of the construction BMPs in the Site-Specific Construction Best Management Plan in relation to the design storm. If the storm was less than the design storm and BMPs were ineffective, revise BMPs to prevent future discharges of a similar nature.*

Conclusion

Based on the nature of the proposed work and implementation of the proposed BMPs and minimization measures discussed in our June 30, 2023 letter along with these Conservation

Recommendations, the FHWA believes there will be no more than minimal adverse effects to EFH.

We are seeking concurrence that the proposed action will have no more than minimal adverse effects to EFH. We respectfully request your response within 30 days of receipt of this letter.

If you have any questions, please feel free to contact Meesa Otani, Environmental Engineer, at (808) 541-2316 or by email at meesa.otani@dot.gov. Thank you for your assistance.

Sincerely yours,

for Richelle M. Takara, P.E.
Division Administrator

cc: Richard Darden, FHWA
Lisa Powell, FHWA
Colleen Vaughn, FHWA
Pua Aiu, HDOT
Genevieve Sullivan, HDOT
Peter Liebowitz, WSP
Jan Reichelderfer, WSP
James Sullivan, WSP
Wayne Yoshioka, WSP
Malia Chow, NMFS
David Delaney, NMFS
Giannina DiMaio, NMFS
Sean Hanser, NMFS
Jamie Marchetti, NMFS
Kate Taylor, NMFS
Dale Youngkin, NMFS
Alexandria Barkman, NMFS

Sullivan, James

From: Alexandria Barkman - NOAA Federal <alexandria.barkman@noaa.gov>
Sent: Tuesday, October 10, 2023 6:40 PM
To: Otani, Meesa (FHWA)
Cc: Gerry Davis - NOAA Federal; Darden, Richard (FHWA); Powell, Lisa (FHWA); Vaughn, Colleen (FHWA); Aiu, Pua; Sullivan, Genevieve; Reichelderfer, Jan; Liebowitz, Peter; Yoshioka, Wayne; Malia Chow - NOAA Federal; David Delaney - NOAA Federal; Giannina DiMaio - NOAA Federal; Sean Hanser - NOAA Federal; Jamie Marchetti - NOAA Federal; Kate Taylor - NOAA Federal; Dale Youngkin - NOAA Federal; Sullivan, James; Takara, Richelle (FHWA)
Subject: Re: NMFS EFH Conservation Recommendations Letter for FHWA Honoapi'ilani Highway Improvements
Attachments: ~WRD0000.jpg

Follow Up Flag: Follow up
Flag Status: Flagged

Aloha Meesa,

The Habitat Conservation Division of the National Marine Fisheries Service, Pacific Islands Regional Office (NMFS) has received the FHWA's response to the conservation recommendations provided by NMFS. Thank you for your response and acceptance of the conservation recommendations. The EFH consultation for the Honoapi'ilani Highway Improvements is complete.

Regards,
Alex Barkman

On Fri, Oct 6, 2023 at 11:30 AM Otani, Meesa (FHWA) <meesa.otani@dot.gov> wrote:

> Hi Gerry,
>
> Thank you for the NMFS's response to FHWA's request for EFH consultation. Attached is the FHWA and HDOT's response to the July 26, 2023 letter.
>
> Please let me know if you have any questions.
>
> Thank you!
>
> Meesa
>
> ***Meesa Otani***

Environmental Engineer

Federal Highway Administration, Hawaii Division

300 Ala Moana Blvd., Room 3-229

Honolulu, Hawaii 96850

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Think before you print

From: Alexandria Barkman - NOAA Federal <alexandria.barkman@noaa.gov>
Sent: Wednesday, July 26, 2023 3:36 PM
To: Takara, Richelle (FHWA) <Richelle.TAKARA@dot.gov>
Cc: Darden, Richard (FHWA) <richard.darden@dot.gov>; Powell, Lisa (FHWA) <lisa.powell@dot.gov>; Otani, Meesa (FHWA) <meesa.otani@dot.gov>; Vaughn, Colleen (FHWA) <colleen.vaughn@dot.gov>; pua.aiu@hawaii.gov; genevieve.h.sullivan@hawaii.gov; jan.reichelderfer@wsp.com; peter.liebowitz@wsp.com; wayne.yoshioka@wsp.com; Malia Chow - NOAA Federal <malia.chow@noaa.gov>; David Delaney - NOAA Federal <david.delaney@noaa.gov>; Gerry Davis - NOAA Federal <gerry.davis@noaa.gov>; Giannina DiMaio - NOAA Federal <giannina.dimaio@noaa.gov>; Sean Hanser - NOAA Federal <sean.hanser@noaa.gov>; Jamie Marchetti - NOAA Federal <jamie.marchetti@noaa.gov>; Kate Taylor - NOAA Federal <kate.taylor@noaa.gov>; Dale Youngkin - NOAA Federal <dale.youngkin@noaa.gov>
Subject: NMFS EFH Conservation Recommendations Letter for FHWA Honoapi'ilani Highway Improvements

CAUTION: This email originated from outside of the Department of Transportation (DOT). Do not click on links or open attachments unless you recognize the sender and know the content is safe.

Aloha Ms. Takara,

The Habitat Conservation Division of the National Marine Fisheries Service, Pacific Islands Regional Office (NMFS) received the Federal Highway Administration's request for an abbreviated essential fish habitat (EFH) consultation regarding Honoapi'ilani Highway Improvements. We reviewed the submitted EFH Assessment and provided conservation recommendations pursuant to the EFH provisions of the Magnuson-Stevens Fishery Conservation and Management Act in the attached EFH Consultation letter.

Thank you for your early coordination with NMFS during the planning phase of this important project.

Regards,

Alexandria Barkman

--

Alexandria Barkman, PhD.

EFH Consulting Biologist, PIRO Habitat Conservation Division

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Alexandria Barkman, PhD.
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U.S. Department of Transportation
Federal Highway Administration

Hawaii Federal-Aid Division

June 30, 2023

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In Reply Refer To:
HDA-HI

Ms. Sarah Malloy
Regional Administrator (Acting), Pacific Islands Regional Office
National Oceanic and Atmospheric Administration
NOAA Inouye Regional Center, NMFS/PIRO
1845 Wasp Boulevard, Building 176
Honolulu, HI 96818

Subject: Endangered Species Act (ESA) Section 7 Consultation
Honoapiilani Highway Improvements, West Maui, Ukumehame to Launiupoko
Lahaina, Island of Maui, State of Hawaii
Federal-aid Project No. RAEM-030-1(059)

Dear Ms. Malloy:

The Federal Highway Administration (FHWA), in cooperation with the State of Hawaii Department of Transportation (HDOT), is planning to improve Honoapiilani Highway (State Route 30) between milepost 11 and milepost 17 with State and federal funds. Therefore, the project is required to be in compliance with the National Environmental Policy Act (NEPA) and other federal requirements including Section 7 of the Endangered Species Act (ESA) of 1973 (Section 7), as amended.

We are requesting ESA Section 7 consultation with the National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS) for the proposed project. The initial consultation meeting with several NOAA representatives (Sean Hanser, David Delaney, Kate Taylor, Jamie Marchetti, and Ron Dean) was held on February 16, 2023. In this letter, the project team is providing a description of the proposed action, a list of ESA protected species and critical habitat, an assessment of potential adverse effects, proposed ways to mitigate for any effects, and a determination as to how the action will affect Federally-protected species and their designated critical habitat.

Description of the Proposed Action

The proposed project is in West Maui, in the areas served by the existing Honoapiilani Highway between milepost 11 and milepost 17. Honoapiilani Highway, which is part of Maui's Belt Road system, is a two-lane principal arterial highway that provides the sole access between communities along the west coast of Maui and the rest of the island. The proposed southeastern terminus at milepost 11 is in Ukumehame, in the vicinity of Papalaua Beach Park, and the

northwestern terminus of the project is at milepost 17 in Launiupoko, where Honoapiilani Highway currently intersects the southern terminus of the Lahaina Bypass. This approximately six-mile long and 3/4-mile-wide project area is composed predominantly of a coastal plain that includes the Ahupuaa of Ukumehame, Olowalu, and Launiupoko. Offshore, the Olowalu reef area, which extends from Ukumehame to Launiupoko, hosts about 1,000 acres of some of the healthiest and oldest living corals within the main Hawaiian Islands.

FHWA and HDOT developed four preliminary project alternatives. The project alternatives would be further refined as the Draft Environmental Impact Statement (EIS) is prepared, leading to the selection of a preferred alternative. The proposed project does not include work on the existing highway except where the new project joins the existing highway at the northern and southern connections points and potentially at connector roads to ensure continued access to residences, businesses, and public beaches. Depending on the selected alternative, there may be intersections at Luawai Street in Olowalu and Ehehene Street, Pohaku Aeko Street as well as a new driveway connect for direct access to the Ukumehame Firing Range. It is anticipated that there will be little or no new construction at the existing highway since these primary connector roads all have existing intersections with considerable infrastructure including left and right turn lanes on the existing highway as well as merge lanes for traffic turning from the side street onto the existing highway.

Additional information can be obtained at the project website, www.honoapiilanihwyimprovements.com.

Project Alternatives

A Preferred Alternative has not yet been identified. Four draft "Build Alternatives" have been identified and are being evaluated in the Draft EIS currently underway. Each alternative involves the construction of a new highway, which is mainly along a new alignment, further inland from the ocean. None of the alternatives involve work in the ocean. They may require bridges over the streams. All project alternatives would incorporate Best Management Practices (BMPs). Opportunities to avoid cultural and environmental constraints identified during the EIS technical studies would be considered in ongoing conceptual design work in support of the Draft EIS and determination of the Preferred Alternative.

As a refresher to our previous communication, the four alternatives as presented in the NOI and Scoping Documents are depicted in Figure 1 and brief descriptions are as follows:

> **Build Alternative 1 (Red Line)** has been adapted from the County of Maui's Pali to Puamana Parkway 2005 coastal or makai concept. This alignment has been "modified" to apply American Association of State Highway and Transportation Officials (AASHTO) design standards, bypass erosion areas, and avoid cultural resources. This alternative is just mauka of most inundation areas in Launiupuoko and Olowalu and maximizes use of the existing right-of-way (ROW).
>
> **Build Alternative 2 (Yellow Line)** has been adapted from the County of Maui's Pali to Puamana Parkway 2005 "middle" concept. The alignment was "modified" to apply AASHTO standards, bypass erosional areas, and avoid cultural resources.

Build Alternative 3 (Bright Green Line) has been adapted from the County of Maui's Pali to Puamana Parkway 2005 "mauka" concept. The alignment was "modified" to apply AASHTO standards, bypass erosional areas, and avoid cultural resources.

Build Alternative 4 (Purple Line) was also adapted from the County of Maui's Pali to Puamana Parkway 2005 mountain-ward or mauka concept. The alignment has been "corrected" to apply AASHTO standards, bypass erosional areas, and avoid cultural resources. The route through Olowalu town, which distinguishes this alignment, is based on landowner input provided in 2007. This alignment meets the 55 miles per hour (mph) design speed (with speed signs to be posted at 45 mph), while minimizing curves.

The alignments converge at several points and there are two distinct areas where the alignments all differ from one another: one in Olowalu and the other in Ukumehame. The preferred alternative may be selected from two proposed alternatives, one in each of the two differing areas.

The No-Build Alternative reflects future conditions if the proposed project were not constructed. Future conditions are based on projections of land-use and development that are likely to occur in 2045 Build Analysis timeframe. The roadway would continue to operate in its current location and condition, including at the several locations along the existing highway where the highway has been protected by various emergency stabilization projects. Additional stabilization efforts could be required in the future under the No Build Alternative.

For the proposed project, none of the four alternatives would require any disturbance or work in the ocean. While it is intended that the existing highway right-of-way would be transferred from the State to Maui County (where, consistent with Maui County park planning, it would be used to provide continued access to beaches and local residential and commercial uses) the proposed project does not include any work on the existing highway in the areas where prior emergency stabilizations have occurred.

It is also noted that no night work is anticipated during construction, and construction duration is anticipated to be no longer than two years. However, should night work be required, additional coordination would be conducted with NMFS to agree upon any other appropriate conservation measures.

Analysis of Potential Adverse Effects on ESA

NMFS expressed specific concerns for the potential impacts to Hawaiian Monk Seal (*Neomonachus schauinslandi)* critical habitat and water from polluted runoff at the February 16, 2023 consultation meeting. Other species of concern are listed on the Marine Protected Species of the Hawaiian Islands | NOAA Fisheries website (accessed 6/19/2023).

Hawaiian Monk Seals are in the Olowalu reef area offshore of the project. In the project area, the Monk Seal's critical habitat is not only in the ocean but also extends 5 feet on to the shoreline to account for the seals going onto the beach. In addition, False Killer Whale (*Pseudorca crassidens*) critical habitat is found offshore of Maui.

Both the Hawaiian Monk Seal and the False Killer Whale are listed as endangered. Additional marine mammals in the Hawaiian Islands listed as endangered are:

Blue Whale *Balaenoptera musculus*
Fin Whale *Balaenoptera physalus*
North Pacific Right Whale *Eubalaena japonica*
Sei Whale *Balaenoptera borealis*
Sperm Whale *Physeter macrocephalus*

There are several species of sea turtles protected under the ESA:

Central North Pacific Green Turtle *Chelonia mydas* (Threatened)
Hawksbill Turtle *Eretmochelys imbricata* (Endangered)
Leatherback Turtle *Dermochelys coriacea* (Endangered)
North Pacific Loggerhead Turtle *Caretta caretta (*Endangered)
Olive Ridley Turtle *Lepidochelys olivacea* (Threatened)

The protected fish species are:

Giant Manta Ray *Manta birostris* (Threatened)
Oceanic Whitetip Shark *Carcharhinus longimanus* (Threatened)
Shortfin Mako Shark *Isurus oxyrinchus* (Candidate Species)

There are currently no known ESA-listed coral species found in the Hawaiian Archipelago. However, the Olowalu coral reef is home to an incredible diversity of marine life including large populations of manta rays, sea turtles, reef sharks, and a multitude of tropical fish species and is vitally important to the surrounding underwater ecosystems of Maui, Molokai and Lanai, serving as a nursery to replenish and populate nearby reefs.

NMFS sent HDOT suggested BMPs that have been used for a similar project. The provided BMPs address physical damage to the benthos (e.g., corals and seagrass), sedimentation and turbidity, introduction of chemical contaminants, introduction of invasive species, and noise.

Physical damage to the benthos (e.g., corals and seagrass)

Physical damage to corals can occur due to abrasion or breaking of colonies. Activities that may impart physical damage from the construction projects can include dredging, filling discharge (e.g., rocks, dirt, cement, etc.), anchoring vessels/barges and silt curtains, and using heavy equipment in-water.

The proposed project does not include any work in the ocean so would not impart physical damage to the corals or other ocean life. It is not anticipated to have cumulative effects based on any reasonably foreseeable actions.

Sedimentation and Turbidity

Increased sedimentation and turbidity can cause smothering of benthic species and block sunlight necessary for species that rely on photosynthesis. For fish, sedimentation is less likely to cause significant impacts because of their mobility, but some effects are still possible.

Sedimentation and turbidity are potential adverse effects. Use of proper BMPs, as detailed below, would avoid or minimize potential adverse effects and no additional mitigation would be anticipated. It is not anticipated to have cumulative effects based on any reasonably foreseeable actions. The project would require a National Pollutant Discharge Elimination System (NPDES) permit and the associated Stormwater Pollution Prevention Plan (SWPPP) to minimize sedimentation and turbidity effects.

Hui O Ka Wai Ola (huiokawaiola.com) and the Hawaii Department of Health regularly sample water quality, including turbidity, along the project area coast. Their work since 2006 provides a valuable record of nearshore water quality conditions. During construction, their monitoring data would allow HDOT to evaluate the effectiveness of the construction BMPs and quickly respond if there are any abnormal turbidity results.

Introduction of Nutrients, Chemical Contaminants, and Freshwater

Increases in nutrients (i.e., from earthmoving, land use changes, and runoff), pollutants and contaminants (i.e., from earthmoving and equipment), and freshwater to the marine environment can reduce fitness and cause mortality of exposed organisms. Increases of land-based runoffs and discharges can subject benthic communities to adverse exposures and potential degradation of condition and mortality. Water conditions around coral reefs are often oligotrophic, and introduction of nutrients can change water conditions from a clear, nutrient limited baseline. The construction site's primary potential sources of nutrient loading are sediment runoff from ground disturbance and the storage and use of construction equipment. When not properly maintained, equipment could release contaminants (oil, fuel, etc.) into the marine environment. Accidental releases or spills due to unanticipated circumstances are also possible. Contaminant runoff could be generated from storage and use of construction equipment that is leaking fuel or oil, and/or improperly stored construction materials being exposed to stormwater runoff.

The release of contaminants such as oil or fuel and the introduction of nutrients are potential adverse effects addressed by proposed BMPs which would avoid or minimize potential adverse effects and no additional mitigation would be anticipated. It is not anticipated to have cumulative effects based on any reasonably foreseeable actions.

Introduction of Invasive Species

Introduced species are organisms that have been moved, intentionally or unintentionally, into areas where they do not naturally occur. Species can be introduced to new biogeographies, typically via transport on vessel hulls, in ballast waters, or on equipment. Invasive species can rapidly increase in abundance to the point that they come to dominate their new environment, creating adverse ecological effects to other species of the ecosystem and the functions and services it may provide. Invasive species can decrease species diversity, change trophic structure, and diminish physical structure, but adverse effects are highly variable and species-specific.

Invasive species are both a threat to the ocean and the land ecosystems. Specific BMPs to prevent invasive species from being spread by the project would avoid or minimize potential adverse effects and no additional mitigation would be anticipated. It is not anticipated to have cumulative effects based on any reasonably foreseeable actions.

Noise

Construction noise has been shown to have a broad range of potential effects. However, no noise would be directly generated in the ocean by this project. BMPs suggested are directed at any bridge construction on the streams entering the ocean.

Given the proposed implementation of BMPs and minimization measures, which are described further below, potential adverse effects would be avoided and no additional mitigation would be anticipated. Noise is not anticipated to have cumulative effects based on any reasonably foreseeable actions.

Project Best Management Practices and Avoidance and Minimization Measures

BMPs would be implemented during construction to minimize the potential for impacts to water quality. BMPs for in-water and land-based construction would be implemented in accordance with the documented approach, "*An Integrated Storm Water Management Approach and a Summary of Clear Water Diversion and Isolation Best Management Practices for Use in the State of Hawaii*" by the Federal Highway Administration and Hawaii Department of Transportation Practitioners Guide (2016) or the *Construction Best Management Practices Field Manual* by the State of Hawaii Department of Transportation (2008).

Specific BMPs and minimization measures to be implemented include:

1. Waste Management – Concrete wastes, solid wastes, and any sanitary/septic wastes would be located away from and managed to assure no contamination to the ocean or critical habitats.

2. Vehicle and Equipment Management – All vehicles and equipment cleaning, maintenance, and refueling would be located away from and managed to assure no contamination to the critical habitats. Invasive species controls shall be maintained to ensure that all materials transported from off-site are free of such species.

3. Stormwater Management and Erosion Control – The project would require an NPDES permit with a SWPPP. The Contractor would be required to install and maintain BMPs as part of the proposed project. Site-specific stormwater BMPs would be implemented and/or installed at the staging and work areas to prevent water quality degradation associated with stormwater runoff. Stormwater BMPs would include maintaining equipment in good working order, storing equipment and materials away from the ocean or stream bank with strategic placement of absorbent material, such as fiber rolls, as a buffer between equipment and nearby waterbodies. Drip pans shall also be maintained beneath construction equipment. The Contractor would be required to prevent any debris from falling into the water.

4. The HDOT Standard Specifications for Road and Bridge Construction Section 209 Temporary Water Pollution, Dust, and Erosion Control would be followed.

5. The project would require temporary construction laydown areas. Stockpiling, storage, and equipment staging would utilize appropriate BMPs to prevent potential surface runoff from entering the stream. No stockpiling, storage, or heavy equipment would be placed in the streams.

In addition, NMFS provided a list of standard BMPs (Enclosure: Initial BMPs to Consider for Road Construction Projects Version 27 Feb 2023). These BMPs have been evaluated for applicability to the proposed project and those that are appropriate are presented below and would be used in the design and construction of the Project.

Specific BMPs and minimization measures to be implemented include:

A. For Physical Impacts to Benthic Communities (most of these are not considered applicable since there is no anticipated construction in the marine environment).
    1. Prevent trash and debris from entering the marine environment during the project.
    2. For anticipated stream crossings, all temporary structures must be removed at the completion of in-water work.
    3. For anticipated stream crossings, do not stockpile or stage materials in the marine environment unless absolutely necessary. Place material that is stored in the marine environment on unconsolidated sediments devoid of coral and seagrass.

B. For Increase in Sedimentation and/or Turbidity
    1. Install sediment, turbidity, and/or pneumatic curtains, and use real-time monitoring (automated or manual) to detect failure and implement stop-work processes if pre-determined project thresholds are reached (use standards from Clean Water Act 401 water quality certification). In areas of soft sediment, consider partial length turbidity curtains to reduce resuspension of sediment during high winds and currents.
    2. Maintain baseline water flow, volume, and velocity of the waterbody.
    3. Use natural or bio-engineered solutions when feasible.
    4. Fully stabilize disturbed upland areas prior to removing silt fences and erosion prevention measures.
    5. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction conditions and elevations.
    6. Minimize disturbances to stream banks, and place abutments outside of the floodplain whenever possible. Seek to maintain baseline water flow volume and velocity within the system.
    7. Design the structure to maintain or replicate natural stream channel and flow conditions to the greatest extent practicable.
    8. Revegetate shoreline areas with appropriate native species and fully stabilize disturbed upland areas prior to removing silt fences and erosion prevention measures.

C. For Increase in Nutrients, Pollution, Contaminants, and Freshwater
    1. Conduct work during the dry season when possible; stop work during storms or heavy rains.
    2. Prevent discharges into the water.
    3. Inspect all equipment prior to beginning work each day to ensure the equipment is in good working condition, and there are no contaminant (e.g., oil, fuel) leaks. Work

must be stopped until leaks are repaired, and equipment is cleaned. Equipment should always be stored in appropriate staging area designed to be preventative in terms of containing unexpected spills when equipment is not in use or during fueling.

4. All fueling or repairs to equipment must be done in a location with the appropriate controls that prevent the introduction of contaminants to marine environment.
5. Fueling of project-related vehicles and equipment shall take place at least 50 feet, or the maximum distance possible, from the water and within a containment area, preferably over an impervious surface.
6. Use of treated wood that would be in contact with the water is not authorized.
7. Use materials that are nontoxic to aquatic organisms, such as untreated wood, concrete, or steel (avoid pressure treated lumber).
8. Prevent bentonite and other drilling fluids from contacting benthic organisms.
9. Prevent discharges of chemicals and other fluids dissimilar from seawater into the water column.

As provided by NMFS, these remaining BMPs and minimization measures do not apply to the project primarily since there is no anticipated in-water ocean construction associated with the Project.

A. For Physical Impacts to Benthic Communities
    1. Restrict all physical contact with the bottom to unconsolidated sediments devoid of coral and seagrass.
    2. Perform pre-deployment reconnaissance (e.g., divers, drop cameras) to ensure that all anchors are set on hard or sandy bottom devoid of corals and seagrass and that chosen anchor locations take into consideration damage that could occur from the anchor chain if the vessel swings due to currents or tides.
    3. Prior to mobilizing, ensure all equipment, ballast, and vessel hulls do not pose a risk of introducing new invasive species and will not increase abundance of invasive species present at the project location.
    4. Relocate infrastructure materials (e.g., riprap, piles, boulders) that are colonized with benthic communities according to an approved relocation plan. If infrastructure materials (e.g., riprap, piles, boulders) that are colonized with benthic communities will be removed or destroyed as part of permitted activities, relocate these materials to an appropriate receiving site. Equipment, anchors, structures, or fills shall not be deployed in project areas containing live corals, seagrass beds, or visible benthic organisms. Perform pre-deployment reconnaissance (e.g., divers, drop cameras, etc.) to ensure these resources are avoided.
    5. Minimize direct impact (direct or indirect contact causing damage) by divers and construction related tools, equipment, and materials with benthic organisms, regardless of size, especially corals and seagrass.
    6. Maintain all structures, gears, instruments, mooring lines, and equipment to prevent failures.
    7. All objects lowered to the bottom shall be lowered in a controlled manner. Note: This can be achieved using buoyancy controls such as lift bags, or the use of cranes, winches, or other equipment that affect positive control over the rate of descent. This often requires skilled in-water observation.
    8. Select work platforms based on the following preferential hierarchy:

A. conduct all work from land or an existing structure;
B. use a barge with auto-positioning systems where thrusters will not cause increased turbidity;
C. anchor barges to (1) shoreline infrastructure; (2) nearby existing moorings; and, (3) anchors or spuds on sand only (as possible, have SCUBA divers lay anchors by hand in sand areas).

10. Ensure new structures minimize shading impacts to marine habitats.
11. Mooring systems (e.g., buoys, chains, ropes) must:
    A. be kept taut to the minimum length necessary.
    B. employ the minimum line length necessary to account for expected fluctuations in water depth due to tides or waves.
    C. use a mid-line floats or other buoyancy devices to prevent contact with the ocean floor.
    D. be properly maintained.
12. Ensure structures are properly weighted to prevent movement from currents or waves and implement a maintenance plan to ensure integrity over time.
13. Require a long-term maintenance plan for gear, instruments, and equipment to prevent failures leading to permanent adverse effects to EFH (e.g. scour or vessel groundings).

B. For Increase in Sedimentation and/or Turbidity
1. Collect all accumulated sediment and/or debris and remove them entirely from the water and place onto a surface vessel; debris should not be towed outside a containment.
2. Debris and sediment that is removed from the water shall be disposed of at an appropriate upland location. Sediment and debris must be contained while in transit or on the shore.
3. Project operations must cease under unusual conditions, such as large tidal events, storms, and high surf conditions.
4. Conduct intertidal work at low and/or slack tide to the greatest extent feasible.
5. To minimize impacts to coral larvae, you should avoid in-water work during mass-coral spawning times or peak coral spawning seasons. Permittees should coordinate with local NMFS Habitat Conservation Division representatives to determine the exact period when coral spawning would occur for the given year at the project site.
6. Use cofferdams to dewater the project impact site for activities.
7. Utilize environmental clamshell buckets for mechanical dredging.

C. For Increase in Nutrients, Pollution, Contaminants, and Freshwater
1. Use diffusers on the end of subtidal discharge pipes to minimize impacts from discharges.

D. For Increase in Acoustic Impacts
1. Use a vibratory hammer to install piles when possible. Under conditions where impact hammers are required, drive as deep as possible with a vibratory hammer prior to the use of an impact hammer.
2. Implement measures to attenuate the sound or minimize impacts to aquatic resources during pile installation. Methods to mitigate sound impacts include but are not limited

to the following: surround the pile with a dewatered cofferdam and/or air bubble curtain system.

Conclusion

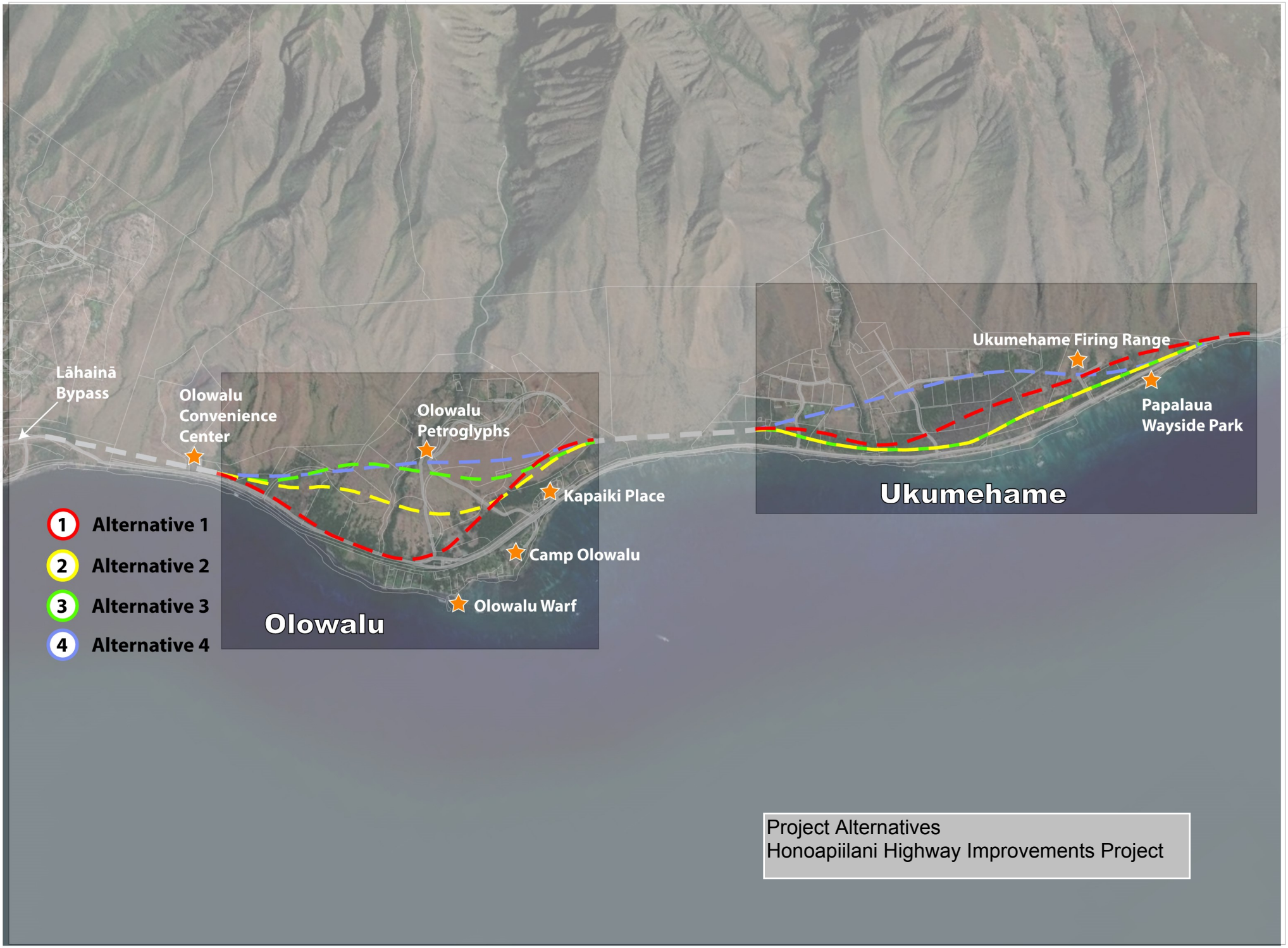
Based on the nature of the proposed work and implementation of the proposed BMPs and minimization measures, the FHWA has determined that the proposed action may affect, but is not likely to adversely affect Federally-protected species or their designated critical habitat, including Hawaiian Monk Seal and False Killer Whale designated critical habitat. We request your concurrence with our may affect, but not likely to adversely affect determination. We respectfully request your response within 60 days of receipt of this letter.

If you have any questions, please feel free to contact Meesa Otani, Environmental Engineer, at (808) 541-2316 or by email at meesa.otani@dot.gov. Thank you for your assistance.

Sincerely yours,

for Richelle M. Takara, P.E.
Division Administrator

Enclosures


Lāhainā Bypass
Olowalu Convenience Center
Olowalu Petroglyphs
Kapaiki Place
Camp Olowalu
Olowalu Warf
Olowalu
Ukumehame Firing Range
Papalaua Wayside Park
Ukumehame
1 Alternative 1
2 Alternative 2
3 Alternative 3
4 Alternative 4
Project Alternatives
Honoapiilani Highway Improvements Project

Enclosure: Initial BMPs to Consider for Road Construction Projects
Version 27 Feb 2023

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3. Prior to mobilizing, ensure all equipment, ballast, and vessel hulls do not pose a risk of introducing new invasive species and will not increase abundance of invasive species present at the project location.

4. Relocate infrastructure materials (e.g., riprap, piles, boulders) that are colonized with benthic communities according to an approved relocation plan. If infrastructure materials (e.g., riprap, piles, boulders) that are colonized with benthic communities will be removed or destroyed as part of permitted activities, relocate these materials to an appropriate receiving site. Equipment, anchors, structures, or fills shall not be deployed in project areas containing live corals, seagrass beds, or visible benthic organisms. Perform pre-deployment reconnaissance (e.g., divers, drop cameras, etc.) to ensure these resources are avoided.

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12. Ensure structures are properly weighted to prevent movement from currents or waves and implement a maintenance plan to ensure integrity over time.

13. Require a long-term maintenance plan for gear, instruments, and equipment to prevent failures leading to permanent adverse effects to EFH (e.g. scour or vessel groundings).

14. All temporary structures must be removed at the completion of in-water work.

15. Do not stockpile or stage materials in the marine environment unless absolutely necessary. Place material that is stored in the marine environment on unconsolidated sediments devoid of coral and seagrass.

B. For Increase in Sedimentation and/or Turbidity

1. Install sediment, turbidity, and/or pneumatic curtains, and use real-time monitoring (automated or manual) to detect failure and implement stop-work processes if pre-determined project thresholds are reached (use standards from Clean Water Act 401 water quality certification). In areas of soft sediment, consider partial length turbidity curtains to reduce resuspension of sediment during high winds and currents.
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5. Conduct intertidal work at low and/or slack tide to the greatest extent feasible.
6. To minimize impacts to coral larvae, you should avoid in-water work during mass-coral spawning times or peak coral spawning seasons. Permittees should coordinate with local NMFS Habitat Conservation Division representatives to determine the exact period when coral spawning would occur for the given year at the project site.
7. Maintain baseline water flow, volume, and velocity of the waterbody.
8. Use natural or bio-engineered solutions when feasible.
9. Fully stabilize disturbed upland areas prior to removing silt fences and erosion prevention measures.
10. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction conditions and elevations.
11. Use cofferdams to dewater the project impact site for activities.
12. Utilize environmental clamshell buckets for mechanical dredging.
13. Minimize disturbances to stream banks, and place abutments outside of the floodplain whenever possible. Seek to maintain baseline water flow volume and velocity within the system.
14. Design the structure to maintain or replicate natural stream channel and flow conditions to the greatest extent practicable.
15. Revegetate shoreline areas with appropriate native species and fully stabilize disturbed upland areas prior to removing silt fences and erosion prevention measures.

C. For Increase in Nutrients, Pollution, Contaminants, and Freshwater

1. Conduct work during the dry season when possible; stop work during storms or heavy rains.
2. Prevent discharges into the water.
3. Inspect all equipment prior to beginning work each day to ensure the equipment is in good working condition, and there are no contaminant (e.g., oil, fuel) leaks. Work must be stopped until leaks are repaired, and equipment is cleaned. Equipment should always be stored in appropriate

staging area designed to be preventative in terms of containing unexpected spills when equipment is not in use or during fueling.

4. All fueling or repairs to equipment must be done in a location with the appropriate controls that prevent the introduction of contaminants to marine environment
5. Fueling of project-related vehicles and equipment shall take place at least 50 feet, or the maximum distance possible, from the water and within a containment area, preferably over an impervious surface.
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9. Prevent bentonite and other drilling fluids from contacting benthic organisms.
10. Prevent discharges of chemicals and other fluids dissimilar from seawater into the water column.

D. For Increase in Acoustic Impacts

1. Use a vibratory hammer to install piles when possible. Under conditions where impact hammers are required, drive as deep as possible with a vibratory hammer prior to the use of an impact hammer.
2. Implement measures to attenuate the sound or minimize impacts to aquatic resources during pile installation. Methods to mitigate sound impacts include, but are not limited to the following: surround the pile with a dewatered cofferdam and/or air bubble curtain system.

Sullivan, James

From: Otani, Meesa (FHWA) <meesa.otani@dot.gov>
Sent: Thursday, October 19, 2023 2:12 PM
To: Jamie Marchetti - NOAA Federal
Cc: Powell, Lisa (FHWA); Darden, Richard (FHWA); Vaughn, Colleen (FHWA)
Subject: RE: RAEM-030-1(059) Honoapiilani Highway Improvements ESA and EFH Consultation

Hi Jamie,

Yes, that would be great.

Thank you!
Meesa

From: Jamie Marchetti - NOAA Federal <jamie.marchetti@noaa.gov>
Sent: Thursday, October 19, 2023 9:01 AM
To: Otani, Meesa (FHWA) <meesa.otani@dot.gov>
Cc: Powell, Lisa (FHWA) <lisa.powell@dot.gov>; Darden, Richard (FHWA) <richard.darden@dot.gov>; Vaughn, Colleen (FHWA) <colleen.vaughn@dot.gov>
Subject: Re: RAEM-030-1(059) Honoapiilani Highway Improvements ESA and EFH Consultation

CAUTION: This email originated from outside of the Department of Transportation (DOT). Do not click on links or open attachments unless you recognize the sender and know the content is safe.

Hello,
I am nearly finished with your consultation and will shortly be sending it off for internal review.
From the time this project was submitted until now, Green sea turtle critical habitat has become something that we have begun conferencing on. It is at the action agency's discretion. As you mentioned in your prior email: *We are aware of the critical habitat along the Maui coastline, but given the existing conditions, our current mitigation measures and proposed construction activities minimize and are likely to avoid any potential adverse effects migrating from our inland project area to marine waters.*
I can include this as a conference if you like and would concur with an NLAA determination.

Just let me know either way.

Thanks
Jamie Marchetti

On Tue, Oct 10, 2023 at 3:23 PM Jamie Marchetti - NOAA Federal <jamie.marchetti@noaa.gov> wrote:

> Hello,
> Thank you for the followup email. I now have all the information needed to initiate your consultation request. The initiation date is today 10/10/23 and we will have a response within 60 days, though we strive to respond sooner. I will reach out if I have any further questions.
>
> Thank you
> Jamie
>
> On Fri, Oct 6, 2023 at 1:43 PM Otani, Meesa (FHWA) <meesa.otani@dot.gov> wrote:

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Regional Office
1845 Wasp Blvd., Bldg 176
Honolulu, Hawaii 96818
(808) 725-5000 · Fax: (808) 725-5215

November 27, 2023

Meesa Otani
Federal Highway Administration, Hawaii Division
300 Ala Moana Blvd # 3-229, Honolulu, Hawaii 96850

RE: Request for Informal ESA Consultation and Conference on Honoapiilani Highway Improvements, West Maui, milepost 11 (Ukumehame) to milepost 17 (Launiupoko) (PIRO-2022-03611, I-PI-23-2170-DG).

Dear Ms. Otani:

On June 30, 2023, NOAA's National Marine Fisheries Service (NMFS) received your written request for informal consultation on the Federal Highway Administration's (FHWA), in cooperation with the State of Hawaii Department of Transportation (HDOT), proposed action to construct a new alignment of Honoapiilani Highway further inland from the ocean, between milepost 11 (near Ukumehame) and milepost 17 (near Launiupoko) with state and federal funds.

The proposed action may affect the endangered or threatened species and/or designated critical habitat under our jurisdiction, as identified below in Table 1. On November 30, 2022, NMFS received an invitation from FHWA to become a cooperating agency for this project. The letter informed NMFS of a Notice of Intent to prepare an Environmental Impact Statement (EIS), published in the Federal Register on November 22, 2022, and a Hawaii Environmental Policy Act EIS Preparation Notice, published in Hawaii's The Environmental Notice on November 23, 2022. The publication of the two announcements started the scoping process in which the FHWA and HDOT were seeking input on the project. NMFS agreed to be a cooperating agency on December 27, 2022. On July 7, 2023, we requested clarification on the proposed activities included in the action and provided a list of additions to the Best Management Practices related to these activities. On October 10, 2023, we received all the necessary information to evaluate the proposed action and initiated section 7 consultation.

We prepared this response to your request pursuant to section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. §1531 *et seq*.), implementing regulations at 50 CFR 402, and agency guidance for the preparation of letters of concurrence. This letter also underwent pre-dissemination review using standards for utility, integrity, and objectivity in accordance with applicable guidelines issued under the Information Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). A complete record of this consultation is on file at the Pacific Island Regional Office, Honolulu, Hawaii.

On July 5, 2022, the U.S. District Court for the Northern District of California issued an order vacating the 2019 regulations that were revised or added to 50 CFR part 402 in 2019 ("2019 Regulations," see 84 FR 44976, August 27, 2019) without making a finding on the merits. On

September 21, 2022, the U.S. Court of Appeals for the Ninth Circuit granted a temporary stay of the district court's July 5 order. On November 14, 2022, the Northern District of California issued an order granting the government's request for voluntary remand without vacating the 2019 regulations. The District Court issued a slightly amended order two days later on November 16, 2022. As a result, the 2019 regulations remain in effect, and we are applying the 2019 regulations here. On June 22, 2023, we proposed clarifications to the language in the regulations. For purposes of this consultation and in an abundance of caution, we considered whether the substantive analysis and conclusions articulated in the letter of concurrence would be any different under the pre-2019 regulations, the 2019 regulation, or the 2023 proposed regulations. We have determined that our analysis and conclusions would not be any different.

Under section 7(a)(4) of the ESA, each Federal agency shall confer with the Secretary on any agency action which is likely to jeopardize the continued existence of any species proposed to be listed or result in the destruction or adverse modification of critical habitat proposed to be designated for such species. While consultations are required when the proposed action may affect listed species, a conference is required only when the proposed action is likely to jeopardize the continued existence of a proposed species or destroy or adversely modify proposed critical habitat. However, Federal action agencies may request a conference on any proposed action that may affect proposed species or proposed critical habitat (USFWS & NMFS 1998).

Proposed Action

The FHWA, in cooperation with HDOT, proposes using state and federal funds to move Honoapiilani Highway further inland between milepost 11 and milepost 17. The current alignment of Honoapiilani Highway lies within the projected Sea Level Rise Exposure Area (SLR-XA), as defined by the State of Hawaii's Climate Change Mitigation and Adaptation Commission and the State Department of Land and Natural Resources. The project design allows the realigned roadway to improve resilience to the anticipated 3.2 feet of average sea level rise within the SLR-XA (Figure 1) (FHWA 2022).



Figure 1: Projected sea level rise exposure area.

A preferred alternative has not yet been identified (Figure 2). However, all build alternatives would move a portion of the highway and connect the improved Honoapiilani Highway with the current Lahaina Bypass (Hawaii Route 3000).

- Alternative 1 would avoid approximately 84 percent of the SLR-XA encroachment area on the existing highway. Roughly 0.6 miles (3,330 feet) of this alignment would remain inside the SLR-XA.
- Alternative 2 would avoid approximately 71 percent of the SLR-XA encroachment area on the existing highway. Roughly 1.1 miles (about 6,000 feet) of this alignment would remain inside the SLR-XA.
- Alternative 3 would avoid approximately 71 percent of the SLR-XA on the existing highway, similar to Alternative 2. Roughly 1.1 miles (about 6,000 feet) of this alignment would remain inside the SLR-XA.
- Alternative 4 would avoid approximately 92 percent of the SLR-XA on the existing highway. Roughly 0.3 miles (about 1,600 feet) of its alignment would remain inside the SLR-XA.



Figure 2: Preferred alternatives for Honoapiilani Highway realignment.

Each alignment assumes a typical 140-foot-wide cross-section, each with a two-lane roadway with sufficient right-of-way width to accommodate up to four lanes in the future. HDOT may seek design solutions to elevate the highway by a height in areas where there is still overlap with the SLR-XA. The proposed project only includes work on the existing highway where the new project joins it at the northern and southern connection points and potentially at connector roads to ensure continued access to residences, businesses, and public beaches. Heavy equipment would be used for the demolition of existing structures, removal of structural components/debris, excavation, filling, grading, laying pavement, road construction, and new bridge construction. None of these alternatives involve in-water work.

Any given alignment will have a mix of the following activities:

- Road construction, resurfacing, and reconstruction,
- Grading and establishment of staging and storage areas,

- Establishment of new temporary access roads and traffic detours,
- Enhancing existing scour protection and establishing new scour protection,
- Establishing grated inlets, guardrails, curbs, and curb ramps,
- Installing pavement markings and signage and utility manholes,
- Installation of spread footings and drilled shafts with pile caps (i.e. large caps combining multiple drilled shafts) not anticipated to involve in-water work,
- In-land sheet pile driving for temporary excavations,
- Clearing, grubbing of vegetation,
- Grading – cut and fill,
- The use of land-based, wetland environment cofferdams,
- Construction of new bank stabilization and any maintenance/reconstruction,
- Installing traffic signals, street lighting, and utility poles,
- New bridges construction at three primary streams, Launiupoko, Olowalu, and Ukumehame, as well as other surface water bodies, and
- Construction of box culverts.

Construction is scheduled to begin August 2025 with the duration anticipated to last no longer than two years.

Best Management Practices

In order to avoid or minimize effects on the Central North Pacific green, hawksbill sea turtles, and the Hawaiian monk seal, the FHWA/HDOT will implement the following BMPs to ensure that impacts to ESA-listed species and Hawaiian monk seal critical habitat are minimal and would not adversely modify the habitat.

These include:

1. Contractors will monitor for the presence of ESA-listed species during all aspects of the permitted action.
    a. A responsible party, i.e., permittee/site manager/project supervisor, will designate a competent observer to search/monitor work sites and the areas adjacent to the authorized work area for ESA-listed species.
    b. Observers will survey the area before the start of work each day, including before resumption of work following any break of more than one-half hour.
2. The Action Agency will ensure that a monitoring plan identifies the methods, equipment, communication, and all necessary measures to adequately observe ESA-listed species in the affected areas and communicate with workers.
    a. The Action Agency will ensure that observers are exclusively looking for ESA-listed species at the work site and not assigned to other tasks.
    b. Observers shall report to the workers when motile ESA-listed marine species are within 50 meters (54.7 yards, 164 feet) of the proposed work and halt work, and shall only begin/resume after the animals have voluntarily departed the area
    c. If listed species are noticed in the area after work has already begun, that work may continue only if, in the best judgment of the project supervisor, there is no way for the activity to adversely affect the animal(s).
3. Project-related personnel will NOT attempt to disturb, touch, ride, feed, or otherwise intentionally interact with any protected species.

4. The project manager or heavy equipment operators will perform daily pre-work equipment inspections for leaks. Detection of leaks will result in postponing or halting the use of heavy equipment until the leak is repaired and the equipment cleaned.
    a. The worksite will have sufficient materials to contain and clean possible spills.
    b. Equipment storage will occur in an appropriate staging area designed to prevent unexpected spills when equipment is not in use or during fueling.
    c. Drip pans will also be maintained beneath construction equipment. The contractor must keep the water free of debris.
5. Avoid nighttime work during the nesting and hatching season, which extends from May through December.
6. Turbidity and sediment from project-related work will be minimized and contained to the immediate vicinity of the project through the appropriate use of effective sediment containment devices and the curtailment of work during adverse tidal and weather conditions.
    a. All silt fences, curtains, and other structures will be installed properly and maintained in a functioning manner for the life of the construction period and until the impact area is permanently stabilized, self-sustaining, and/or turbidity levels, elevated due to construction, return to ambient levels.
    b. Use real-time monitoring (automated or manual) to detect failure and implement stop-work processes if predetermined project thresholds are reached (use standards from Clean Water Act 401water quality certification).
    c. In areas of soft sediment, consider partial-length turbidity curtains to reduce the resuspension of sediment during high winds and currents.
7. Minimize disturbances to stream banks. Seek to maintain baseline water flow volume and velocity within the system.
8. Revegetate shoreline areas with appropriate native species and fully stabilize disturbed upland areas before removing silt fences and erosion prevention measures.
9. Project construction-related materials (fill, revetment rock, pipe, etc.) will not be stockpiled in or near aquatic habitats, to prevent materials from being carried into waters by wind, rain, or high surf.
10. For anticipated stream crossings, removal of all temporary structures will occur at the completion of in-water work.
11. For anticipated stream crossings, do not stockpile or stage materials in the marine environment unless necessary.
12. The use of treated wood for in-water work is not authorized.
13. Prevent discharges of chemicals and other fluids dissimilar from seawater into the water column.
    a. Concrete wastes, solid wastes, and any sanitary/septic wastes would be located away from and managed to ensure no contamination of the ocean or critical habitats.
    b. Site-specific storm water BMPs will be implemented and/or installed at the road staging and work areas to prevent water quality degradation associated with storm water runoff.
    c. Project-related materials and equipment placed in the water will be free of pollutants.

d. Fueling of land-based vehicles and equipment will take place away from the water, preferably over an impervious surface.

Action Area

The action area is defined by regulation as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR §402.02). The action area for the proposed activities encompasses the full extent of the action's modifications to land, water, and air. For this action, the full extent of direct and indirect effects is the potential exposure to increased turbidity and waste and discharge.

The proposed project is located in West Maui, in the area served by the existing Honoapiilani Highway between milepost 11 and milepost 17. Regardless of which alternative the FHWA implements, the action area will extend from the base of the West Maui Mountains to the existing highway along the coastline (Figure 3). This area is approximately six miles long and ¾ miles wide and contains all four build alternatives and the immediately adjacent coastal waters.



Figure 3: Proposed Action Area.

Listed Species in the Action Area

We are reasonably certain the ESA-listed species and designated critical habitat under our jurisdiction listed in Table 1 occur in the action area, and may be affected by the proposed activities. Detailed information about the biology, habitat, and conservation status of the animals listed in Table 1 is available in their status reviews, recovery plans, federal register notices, and other sources at https://www.fisheries.noaa.gov/species-directory/threatened-endangered.

Table 1. Common name, scientific name, ESA status, effective listing date, critical habitat designation, and recovery plans, with Federal Register reference for ESA-listed species considered in this consultation.

Species/ common name	**ESA Status**	**Effective Listing Date/ FR Notice**	**Critical Habitat**	**Recovery Plan**
Central North Pacific Green Sea Turtle	Threatened	05/06/2016 81 FR 20057		
Eretmochelys imbricata Hawksbill Sea Turtle	Endangered	06/03/1970 35 FR 8491		5/22/98 63 FR 28359
Neomonachus schauinslandi Hawaiian Monk Seal	Endangered	11/23/1976 41 FR 51612	9/21/2015 (revised) 80 FR 50925	8/22/07 72 FR 46966

We acknowledge that the FHWA considered blue whales, fin whales, North Pacific Right whales, sei whales, sperm whales, leatherback sea turtles, North Pacific loggerhead sea turtles, olive ridley sea turtles, giant manta rays, oceanic whitetip sharks, shortfin mako sharks, and Main Hawaiian Island insular false killer whales and their critical habitat in their biological assessment. However, based on discussions with the FHWA, they removed these species from the request for consultation. These species' geographic locations do not overlap with the full extent of direct effects and indirect effects, and therefore there would be "no effect" from the listed stressors.

Critical Habitat in the Action Area

Hawaiian monk seal. In designated areas of the Main Hawaiian Islands (MHI), critical habitat for monk seals includes the marine environment with a seaward boundary that extends from the 200-meter depth contour line (relative to mean lower low water), including the seafloor and all subsurface waters and marine habitat within 10 meters of the seafloor, through the water's edge 5 meters into the terrestrial environment. Detailed information on Hawaiian monk seal critical habitat is available at https://www.fisheries.noaa.gov/action/critical-habitat-hawaiian-monk-seals.

The specific areas within the designation, with their physical and biological features are:

1. Terrestrial areas preferred by monk seals for pupping and nursing with adjacent shallow, sheltered aquatic areas
2. Marine areas from 0 to 200 meters in depth with water quality and sediment characteristics that support adequate prey quality and quantity for juvenile and adult monk seal foraging
3. Significant areas used by monk seals for hauling out, resting or molting

Proposed Central North Pacific Green Sea Turtle. Proposed critical habitat for Central North Pacific green sea turtles includes the marine environment from the mean high water line to 20 m depth. Detailed information on proposed Central North Pacific green sea turtle critical habitat is available at: https://www.fisheries.noaa.gov/action/proposed-rule-designate-critical-habitat-green-sea-turtles.

The specific areas within the proposed designation, with their physical and biological features are:

1. From the mean high water line to 20 m depth, sufficiently dark and unobstructed nearshore waters adjacent to nesting beaches proposed as critical habitat by USFWS, to allow for the transit, mating, and internesting of reproductive individuals, and the transit of post-hatchlings.
2. From the mean high water line to 20 m depth, underwater refugia (*e.g.,* caves, reefs, protective outcroppings, submarine cliffs, and "potholes") and food resources (*i.e.,* seagrass, marine algae, and/or marine invertebrates) of sufficient condition, distribution, diversity, abundance, and density necessary to support survival, development, growth, and/or reproduction.

Analysis of Effects

Under the ESA (50 CFR 402.02), "effects of the action" are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action.

The applicable standard to find that a proposed action is "not likely to adversely affect" listed species or critical habitat is that all of the effects of the action are expected to be discountable, insignificant, or completely beneficial (USFWS & NMFS 1998). Discountable effects are those extremely unlikely to occur. Insignificant effects relate to the size of the impact and should never reach the scale where take[1] occurs. Beneficial effects are contemporaneous positive effects without any adverse effects.

Despite the FHWA/HDOT's use of all BMPs, we identified the following stressors remain, and have the potential to affect listed marine species and/or critical habitat in the action area:

- Disturbance from human activity,
- Increased turbidity,
- Exposure to waste and discharge, and
- Exposure to elevated noise.

To assess the effects of proposed actions, we use an exposure-response assessment framework. Effects are discountable if exposure is extremely unlikely to occur. For this reason we first determine the probability of stressors co-occurring with individuals from the listed species, or features of critical habitat. For stressors where exposure is not discountable, we discuss the significance of the species' response.

Disturbance from human activity

The proposed action involves construction activities near coastal waters at the juncture of the new highway and the existing highway. In these areas, disturbances from human activities may affect Central North Pacific green sea turtles, hawksbill sea turtles, and Hawaiian monk seals.

[1] The term take means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct (16 U.S.C. §1532). We define harass as to create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering (Wieting 2016).

These disturbances may include visual disturbances from land-based equipment operations (i.e., excavator, bulldozer, etc.) and the presence of construction workers. At no time would construction equipment or material enter the water.

Land-based activities involving equipment and construction workers could disturb Central North Pacific green sea turtles, hawksbill sea turtles, and Hawaiian monk seals. However, the most frequent response to this type of interaction is low-energy behavioral avoidance, leading to a temporary displacement of feeding and resting activities.

In order to avoid or minimize these effects, the FHWA/ HDOT will implement appropriate BMPs. These include constant vigilance for the presence of ESA-listed species during all aspects of the permitted action, work being postponed or halted when ESA-listed marine species are within 50 m of the proposed activities and will only begin/resume after the animals have voluntarily departed the area, and project-related personnel will not attempt to disturb, touch, ride, feed, or otherwise intentionally interact with any protected species. With the implementation of these BMPs, we are reasonably certain the effects of disturbances from human activities on Central North Pacific green sea turtles, hawksbill sea turtles, and Hawaiian monk seals will not reach the scale where harm or harassment occur and are therefore insignificant.

Exposure to waste and discharge
The action involves construction activities that may expose Central North Pacific green sea turtles, hawksbill sea turtles, and Hawaiian monk seals to waste and discharge. Construction waste and debris, including plastic bags and other items, may enter the water, and construction equipment can cause accidental spills of petroleum-based products (lubricants, oil, and fuel).

Local and Federal regulations prohibit intentionally discharging toxic wastes and plastics into the marine environment. Additionally, the proposed action includes BMPs that include a chemical spill contingency plan, pre-work equipment inspections for cleanliness and leaks, and fueling of land-based equipment at least 50 feet away from the water. With proper planning and contingencies in place, discharges and spills are extremely unlikely to occur, and if they do occur, they are expected to be infrequent, small, and quickly cleaned up.

Based on the low likelihood of an ESA-listed species being in the vicinity, the unlikely event of a spill occurring, and adherence to the BMPs that would prevent or minimize potential exposure from spills, we are reasonably certain the effects of exposure to waste and discharge on Central North Pacific green sea turtles, hawksbill sea turtles and Hawaiian monk seals to wastes and discharges would be extremely unlikely to occur and potential effects from this stressor would therefore be discountable.

Increased turbidity
While no in-water work will occur, construction activities and heavy machinery associated with new bridge construction could mobilize additional sediments and cause increased turbidity at Launiupoko, Olowalu, and Ukumehame streams or other surface water bodies. Launiupoko, Olowalu, and Ukumehame are perennial streams that support flow to the ocean at least 95 percent of the time (Cheng 2014). An increase in turbidity may affect Central North Pacific green sea turtles, hawksbill sea turtles, and Hawaiian monk seals if it were to reach the ocean.

Green sea turtles, hawksbill sea turtles, and Hawaiian monk seals may encounter localized, temporary turbidity increases generated during new bridge construction. Sea turtles and seals

breathe air, and increased turbidity will not affect their respiration. They are highly motile and can quickly leave turbid areas or avoid localized turbidity plumes in favor of clear water, reducing their exposure risk.

West Maui has a history of degraded water quality characterized by high turbidity due to land-based runoff. Nearshore water sampling conducted by the nonprofit Hui O Ka Wai Ola shows a history of turbidity levels well above the Department of Health (DOH) standards at Olowalu and Ukumehame (Hui O Ka Wai Ola 2022). The FHWA/HDOT will employ BMPs to minimize and contain turbidity and sediment from project-related work through the appropriate use of effective sediment containment devices and the curtailment of work during adverse tidal and weather conditions for the entire construction period. Real-time monitoring (automated or manual), in conjunction with records of nearshore water quality conditions from the DOH and Hui O Ka Wai Ola, will allow the FHWA/HDOT to evaluate the effectiveness of the BMPs and quickly respond if there are any abnormal turbidity results during construction. Implementation of stop-work processes will occur if the project reaches its thresholds for turbidity, as predetermined in the Storm water Pollution Prevention Plan and National Pollutant Discharge Elimination System permit.

Additionally, the FHWA/HDOT will follow *The HDOT Standard Specifications for Road and Bridge Construction Section 209: Temporary Water Pollution, Dust, and Erosion Construction Control* (HDOT 2017), which includes detailed plans, diagrams, and site-specific BMPs to comply with applicable State and Federal permit conditions. Given the temporary nature of turbidity caused by the project activities and the implemented BMPs, we are reasonably certain that the probability of exposure to appreciably increased turbidity on Central North Pacific green sea turtles, hawksbill sea turtles, and the Hawaiian monk seals is extremely unlikely, and therefore discountable.

Exposure to elevated noise

The proposed activities may expose North Pacific green sea turtles, hawksbill sea turtles, and Hawaiian monk seals to elevated sound from land-based sources. The effects of exposure to sound vary with the frequency, intensity, duration of the sound source, and the hearing characteristics of the affected animal. The project area is inland of the beach, providing a buffer distance to attenuate any sound waves that transfer from air into the water column.

Land-based equipment operation and construction activities will occur from shore and produce in-air noise. Typical construction noise associated with the equipment used in this project is between 77 and 85 dBA at 50 feet (FHWA 2017), while noise associated with existing average highway traffic at 50 feet is from 70 to 80 dBA (Corbisier 2003). Temporary displacement or avoidance of the area would likely be the predominant effect on most species. Most sounds generated from construction are non-continuous, and we do not expect ESA-listed Hawaiian monk seals and sea turtles to be exposed to this level of sound continuously as the noise dissipates from the source.

In-land bridge construction over streams using drilled shafts will produce in-air noise. Bridge abutments over streams will occur outside the Ordinary High Water Mark. Elevated in-air noise from construction is unlikely to generate underwater noise above ambient levels because the sound does not efficiently transfer from the air into the water column. Sound waves are also attenuated or blocked by encountering obstructions such as shallow water, land masses, or rocks. As both the Olowalu and Ukumehame Streams are shallow and rocky with numerous riffles,

potential effects on monk seals and sea turtles will diminish with distance from construction activities. Given FHWA/HDOT's BMPs that require work to stop if an ESA-listed individual is within 50 m of the proposed activity and the lack of in-water construction, we are reasonably certain that the probability of exposure to elevated sound levels from the construction activities is extremely unlikely, and therefore discountable.

Critical Habitat

The action area overlaps with the proposed critical habitat for the Central North Pacific green sea turtle and Hawaiian monk seal critical habitat. Construction activities near coastal waters and the construction of new bridges may expose essential features of the critical habitats to elevated turbidity and exposure to waste and discharges.

Essential features of Hawaiian monk seal critical habitat that could be affected by elevated turbidity include shallow, sheltered aquatic areas preferred by monk seals for pupping and nursing and areas less than 200 m in depth that support adequate prey quality and quantity for juvenile and adult monk seal foraging. As discussed in the Exposure to Increased Turbidity section, silt containment devices will minimize turbidity and siltation associated with construction activities and bridge construction and contain any short-term turbidity events. Additionally, no work will occur during flooding or adverse tidal and weather conditions. Based on the implemented BMPs, we are reasonably certain the probability of exposure to elevated turbidity to essential features of monk seal critical habitat is extremely unlikely and therefore discountable.

Essential features of the Central North Pacific green sea turtle's proposed critical habitat from the mean high water line to 20 m depth that could be affected by elevated turbidity include underwater refugia and food resources of sufficient condition, distribution, diversity, abundance, and density necessary to support survival, development, growth, and reproduction. As discussed in the Exposure to Increased Turbidity section, silt containment devices will minimize turbidity and siltation associated with construction activities and bridge construction and contain any short-term turbidity events. Additionally, no work will occur during flooding or adverse tidal and weather conditions. Based on the implemented BMPs, we are reasonably certain the probability of exposure to elevated turbidity to essential features of the Central North Pacific green sea turtle's proposed critical habitat is extremely unlikely and therefore discountable.

Exposure of the essential features of Hawaiian monk seal marine critical habitat and Central North Pacific green sea turtle's proposed critical habitat to waste and discharge could occur due to trash, accidental leaks, or spills from equipment associated with the action. As discussed in the Exposure to Waste and Discharges section above, several BMPs will prevent discharges into the marine environment and manage any leaks or spills. Based on the implemented BMPs, we are reasonably certain the probability of exposure to waste and discharge to essential features of designated monk seal and proposed green sea turtle critical habitat is extremely unlikely and therefore discountable.

Conclusion

Considering the information and assessments presented in the consultation request and available reports and information, and in the best scientific information available about the biology and expected behaviors of the ESA-listed marine species considered in this consultation, all effects of the proposed action are either discountable or insignificant. Accordingly, we concur with your determination that the proposed action is not likely to adversely affect the following ESA-listed

species and designated critical habitats: endangered Hawaiian monk seals; threatened Central North Pacific green turtles; endangered hawksbill turtles; and designated critical habitat for Hawaiian monk seals.

This concludes informal consultation under section 7 of the ESA for species under our jurisdiction. Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect essential fish habitat (EFH). If necessary, it is your responsibility to request EFH consultation for this action with NMFS' Habitat Conservation Division.

Reinitiation Notice

Reinitiation of consultation is required and shall be requested by the FHWA or by NMFS, where discretionary Federal involvement or control over the action has been retained or is authorized by law and if:

a. Take occurs to an ESA-listed species;
b. New information reveals effects of the action that may affect ESA-listed species or designated critical habitat in a manner or to an extent not previously considered;
c. The identified action is subsequently modified in a manner that causes an effect to ESA-listed species or designated critical habitat that was not considered in this concurrence; or
d. A new species is listed or critical habitat designated that may be affected by the identified action.

If you have further questions, please contact Jamie Marchetti at (808) 725-5108 or Jamie.marchetti@noaa.gov. Thank you for working with us to protect our nation's living marine resources.

Sincerely,

Dawn Golden

Dawn Golden
Assistant Regional Administrator
Protected Resources Division

NMFS File No.: PIRO-2022-03611
PIRO Reference No.: I-PI-23-2170-DG

Literature Cited

Cheng, C.L. 2014. Low-flow characteristics of streams in the Lahaina District, West Maui, Hawai‘i: U.S. Geological Survey Scientific Investigations Report 2014–5087, 58 p., http://dx.doi.org/10.3133/sir20145087.

Corbisier, C. 2003. Living with Noise. US Department of Transportation, Federal Highway Administration. *Public Roads* 67(1). July/August 2003. https://www.fhwa.dot.gov/publications/publicroads/03jul/06.cfm

FHWA. 2017. Construction Noise Handbook. https://www.fhwa.dot.gov/Environment/noise/construction_noise/handbook/handbook09.cfm

FHWA. 2022. Notice of intent to prepare an environmental impact statement. 87 FR 71392.

HDOT. 2017. The HDOT Standard Specifications for Road and Bridge Construction Section 209: Temporary Water Pollution, Dust, and Erosion Construction Control.

Hui O Ka Wai Ola. 2022. Coastal Water Quality Report 2016-2021. 34 pp.

U.S. Fish and Wildlife Service and National Marine Fisheries Service. 1998. Endangered Species Consultation Handbook. Procedures for Conducting Consultation and Conference Activities under Section 7 of the Endangered Species Act.

Wieting, D. S. 2016. Interim Guidance on the Endangered Species Act Term "Harass". U.S. Dept. of Commerce, NOAA, NMFS, Office of Protected Resources, Silver Spring, MD, October 21, 2016. Memorandum from the Director of the NMFS Office of Protected Resources to NMFS Regional Administrators.

Sullivan, James

From: Sullivan, Genevieve <genevieve.h.sullivan@hawaii.gov>
Sent: Wednesday, November 29, 2023 3:21 PM
To: Liebowitz, Peter; Sullivan, James; Shahin Ansari; Kelly Hardwicke
Cc: Yoshioka, Wayne
Subject: Fw: RAEM-030-1(059) Honoapiilani Highway Improvements ESA and EFH Consultation
Attachments: LoC Honoapiilani Highway Improvements (PIRO-2022-03611, I-PI-23-2170-DG)+rjd (2) DG.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

FYI

From: Powell, Lisa (FHWA) <lisa.powell@dot.gov>
Sent: Wednesday, November 29, 2023 9:29 AM
To: Sullivan, Genevieve <genevieve.h.sullivan@hawaii.gov>; Aiu, Pua <Pua.Aiu@hawaii.gov>
Subject: [EXTERNAL] FW: RAEM-030-1(059) Honoapiilani Highway Improvements ESA and EFH Consultation

Lisa Powell, P.E.
Transportation Engineer
FHWA-Hawaii Division
300 Ala Moana Boulevard Room 3-229
Honolulu, HI 96850

From: Jamie Marchetti - NOAA Federal <jamie.marchetti@noaa.gov>
Sent: Wednesday, November 29, 2023 9:28 AM
To: Otani, Meesa (FHWA) <meesa.otani@dot.gov>
Cc: Powell, Lisa (FHWA) <lisa.powell@dot.gov>; Darden, Richard (FHWA) <richard.darden@dot.gov>; Vaughn, Colleen (FHWA) <colleen.vaughn@dot.gov>
Subject: Re: RAEM-030-1(059) Honoapiilani Highway Improvements ESA and EFH Consultation

CAUTION: This email originated from outside of the Department of Transportation (DOT). Do not click on links or open attachments unless you recognize the sender and know the content is safe.

Hello,

Please see your attached Letter of Concurrence for FHWA's Honoapiilani Highway Improvements. Please feel free to reach out if you have any further questions.

Thank you,
Jamie Marchetti

On Thu, Oct 19, 2023 at 9:12 AM Otani, Meesa (FHWA) <meesa.otani@dot.gov> wrote:

> Hi Jamie,

Yes, that would be great.

Thank you!
Meesa

From: Jamie Marchetti - NOAA Federal <jamie.marchetti@noaa.gov>
Sent: Thursday, October 19, 2023 9:01 AM
To: Otani, Meesa (FHWA) <meesa.otani@dot.gov>
Cc: Powell, Lisa (FHWA) <lisa.powell@dot.gov>; Darden, Richard (FHWA) <richard.darden@dot.gov>; Vaughn, Colleen (FHWA) <colleen.vaughn@dot.gov>
Subject: Re: RAEM-030-1(059) Honoapiilani Highway Improvements ESA and EFH Consultation

CAUTION: This email originated from outside of the Department of Transportation (DOT). Do not click on links or open attachments unless you recognize the sender and know the content is safe.

Hello,
I am nearly finished with your consultation and will shortly be sending it off for internal review.
From the time this project was submitted until now, Green sea turtle critical habitat has become something that we have begun conferencing on. It is at the action agency's discretion. As you mentioned in your prior email: *We are aware of the critical habitat along the Maui coastline, but given the existing conditions, our current mitigation measures and proposed construction activities minimize and are likely to avoid any potential adverse effects migrating from our inland project area to marine waters.*
I can include this as a conference if you like and would concur with an NLAA determination.

Just let me know either way.

Thanks
Jamie Marchetti

On Tue, Oct 10, 2023 at 3:23 PM Jamie Marchetti - NOAA Federal <jamie.marchetti@noaa.gov> wrote:

> Hello,
> Thank you for the followup email. I now have all the information needed to initiate your consultation request. The initiation date is today 10/10/23 and we will have a response within 60 days, though we strive to respond sooner. I will reach out if I have any further questions.
>
> Thank you
> Jamie

U.S. Department of Transportation
Federal Highway Administration

Hawaii Federal-Aid Division

300 Ala Moana Blvd, Rm 3-306
Box 50206
Honolulu, Hawaii 96850
Phone: (808) 541-2700
Fax: (808) 541-2704

November 13, 2023

VIA EMAIL: pifwo_admin@fws.gov

In Reply Refer To:
HDA-HI

Earl Campbell, Ph.D.
Field Supervisor, Pacific Islands Fish and Wildlife Office
U.S Fish and Wildlife Service
300 Ala Moana Boulevard, Rm 3-122
Honolulu, HI 96850

Subject: Honoapiʻilani Highway Improvements Project
Endangered Species Act Section 7 Informal Consultation and
Migratory Bird Treaty Act Coordination
Request for Concurrence on Effect Determination

Dear Dr. Campbell:

The Federal Highway Administration (FHWA), in cooperation with the State of Hawaii Department of Transportation (HDOT), is planning the Honoapiʻilani Highway Improvements Project (the Project). Pursuant to Section 7 of the Endangered Species Act and the Migratory Bird Treaty Act, the FHWA is requesting concurrence from the U.S. Fish and Wildlife Service (USFWS) that the proposed Project may affect, but is not likely to adversely affect the following federally listed species: Hawai'ian hoary bat (*Lasiurus cinereus semotus*); four Hawai'ian waterbird taxa - Hawai'ian stilt or ae'o (*Himantopus mexicanus knudseni*), Hawai'ian coot (*Fulica alai*), Hawai'ian duck (*Anas wyvilliana*), and the threatened Hawai'ian goose or nēnē (*Branta sandvicensis*); three Hawai'ian seabirds—Hawai'ian petrel (*Pterodroma sandwichensis*), Band-rumped-storm-petrel (*Hydrobates castro*), and the threatened Newell's shearwater (*Puffinus newelli*); one reptile—the green sea turtle or honu (*Chelonia mydas*), and one insect—Blackburn's sphinx moth (*Manduca blackburni*). Other than the nēnē and Hawai'ian stilt, none of the other nine endangered animals identified in the USWFS Information for Planning and Consultation (IPaC) List were observed in the Biological Survey Area (BSA) during biological surveys.

Field reconnaissance surveys conducted by qualified ecologists, HT Harvey & Associates Inc., along with review of aerial photographs and topographic maps, thorough literature review including IPaC, informal pre-consultation meetings with USFWS staff, and a March 22, 2023 site visit with USWFS staff identified and documented potential concerns regarding species and habitats within the Project Area. Results from these efforts, documented in the Biological Survey Report, indicate that there are no botanical concerns in the Project Area, and it is unlikely that the proposed Project would result in a substantial adverse effect on any plant species that is

state or federally listed as threatened or endangered, a candidate species for listing, a rare native plant species, or a native plant species of concern. None of these species or taxa were observed in the Project Area. Based on additional findings, it is highly unlikely that the Project Area contains the nine endangered plant taxa identified in IPaC list of threatened and endangered species that potentially may occur in the proposed Project location or may be affected by the proposed Project: `Ena`ena (*Pseudognaphalium sandwicensium var. molokaiense)*, Awiwi (*Schenkia sebaeoides)*, Carter's Panicgrass (*Panicum fauriei var. carteri)*, Dwarf Naupaka (*Scaevola coriacea*), Ihi (*Portulaca villosa*), Ko`oloa`ula (*Abutilon menziesii*), Ohai (*Sesbania tomentosa*), and two Round-leaved Chaff-flower (*Achyranthes splendens var. rotundata*), (*Vigna o-wahuensis).*

No terrestrial critical habitat has been identified in the highly disturbed environment of the Project Area. There is possible presence of endangered Hawai'ian monk seal in offshore environments beyond our Project Area, but current mitigation measures minimize and are likely to avoid any potential adverse effects migrating from inland activities to marine waters. Additionally, because the Project is entirely terrestrial, marine environments are not anticipated to experience any direct exposure to Project activities.

Description of the Proposed Action

The proposed Project is in West Maui, in the areas served by the existing Honoapiʻilani Highway between milepost 11 in Ukumehame in the vicinity of Pāpalaua Beach Park, and milepost 17 in Launiupoko where Honoapiʻilani Highway currently intersects the southern terminus of the Lāhainā Bypass. Honoapiʻilani Highway, which is part of Maui's Belt Road system, is a two-lane principal arterial highway that provides the main access between communities along the west coast of Maui and the rest of the island. This approximately six-mile-long and 3/4-mile-wide Project Area is composed predominantly of a coastal plain that includes the Ahupuaʻa of Ukumehame, Olowalu, and Launiupoko. Offshore, the Olowalu reef area, which extends from Ukumehame to Launiupoko, hosts about 1,000 acres of some of the healthiest and oldest living corals within the main Hawai'ian Islands.

FHWA and HDOT have developed four preliminary Project alternatives. The Project alternatives will be further refined as the Draft EIS is prepared, leading to the selection of a preferred alternative. The proposed Project does not include work on the existing highway except where the new Project joins the existing highway at the northern and southern connections points and potentially at connector roads to ensure continued access to residences, businesses, and public beaches. Planned intersections occur at Luawai Street in Olowalu and Ehehene Street, Pohaku Aeko Street and Paeki'i Place and the Ukumehame Firing Range access road in Ukumehame with configurations depending on the selected alternative. These streets already have full interchanges with the existing highway (i.e., left and right turning lanes) and additional construction on the existing highway would not be needed as part of the Project.

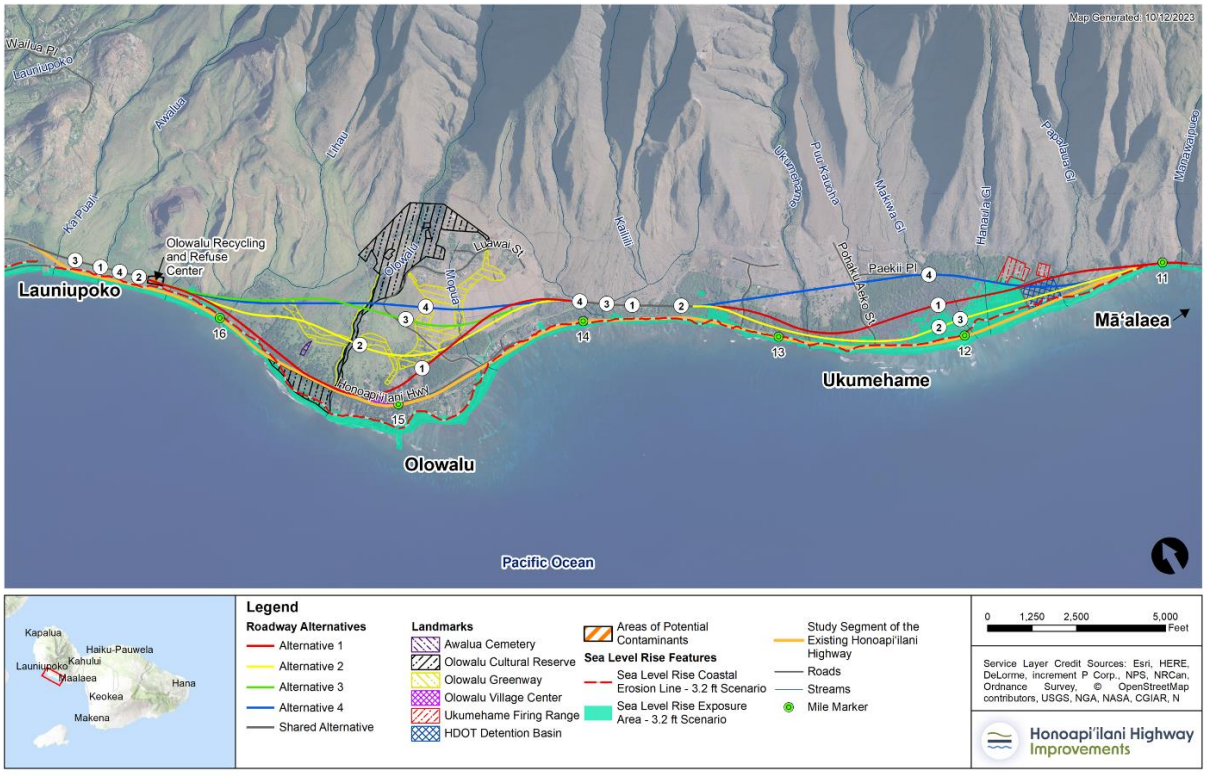
Additional information can be obtained at the Project website, www.honoapiilanihwyimprovements.com.

Project Alternatives

A Preferred Alternative has not yet been identified. Four draft "Build Alternatives" have been identified and are being evaluated in the Draft EIS currently underway. Each alternative involves the construction of a new highway, which is mainly along a new alignment, further inland from the ocean. None of the alternatives involve work in the ocean. The Build Alternatives would have approximately the same number of stream crossings and would require four bridges and approximately seven or eight culverts. All the bridge structures would be built outside of the Ordinary High Water Mark (OHWM). Preliminary planning includes bridges over the two perennial streams, the Olowalu and Ukumehame, along with two over the intermittent Ka'ili'ili and Lihau. Culverts will be located at KaPu'ali Stream, Awalua Stream, Līhau Stream North, Mōpua Stream, and Līhau Stream South. Each Build Alternative would also include a viaduct at Pāpalaua to minimize wetland impacts around the Ukumehame Firing Range and stay above projected sea level rise exposure areas. All Project alternatives will incorporate Best Management Practices (BMPs) as prescribed by FHWA, USFWS, National Oceanic and Atmospheric Administration (NOAA) and other regulatory agencies participating in the review and approval of the proposed Project.

These four alternatives are depicted in Figure 1. All alignments were adapted from the County of Maui's Pali to Puamana Parkway Plan of 2005. This Plan never moved forward but HDOT and FHWA were able to build on the proposed alignments presented in this County Plan by modifying them to apply American Association of State Highway and Transportation Officials (AASHTO) design standards, bypass erosion areas, and to avoid cultural resources.

Figure 1: Alignment Alternatives



Source: WSP (2023)

The No-Build Alternative reflects future conditions if the proposed Project were not constructed. Future conditions are based on projections of land-use and development that are likely to occur 25 years after the Project construction is completed. The roadway would continue to operate in its current location and condition, including at the several locations along the existing highway where the highway has been protected by various emergency stabilization projects. Additional stabilization efforts could be required in the future under the No Build Alternative. The No Build Alternative would not affect flora and fauna in any new ways.

For the proposed Project, none of the four Build Alternatives would require any disturbance or work in the ocean.

It is also noted that no night work is anticipated during construction, and construction duration is anticipated to be no longer than two years. However, should night work be required, additional coordination will be conducted with USFWS to agree upon any other appropriate conservation measures.

Coordination with USFWS

The Project team met with Lindsy Asman and James Yrigoyen of the USFWS on February 2, 2023, and again in the field on March 22. The protected species list for both flora and fauna was initially downloaded from IPaC on February 3, 2023, and the USFWS General Project Design Guidelines were accessed. Since then, USFWS General Project Design Guidelines have not changed, and the IPaC species list was redownloaded on September 19, 2023. There was no change between the February and September IPaC species lists. Field studies were conducted in January, March, April, May, and July 2023 and the report from H.T. Harvey and Associates with appendices is provided as an enclosure.

Potential Impacts to Protected Species

Hawai'ian Hoary Bat (Lasiurus cinereus semotus)
The only native Hawai'ian terrestrial mammal, the endangered Hawai'ian hoary bat is known to occur on Maui and possible presence in the Project Area cannot be ruled out. Hawai'ian hoary bats are known to roost in large (typically greater than 15-foot-tall) dense-canopy trees, sometimes at the edges of water bodies, such as streams and lakes. Hawai'ian hoary bats may hunt for flying insect prey along roadways, gulches, and open areas and occasionally roost in large, dense-foliage trees. There are numerous large trees in the Project Area that could potentially provide suitable day roosting habitat for Hawai'ian hoary bats, so it is assumed that this species is present within the Project Area. Additionally, Hawai'ian hoary bats forage for insects from as low as 3 feet to higher than 500 feet above the ground and can become entangled in barbed wire used for fencing. Adherence to mitigation measures listed below, coupled with the availability of roosting elsewhere (outside of the Project Area) adverse impacts would be minimized and avoided to the population of Hawai'ian hoary bat.

*Hawai'ian goose (*nēnē) (*Branta sandvicensis*)
Nēnē use a variety of habitats, but prefer open areas, such as pastures, golf courses, wetlands, natural grasslands and shrublands, and lava flows. Six nēnē have been seen loafing at the Ukumehame Firing Range on multiple occasions. Two of them were banded individuals. One individual nēnē was also seen loafing in the open grassy area in Ukumehame subdivision. There were no observations of nēnē in the Olowalu area, but are often seen here near the water reservoir outside of the Project Area. The appearance of ephemeral aquatic habitat could attract these species. Threats to the species include introduced mammalian and avian predators, wind facilities, and vehicle strikes. With adherence to mitigation measures included below, Project activities are not likely to adversely affect nēnē.

*Hawai'ian Stilts (*ae'o*)(Himantopus mexicanus knudseni*)
There is an abundance of suitable habitats, such as open water bodies (e.g. streams, ditches), wetlands, and open grassy areas for Hawai'ian stilts within the Project Area. the Hawai'ian stilt is known to nest in sub-optimal locations (e.g. any ponding water), if water is present. Hawai'ian stilts were observed at the Ukumehame Firing Range and were either feeding or loafing as no nests were found. Other sightings occurred at a ditch in Ukumehame where the individual was seen feeding. Although, given the availability of a range of suitable habitats, nesting within the Project Area cannot be ruled out. Threats to these species include non-native predators, habitat loss, and habitat degradation. With adherence to mitigation measures included below, Project activities are not likely to adversely affect Hawai'ian stilts.

Other Hawai'ian Waterbirds
Even though the endangered Hawai'ian coot (*Fulica alai*), Hawai'ian duck (*Anas wyvilliana*), and Hawai'ian common gallinule (*Gallinula galeata sandvicensis*) were not seen during this survey, it should be noted that the Hawai'ian coot does occur on Maui. The Hawai'ian duck is considered rare, and very difficult to distinguish from mallard hybrid taxa which have genetically "swamped out" Hawai'ian ducks on most islands other than Kauai Birds reported as Hawai'ian ducks on Maui are likely mallard-Hawai'ian duck hybrids, .and currently pure Hawai'ian ducks are considered restricted to Kaua'i and (via reintroductions) the island of Hawai'i . Hawai'ian ducks were re-established on islands of O'ahu and Maui through captive propagation and release programs, but populations now almost entirely comprise hybrids with introduced Mallard. The Hawai'ian common gallinule (*Gallinula galeata sandvicensis*) generally occurs in wetland habitats below 125 meters (410 feet) elevation on the islands of Kaua'i and O'ahu, although there have been reports from Ke'anae Peninsula on Maui and from the island of Hawai'i. Despite reported sighting in June 2013, there is no documentation to support the identification of the reported gallinules on Maui. Historically, the Hawai'ian common gallinule occurred on all the Main Hawai'ian Islands except for Lāna'i and Kaho'olawe. The apparent absence of this species, or extreme rarity, on Maui makes it very unlikely to occur in the Project Area. Commitment to conservation measures below coupled with suitable habitat occurring elsewhere on Maui, the Project activities are not likely to adversely affect other Hawai'ian Waterbirds.

Hawai'ian Seabirds
Hawai'ian federally and state listed Seabirds including the Hawai'ian petrel (*Pterodroma sandwichensis),* Newell's Townsend's Shearwater (*Puffinus auricularis newelli*), and the band-rumped storm-petrel (*Hydrobates castro)* may traverse over the Project Area at night during the breeding, nesting, and fledging seasons (March 1 through December 15).The endangered short-

tailed albatross (*Phoebastria albatrus)*, the largest of three north Pacific albatross species breeds almost exclusively on islands off Japan, with recent nesting at Midway Atoll (average one pair per year). This species has a broad foraging range that includes offshore Japan, Russia, Alaska, Washington, Oregon, California, Baja California and portions of the Pacific Islands. There are no records for this rare species on or near Maui (nor for any of the main Hawai'ian islands).

Outdoor lighting attracts seabirds and could result in seabird disorientation, fallout, and injury or mortality. After circling the lights, seabirds may become exhausted and collide with nearby wires, buildings, or other structures, or they land on the ground. If not detected and rescued, downed seabirds may experience increased mortality due to collision with automobiles, starvation, and predation by dogs, cats, and other predators. Young birds (fledglings) traversing the Project Area between September 15 and December 15, in their first flights from their mountain nests to the sea, are particularly vulnerable to light attraction. With adherence to mitigation measures included below, Project activities are not likely to adversely affect Hawai'ian Seabirds.

Sea Turtles

Green sea turtles or honu (*Chelonia mydas*) are known to bask or nest on select sandy beaches in Hawaii, however it is unlikely that the Project activities would impact honu as the NOAA Pacific Island Fisheries Science Center (PIFSC) does not identify the shoreline adjacent to the Project Area as preferred basking or nesting areas for honu

Hawksbill sea turtles or honu'ea (*Eretmochelys imbricata)* exhibit a wide tolerance for nesting substrate (ranging from sandy beach to crushed coral) with nests typically placed under vegetation. Hawksbill sea turtles are known to rarely establish nest sites along the beach between Sugar Beach and Haycraft Beach Park along Maalaea Bay. Even though no Hawksbill sea turtles were observed in the Project Area during the reconnaissance level surveys, it is possible the species at times may visit the nearshore reefs along the coast adjacent to the Project Area. However, map guides published by NOAA-PIFSC do not identify the beaches between Ukumehame and Olowalu as important basking or nesting sites for Hawksbill sea turtles

Both species exhibit strong nest-site fidelity. Nesting occurs on beaches from May through September, peaking in June and July, with hatchlings emerging through November and December. Although there is no in-water work proposed for the Project, construction in the vicinity of beaches can result in sediment, contaminant and nutrient runoff. However, BMPs will be in place to mitigate these potential impacts. Additionally, an increase in direct and ambient light pollution may disorient hatchlings or deter nesting females. Proposed mitigation for runoff and light pollution is presented below. With adherence to mitigation measures included below, Project activities are not likely to adversely affect Hawksbill sea turtles.

Blackburn's Sphinx Moth (*Manduca blackburni)*

Blackburn's Sphinx Moth (BSM), also known as the Hawai'ian tomato hornworm or Hawai'ian tobacco hornworm, is an endemic species federally and state listed as endangered. Eggs and larvae of the BSM have been observed on host plants between August and May with substantial variation in the larval length throughout this "season".

The primary constituent elements required by BSM larvae for foraging, shelter, and maturation are the two documented host plan species in the genus *Nothocestrum* (*N. latifolium and N. brevifolium*). Neither of these primary constituent elements required by BSM larvae were found in the Project Area. BSM larvae are also known to feed on tree tobacco plants and documented on the indigenous popolo (*Solanum sandwicense*). A few tree tobacco plants and one indigenous popolo were found in the Project Area, but no BSM eggs or larvae and no signs of feeding damage indicative of the presence of the BSM were found. Therefore, it is unlikely that the Project activities will have an adverse impact on the BSM adults or larvae. On-going threats include habitat loss and degradation due to human development, introduced plants and animals, and wildfire. Natural variation in rainfall can also negatively affect BSM populations.

Flora

While numerous endangered plant species were listed as being potentially found in the Project Area, none were encountered during the biological survey. The field surveys were conducted in January, March, April, May, and July 2023. Botanical surveys should optimally be conducted during the wettest part of the year (typically November through March) when plants and identifying features are more likely to be visible, especially in drier areas.

Activities such as the use of construction equipment and vehicles, and increased human traffic (i.e. trails, visitation, monitoring), can cause ground disturbance, erosion, and/or soil compaction which decrease absorption of water and nutrients and damage plant root systems and may result in reduced growth and/or mortality of listed plants. Descriptions of the endangered flowering plants are listed in the attached Biological Resources Report.

The endangered flowering plants listed are:`Ena`ena (*Pseudognaphalium sandwicensium var. molokaiense)*, Awiwi (*Schenkia sebaeoides)*, Carter's Panicgrass (*Panicum fauriei var. carteri)*, Dwarf Naupaka (*Scaevola coriacea*), Ihi (*Portulaca villosa*), Ko`oloa`ula (*Abutilon menziesii*), Ohai (*Sesbania tomentosa*), Round-leaved Chaff-flower (*Achyranthes splendens var. rotundata*), and the no common name (*Vigna o-wahuensis)*.

It is unlikely that the proposed Project would result in a substantial adverse effect on any plant species that is state or federally listed as threatened or endangered, a candidate species for listing, a rare native plant species, or a native plant species of concern. Overall, the Project Area is composed of highly disturbed habitats typically seen in the coastal plain and lowland areas previously used for agriculture. None of the listed plants were observed during the botanical survey.

Nearshore and Offshore Marine Environments

All four of the build alternatives require stream crossings, including two perennial streams, the Olowalu and Ukumehame, with connections to the ocean. These connections mean potential impacts to nearshore and offshore marine environments, such as Hawai'ian monk seal habitat, from land-based discharges and runoff. Hawai'ian monk seals have been known to haul out on beaches in West Maui, however the Project Area does not include any coastline work. The entire Maui coastline is NOAA National Marine and Fisheries Service (NMFS) designated critical habitat for the Hawai'ian monk seal. However, there is no USFWS designated or proposed critical habitat in the coastal area south of the 6-mile stretch of the Project Area. Hawai'ian monk

seals were not listed in the USFWS IPaC species list nor observed during biological field surveys for the Project. Proposed mitigation for these potential impacts is presented below.

Invasive Species

A potential impact of implementing the Project is the introduction and spread of invasive species during the construction phase. There are several invasive species that occur on Maui but are restricted in distribution and are targeted for containment or eradication (e.g. fountain grass [*Cenchrus setaceus*], little fire ants [*Wasmannia auropunctata*], and coqui frogs [*Eleutherodactylus coqui*]) as well as invasive species that are not yet present on Maui (e.g. Coconut rhinoceros beetle [*Oryctes rhinoceros*] on Oahu) but that could be introduced or inadvertently spread to or from the Project Area.

Avoidance and Minimization Measures for Protected Species

The Project will include the following mitigation measures:

Hawai'ian Hoary Bat

Implementation of the following conservation measures, coupled with the availability of suitable roosting habitat elsewhere, outside of the Project Area, may avoid adversely impacting the population of Hawai'ian hoary bats locally and on Maui.

- Project activities that involve removal of large (> 15 feet) trees should, if possible, be conducted outside of the bat breeding season, from June 1 to September 15. It is also recommended that to the greatest extent possible, large trees such as those in the Olowalu area are preserved in place.
- Barbed wire fencing, including single barb wire top strand segments, should not be used.

Hawai'ian goose (nēnē)

To avoid and minimize potential Project impacts to nēnē, the following measures will be incorporated into the Project:

- Do not approach, feed, or disturb nēnē.
- If nēnē are loafing or foraging within the Project Area during the breeding season (September through April), a biologist familiar with the nesting behavior of nēnē shall survey for nests in and around the Project Area prior to the commencement or resumption of any work. Surveys shall be repeated after any subsequent delay of work of three (3) or more days (during which the birds may attempt to nest).
- Cease all work immediately and contact the Service for further guidance whenever nests are found within a 150 foot-radius of construction. This applies to nests found after construction has already commenced.
- In areas where nēnē are known to be present, inform Project personnel and contractors about the presence of endangered species on-site.
- For alignment activities near observed nēnē, fencing will be used where practicable to maintain a distance buffer and reduce vehicle strikes. If observations occur within an established buffer, the contractor will assign a monitor to reduce accidental vehicle strikes.

Other Hawai'ian Waterbirds

To avoid and minimize potential Project impacts to Hawai'ian Waterbirds, the following measures will also be incorporated into the Project:

- To the greatest extent possible, preserve suitable habitat such as wetlands, streams, and open water features in their natural condition.
- Inform Project personnel and contractors about the potential presence of endangered species on-site. Post and enforce speed limits in areas where waterbirds are known to be present.
- Incorporate the USFWS's Best Management Practices for Work in Aquatic Environments into the project design.
- If a nest or active brood is found:
    - Contact the USFWS within 48 hours for further guidance.
    - Establish and maintain a 100-foot buffer around all active nests and/or broods until the chicks/ducklings have fledged. Do not conduct potentially disruptive activities or habitat alteration within this buffer.

Hawai'ian Seabirds

No night work is anticipated for this Project. However, should night work be required, then lighting should be configured to be "dark sky friendly", in compliance with Hawai'i Revised Statute § 201-8.5 and these additional measures will be incorporated into the Project to avoid and minimize potential Project impacts to Hawai'ian seabirds:

- Fully shield all outdoor lights so the bulb can only be seen from below.
- Install automatic motion sensor switches and controls on all outdoor lights or turn off lights when human activity is not occurring in the lighted area.
- Avoid nighttime construction during the seabird-fledging period (September 15 to December 15).

Sea Turtles

To avoid and minimize Project impacts to sea turtles and their nests the following measures will be incorporated into the Project description:

- Do not remove native dune vegetation. Prior to any dune vegetation removal, a botanist familiar with native species will be consulted to identify native dune vegetation.
- Do not stockpile Project-related materials in the intertidal zone, reef flats, sandy beach and adjacent vegetated areas, or stream channels.

No night work is anticipated during construction. However, should night work be required, these additional measures will be incorporated into the Project to avoid and minimize potential Project impacts to sea turtles:

- Avoid nighttime work during the nesting and hatching season (May to December).
- Minimize the use of lighting on or near beaches and shield all Project-related lights so the light is not visible from any beach.
    - If lights can't be fully shielded or if headlights must be used, fully enclose the light source with light filtering tape or filters.
    - reducing the height of exterior lighting to below 3 ft and pointed downward or away from the beach; and

- minimize light intensity to the lowest level feasible and, when possible, include timers and motion sensors.

Blackburn's Sphinx Moth

Measures should be taken to avoid attraction of Blackburn's sphinx moth to the Project location and prohibit tree tobacco from entering the site. Tree tobacco can grow greater than 3 feet tall in approximately 6 weeks. If it grows over 3 feet, the plants may become a host plant for Blackburn's sphinx moth larvae.

- Remove any tree tobacco less than 3 feet tall.
- Monitor the site every 4-6 weeks for new tree tobacco growth before, during, and after the proposed ground-disturbing activity. This monitoring for can be completed by any staff, such as groundskeeper or regular maintenance crew if they are provided with training and picture placards of tree tobacco and BSM at different life stages.

Flora

No threatened, endangered, or rare plants were observed in the Project Area. The Project Area is highly disturbed with a history of vegetation disturbance and landscape level modification. The Project Area has an almost 100 percent cover of non-native and invasive plants and contains other direct threats to the nine endangered plants described above, such as feral ungulates, rodents, non-native snails and slugs, fire, and is regularly subject to drought. Based on these findings, it is highly unlikely that the Project Area contains the nine endangered plant taxa identified in the IPaC resource list and therefore no mitigation measures are proposed at this time.

Invasive Species

The Coordination Group on Alien Pest Species in Hawaii has outlined BMPs for projects in the state. These include:

- All construction equipment and vehicles should arrive at the work site for the first time in clean condition and free of: any soil; plants or plant parts, including seeds; insects, including eggs; and reptiles and amphibians, including their eggs. Similarly, all construction equipment and vehicles should be cleaned after use in the Project Area and before leaving the site. This would be particularly important for equipment movement between the Project Area and the other islands.
- All materials imported to the Project Area, including gravel, soil, rock, and sand, should be certified weed free. Invasive species found on stockpiled materials should be removed either chemically or mechanically.
- Only weed-free seed mixtures should be used for hydroseeding and hydromulching on the Project Area. A qualified botanist should inspect the seeded areas a minimum of 60 days after the hydroseed/hydromulch is applied. Any species of plant other than those intended to be in the hydroseed/hydromulch should be removed. In particular, plant species that are not known to occur on Maui and those that are actively being controlled on the island should be removed.
- To the extent feasible the Project should use native plants for revegetation or landscaping purposes. These species are included in the Biological Resources Report and Appendix D. If native plants do not meet landscaping objectives, plants with a low risk of becoming invasive may be substituted. Additional information on selecting appropriate plants for

landscaping can be obtained from the Plant Pono website (http://www.plantpono.org/) and following County of Maui Planting Guidelines (https://www.mauicounty.gov/242/Maui-Planting-Guidelines).

- Only plants grown on Maui should be used for landscaping purposes. If locally grown plants are unavailable, then imported plants may be used, but they should be thoroughly inspected or quarantined if necessary to ensure that they are free from invasive pests such as little fire ants and invasive plant seeds and seedlings that could arrive inadvertently.

Quarantines and/or management activities occurring on specific priority invasive species proximal to project areas will be addressed by the Contractor prior to physical construction in accordance with HDOT *Standard Specifications Section 621 – Invasive Species Management* (2021).

Nearshore and Offshore Marine Environments

It is highly unlikely that Project actions will impact nearshore and offshore marine environments, including Hawai'ian monk seal, due to the location of these environments and critical habitat outside of the Project Area. Potential impacts to nearshore and offshore marine environments, including Hawai'ian monk seal, will be further mitigated through water quality BMPs set forth below, as well as NOAA NMFS conservation recommendations, and select BMPs from USFWS *Recommended Standard Best Management Practices* for aquatic environments listed below.

Additional Best Management Practices

BMPs will be implemented during construction to minimize the potential for impacts to water quality. The Project will obtain a Notice of General Permit Coverage (NGPC) from the National Pollution Elimination Discharge System (NPDES) accompanied by a Storm Water Pollution Prevention Plan (SWPPP). BMPs will be implemented in accordance with the documented approach detailed in the *Construction Best Management Practices Field Manual by the State of Hawaii Department of Transportation* (2008).

Additionally, the following measures will be implemented, which include applicable measures from the USFWS list on "Recommended Standard Best Management Practices" for aquatic environments:

- Construction staff will be informed of the potential presence of threatened and endangered species, including being provided materials to assist in species identification and appropriate actions if a species enters the work area.
- Good housekeeping practices and erosion-control device(s) shall be employed at the job site to prevent debris and soil from leaving the site.
- Upon completion of the Project, all Project construction-related debris and sediment containment devices shall be removed and disposed of at an approved site.
- A litter-control plan shall be developed and implemented to prevent attraction and introduction of non-native species.
- Invasive species controls shall be maintained to ensure that all materials transported from off-site are free of such species.
- Project construction-related materials shall not be stockpiled in, or in close proximity to aquatic habitats and shall be protected from erosion (*e.g.*, with filter fabric, etc.) to prevent materials from being carried into waters by wind, rain, or high surf.

- Fueling of Project-related vehicles and equipment shall take place away from the aquatic environment. A contingency plan to control petroleum products accidentally spilled during the Project shall be developed. The plan shall be retained on site with the person responsible for compliance with the plan. Absorbent pads and containment booms shall be stored on-site to facilitate the clean-up of accidental petroleum releases.
- All deliberately exposed soil or under-layer materials used in the Project near water shall be protected from erosion and stabilized as soon as possible with geotextile, filter fabric or native or non-invasive vegetation matting, hydro-seeding, etc.

In addition, coordination has been completed with NOAA NMFS to avoid and minimize in-water effects to the green sea turtle and Hawksbill Sea turtle, and Essential Fish Habitat. NOAA NMFS conservation recommendations stipulated in a letter to FHWA serve to avoid and minimize potential adverse effects of the Project to these species, as well as offshore and nearshore marine environments, and Hawai'ian monk seal. The recommendations include:

- If at all possible, avoid placing bridge footings, foundations, or other structural elements in streambeds. Seek engineering solutions that place bridge structural elements outside a streambed.
- Although designs of alternatives will take into account potential future effects of inundation and sea level rise, also plan to accommodate increased water that could come from the land through riparian corridors and flooding pathways. Do not plan bridges or culverts that would restrict the flow of water and could raise water flow rates and increase scour. Consider incorporating low impact design elements into plans that slow water flow, impound sediment, and filter runoff from impermeable surfaces.
- Develop a plan for managing equipment, materials, and job site conditions in the event of approaching foul weather (i.e., tropical storms and hurricanes). Equipment and materials may need to be removed from the Project site or adequately secured. Stormwater runoff and erosion may require heightened management during storm events.

These conservation recommendations apply to whichever Build Alternative is chosen as the preferred alternative. FHWA accepted the conservation recommendations and received confirmation of coordination completion from NOAA NMFS on October 10, 2023.

Request for Concurrence

With the implementation of the avoidance and minimization measures described above, the FHWA has determined that the Honoapiʻilani Highway Improvements Project *may affect, but is not likely to adversely affect* the Hawai'ian Hoary Bat; the Hawai'ian goose; Hawai'ian Waterbirds the Hawai'ian coot and Hawai'ian stilt. These measures would extend to other listed waterbirds including the Hawai'ian common gallinule and the Hawai'ian duck; Hawai'ian seabirds including the Hawai'ian petrel, the band-rumped storm-petrel, and Newell's Townsend's shearwater; the Blackburn's Sphinx Moth; and the Sea turtles in the highly unlikely event of an occurrence in the Project Area. No federally listed plant species were found, and no terrestrial critical habitat is located in the highly disturbed habitats of the Project Area.

We request your concurrence with this determination. We respectfully request your response within 60 days of receipt of this letter. If you have any questions or require additional

information, please feel free to contact me at (808) 541-2316 or by email at meesa.otani@dot.gov. Thank you for your assistance.

Sincerely yours,

Meesa Otani
Environmental Engineer

Enclosures

- Honoapiilani Highway Improvements Project Vicinity Map
- HT Harvey & Associates Biological Resources Report w/ appendices:
  - USFWS IPaC List Feb. 2023
  - USFWS General Project Design Guidelines
  - USFWS Refined Species List May 2023 Memo
  - BMPs for Invasive Species Prevention
- NOAA NMFS EFH Conservation Recommendations Letter
- USFWS IPaC List for the Honoapiilani Highway Improvements Project Sept. 2023
- USFWS Best Management Practices for Work in or Around Aquatic Environments

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

Dec 1, 2022

MEMORANDUM

FROM: **DLNR Agencies:**
_X_ Div. of Aquatic Resources (kendall.l.tucker@hawaii.gov)
___Div. of Boating & Ocean Recreation
_X_ Engineering Division (DLNR.ENGR@hawaii.gov)
_X_ **Div. of Forestry & Wildlife** (rubyrosa.t.terrago@hawaii.gov)
___Div. of State Parks
_X_ Commission on Water Resource Management (DLNR.CWRM@hawaii.gov)
_X_ Office of Conservation & Coastal Lands (sharleen.k.kuba@hawaii.gov)
_X_ Land Division – Maui District (daniel.l.ornellas@hawaii.gov)

TO: Russell Y. Tsuji, Land Administrator *Russell Tsuji*
SUBJECT: **Honoapi'ilani Highway Improvements Project**
Federal Aid Project No.: RAEM-30-1(59)
LOCATION: Lahaina, Island of Maui; TMK Plats: (2) 4-7-001, 4-8-001, 002, 003, 004, and Honoapi'ilani Highway Rights-of-Way
APPLICANT: U.S. Department of Transportation, Federal Highway Administration

Transmitted for your review and comment is information on the above-referenced subject matter. Please submit any comments by **December 28, 2022.**

If no response is received by the above date, we will assume your agency has no comments. Should you have any questions about this request, please contact Darlene Nakamura at darlene.k.nakamura@hawaii.gov. Thank you.

BRIEF COMMENTS:

( ) We have no objections.
( ) We have no comments.
( ) We have no additional comments.
(☑) Comments are included/attached.

Signed: *Lainie Berry*
Print Name: LAINIE BERRY, Wildlife Program Mgr.
Division: Division of Forestry and Wildlife
Date: Dec 27, 2022

Attachments
cc: Central Files

JOSH GREEN, M.D.
GOVERNOR | KE KIAʻĀINA

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIAʻĀINA

STATE OF HAWAIʻI | KA MOKUʻĀINA ʻO HAWAIʻI
DEPARTMENT OF LAND AND NATURAL RESOURCES
Division of Forestry and Wildlife
1151 Punchbowl Street, Room 325
Honolulu, Hawaii 96813

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

M. KALEO MANUEL
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

December 27, 2022

MEMORANDUM *Log no. 3926*

TO: RUSELL Y. TSUJI, Land Administrator
Land Division

FROM: LAINIE BERRY, Wildlife Program Manager
Division of Forestry and Wildlife

SUBJECT: **Division of Forestry and Wildlife Acceptance to Become a Participating Agency for the Honoapiʻilani Highway Improvement Project on Maui**

The Department of Land and Natural Resources, Division of Forestry and Wildlife (DOFAW) has received your invitation to become a Participating Agency to identify any issues of concern regarding the Honopiʻilani Highway Improvement Project's [Federal Aid Project No.: RAEM-030-1(59)] potential environmental or socioeconomic impacts that could substantially delay or prevent an agency from granting a permit or other approval that is needed for the project. The proposed project consists of addressing existing coastal erosion and flooding, as well as future coastal erosion and flooding caused by anticipated sea level rise along the stretch of highway from Ukumehame, approximately milepost 11, in the vicinity of Papalaua Wayside Park to Launiopoko, at milepost 17, the existing southern terminus of Lahaina Bypass, on the island of Maui.

DOFAW accepts the invitation to become a Participating Agency in the development of the above project and will offer our expertise as it relates to management of natural resources, including watersheds, wetlands, protected species and their habitats, prevention and suppression of wildfire, trails and access, and integrated management of erosion and sedimentation that impacts near shore and marine ecosystems. We provide the following preliminary comments regarding the potential for the proposed work to affect those environmental concerns in the vicinity of the project area.

One or more of the proposed alternative road alignments may pass through department lands being scoped for designation as forest reserves for their natural resource values, including lands that may have historically supported wetland habitats. Coordination with DOFAW will support planning for those lands.

The State endangered Assimulans Yellow-faced Bee (*Hylaeus assimulans*) has been documented at several locations in West Maui, including in areas of the proposed project site. DOFAW recommends coordinating with our agency to determine site-specific avoidance and minimization measures to prevent impacts to this species.

DOFAW recommends that a qualified botanist survey for rare and endangered plants in all proposed affected areas prior to commencing work. Our initial evaluation suggests that the proposed project site falls within or in close proximity to critical habitat for listed plants. These include the following:

- *Asplenium diellaciniatum*
- *Bidens campylotheca ssp. pentamera*
- *Cenchrus agrimonioides*
- *Ctenitis squamigera*
- *Cyanea obtusa*
- *Gouania hillebrandii*
- *Hesperomannia arbuscula*
- *Hibiscus brackenridgei*
- *Kadua coriacea*
- *Lysimachia lydgatei*
- *Neraudia sericea*
- *Remya mauiensis*
- *Santalum haleakalae var. lanaiense*
- *Schiedea salicaria*
- *Sesbania tomentosa*
- *Spermolepis hawaiiensis*
- *Tetramolopium capillare*
- *Tetramolopium remyi*

We recommend that the survey consists of a complete species list and that surveying of dry areas should be done during the wettest time when plants are more likely to be visible. If any listed species are found, please notify DOFAW at (808) 587-0166. For information on avoidance and minimization measures for plants, please refer to the following link: https://www.fws.gov/sites/default/files/documents/Plant%20Avoidance%20and%20Minimization%20MeasuresApril%202022.pdf

The State listed Hawaiian Hoary Bat or ʻŌpeʻapeʻa (*Lasiurus cinereus semotus*) could potentially occur at or in the vicinity of the project and may roost in nearby trees. Any required site clearing should be timed to avoid disturbance to bats during their birthing and pup rearing season (June 1 through September 15). During this period woody plants greater than 15 feet (4.6 meters) tall should not be disturbed, removed, or trimmed. Barbed wire should also be avoided for any construction because bats can become ensnared and killed by such fencing material during flight.

Artificial lighting can adversely impact seabirds that may pass through the area at night by causing them to become disoriented. This disorientation can result in their collision with manmade structures or the grounding of birds. **Any permanent lighting installed would pose a very high**

risk of seabird attraction on the proposed stretch of road. New highway lights, therefore, should not be installed in this area to protect seabird flyways and preserve the night sky. For nighttime work that might be required, DOFAW recommends that all lights used be fully shielded to minimize the attraction of seabirds. Nighttime work that requires outdoor lighting should be avoided during the seabird fledging season from September 15 through December 15, the period when young seabirds make their maiden voyage to sea. For illustrations and guidance related to seabird-friendly light styles that also protect seabirds and the dark starry skies of Hawai‘i please visit https://dlnr.hawaii.gov/wildlife/files/2016/03/DOC439.pdf.

The State endangered Hawaiian Monk Seal (*Monachus schauinslandi*) and threatened Green Sea Turtle (*Chelonia mydas*) could potentially occur or haul out onshore within the vicinity of the proposed project site. If either species is detected within 100 meters of the project area all nearby construction operations should cease and not continue until the focal animal has departed the area on its own accord.

The State listed Hawaiian Goose or Nēnē (*Branta sandvicensis*) occurs in the vicinity of the proposed project site. It is unlawful s to harm or harass these species (Chapter 195D, Hawaii Revised Statutes). If any are present during construction, all activities within 100 feet (30 meters) should cease and the bird or birds should not be approached. Work may continue after the bird or birds leave the area of their own accord. If a nest is discovered at any point, please contact the Maui Branch DOFAW Office at (808) 984-8100.

The project area is within the range of the State listed Blackburn's Sphinx Moth (*Manduca blackburni*) or BSM. Larvae of BSM feed on many nonnative hostplants, which includes tree tobacco (*Nicotiana glauca*), that grow in disturbed soil. We recommend contacting the Maui Branch DOFAW office at (808) 984-8100 for further information about where BSM may be present and whether a vegetation survey should be conducted to determine the presence of plants preferred by BSM. DOFAW recommends removing plants less than one meter in height or during the dry season to avoid harm to BSM. If you intend to either remove tree tobacco over one meter in height or to disturb the ground around or within several meters of these plants, they must be thoroughly inspected by a qualified entomologist for the presence of BSM eggs and larvae.

DOFAW recommends using native plant species for landscaping that are appropriate for the area, such as plants for which climate conditions are suitable for them to thrive, plants that historically occurred there, etc. Please do not plant invasive species. DOFAW also recommends referring to www.plantpono.org for guidance on the selection and evaluation of landscaping plants and to determine the potential invasiveness of plants proposed for use in the project.

DOFAW recommends minimizing the movement of plant or soil material between worksites. Soil and plant material may contain detrimental fungal pathogens (e.g., Rapid ‘Ōhi‘a Death), vertebrate and invertebrate pests (e.g., Coqui Frogs, Little Fire Ants, etc.), or invasive plant parts (e.g., Miconia, Mullein, etc.) that could harm our native species and ecosystems. We recommend consulting the Maui Invasive Species Committee (MISC) at (808) 573-6472 to help plan, design, and construct the project, learn of any high-risk invasive species in the area, and ways to mitigate their spread. All equipment, materials, and personnel should be cleaned of excess soil and debris to minimize the risk of spreading invasive species.

Introduced predators, such as cats, rats, and mongooses, kill native birds. DOFAW recommends that all agencies and contractors be required to follow strict protocols to securely contain all food, waste, and organic matter that could serve as a food resource for predators.

Due to the arid climate and risks of wildfire to listed species, we recommend coordinating with the Hawai‘i Wildfire Management Organization at (808) 885-0900 or admin@hawaiiwildfire.org, on how wildfire prevention can be addressed in the project area.

Finally, we note that DOFAW is collaborating with marine partners to address erosion issues in the project area, for which the sources of sedimentation are multiple public and private landowners, including DLNR and HDOT. Coordination to address those management concerns will benefit a broad and diverse network of constituents that rely on those natural resources for ecosystem and economic services. We encourage FHWA to include marine management stakeholder organizations in its scoping, including Maui Nui Marine Resource Council, The Nature Conservancy of Hawaii Marine Program, and the Maui Nui Makai Network.

We appreciate your efforts to work with our office for the conservation of natural resources. These comments are general guidelines and should not be considered comprehensive for this site or project. It is the responsibility of the applicant to do their own due diligence to avoid any negative environmental impacts. Should the scope of the project change significantly, or should it become apparent that threatened or endangered species may be impacted, please contact our staff as soon as possible. If you have any questions, please contact Myrna N. Girald Pérez, Protected Species Habitat Conservation Planning Associate at (808) 265-3276 or myrna.girald-perez@hawaii.gov.

Sincerely,

Lainie Berry

LAINIE BERRY
Wildlife Program Manager

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish And Wildlife Office
300 Ala Moana Boulevard, Box 50088
Honolulu, HI 96850-5000
Phone: (808) 792-9400 Fax: (808) 792-9580

In Reply Refer To: September 19, 2023
Project Code: 2023-0041712
Project Name: Honoaliilani Highway Improvements

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened and endangered species, as well as designated critical habitat that may occur within the boundary of your proposed project and that may be affected by project related actions. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Please contact the Service's Pacific Islands Fish and Wildlife Office (PIFWO) at 808-792-9400 if you have any questions regarding your IPaC species list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may adversely affect threatened and endangered species and/or designated critical habitat.

Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a Biological

Evaluation, similar to a Biological Assessment, be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment or Biological Evaluation are described at 50 CFR 402.12.

Due to the significant number of listed species found on each island within PIFWO's regulatory jurisdiction, and the difficulty in accurately mapping ranges for species that we have limited information about, your species list may include more species than if you obtained the list directly from a Service biologist. We recommend you use the species links in IPaC to view the life history, habitat descriptions, and recommended avoidance and minimization measures to assist with your initial determination of whether the species or its habitat may occur within your project area. If appropriate habitat is present for a listed species, we recommend surveys be conducted to determine whether the species is also present. If no surveys are conducted, we err on the side of the species, by regulation, and assume the habitat is occupied. Updated avoidance and minimization measures for plants and animals, best management practices for work in or near aquatic environments, and invasive species biosecurity protocols can be found on the PIFWO website at: https://www.fws.gov/office/pacific-islands-fish-and-wildlife/library.

If a Federal agency determines, based on the Biological Assessment or Biological Evaluation, that a listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: http://www.fws.gov/endangered/esa-library/index.

Non-federal entities can also use the IPaC generated species list to develop Habitat Conservation Plans (HCP) in accordance with section 10(a)(1)(B) of the Act. We recommend HCP applicants coordinate with the Service early during the HCP development process. For additional information on HCPs, the Habitat Conservation Planning handbook can be found at https://www.fws.gov/sites/default/files/documents/habitat-conservation-planning-handbook-entire.pdf.

Please be aware that wind energy projects should follow the Service’s wind energy guidelines (http://www.fws.gov/windenergy) for minimizing impacts to migratory birds. Listed birds and the Hawaiian hoary bat may also be affected by wind energy development and we recommend development of a Habitat Conservation Plan for those species, as described above. Guidance for minimizing impacts to migratory birds for projects including communications towers can be found at:

- http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers
- http://www.towerkill.com
- http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation actions that benefit threatened and endangered species into their project planning to further the purposes of the Act in accordance with section 7(a)(1). Please include the Consultation Tracking Number associated with your IPaC species list in any

request for consultation or correspondence about your project that you submit to our office. Please feel free to contact us at PIFWO_admin@fws.gov or 808-792-9400 if you need more current information or assistance regarding the potential impacts to federally listed species and federally designated critical habitat.

Attachment(s):

- Official Species List

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Pacific Islands Fish And Wildlife Office
300 Ala Moana Boulevard, Box 50088
Honolulu, HI 96850-5000
(808) 792-9400

PROJECT SUMMARY

Project Code: 2023-0041712
Project Name: Honoaliilani Highway Improvements
Project Type: New Constr - Above Ground
Project Description: The primary purpose of this project is to provide a reliable transportation facility in West Maui by reducing the highway's vulnerability to coastal hazards. Specifically, the project will look at ways to address existing and future erosion and flooding from Ukumehame, at approximately milepost 11, in the vicinity of Pāpalaua Wayside Park to Launiopoko, at milepost 17, the existing southern terminus of Lāhainā Bypass. Currently, there are four alternatives being considered, which would realign the highway further mauka of the existing Honoapiilani Highway. The EIS process is on-going and also includes a no-build option.

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@20.813553900000002,-156.6173807703801,14z



Counties: Maui County, Hawaii

ENDANGERED SPECIES ACT SPECIES

There is a total of 20 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Hawaiian Hoary Bat *Lasiurus cinereus semotus*	Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/770
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/6477.pdf

BIRDS

NAME	STATUS

Band-rumped Storm-petrel *Oceanodroma castro* — Endangered

Population: USA (HI)
No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/1226
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/6939.pdf

Hawaiian Coot *Fulica alai* — Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/7233
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/6934.pdf

Hawaiian Duck *Anas wyvilliana* — Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/7712
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/6934.pdf

Hawaiian Goose *Branta (=Nesochen) sandvicensis* — Threatened

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/1627
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/6925.pdf

Hawaiian Petrel *Pterodroma sandwichensis* — Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/6746
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/6939.pdf

Hawaiian Stilt *Himantopus mexicanus knudseni* — Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/2082
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/6934.pdf

Newell's Townsend's Shearwater *Puffinus auricularis newelli* — Threatened

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/2048
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/6939.pdf

NAME	STATUS
Short-tailed Albatross *Phoebastria (=Diomedea) albatrus*	Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/433

REPTILES

NAME	STATUS
Green Sea Turtle *Chelonia mydas*	Threatened

Population: Central North Pacific DPS
There is **proposed** critical habitat for this species.
Species profile: https://ecos.fws.gov/ecp/species/6199
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/6929.pdf

INSECTS

NAME	STATUS
Blackburn's Sphinx Moth *Manduca blackburni*	Endangered

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/4528
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/6926.pdf

FLOWERING PLANTS

NAME STATUS

`ena`ena *Pseudognaphalium sandwicensium var. molokaiense* Endangered
No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/5993
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/7051.pdf

Awiwi *Schenkia sebaeoides* Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/7103
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/7051.pdf

Carter's Panicgrass *Panicum fauriei var. carteri* Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/5578
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/7060.pdf

Dwarf Naupaka *Scaevola coriacea* Endangered
No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/4669
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/7060.pdf

Ihi *Portulaca villosa* Endangered
No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/4886

Ko`oloa`ula *Abutilon menziesii* Endangered
No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/3268
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/7051.pdf

Ohai *Sesbania tomentosa* Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/8453
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/7051.pdf

Round-leaved Chaff-flower *Achyranthes splendens var. rotundata* Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/4709
General project design guidelines:

NAME STATUS

https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/7051.pdf

Vigna o-wahuensis Endangered

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.

Species profile: https://ecos.fws.gov/ecp/species/8445

General project design guidelines:

https://ipac.ecosphere.fws.gov/project/MPPFAMXE2BC67EVQ2SMKIJJ74I/documents/generated/7051.pdf

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: James Sullivan
Address: 1444 S Entertainment Ave
Address Line 2: #300
City: Boise
State: ID
Zip: 83709
Email james.sullivan1@wsp.com
Phone: 3128036661

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Highway Administration

U.S. Fish and Wildlife Service
Recommended Standard Best Management Practices

The U.S. Fish and Wildlife Service (USFWS) recommends the following measures to be incorporated into project planning to avoid or minimize impacts to fish and wildlife resources. Best Management Practices (BMPs) include the incorporation of procedures or materials that may be used to reduce either direct or indirect negative impacts to aquatic habitats that result from project construction-related activities. These BMPs are recommended in addition to, and do not over-ride any terms, conditions, or other recommendations prepared by the USFWS, other federal, state or local agencies. If you have questions concerning these BMPs, please contact the USFWS Aquatic Ecosystems Conservation Program at 808-792-9400.

1. Authorized dredging and filling-related activities that may result in the temporary or permanent loss of aquatic habitats should be designed to avoid indirect, negative impacts to aquatic habitats beyond the planned project area.

2. Dredging/filling in the marine environment should be scheduled to avoid coral spawning and recruitment periods, and sea turtle nesting and hatching periods. Because these periods are variable throughout the Pacific islands, we recommend contacting the relevant local, state, or federal fish and wildlife resource agency for site specific guidance.

3. Turbidity and siltation from project-related work should be minimized and contained within the project area by silt containment devices and curtailing work during flooding or adverse tidal and weather conditions. BMPs should be maintained for the life of the construction period until turbidity and siltation within the project area is stabilized. All project construction-related debris and sediment containment devices should be removed and disposed of at an approved site.

4. All project construction-related materials and equipment (dredges, vessels, backhoes, silt curtains, etc.) to be placed in an aquatic environment should be inspected for pollutants including, but not limited to; marine fouling organisms, grease, oil, etc., and cleaned to remove pollutants prior to use. Project related activities should not result in any debris disposal, non-native species introductions, or attraction of non-native pests to the affected or adjacent aquatic or terrestrial habitats. Implementing both a litter-control plan and a Hazard Analysis and Critical Control Point plan (HACCP – see https://www.fws.gov/policy/A1750fw1.html) can help to prevent attraction and introduction of non-native species.

5. Project construction-related materials (fill, revetment rock, pipe, etc.) should not be stockpiled in, or in close proximity to aquatic habitats and should be protected from erosion (*e.g.*, with filter fabric, etc.), to prevent materials from being carried into waters by wind, rain, or high surf.

6. Fueling of project-related vehicles and equipment should take place away from the aquatic environment and a contingency plan to control petroleum products accidentally spilled during the project should be developed. The plan should be retained on site with the person responsible for compliance with the plan. Absorbent pads and containment booms should be stored on-site to facilitate the clean-up of accidental petroleum releases.

7. All deliberately exposed soil or under-layer materials used in the project near water should be protected from erosion and stabilized as soon as possible with geotextile, filter fabric or native or non-invasive vegetation matting, hydro-seeding, etc.

PIFWO Invasive Species Biosecurity Protocols

(Updated July 2024)

Project activities may introduce or spread invasive species, causing negative ecological consequences to new areas or islands, resulting in potential impacts to fish, wildlife, and their habitat. For example, seeds of invasive plant species (e.g., *Chromolaena odorata*, *Senecio madagascariensis*, *Cyathea cooperi*, or *Miconia calvescens*) can be inadvertently transported on equipment from a previous work site to a new site where the species are not present. Likewise, equipment used in an area infected with a pathogen or insect pest that can have ecological consequences (e.g., rapid ʻōhiʻa death (*Ceratocystis spp.*), black twig borer (*Xylosandrus compactus*), or naio thrips (*Klambothrips myopori*), if not properly decontaminated, can act as a vector to introduce the pathogen into a new area. Additionally, vehicles must be properly inspected and cleaned to ensure vertebrate or invertebrate pests do not stowaway and spread to other areas. These are just a few examples of how even well-intended project activities may inadvertently introduce or spread invasive species.

To avoid and minimize invasive species potential impacts to fish, wildlife, and their habitat we recommend incorporating general biosecurity protocols into your project planning (see below). Additional consultation is recommended if project activities involve transportation of materials, equipment, vehicles, etc. between islands or transpacific movement of materials or equipment.

Invasive Species Biosecurity Protocol

The following biosecurity protocol is recommended to be incorporated into planning for your project to avoid or minimize transportation of invasive species with potential to impact to fish, wildlife, and their habitat. Cleaning, treatment, and/or inspection activities are the responsibility of the equipment or vehicle owner and operator. However, it is ultimately the responsibility of the action agency to ensure that all project materials, vehicles, machinery, equipment, and personnel are free of invasive species before entry into a project site. Please refer to the resources listed below for current removal/treatment recommendations that may be relevant to your project.

1. Cleaning and treatment:
   Project applicants should assume that all project materials (i.e., construction materials, or aggregate such as dirt, sand, gravel, etc.), vehicles, machinery, and equipment contain dirt and mud, debris, plant seeds, and other invasive species, and therefore require thorough cleaning. Treatment for specific pests, for example, trapping and poison baiting for rodents, or baiting and fumigation for insects, should be considered when applicable. For effective cleaning we offer the following recommendations prior to entry into a project site:
   a. Project materials, vehicles, machinery, and equipment must be pressure washed thoroughly (preferably with hot water) in a designated cleaning area. Project materials, vehicles, machinery, and equipment should be visibly free of mud/dirt (excluding aggregate), seeds, plant debris, insects, spiders, frogs (including frog eggs), other vertebrate species (e.g.,

rodents, mongoose, feral cats, reptiles, etc.), and rubbish. Areas of particular concern include bumpers, grills, hood compartments, wheel wells, undercarriage, cabs, and truck beds. Truck beds with accumulated material are prime sites for hitchhiking invasive species.

b. The interior and exterior of vehicles, machinery, and equipment must be free of rubbish and food, which can attract pests (i.e., rodents and insects). The interiors of vehicles and the cabs of machinery should be vacuumed clean particularly for any plant material or seeds.

2. Inspection:
    a. Following cleaning and/or treatment, project materials, vehicles, machinery, and equipment, must be visually inspected by its user, and be free of mud/dirt (excluding aggregate), debris, and invasive species prior to entry into a project site. For example, careful visual inspection of a vehicle's tires and undercarriage is recommended for any remaining mud that could contain invasive plant seeds.
    b. Any project materials, vehicles, machinery, or equipment found to contain invasive species (e.g., plant seeds, invertebrates, rodents, mongoose, cats, reptiles, etc.) must not enter the project site until those invasive species are properly removed/treated.

3. For all project site personnel:
    a. Prior to entry into the project site, visually inspect and clean your clothes, boots or other footwear, backpack, radio harness, tools and other personal gear and equipment for insects, seeds, soil, plant parts, or other debris. We recommend the use of a cleaning brush with sturdy bristles. Seeds found on clothing, footwear, backpacks, etc., should be placed in a secure bag or similar container and discarded in the trash rather than being dropped to ground at the project site or elsewhere.

4. Additional considerations:
    a. Consider implementing a Hazard Analysis and Critical Control Point (HACCP) plan (https://www.fws.gov/policy/A1750fw1.html) to improve project planning around reducing the risk of introducing or spreading invasive species.
    b. When applicable, use pest-free or low-risk sources of plants, mulch, wood, animal feed or other materials to be transported to a project site.
    c. For projects involving plants from nurseries (e.g., outplanting activities, etc.), all plants should be inspected, and if necessary, appropriately cleaned or treated for invasive species prior to being transported to the project site.
    d. Avoid unnecessary exposure to invasive species at a particular site (to the extent practical) to reduce contamination and spread. For example, if your project involves people or equipment moving between multiple locations, plan and organize timelines so that work is completed in native habitat

prior to working in a disturbed location to reduce the likelihood of introducing a pest into the native habitat.

e. Maintain good communication about invasive species risks between project managers and personnel working on the project site (e.g., conduct briefings and training about invasive species). Ensure prevention measures are communicated to the entire project team. Also consider adding language on biosecurity into contracts or permitting mechanisms to provide clarity to all involved in the project. Report any species of concern or possible introduction of invasive species to appropriate land managers.

For current removal/treatment recommendations please refer to the following:
Hawaiian Islands:

- Hawai‘i Island – https://www.biisc.org/
- **Maui – https://mauiinvasive.org/**
- Moloka‘i - https://www.molokaiisc.org/
- Lāna‘i - https://pulamalanai.com/
- O‘ahu – https://www.oahuisc.org/
- Kaua‘i – https://www.kauaiisc.org/

Species-Specific Biosecurity Protocols

The following section contains specific protocols for a few select invasive species of concern in the Pacific Islands highlighted because of their potential to easily spread and cause great harm to native species and habitats. Other invasive species may not have existing specific protocols or may already be minimized by implementing the general invasive species protocols above (e.g., invasive plants, invertebrates, larger vertebrates). Information on other invasive species can be found in the island specific links below. As new threats emerge that require development of species-specific protocols, those may be added to this list.

Table 1. Current island distribution of invasive species with specific biosecurity protocols in the Pacific Islands (PIFWO jurisdiction).

Island	Invasive Species with Specific Protocols			
	Rapid ‘Ōhi‘a Death	**Little Fire Ant**	**Coconut Rhinoceros Beetle (CRB)**	**Brown Treesnake**
Island of Hawai‘i	widespread	widespread	not present	not present
Maui	present	incipient	detected in Nov 2023, not observed since. The state and Service recommend implementing CRB biosecurity BMPs	not present
O‘ahu	incipient	incipient	widespread	not present
Kaua‘i	widespread	not present	not present	not present

Rapid ‘Ōhi‘a Death (ROD)

If working directly with ʻōhiʻa trees (e.g., sampling suspected trees, clearing an area of ʻōhiʻa, etc.) or in an area(s) known to be highly infested with ROD, additional consultation is recommended.

Current Distribution of ROD: island of Hawaiʻi, Maui, Oʻahu, Kauaʻi (https://cms.ctahr.hawaii.edu/rod

While ROD is not currently reported on Molokaʻi at this time, if you are in ʻōhiʻa forest it would be prudent to take precautions. Also, consider where the equiptment to be used on Molokaʻi will be coming from, and if from an island with confirmed ROD, take the necessary precautions.

Rapid ʻŌhiʻa Death (ROD) is a caused by a fungal pathogen (*Ceratocystis* spp.) that attacks and kills ʻōhiʻa trees (*Metrosideros polymorpha*). ʻŌhiʻa is endemic to the Hawaiian Islands and is the most abundant native tree species, comprising approximately 80 percent of Hawaiʻi's remaining native forests.

For more information about ROD including its current distribution, ROD science updates, and the latest on ROD protocol, please visit www.rapidohiadeath.org.

To reduce the risk of spreading ROD, the following best management practices and decontamination protocol are recommended:

Best Management Practices for ROD

1. Never transport any part of an ʻōhiʻa tree between different areas of an island or to a different island.

2. Do not use equipment from ROD infected islands on another island unless it is very specialized equipment and follows the decontamination protocol described below.

3. Avoid wounding ʻōhiʻa trees and roots with mowers, chainsaws, weed eaters, and other tools. If an ʻōhiʻa receives a minor injury like a small broken branch, then give the injury a clean, pruning-type cut (close to the main part of the trunk or branch) to promote healing, and then spray the entire wounded area with a pruning seal.

4. Always report suspect ROD ʻōhiʻa trees observed within you project area. ROD is a wilt disease that cuts off the supply of water and nutrients to the tree. The primary symptom to look for is an entire canopy or a large branch with dying leaves or red discolored leaves. Please record the GPS coordinates and location and take a picture of the tree if possible. Please report suspected ROD ʻōhiʻa trees to the following agencies:
    a. Island of Hawaiʻi – BIISC: 808-969-8268 (ohialove@hawaii.edu)
    b. Maui – MISC: 808-573-6472 (miscpr@hawaii.edu)

c. Molokaʻi – TNC: 808-553-5236 ext. 6585 (lbuchanan@tnc.org)
d. Oʻahu – OISC: 808-266-7994 (oisc@hawaii.edu)
e. Kauaʻi – KISC: 808-821-1490 (kisc@hawaii.edu)

ROD Decontamination Protocol

1. Clothes, footwear, backpacks, and other personal equipment
    a. Before leaving the project site, remove as much mud and other contaminants as possible. Use of a brush with soap and water to clean gear is preferred. Footwear, backpacks, and other gear must be sanitized by spraying with a solution of >70 percent isopropyl alcohol or a freshly mixed 10 percent bleach solution.

2. Vehicles, machinery, and other equipment
    a. Vehicles, machinery, and other equipment must be thoroughly hosed down with water (pressure washing preferred) and visibly free of mud and debris, then sprayed with a solution of >70 percent isopropyl alcohol or a freshly mixed 10 percent bleach solution. Use of a "pump-pot" sprayer is recommended for the solution and a hot water wash is preferred. Be sure to thoroughly clean the undercarriage, truck bed, bumpers, and wheel wells.
    b. If non-decontaminated personnel or items enter a vehicle, then the inside of the vehicle (i.e., floor mats, etc.) must be subsequently decontaminated by removing mud and other contaminants and sprayed with the one of the same aforementioned sanitizing solutions.

3. Cutting tools
    a. All cutting tools, including machetes, chainsaws, and loppers must be sanitized to remove visible mud and other contaminants. Tools must be sanitized using a solution of >70 percent isopropyl alcohol or a freshly mixed 10 percent bleach solution. One minute after sanitizing, one may apply an oil-based lubricant to chainsaw chains or other metallic parts to prevent corrosion as bleach is corrosive to metal.

    NOTE: When using a 10 percent bleach solution, surfaces should be cleaned with a minimum contact time of 30 seconds. Bleach must be mixed daily and used within 24 hours, as once mixed it degrades. Bleach will not work to disinfect surfaces that have high levels of organic matter such as sawdust or soil. Because bleach is also corrosive to metal, a water rinse after proper sanitization is recommended to avoid corrosion.

Little Fire Ant (LFA)

For the most current status on distribution and infestations, please visit http://stoptheant.org/lfa-in-hawaii/

The little fire ant (*Wasmannia auropunctata*), or LFA, is an invasive species with a painful sting that can inhabit many different environments. In Hawai‘i, it often infests agricultural fields and farms, damaging crops and stinging unsuspecting workers. Little fire ants are also highly disruptive to native tropical ecosystems and harmful to wildlife. Slow moving, but tiny and capable of foraging 24 hours a day with multiple queens per colony, LFA is a formidable threat to biodiversity, agriculture, and quality of life on tropical islands in the Pacific.

For more information about LFA including helpful guides and workshops for treating or detecting LFA, please visit www.littlefireants.com.

To reduce the risk of spreading LFA, the following biosecurity protocol is recommended:

Biosecurity Protocol for LFA

1. For projects involving plants from nurseries (e.g., outplanting activities, etc.), all plants should be inspected for little fire ants and other pests prior to being transported to the project site. If plants are found to be infested by ants of any species, plants should be sourced from an alternative nursery and the infested nursery should follow treatment protocols recommended by the Hawai‘i Ant Lab (https://littlefireants.com/wp-content/uploads/2020-Management-of-Pest-Ants-in-Nurseries-min.pdf).

2. All work vehicles, machinery, and equipment should follow steps 1 and 2 in the “Invasive Species Biosecurity Protocol” for (1) cleaning and treatment and (2) inspection for invasive ants prior to entering a project site.

3. Any machinery, vehicles, equipment, or other supplies found to be infested with ants (or other invasive species) must not enter the project site until it is properly treated (https://littlefireants.com/how-to-treat-for-little-fire-ants-for-homeowners/#recommended-bait-products) and re-tested. Infested vehicles must be treated following recommendations by the Hawai‘i Ant Lab (https://littlefireants.com/resource-center/) or another ant control expert and in accordance with all State and Federal laws. Treatment is the responsibility of the equipment or vehicle owner. Ultimately however, it is the responsibility of the action agency to ensure that all project materials, vehicles, machinery, and equipment follow the appropriate protocol(s).

4. General Vehicle Ant Hygiene: Even the cleanest vehicle can pick up and spread little fire ant. Place MaxForce Complete Brand Granular Insect Bait (1.0 percent Hydramethylnon; https://labelsds.com/images/user_uploads/Maxforce%20Complete%20Label%201-5-18.pdf) into refillable tamper resistant bait stations. An example of a commercially available refillable tamper resistant bait station is the Ant Café Pro (https://www.antcafe.com/). Place a bait station (or stations) in the vehicle and note that larger vehicles, such as trucks, may require multiple stations. Monitor bait stations frequently (every week at a minimum) and replace bait as needed. If

the bait station does not have a sticker to identify the contents, apply a sticker listing contents to the station.

5. Gravel, building materials, or other equipment such as portable buildings should be baited using MaxForce Complete Brand Granular Insect Bait (1.0 percent Hydramethylnon; https://labelsds.com/images/user_uploads/Maxforce%20Complete%20Label%201-5-18.pdf) or AmdroPro (0.73 percent Hydramethylnon; https://connpest.com/labels/AMDROPRO.pdf) following label guidance.

6. Storage areas that hold field tools, especially tents, tarps, and clothing should be baited using MaxForce Complete Brand Granular Insect Bait (1.0 percent Hydramethylnon; https://labelsds.com/images/user_uploads/Maxforce%20Complete%20Label%201-5-18.pdf) or AmdroPro (0.73 percent Hydramethylnon; https://connpest.com/labels/AMDROPRO.pdf) following label guidance.

7. Vehicles that have entered a project site known or thought to overlap with areas infested with LFA should subsequently be tested for LFA with baiting in accordance with protocol recommended by the Hawai‘i Ant Lab (https://littlefireants.com/survey-your-home-for-lfa/).

8. If LFA are detected, please report it to 808-643-PEST (Hawai‘i), 671-475-PEST (Guam), or 684-699-1575 (American Samoa). Please visit https://littlefireants.com/identification-of-little-fire-ants/ for assistance in identifying LFA.

Coconut Rhinoceros Beetle (CRB)

Current Distribution of CRB in Hawai‘i: O‘ahu, detected on Maui in November 2023 but not observed since (there are ongoing search efforts: https://governor.hawaii.gov/newsroom/hdoa-news-release-on-on-going-efforts-against-the-coconut-rhinoceros-beetle-on-maui/)

The coconut rhinoceros beetle (*Oryctes rhinoceros*), or CRB, is a large, horned scarab beetle native to Southeast Asia. An invasive pest where it occurs outside of its native range, the adult beetles primarily attack coconut palms by boring into the crowns to feed on developing leaves. It is also known to feed on bananas, sugarcane, pineapples, oil palms, and pandanus trees. The larval grub stage burrow into and feed upon decomposing mulch and vegetation. On most Pacific Islands it lacks natural predators, leading to severe declines and extirpations of palm species where it has become established. On Guam, researchers have recently documented a shift of CRB to the island's native and threatened cycad tree (*Cycas micronesica*) (Marler et al. 2020). In the Hawaiian Islands, CRB is a documented threat to archipelago's native *Pritchardia* palm species.

For more information about CRB including the current situation in Guam and high/low-risk areas on O‘ahu, please visit http://cnas-re.uog.edu/crb/ or https://www.crbhawaii.org/.
To reduce the risk of spreading CRB, the following biosecurity protocol is recommended:

Biosecurity Protocol for CRB used on O‘ahu (most can be applied to Maui)

1. Never transport green waste between islands and minimize the creation, storage, and transport of green waste within O‘ahu, this also includes:
    a. Mulch, bark, compost
    b. Soil of any kind
    c. Potted plants of any kind

    Additional consultation is recommended if the project involves transportation of materials, soil, equipment, vehicles, etc. between islands.

2. If felling or trimming palms, contact CRB Response for a free inspection ((808) 679-5244 or email at info@crbhawaii.org)

3. Keep green waste whole until it is ready to be treated and removed.
    a. Chip green waste on site and transport it on the same day to a secure and managed green waste disposal site/facility.
    b. For chipped green waste in high-risk areas, re-chip prior to movement outside the infested area, treat with pesticide (when applicable), heat treatment (>130 degrees F), spread and dry, or store in sealed durable containers.

4. Minimize accumulations of green waste by regularly treating mulch piles or depositing it in sealed green waste bins. In low-risk areas, we also recommend thinly spreading mulch (less than 2 inches deep) and allowing it to dry (no irrigation).

5. If injured or dying coconut palm trees are observed or if CRB are detected, contact CRB Response at (808) 679-5244 or email at info@crbhawaii.org or online at https://www.crbhawaii.org/report

PIFWO Invasive Species Biosecurity Protocols

(Updated July 2024)

Project activities may introduce or spread invasive species, causing negative ecological consequences to new areas or islands, resulting in potential impacts to fish, wildlife, and their habitat. For example, seeds of invasive plant species (e.g., *Chromolaena odorata*, *Senecio madagascariensis*, *Cyathea cooperi*, or *Miconia calvescens*) can be inadvertently transported on equipment from a previous work site to a new site where the species are not present. Likewise, equipment used in an area infected with a pathogen or insect pest that can have ecological consequences (e.g., rapid ʻōhiʻa death (*Ceratocystis spp.*), black twig borer (*Xylosandrus compactus*), or naio thrips (*Klambothrips myopori*), if not properly decontaminated, can act as a vector to introduce the pathogen into a new area. Additionally, vehicles must be properly inspected and cleaned to ensure vertebrate or invertebrate pests do not stowaway and spread to other areas. These are just a few examples of how even well-intended project activities may inadvertently introduce or spread invasive species.

To avoid and minimize invasive species potential impacts to fish, wildlife, and their habitat we recommend incorporating general biosecurity protocols into your project planning (see below). Additional consultation is recommended if project activities involve transportation of materials, equipment, vehicles, etc. between islands or transpacific movement of materials or equipment.

Invasive Species Biosecurity Protocol

The following biosecurity protocol is recommended to be incorporated into planning for your project to avoid or minimize transportation of invasive species with potential to impact to fish, wildlife, and their habitat. Cleaning, treatment, and/or inspection activities are the responsibility of the equipment or vehicle owner and operator. However, it is ultimately the responsibility of the action agency to ensure that all project materials, vehicles, machinery, equipment, and personnel are free of invasive species before entry into a project site. Please refer to the resources listed below for current removal/treatment recommendations that may be relevant to your project.

1. Cleaning and treatment:
   Project applicants should assume that all project materials (i.e., construction materials, or aggregate such as dirt, sand, gravel, etc.), vehicles, machinery, and equipment contain dirt and mud, debris, plant seeds, and other invasive species, and therefore require thorough cleaning. Treatment for specific pests, for example, trapping and poison baiting for rodents, or baiting and fumigation for insects, should be considered when applicable. For effective cleaning we offer the following recommendations prior to entry into a project site:
   a. Project materials, vehicles, machinery, and equipment must be pressure washed thoroughly (preferably with hot water) in a designated cleaning area. Project materials, vehicles, machinery, and equipment should be visibly free of mud/dirt (excluding aggregate), seeds, plant debris, insects, spiders, frogs (including frog eggs), other vertebrate species (e.g.,

rodents, mongoose, feral cats, reptiles, etc.), and rubbish. Areas of particular concern include bumpers, grills, hood compartments, wheel wells, undercarriage, cabs, and truck beds. Truck beds with accumulated material are prime sites for hitchhiking invasive species.

b. The interior and exterior of vehicles, machinery, and equipment must be free of rubbish and food, which can attract pests (i.e., rodents and insects). The interiors of vehicles and the cabs of machinery should be vacuumed clean particularly for any plant material or seeds.

2. Inspection:
    a. Following cleaning and/or treatment, project materials, vehicles, machinery, and equipment, must be visually inspected by its user, and be free of mud/dirt (excluding aggregate), debris, and invasive species prior to entry into a project site. For example, careful visual inspection of a vehicle's tires and undercarriage is recommended for any remaining mud that could contain invasive plant seeds.
    b. Any project materials, vehicles, machinery, or equipment found to contain invasive species (e.g., plant seeds, invertebrates, rodents, mongoose, cats, reptiles, etc.) must not enter the project site until those invasive species are properly removed/treated.

3. For all project site personnel:
    a. Prior to entry into the project site, visually inspect and clean your clothes, boots or other footwear, backpack, radio harness, tools and other personal gear and equipment for insects, seeds, soil, plant parts, or other debris. We recommend the use of a cleaning brush with sturdy bristles. Seeds found on clothing, footwear, backpacks, etc., should be placed in a secure bag or similar container and discarded in the trash rather than being dropped to ground at the project site or elsewhere.

4. Additional considerations:
    a. Consider implementing a Hazard Analysis and Critical Control Point (HACCP) plan (https://www.fws.gov/policy/A1750fw1.html) to improve project planning around reducing the risk of introducing or spreading invasive species.
    b. When applicable, use pest-free or low-risk sources of plants, mulch, wood, animal feed or other materials to be transported to a project site.
    c. For projects involving plants from nurseries (e.g., outplanting activities, etc.), all plants should be inspected, and if necessary, appropriately cleaned or treated for invasive species prior to being transported to the project site.
    d. Avoid unnecessary exposure to invasive species at a particular site (to the extent practical) to reduce contamination and spread. For example, if your project involves people or equipment moving between multiple locations, plan and organize timelines so that work is completed in native habitat

prior to working in a disturbed location to reduce the likelihood of introducing a pest into the native habitat.

e. Maintain good communication about invasive species risks between project managers and personnel working on the project site (e.g., conduct briefings and training about invasive species). Ensure prevention measures are communicated to the entire project team. Also consider adding language on biosecurity into contracts or permitting mechanisms to provide clarity to all involved in the project. Report any species of concern or possible introduction of invasive species to appropriate land managers.

For current removal/treatment recommendations please refer to the following:
Hawaiian Islands:

- Hawai‘i Island – https://www.biisc.org/
- **Maui – https://mauiinvasive.org/**
- Moloka‘i - https://www.molokaiisc.org/
- Lāna‘i - https://pulamalanai.com/
- O‘ahu – https://www.oahuisc.org/
- Kaua‘i – https://www.kauaiisc.org/

Species-Specific Biosecurity Protocols

The following section contains specific protocols for a few select invasive species of concern in the Pacific Islands highlighted because of their potential to easily spread and cause great harm to native species and habitats. Other invasive species may not have existing specific protocols or may already be minimized by implementing the general invasive species protocols above (e.g., invasive plants, invertebrates, larger vertebrates). Information on other invasive species can be found in the island specific links below. As new threats emerge that require development of species-specific protocols, those may be added to this list.

Table 1. Current island distribution of invasive species with specific biosecurity protocols in the Pacific Islands (PIFWO jurisdiction).

Island	Invasive Species with Specific Protocols			
	Rapid ‘Ōhi‘a Death	**Little Fire Ant**	**Coconut Rhinoceros Beetle (CRB)**	**Brown Treesnake**
Island of Hawai‘i	widespread	widespread	not present	not present
Maui	present	incipient	detected in Nov 2023, not observed since. The state and Service recommend implementing CRB biosecurity BMPs	not present
O‘ahu	incipient	incipient	widespread	not present
Kaua‘i	widespread	not present	not present	not present

Rapid ‘Ōhi‘a Death (ROD)

If working directly with ʻōhiʻa trees (e.g., sampling suspected trees, clearing an area of ʻōhiʻa, etc.) or in an area(s) known to be highly infested with ROD, additional consultation is recommended.

Current Distribution of ROD: island of Hawaiʻi, Maui, Oʻahu, Kauaʻi (https://cms.ctahr.hawaii.edu/rod

While ROD is not currently reported on Molokaʻi at this time, if you are in ʻōhiʻa forest it would be prudent to take precautions. Also, consider where the equiptment to be used on Molokaʻi will be coming from, and if from an island with confirmed ROD, take the necessary precautions.

Rapid ʻŌhiʻa Death (ROD) is a caused by a fungal pathogen (*Ceratocystis* spp.) that attacks and kills ʻōhiʻa trees (*Metrosideros polymorpha*). ʻŌhiʻa is endemic to the Hawaiian Islands and is the most abundant native tree species, comprising approximately 80 percent of Hawaiʻi's remaining native forests.

For more information about ROD including its current distribution, ROD science updates, and the latest on ROD protocol, please visit www.rapidohiadeath.org.

To reduce the risk of spreading ROD, the following best management practices and decontamination protocol are recommended:

Best Management Practices for ROD

1. Never transport any part of an ʻōhiʻa tree between different areas of an island or to a different island.

2. Do not use equipment from ROD infected islands on another island unless it is very specialized equipment and follows the decontamination protocol described below.

3. Avoid wounding ʻōhiʻa trees and roots with mowers, chainsaws, weed eaters, and other tools. If an ʻōhiʻa receives a minor injury like a small broken branch, then give the injury a clean, pruning-type cut (close to the main part of the trunk or branch) to promote healing, and then spray the entire wounded area with a pruning seal.

4. Always report suspect ROD ʻōhiʻa trees observed within you project area. ROD is a wilt disease that cuts off the supply of water and nutrients to the tree. The primary symptom to look for is an entire canopy or a large branch with dying leaves or red discolored leaves. Please record the GPS coordinates and location and take a picture of the tree if possible. Please report suspected ROD ʻōhiʻa trees to the following agencies:
    a. Island of Hawaiʻi – BIISC: 808-969-8268 (ohialove@hawaii.edu)
    b. Maui – MISC: 808-573-6472 (miscpr@hawaii.edu)

c. Molokaʻi – TNC: 808-553-5236 ext. 6585 (lbuchanan@tnc.org)
d. Oʻahu – OISC: 808-266-7994 (oisc@hawaii.edu)
e. Kauaʻi – KISC: 808-821-1490 (kisc@hawaii.edu)

ROD Decontamination Protocol

1. Clothes, footwear, backpacks, and other personal equipment
    a. Before leaving the project site, remove as much mud and other contaminants as possible. Use of a brush with soap and water to clean gear is preferred. Footwear, backpacks, and other gear must be sanitized by spraying with a solution of >70 percent isopropyl alcohol or a freshly mixed 10 percent bleach solution.

2. Vehicles, machinery, and other equipment
    a. Vehicles, machinery, and other equipment must be thoroughly hosed down with water (pressure washing preferred) and visibly free of mud and debris, then sprayed with a solution of >70 percent isopropyl alcohol or a freshly mixed 10 percent bleach solution. Use of a "pump-pot" sprayer is recommended for the solution and a hot water wash is preferred. Be sure to thoroughly clean the undercarriage, truck bed, bumpers, and wheel wells.
    b. If non-decontaminated personnel or items enter a vehicle, then the inside of the vehicle (i.e., floor mats, etc.) must be subsequently decontaminated by removing mud and other contaminants and sprayed with the one of the same aforementioned sanitizing solutions.

3. Cutting tools
    a. All cutting tools, including machetes, chainsaws, and loppers must be sanitized to remove visible mud and other contaminants. Tools must be sanitized using a solution of >70 percent isopropyl alcohol or a freshly mixed 10 percent bleach solution. One minute after sanitizing, one may apply an oil-based lubricant to chainsaw chains or other metallic parts to prevent corrosion as bleach is corrosive to metal.

    NOTE: When using a 10 percent bleach solution, surfaces should be cleaned with a minimum contact time of 30 seconds. Bleach must be mixed daily and used within 24 hours, as once mixed it degrades. Bleach will not work to disinfect surfaces that have high levels of organic matter such as sawdust or soil. Because bleach is also corrosive to metal, a water rinse after proper sanitization is recommended to avoid corrosion.

Little Fire Ant (LFA)

For the most current status on distribution and infestations, please visit http://stoptheant.org/lfa-in-hawaii/

The little fire ant (*Wasmannia auropunctata*), or LFA, is an invasive species with a painful sting that can inhabit many different environments. In Hawai‘i, it often infests agricultural fields and farms, damaging crops and stinging unsuspecting workers. Little fire ants are also highly disruptive to native tropical ecosystems and harmful to wildlife. Slow moving, but tiny and capable of foraging 24 hours a day with multiple queens per colony, LFA is a formidable threat to biodiversity, agriculture, and quality of life on tropical islands in the Pacific.

For more information about LFA including helpful guides and workshops for treating or detecting LFA, please visit www.littlefireants.com.

To reduce the risk of spreading LFA, the following biosecurity protocol is recommended:

Biosecurity Protocol for LFA

1. For projects involving plants from nurseries (e.g., outplanting activities, etc.), all plants should be inspected for little fire ants and other pests prior to being transported to the project site. If plants are found to be infested by ants of any species, plants should be sourced from an alternative nursery and the infested nursery should follow treatment protocols recommended by the Hawai‘i Ant Lab (https://littlefireants.com/wp-content/uploads/2020-Management-of-Pest-Ants-in-Nurseries-min.pdf).

2. All work vehicles, machinery, and equipment should follow steps 1 and 2 in the “Invasive Species Biosecurity Protocol” for (1) cleaning and treatment and (2) inspection for invasive ants prior to entering a project site.

3. Any machinery, vehicles, equipment, or other supplies found to be infested with ants (or other invasive species) must not enter the project site until it is properly treated (https://littlefireants.com/how-to-treat-for-little-fire-ants-for-homeowners/#recommended-bait-products) and re-tested. Infested vehicles must be treated following recommendations by the Hawai‘i Ant Lab (https://littlefireants.com/resource-center/) or another ant control expert and in accordance with all State and Federal laws. Treatment is the responsibility of the equipment or vehicle owner. Ultimately however, it is the responsibility of the action agency to ensure that all project materials, vehicles, machinery, and equipment follow the appropriate protocol(s).

4. General Vehicle Ant Hygiene: Even the cleanest vehicle can pick up and spread little fire ant. Place MaxForce Complete Brand Granular Insect Bait (1.0 percent Hydramethylnon; https://labelsds.com/images/user_uploads/Maxforce%20Complete%20Label%201-5-18.pdf) into refillable tamper resistant bait stations. An example of a commercially available refillable tamper resistant bait station is the Ant Café Pro (https://www.antcafe.com/). Place a bait station (or stations) in the vehicle and note that larger vehicles, such as trucks, may require multiple stations. Monitor bait stations frequently (every week at a minimum) and replace bait as needed. If

the bait station does not have a sticker to identify the contents, apply a sticker listing contents to the station.

5. Gravel, building materials, or other equipment such as portable buildings should be baited using MaxForce Complete Brand Granular Insect Bait (1.0 percent Hydramethylnon; https://labelsds.com/images/user_uploads/Maxforce%20Complete%20Label%201-5-18.pdf) or AmdroPro (0.73 percent Hydramethylnon; https://connpest.com/labels/AMDROPRO.pdf) following label guidance.

6. Storage areas that hold field tools, especially tents, tarps, and clothing should be baited using MaxForce Complete Brand Granular Insect Bait (1.0 percent Hydramethylnon; https://labelsds.com/images/user_uploads/Maxforce%20Complete%20Label%201-5-18.pdf) or AmdroPro (0.73 percent Hydramethylnon; https://connpest.com/labels/AMDROPRO.pdf) following label guidance.

7. Vehicles that have entered a project site known or thought to overlap with areas infested with LFA should subsequently be tested for LFA with baiting in accordance with protocol recommended by the Hawai‘i Ant Lab (https://littlefireants.com/survey-your-home-for-lfa/).

8. If LFA are detected, please report it to 808-643-PEST (Hawai‘i), 671-475-PEST (Guam), or 684-699-1575 (American Samoa). Please visit https://littlefireants.com/identification-of-little-fire-ants/ for assistance in identifying LFA.

Coconut Rhinoceros Beetle (CRB)

Current Distribution of CRB in Hawai‘i: O‘ahu, detected on Maui in November 2023 but not observed since (there are ongoing search efforts: https://governor.hawaii.gov/newsroom/hdoa-news-release-on-on-going-efforts-against-the-coconut-rhinoceros-beetle-on-maui/)

The coconut rhinoceros beetle (*Oryctes rhinoceros*), or CRB, is a large, horned scarab beetle native to Southeast Asia. An invasive pest where it occurs outside of its native range, the adult beetles primarily attack coconut palms by boring into the crowns to feed on developing leaves. It is also known to feed on bananas, sugarcane, pineapples, oil palms, and pandanus trees. The larval grub stage burrow into and feed upon decomposing mulch and vegetation. On most Pacific Islands it lacks natural predators, leading to severe declines and extirpations of palm species where it has become established. On Guam, researchers have recently documented a shift of CRB to the island's native and threatened cycad tree (*Cycas micronesica*) (Marler et al. 2020). In the Hawaiian Islands, CRB is a documented threat to archipelago's native *Pritchardia* palm species.

For more information about CRB including the current situation in Guam and high/low-risk areas on O‘ahu, please visit http://cnas-re.uog.edu/crb/ or https://www.crbhawaii.org/.
To reduce the risk of spreading CRB, the following biosecurity protocol is recommended:

Biosecurity Protocol for CRB used on O‘ahu (most can be applied to Maui)

1. Never transport green waste between islands and minimize the creation, storage, and transport of green waste within O‘ahu, this also includes:
    a. Mulch, bark, compost
    b. Soil of any kind
    c. Potted plants of any kind

    Additional consultation is recommended if the project involves transportation of materials, soil, equipment, vehicles, etc. between islands.

2. If felling or trimming palms, contact CRB Response for a free inspection ((808) 679-5244 or email at info@crbhawaii.org)

3. Keep green waste whole until it is ready to be treated and removed.
    a. Chip green waste on site and transport it on the same day to a secure and managed green waste disposal site/facility.
    b. For chipped green waste in high-risk areas, re-chip prior to movement outside the infested area, treat with pesticide (when applicable), heat treatment (>130 degrees F), spread and dry, or store in sealed durable containers.

4. Minimize accumulations of green waste by regularly treating mulch piles or depositing it in sealed green waste bins. In low-risk areas, we also recommend thinly spreading mulch (less than 2 inches deep) and allowing it to dry (no irrigation).

5. If injured or dying coconut palm trees are observed or if CRB are detected, contact CRB Response at (808) 679-5244 or email at info@crbhawaii.org or online at https://www.crbhawaii.org/report

USFWS Biological Opinion

Biological Opinion for the Honoapiʻilani Highway Realignment Project, Maui



Nēnē at Ukumehame Firing Range Photo Credit: Carrie Harrington, USFWS

July 16, 2025
(2023-0041712-S7-001)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawai‘i 96850

In Reply Refer To:
2023-0041712-S7-001

July 16, 2025

Ms. Richelle M. Takara
Division Administrator
U.S. Department of Transportation
Federal Highway Administration
300 Ala Moana Blvd., Rm 3-229
Honolulu, Hawai‘i 96850

Subject: Biological Opinion and Informal Consultation for the Honoapi‘ilani Highway Realignment Project, Maui

Dear Ms. Takara:

This document transmits the U.S. Fish and Wildlife Service’s (Service) Biological Opinion (Opinion) based on our review of the proposed Honoapi‘ilani Highway Realignment Project (Project) located in Maui County, Hawai‘i, and its effects on the federally threatened nēnē (Hawaiian goose, *Branta sandvicensis*) and federally endangered ae‘o (Hawaiian stilt, *Himantopus mexicanus knudseni*) in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq*.).

A separate informal consultation can be found in Appendix A (file number: 2023-0041712-S7-002) for project impacts that may affect, but are not likely to adversely affect the federally protected ‘ōpe‘ape‘a (Hawaiian hoary bat, *Lasiurus cinereus semotus*), Hawai‘i Distinct Population Segment of the ‘akē‘akē (band-rumped storm-petrel, *Hydrobates castro*), ‘ua’u (Hawaiian petrel, *Pterodroma sandwichensis*), ‘a‘o (Newell’s shearwater, *Puffinus newelli*), Short-tailed albatross (*Phoebastria albatrus*), ‘alae ke‘oke‘o (Hawaiian coot, *Fulica alai*), koloa maoli (Hawaiian duck, *Anas wyvilliana*), Blackburn’s sphinx moth (*Manduca blackburni*), Assimulans yellow-faced bee (*Hylaeus assimulans*), honu (green sea turtle, *Chelonia mydas*), and honu ‘ea (Hawksbill sea turtle, *Eretmochelys imbricata*).

This Opinion is based on information provided in the following: 1) information from your informal consultation request dated November 13, 2023; 2) information in your biological survey report supplement dated October 7, 2024; (3) information in your formal consultation request dated March 10, 2025; (4) communication (verbal and written) between the Federal Highway

Administration (FHWA) staff and our office; and 5) other information available to us. A complete decision record of this consultation is on file in our office.

CONSULTATION HISTORY

May 16, 2025: PIFWO formal consultation was initiated with FHWA.

June 2, 2025: PIFWO requested clarity from FHWA regarding delineated wetlands.

June 3, 2025: FHWA provided PIFWO requested information on delineated wetlands.

June 13, 2025: PIFWO requested clarification from FHWA regarding project acreage, avoidance and minimization measures, and project description.

June 18, 2025: FHWA provided PIFWO the requested information on project acreage, avoidance and minimization measures, and project description.

June 25, 2025: PIFWO requested clarification from FHWA regarding avoidance and minimization measures.

July 03, 2025: FHWA provided PIFWO clarification on requested avoidance and minimization measures.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The proposed Project would realign an approximately 6-mile (mi) portion of the existing Honoapiʻilani Highway along the leeward coast of Mauna Kāhālawai on Maui (West Maui). The Project spans between Milepost 11 in Ukumehame near Pāpalaua Beach Park and Milepost 17 in Launiupoko, where the existing Honoapiʻilani Highway intersects the southern terminus of the Lahaina Bypass (Figure 1). The Action Area is within a corridor between the mountains and the sea (mauka to makai) and is approximately 6 mi long and approximately 0.75 mi wide. The Project site and Action Area are located approximately 0 to 3,100-feet (ft) (950-meters (m)) wide measured mauka to makai and generally parallel with the existing Honoapiʻilani Highway. In total, the Action Area covers 2,437.63-acres (ac), spanning the ahupuaʻa of Ukumehame, Olowalu, and Launiupoko; the Preferred Alternative could result in habitat loss of approximately 124 acres. The Project design includes culverts, bridges, and viaduct structure (a viaduct is a longer multi-span bridge) that allow for water crossings and helps to avoid or minimize potential adverse environmental effects. The proposed viaduct would be constructed in the Ukumehame segment of the Project. The construction footprint is the area that is commonly referred to as the highway right-of-way (ROW).

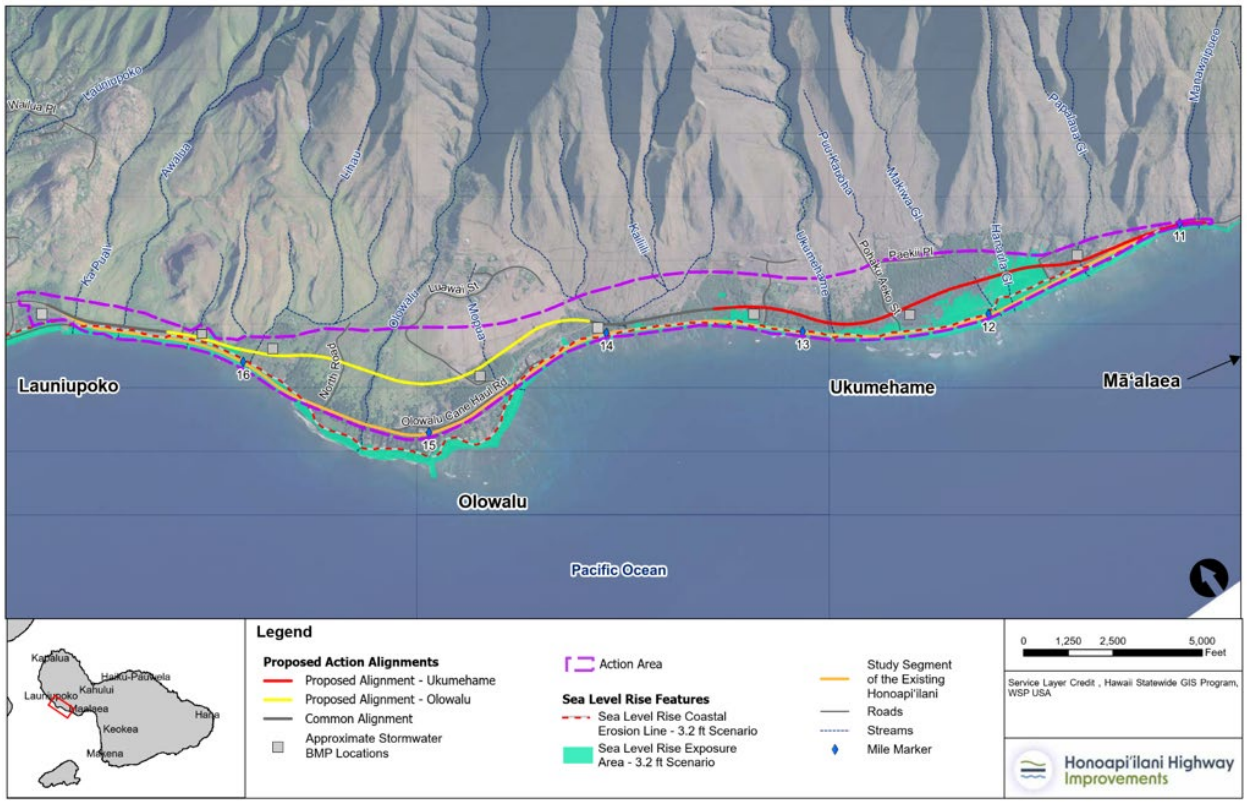


Figure 1. Map of the location, action area, and associated key features of the proposed Honoapi‘ilani Highway Realignment Project located on the leeward coastline of Mauna Kāhālawai from the FHWA’s BA (WSP 2005, p. 6).

The Action Area is comprised of three sections:

1. *Olowalu – Northern Connection to Existing Lahaina Bypass*—Starting at the northern end, the realigned highway would tie into the Lahaina Bypass where it partially overlaps the existing highway before moving mauka through Launiupoko and behind existing businesses and residences to the south and east in the Olowalu Peninsula for about three miles.
2. *Ukumehame – Northern Connection to Olowalu*—In the central portion, a 0.6-mile stretch of the realigned highway connects the northernmost section of Ukumehame to the Olowalu Peninsula.
3. *Ukumehame – Pali Connection through Ukumehame Firing Range*—In the southernmost stretch, the realigned highway is a two-lane alignment from the southern Pali connection through to the north side of the Ukumehame firing range. A single viaduct structure would be constructed to carry the realigned highway across the Hawai‘i Department of Transportation (HDOT) detention basin and the firing range. Accessing the firing range and public beaches would be from the realigned highway’s intersections with existing cross streets (Pōhaku ‘Aeko Street and Ehehene Street) in Ukumehame. No driveways or intersections are proposed further north entering the Olowalu area.

Preparing and constructing the realigned highway along the ROW

In coordination with and as approved by the Hawai‘i Department of Transportation (HDOT), the design-build contractor would identify appropriate construction staging areas within HDOT ROW for storage, equipment, and materials. These areas would avoid adjacency to wetland habitat and streambanks. The contractor would prioritize previously disturbed and bare areas to use for these activities to limit ground disturbance and any potential vegetation clearing.

The contractor could identify disposal and borrow sites (that is, where excavated material would be excavated and stockpiled for application in later stages or removed for off-site disposal). The use of disposal and borrow sites would be subject to standard HDOT specifications and policies, as well as County of Maui and State of Hawai‘i environmental regulations and permit requirements. Another pre-development siting element would be the contractor determining whether there is a need to establish a concrete batch plant (where raw materials of aggregate, sand, cement, and water are stored and mixed as needed for highway construction).

The design-build contractor would ultimately determine the necessary equipment to perform construction activities. Equipment necessary to perform construction activities may include, but is not limited to the following:

- Man Lift
- Pickup Truck
- Power Broom
- Roller
- Grader
- Concrete Saw
- Air Compressor
- Striping Machine
- Crane
- Backhoe
- Backhoe with Hammer
- Forklift
- Generator
- Concrete Pump Truck
- Water Truck
- Hauling Truck
- Front Loader
- Bulldozer
- Cold Planer
- Vacuum Truck
- Volumetric Mixer
- Drill Rig
- Jumping Jack
- Jack Hammer
- Pneumatic Hammer
- Hoe Rams
- Pacing Machine

To prepare for construction activities, the realigned highway alignment (construction footprint) would require preparation by clearing and grubbing of shrubs, brush, and herbaceous vegetation. Clearing is defined as removing and disposing of all unwanted vegetative surface material and grubbing refers to removing and disposing of all unwanted underground vegetative matter such as roots. Clearing and grubbing is completed with large earth moving equipment such as excavators, backhoes, bobcats, bulldozers, graders, front-end loaders or scrapers. The site would be graded once vegetation is cleared, grubbed, and removed from the construction footprint. Grading involves the use of earth moving equipment such as excavators, bulldozers, front-end loaders, graders, scrapers or backhoes to grade, build-up and shape the roadway profile.

After the roadway is cleared and grubbed, subsurface utilities, including drainage infrastructure, would be installed. The ROW would then undergo rough grading to establish the alignment and profile of the realigned highway. As the rough grading gets closer to the finish grade, signal light and streetlight and other future use conduits and pull boxes are installed. The final roadway layers would be based on the contractor’s Pavement Design Report, which would indicate the precise thickness of the pavement structure to use and where it would be needed.

The realigned highway would have a minimum ROW width of 140 ft (43 m) allowing for two (in-bound and out-bound direction) 11 ft wide (3.4 m) travel lanes, 6 ft wide (1.8 m) paved shoulders, a 4 ft wide paved inside shoulder, a 34 ft wide (10.4 m) median, and a 10 ft wide (3 m) shared use path on the makai side of the alignment. Portions of the realigned highway would have fencing along the ROW to control access for safety and security. These locations would be determined through final design.

Figure 2 shows the typical ROW sections with two lanes, as well as narrow sections that may be used at specific locations (pinch points) where available space is limited. Additional ROW at eight natural low points close to the proposed highway alignment would be set aside for permanent stormwater detention ponds. Intersections with existing cross streets that provide access to the existing Honoapi‘ilani Highway would be intersecting the realigned highway, as well. No new additional intersections are planned.

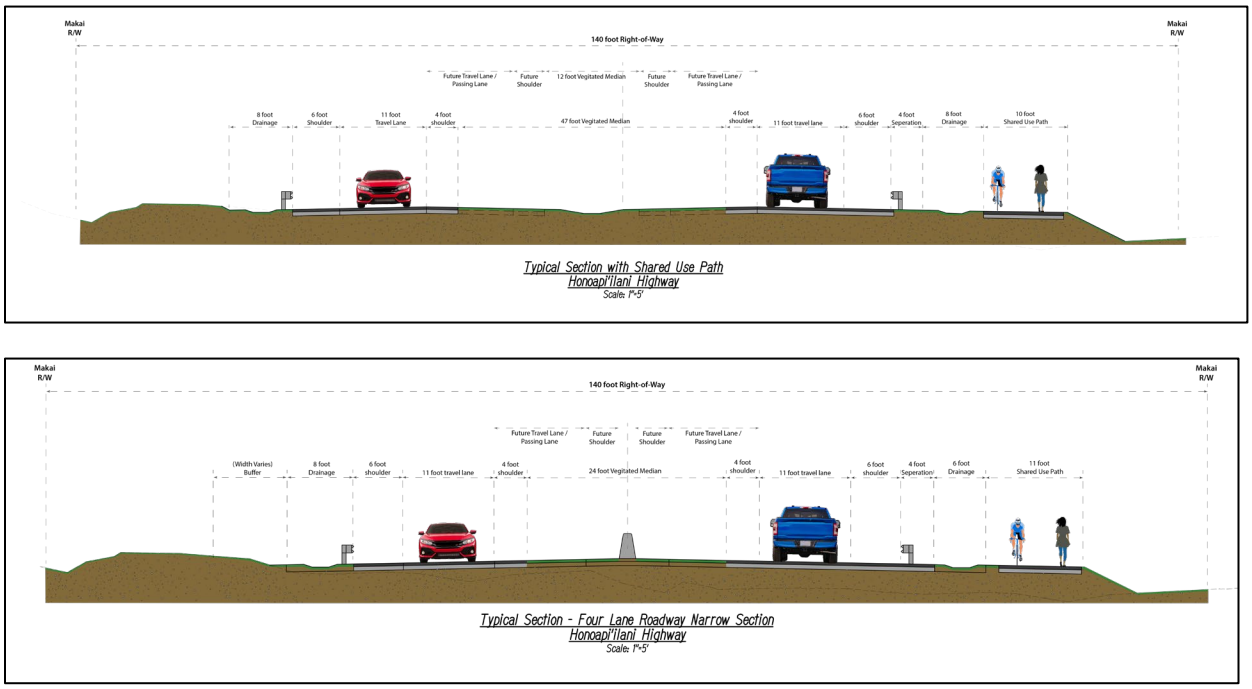


Figure 2. Typical ROW section with two lanes: typical section of realigned highway with shared use path (above); typical narrow section of highway with shared use path (below). (Image credits: FHWA)

Installation of permanent stormwater best management practices

The proposed action would set aside additional ROW along the roadway profile to collect and treat roadway stormwater for permanent stormwater BMPs (permanent BMPs) with an average size of approximately one acre. Proposed locations can be seen on Figure 1 as square structures abutting the alignment. The final design established as part of the design-build process would determine the design, size, and location of the permanent BMPs, including conceptual detention ponds to promote infiltration and treatment of discharge generated on-site, and incorporation of Low Impact Development strategies, such as vegetated swales in the median and on the outside edges of the pavement structure to the maximum extent practicable. Concrete box, open bottom,

and pipe culverts would convey stormwater under the proposed action alignment at various locations, as needed.

These set asides are conservatively sized for a maximum potential area of disturbance and the final number, locations, and size of the infrastructure may vary depending on the treatment strategies as established through final design as part of the design-build process. At a minimum, the preliminary stormwater treatment design that has been developed for the proposed action, would provide treatment that meets the treatment standards established by the Federal, state, and/or local agencies with jurisdiction.

Construction of water crossings

The highway design includes culverts, bridges, and viaduct structure that allow for water crossings and avoid or minimize potential adverse environmental effects. The ultimate determination of culvert and bridge designs, or the use of viaducts to span larger areas, would be based on the length of the span required to pass anticipated design discharges without increasing floodwater elevations, and in consideration of avoiding and minimizing effects to mapped wetlands and recorded nēnē and aeʻo loafing areas, as well as avoiding the sea level rise exposure area. Constructability and cost would also play a role in culvert, bridge, and viaduct specifications.

HDOT's *Design Criteria for Highway Drainage* requires all bridges and culverts to be designed for 50-year storm events, except within areas that encroach the Federal Emergency Management Agency (FEMA) flood zones, where they would be designed for 100-year storm events.

While the final design of the new bridges, culverts, and viaduct portions of the Project would be developed by the design-build team, for the purposes of this BO, it is assumed that new structures would be supported on driven pile or drilled shaft foundations. Drilled shaft foundations would be used when subsurface conditions are anticipated to be problematic for driven pile installation or in areas sensitive to minimize vibration and noise and would be an efficient technique at selected pier bents. Abutment and wingwall footings would also be founded on driven piles or drilled shafts. Construction of the bridge and viaduct portions of the Project would involve completing piers, columns, deck, roadway finishes, and lighting. The designer of record would determine the type of superstructure and construction methods that would best meet the requirements of the Project. The designer of record is the professional who is legally responsible for the design of a construction project, including ensuring it meets all applicable building codes and standards, and is ultimately accountable for the design's integrity throughout the construction process.

Culverts

Concept design of the proposed action includes the option for seven or eight large culverts. Concrete box, naturalized/open bottom, or pipe culverts would allow for the flow of offsite water from upland areas under the highway and to convey stormwater at various locations. Smaller pipe culverts may be constructed to convey offsite water from smaller upland drainage areas. Box culverts may also be used to allow for grade separation of local cane haul roads or driveways as appropriate. Work on culverts in concentrated flow areas would be scheduled during dry periods to minimize the potential for sediment transport resulting from construction

activities. Culverts and drainage features would be designed to minimize any increases in flow velocity.

Bridges

Approximately four bridge structures would be required to span over the two perennial streams, the Olowalu and Ukumehame, along with two over the intermittent Ka‘ili‘ili and Līhau streams. Each crossing would have a separate bridge crossing per two-lane segments and a typical elevation and section (which would vary by span length and height) as shown in Figure 3 for a short-span bridge and Figure 4 for a long-span bridge. Conceptual design includes all abutments (the supporting structures at the ends of the bridge) outside of the ordinary high-water mark (OHWM) to ensure that the critical structural components of the bridge are not intruding into the stream’s natural course.

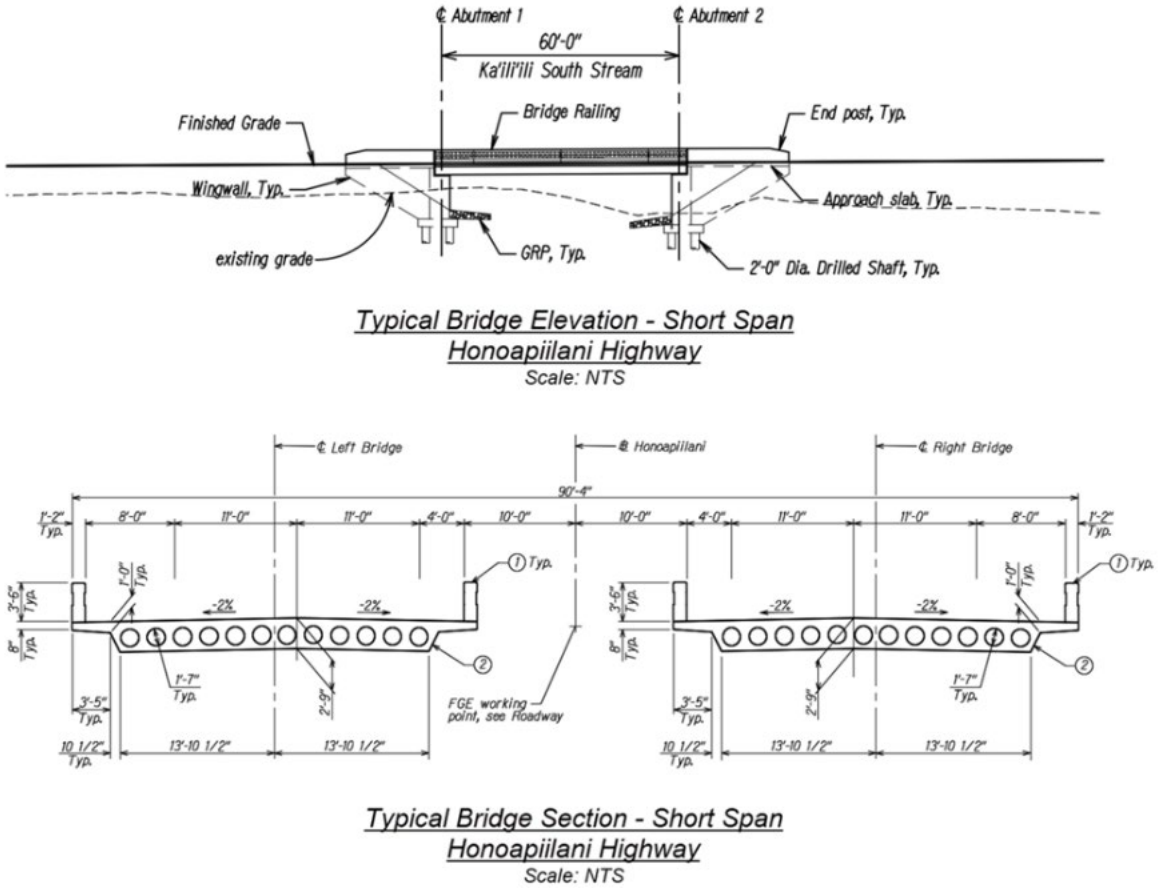


Figure 3. Typical short-span bridge design. (Image credit: FHWA)

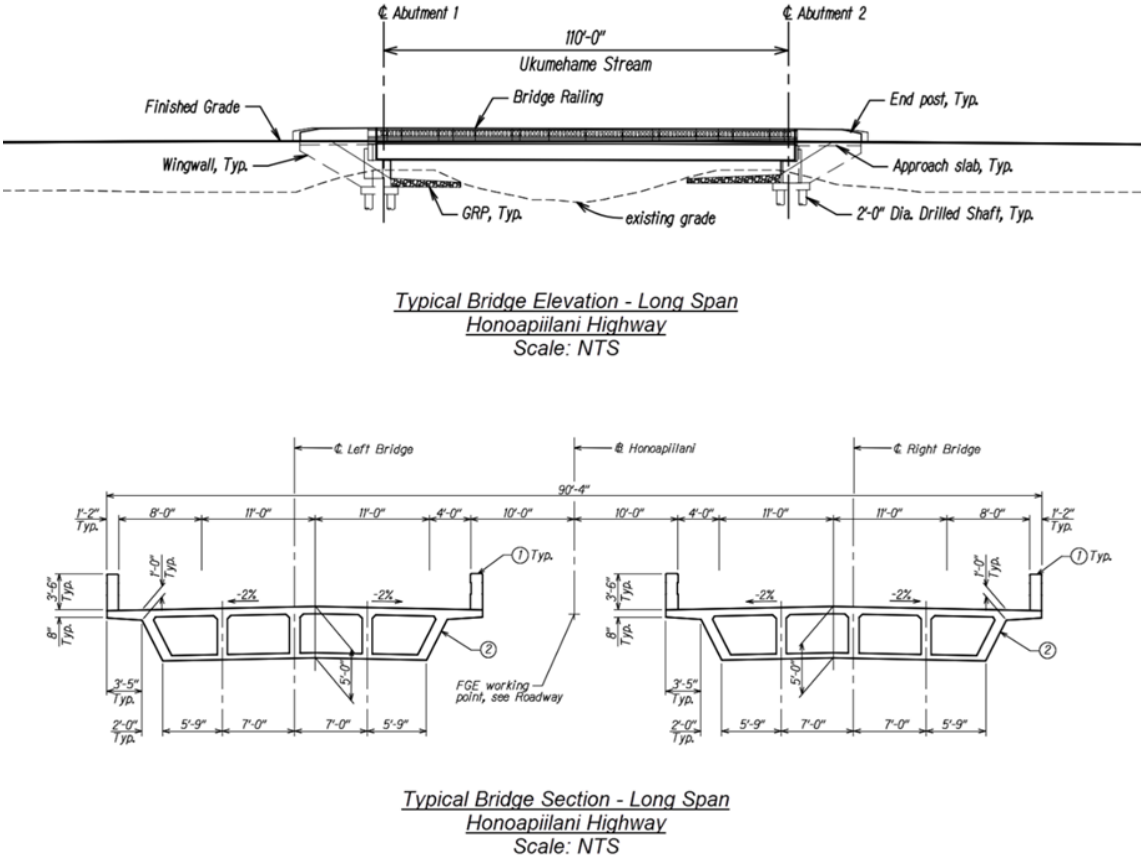


Figure 4. Long-span bridge design. (Image credit: FHWA)

Viaduct

In the Ukumehame area near the Ukumehame Firing Range, the proposed action alignment would largely traverse the area on a two-lane viaduct to avoid and minimize potential adverse effects to wetland habitat (Figure 5) and decrease risks associated with sea level rise. For the purpose of the consultation, it is assumed that new structures would typically be supported on driven pile or drilled shaft foundations (Figure 6). The locations of the piles and/or piers for the viaduct were estimated based on a preliminary engineering analysis. Drilled shaft foundations would be used when subsurface conditions are anticipated to be problematic for driven pile installation and in areas sensitive to vibration and noise and would be an efficient technique at selected pier bents. Abutment and wingwall footings would also be on piles. The final design of the viaduct, including location of piles, would be developed by the designer of record and design-build team.



Figure 5. Viaduct section of the realigned highway through Ukumehame wetland habitat. (Photo credit: H.T. Harvey and Associates 2023)

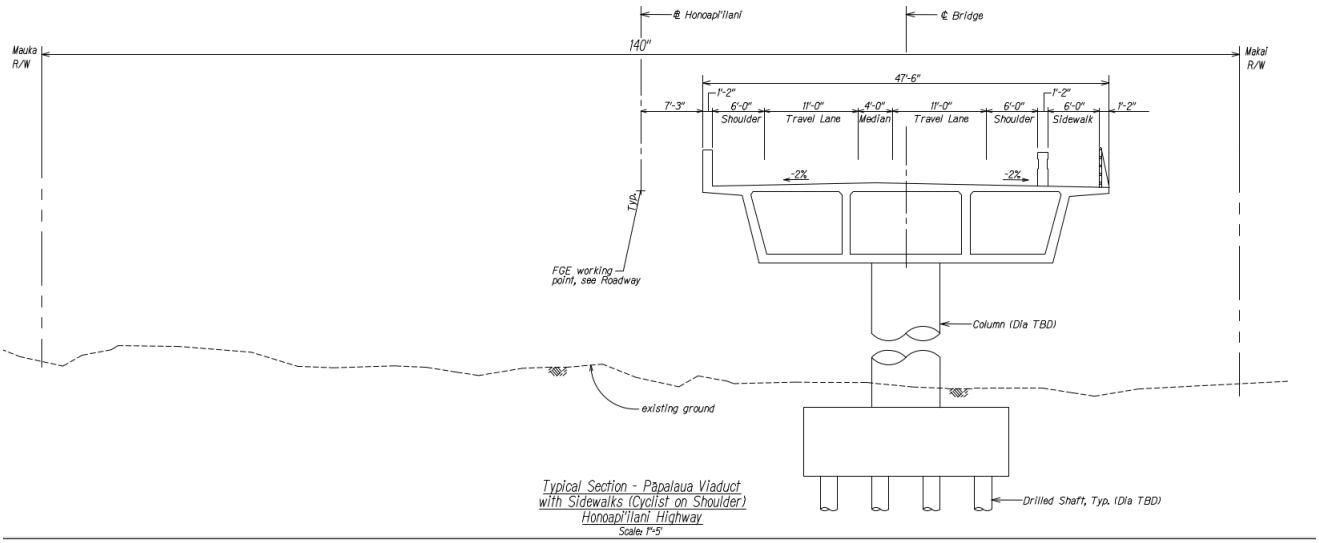


Figure 6. Typical viaduct section on pile foundation. (Image credit: FHWA)

The conceptual design viaduct in the Ukumehame area is approximately 3,678 ft long (1,121 m) with approximate varying elevations of 10 ft (3 m) near take-off and up to 20 ft (6 m) (Figure 7). The aboveground height of the viaduct over the wetlands and nearest the nēnē and aeʻo loafing

areas would be 20 ft (6 m). This aboveground height would allow waterbirds to traverse the low-lying Ukumehame area safely (under the viaduct) without need to cross the realigned highway, as well as permit maintenance vehicles to work within the detention basin and allow for the continued use of the firing range driveway from the existing highway, which would pass underneath the viaduct structure. The viaduct would not have lighting. Rather, reflective pavement markers installed on the edge stripes and barrier wall is anticipated.

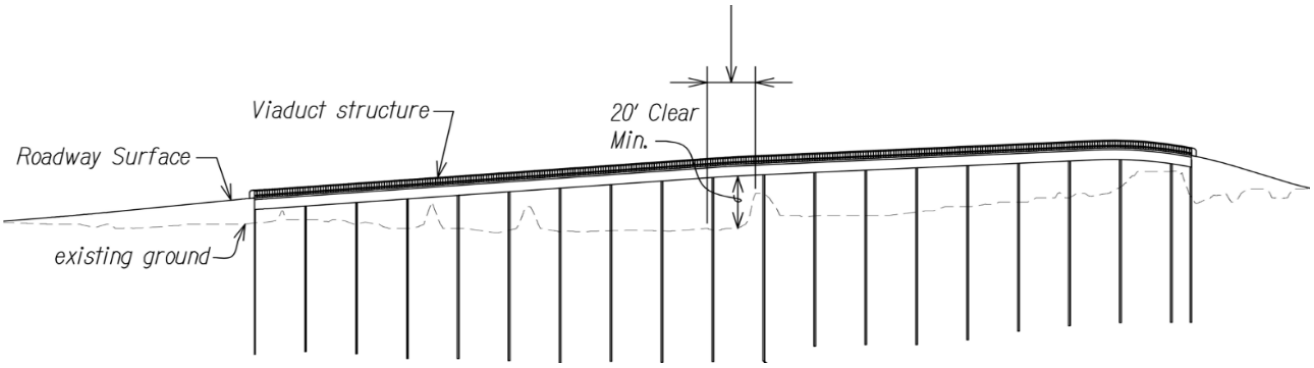


Figure 7. Viaduct height across total length, maximum is 20 ft.

The viaduct would be designed and striped to accommodate traffic in both directions, with 11-foot-wide travel lanes separated by centerline striping and 8 ft wide shoulders on each side with a 6 ft wide (1.8 ac) sidewalk on the makai side. Construction would maintain connectivity to the existing roadway network so that construction activities begin and end at existing roadways. Stub roads would be built to continue to the next phase without disturbing traffic on previously finished segments.

On the viaduct, stormwater would be collected and periodically piped down off the structure to permanent BMPs below. Stormwater would run along the parapet walls until the width of the water running along the wall reaches a threshold to enter a closed drainage system where it would flow through downspouts attached to the piers to a permanent BMP at ground level.

Construction of the bridge and viaduct portions of the Project would involve completing piers, columns, deck, and roadway finishes. The designer would determine the type of superstructure and construction methods that would best meet the requirements of the Project. These methods would be conducted consistent with the avoidance and minimization measures agreed upon between the Service and FHWA, outlined under Nēnē Specific Conservation Measures Incorporated into the Action Area, Aeʻo Specific Conservation Measures Incorporated into the Action Area, and General Conservation Measure that Benefit Nēnē and Aeʻo, below.

Completion and build-out

Once the roadway prism is installed and the final layer of concrete has achieved strength to support construction vehicles, striping would be installed. Guardrail would be used to prevent vehicles from departing the roadway onto unrecoverable slopes and to shield roadside obstructions. Guardrails may be installed before the final pavement layer is installed. Portions of the realigned alignment are likely to have fencing along the ROW to control access for safety and security. These locations would be determined through final design.

Operations and maintenance

Operations

Speed limits: The posted speed limit for the realigned highway would be 45 miles per hour (mph) to maintain consistency with the existing Lahaina Bypass that has a posted speed limit of 45 miles per hour.

Reduced speed limits of 15 mph through the Olowalu area and 10 mph in the Ukumehame area would be posted via sign along active construction roadways during construction.

Operational volume: The maximum directional operational volume is estimated at 1,900 vehicles per hour (vph) for the realigned highway, 325 vph more than the existing highway for Future Year 2045. This higher maximum directional operational volume for the realigned highway is projected because of better management of the number of accesses and improved roadway segment and intersection configurations.

Traffic control and intersections: Traffic control devices would be a mixture of two-way stops and traffic signals at various locations along the realigned highway. Evaluation of traffic signal warrants were based on procedures documented in the FHWA Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition (Chapter 4C, Traffic Control Signal Needs Studies, was applied).

There are five intersections planned for the realigned highway. One unsignalized t-intersection would provide access to the Olowalu Recycling and Refuse Convenience Center as well as a former cinder mining quarry used as a temporary storage site for ash and debris from the Lahaina wildfire just west of mile marker 16. In Olowalu, other intersections include an unsignalized four-legged intersection planned at North Road - halfway between mile markers 16 and 15, and a signalized four-legged intersection at Luawai Street – halfway between mile markers 15 and 14. This area is highly disturbed and is composed of buffel grass dominated grassland (H.T. Harvey & Associates, 2023). In Ukumehame, a signalized four-legged intersections is planned at Ehehene Street and an unsignalized four-legged intersection is planned at Pōhaku ʻAeko Street – east and west of mile marker 13. The viaduct structure would carry the realigned highway across the HDOT detention basin and the firing range, east of mile marker 12, allowing for the continued use of the firing range driveway from the existing highway, which would pass underneath the viaduct structure.

Guardrails: Guardrails would be used to prevent vehicles from departing the roadway onto unrecoverable slopes and to shield roadside obstructions. These guardrails would also deter wildlife from attempting to cross the road. The viaduct structure in Ukumehame would allow for wildlife to more easily pass underneath than to fly up and onto the realigned highway.

Jurisdictional change: The Project would not make any changes to the existing Honoapiʻilani Highway, although it is proposed to become the jurisdiction of County of Maui. Following this jurisdictional change, the operation and maintenance of the existing highway is outside the scope of this proposed action.

The proposed action would create a template and baseline for the eventual implementation of the Maui Metropolitan Planning Organization's *West Maui Greenway Plan* (County of Maui, 2022). This means that upon completion, ownership of the remaining portions of the existing highway in the Action Area that have not been realigned and are not part of the proposed action would be transferred to County of Maui and declassified from a State highway to a local road. This ownership transfer would enable future planning to incorporate more nature-based solutions for future roadway operations.

Maintenance

Maintenance activities include roadway resurfacing and repair, drainage system maintenance, traffic control device maintenance, vegetation control, bridge and structure inspection, and emergency response. Typical inspection and maintenance intervals by HDOT crews can be found in Table 1. As-needed maintenance addresses critical items that are found during these more frequent, less detailed inspections – pothole repairs, guardrail repairs, sign replacement, etc.

Large scale pavement preservation projects, such as full roadway resurfacing, would be done approximately every 10-15 years and are typically funded in part by the FHWA, these projects would require separate environmental analysis and consultation.

Table 1. Typical maintenance and inspection activities during operation.

Infrastructure Category	Inspection Interval	Typical Maintenance Interval
Vegetation Control	weekly	5 weeks
Traffic Control Devices (signs, striping etc.)	weekly	As needed
Bridges / Structures	2 years	As needed
Drainage Systems (Culverts)	As needed	As needed
Roadway Pavement	weekly	As needed
Permanent BMPs	Annually and after major storms	As needed

Permanent BMP structures: Permanent BMP structures would have formal inspections annually, and maintenance generally includes sediment removal, vegetation management, debris and litter removal, erosion repair, structure and filter media replacement or repair. Inspection and maintenance protocols would adhere to HDOT guidelines (HDOT, 2022).

Vegetation setback: Setback of vegetation maintenance would be approximately between 20 ft and 30 ft (6 - 9 m) off the edge of the shoulder such that the realigned highway would have a turf grass-free shoulder in accordance with the 2011 HDOT *Highway Manual for Sustainable Landscape Maintenance:* This setback area, defined as the Landscape Maintenance Zone (LMZ) by HDOT, is the area in which vegetation maintenance activities occur and extends from the end of the travel lane to the recommended lateral clearance distance. The lateral clearance distance, or width of the LMZ, stems from a safety perspective and is intended to create and maintain a

recovery area for motorists that is as free as possible of hazardous vegetation. The width of the LMZ depends on the posted speed limits but may be changed by HDOT.

Within the LMZ of the proposed action alignment, vegetation maintenance activities include:

- Maintain vegetation to 3 ft (0.9 m) tall or less, and in intersections maintain vegetation to 2 feet (0.6 m) tall or less.
- Ensuring that vegetation does not create a road safety, visibility, or road drainage hazard.
- Maintain vertical clearance for any overhanging vegetation to 17 ft (5.2 m) above the ground level within 2 ft (0.6 m) of the travel way.

Mowing protocol includes:

- During dry seasons (June-September), mowing to a height of not less than 6 inches (15 centimeters (cm)) along a 30 ft wide (9 m) swath from the edge of the asphalt to mitigate wildfire risk.
- The rest of the year the LMZ is no mow.
- Steep slopes are no mow to prevent erosion, except when the HDOT inspector identifies a safety concern.

Revegetation: For disturbed areas or for landscaping purposes, the Project would include native plants found within the Action Area, which are:

- ʻIlima (*Sida fallax*)
- ʻIliahialoʻe (*Santalum ellipticum*)
- ʻAʻaliʻi (*Dodonaea viscosa*)
- Hoary Abutilon (*Abutilon incanum*)
- Akulikuli (*Sesuvium portulacastrum*)
- Milo (*Thespesia populnea*)
- Naupaka (*Scaevola taccada*).

An additional three species are native to Maui and are included for consideration in revegetation that are identified by Plant Pono and the Pacific Fire Exchange (PFX) as being in the top 10 fire-resistant plants for Hawaiʻi: Pōhinahina (*Vitex rotundifolia*), ʻŪlei (*Osteomeles anthyllidifolia*), and ʻĀweoweo (*Chenopodium oahuense*) (Plant Pono, PFX 2023). These three plants are included here because of their ability to mitigate wildfire risk, low-maintenance needs, no danger of becoming invasive, cultural significance, and all are native or endemic. Additionally, public comments identified the need to use fire-resistant vegetation as part of this Project. To honor this input, these additional species have been added to the list of species allowed for revegetation and landscape purposes. Additional tolerances, such as wind, may also provide benefits for wildfire risk mitigation.

The design-build contractor may use the Leeward Planting Guide from the Plant Pono website to select additional appropriate drought-tolerant plants for revegetation (Plant Pono n.d.). The design-build contractor will follow all applicable vegetation and landscaping guidelines set forth in the HDOT's *Highway Manual for Sustainable Landscape Maintenance*, including an annual comprehensive inspection (HDOT 2011). They will also follow the County of Maui Planting Guidelines, which include selection criteria and a list of plants to avoid (Maui County 2003). HDOT would adhere to the same guidelines for revegetation and landscaping during highway

operations and maintenance. Table 2 provides a table of acceptable plant species to be used for revegetation and landscaping.

Table 2. Acceptable plant species summary – Revegetation and landscaping

Name	Growth Form	Height	Tolerances
ʻilima*‡	Groundcover	Up to 3 feet	• Drought, Wind, Salt
ʻiliahialoʻe	Shrub/Tree	15-30 feet	• Drought, Wind, Salt, Heat
ʻaʻaliʻi‡	Herbaceous	Up to 3 feet	• Drought, Wind, Salt
hoary abutilon	Shrub	6-8 feet	• Drought, Wind, Heat
akulikuli	Herbaceous	>1 foot	• Waterlogged Soil, Drought, Brackish Water, Wind, Salt, Foot Traffic, Heat
milo	Tree	30-60 feet	• Drought, Wind, Salt
Naupaka*‡	Shrub	Up to 6 feet	• Drought, Wind, Salt
pōhinahina	Groundcover		• Drought, Fire, Salt, Foot Traffic, Wind, Pollution, Sand
ʻulei	Shrub	Up to 10 feet	• Drought, Fire, Salt
ʻaweoweo	Shrub	3-10 feet	• Drought, Fire, Salt

Sources: Plant Pono, n.d.; University of Hawaiʻi 2009
***Plants nēnē are known to forage on (Service 2004).**
‡Plants nēnē are known to nest under (Service 2004).

Conservation Measures

Nēnē Specific Conservation Measures Incorporated into the Action Area

- On-site workers will not approach, feed, or disturb nēnē if observed in the project area.
- On-site Project personnel and contractors will be informed through a formal, mandatory Environmental Awareness Program that educates Project personnel about the presence of endangered species on-site and associated avoidance and minimization measures.
- A biological monitor that is familiar with the species' biology will conduct nēnē nest surveys where appropriate habitat occurs within the vicinity of the proposed Project site prior to Project initiation. Surveys will be repeated again within 72 hours of project initiation and after any subsequent delay of work of 72 or more hours (during which the birds may attempt to nest).
- Whether during initial surveys prior to initiating work, after a delay of 72 hours or more, or in the middle of construction, if nēnē are observed loafing or foraging within the project area during the breeding season (September through April), a 150-ft (45.7 m) buffer will be established and maintained around the bird(s) and no work will occur within the buffer zone until the birds leave on their own.
    - If not already on site, the on-call biologist familiar with nēnē nesting behavior will be contacted to survey for nests in and around the buffer zone prior to the resumption of any work in the area.
- If at any time a nest or active brood is discovered, a 150-foot buffer will be immediately established and maintained around all active nests and/or broods until the birds leave on their own. No work will occur within this buffer.

  - If not already on site, the on-call biologist familiar with nēnē nesting behavior will be contacted immediately for further guidance.
  - The on-call biologist will contact the Service within 48 hours upon discovery.
- Vegetation will be managed to eliminate lush grass or other forage species on road shoulders and edges to reduce attraction of herbivorous birds.
- To prevent nesting, the dedicated on-call biologist (not construction crew) may perform hazing or other deterrent measures if such actions conform to the nēnē 4(d) rule (84 FR 69918; December 19, 2019, 50 CFR 17.41). All hazing that occurs to nēnē will follow the 4(d) rule. The contractor will maintain and require a copy of the 4(d) regulations on-site.

Aeʻo Specific Conservation Measures Incorporated into the Action Area

- Crew will not approach, feed, or disturb aeʻo if observed in the project area.
- On-site Project personnel and contractors will be informed through a formal, mandatory Environmental Awareness Program that educates Project personnel about the presence of endangered species on-site and associated avoidance and minimization measures.
- A biological monitor familiar with the species' biology will conduct Hawaiian waterbird nest surveys where appropriate habitat occurs within the vicinity of the proposed project site prior to project initiation. Surveys will be repeated within 72 hours of project initiation and after any subsequent delay of work of 72 or more hours (during which the birds may attempt to nest).
  - If a nest or active brood is found at any time during the duration of the Project, the on-call biologist will be contacted, who will then contact the Service within 48 hours upon discovery for further guidance.
  - A 100-foot buffer will be immediately established and maintained around all active nests and/or broods until the chicks have fledged. No potentially disruptive activities or habitat alteration will be conducted within this buffer.
  - A biological monitor that is familiar with the species' biology will be present on the project site during all construction or earth moving activities until the chicks fledge to ensure that aeʻo and nests are not adversely impacted.
- If an aeʻo is observed exhibiting nesting behavior within the Action Area during the nesting season (mid-February-August), the on-call biologist familiar with aeʻo nesting behavior will be contacted to advise on next steps.
- Due to the presence of wetland habitat in the Action Area, the Service's Best Management Practices (BMPs) for Work In and Around Aquatic Environments will be implemented (Appendix B).
- Border slopes of the stormwater detention ponds will be designed to have a slope greater than 6:1 to deter aeʻo from nesting adjacent to the ponds.

General Conservation Measures that Benefit Nēnē and Aeʻo

The Project will implement general avoidance and minimization measures, including:

- HDOT, U.S. Environmental Protection Agency (EPA), and National Oceanic and Atmospheric Administration (NOAA)-National Marine Fisheries BMPs to protect water quality and aquatic habitats;
- Service (Appendix C) and Coordination Group on Alien Pest Species biosecurity protocols to avoid and minimize the spread of invasive species;
- General HDOT and FHWA construction BMPs;

- Prohibiting the feeding of any wildlife or feral cats in the action area. Dedicated personnel will enforce this during daily monitoring;
- In areas of known nēnē and ae‘o habitat (Ukumehame wetlands near Firing Range), the design-build contractor will be responsible for predator trapping and would develop a predator control plan for approval by HDOT;
- The contractor will secure all temporary structures to avoid them blowing over during heavy winds and disturbing or injuring listed bird species;
- Drilling shaft foundations will be used in areas sensitive to vibration and noise to protect ae‘o and nēnē eggs;
- Fill placement within wetland habitat will be avoided and minimized to the extent practicable;
- Staging area locations will not occur in or directly adjacent to delineated wetland habitat and streambanks to avoid impacts to ae‘o and nēnē;
- Contractor will prioritize previously disturbed and bare areas for use as staging and lay-down areas, disposal and borrow sites, and concrete batch plants;
- New outdoor lights will adhere to the 2022 Maui Dark Skies Ordinance 5434;
- No portable jobsite radios or other music equipment will be used within the construction footprint at any time to decrease noise disturbance to listed species;
- Biological surveys will be performed by qualified biologists in areas of permanent BMPs that were not included in the previous surveys as they are outside of the initially defined Biological Survey Area prior to the Final Environmental Impact Statement;
- Reforestation and landscaping will include native plants found in the area during the initial biological surveys, native plants historically known from the area, as well as native and possibly nonnative plants not considered invasive species that are fire resistance and recommended by the Pacific Fire Exchange and Pono Pacific;
- If possible, endemic ‘iliahi trees currently growing within the Action Area will be preserved;
- Additional avoidance and minimization measures will be implemented as outlined in the Biological Survey Supplement, BA, and Final Environmental Impact Statement (FEIS);
- Speed limit signs will be placed along active construction roadways within the Action Area reducing vehicle speeds to 15 mph in the Olowalu area and 10 mph in the Ukumehame area due to presence of nēnē;
- To minimize the risk of bird-vehicle collisions along the viaduct, permanent bird diversion poles will be installed along both sides of the bridge (USFWS 2024). These diversion poles direct incoming birds up and over/away from the bridge, as they are perceived as a solid structure (Bard et al. 2001) (Jacobson 2005). Poles will extend approximately 6 feet (1.8 meters) above the 54-inch (137 centimeters) rail and spaced approximately 12 feet (3.7 meters) apart, a maximum pole height of 9 feet above the 54-inch-tall rails will be applied, which corresponds to the typical height of a tractor trailer truck of 13.5 feet;
- The project site will be adequately signposted with high-visibility signs alerting crew to the presence of nēnē in Ukumehame.
    - Signs will be orange during construction and then permanent operating signs in yellow following protocols for warning signs in the *Manual on Uniform Traffic Control Devices*; and
- If nēnē or ae‘o (or other listed species) become injured in the Action Area on-site staff will contact the on-call biologist immediately, who will arrange for the bird(s) (or other listed animal species) to be picked up by DOFAW and provide guidance on temporary handling

prior to DOFAW pickup. Injuries to listed animals (e.g., nēnē or aeʻo) resulting from project actions may require care from the Hawaiʻi Wildlife Center (HWC) on the island of Hawaiʻi. Should transport to and care at the HWC be necessary, HDOT would provide funds to facilitate necessary and appropriate actions.

- The on-call biologist will use the Service's SOP for handling and transporting injured birds or other listed animal species.
- The on-call biologist will complete the Service's Avian Injury/Mortality Form (Appendix D) and submit it to the Service with 72 hours of the incident.

ACTION AREA

The action area is defined at (50 CFR 402.02) as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." The Action Area is within a corridor between the mountains and the sea (mauka to makai) and is approximately 6-mi long and approximately 0.75 mi wide spanning the ahupuaʻa of Ukumehame, Olowalu, and Launiupoko covering approximately 2,437.63 acres (ac) (986.48 hectares (ha)), (Figure 1).

ANALYTICAL FRAMEWORK FOR THE JEOPARDY/ADVERSE MODIFICATION ANALYSIS

Jeopardy Analysis Framework

In accordance with regulation (see 84 FR 44976), the jeopardy determination in this Biological Opinion relies on the following four components:

1. The *Status of the Species,* which evaluates the species' current range-wide condition relative to its reproduction, numbers, and distribution; the factors responsible for that condition; its survival and recovery needs; and explains if the species' current range-wide population is likely to persist while retaining the potential for recovery or is not viable;
2. The *Environmental Baseline* which evaluates the current condition of the species in the action area relative to its reproduction, numbers, and distribution absent the consequences of the proposed action; the factors responsible for that condition; and the relationship of the action area to the survival and recovery of the species;
3. The *Effects of the Action* section of this biological opinion evaluates all consequences to the species that are reasonably certain to be caused by the proposed action (i.e., the consequences would not occur but for the proposed action and are reasonably certain to occur) and how those consequences are likely to influence the survival and recovery of the species; and
4. The *Cumulative Effects* section of this biological opinion evaluates the effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation, on the species and its habitat, and how those effects are likely to influence the survival and recovery of the species.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the consequences of the proposed Federal action in the context of the species' current range-wide status, considering any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and

recovery of the species in the wild. The key to making this finding is clearly establishing the role of the action area in the conservation of the species, and how the effects of the proposed action, taken together with cumulative effects, are likely to alter that role and the continued existence (i.e., survival) of the species.

STATUS OF THE SPECIES

Status of Nēnē

Listing Status
The Service listed the nēnē as endangered in 1967 (32 FR 4001). The Service has not designated critical habitat for the nēnē. The Service published a Draft Revised Recovery Plan for the species in 2004 and completed a 5-year Review in 2011. The nēnē was reclassified from endangered to threatened in 2019 (84 FR 69918).

Species Description
The nēnē is a medium-sized goose with an overall length of approximately 25 to 27 inches (in) [63 to 65 centimeters (cm)] (Banko et al. 1999, p. 2). The plumage of both sexes is similar (Banko et al. 1999, p. 2). This species is adapted to a terrestrial and largely non-migratory lifestyle in the Hawaiian Islands with limited freshwater habitat (Banko et al. 1999, p. 1). Adaptations to a terrestrial lifestyle include increased hind limb size, decreased forelimb size, more upright posture, and reduced webbing between the toes compared to other species of *Branta* (Banko et al. 1999, p. 1; Olson and James 1991, p. 42). Compared to the related Canada goose (*Branta canadensis*), nēnē wings are reduced by about 16 percent in size and their flight is not as strong (Banko et al. 1999, p. 9). Nēnē are capable of inter-island and high-altitude flight, but they do not migrate from the archipelago (Banko et al. 1999, p. 9).

Historic and Current Distribution
Nēnē were once widely distributed among the main Hawaiian Islands (island of Hawai‘i, Maui, Lāna‘i, Moloka‘i, Kaua‘i, and Kaho‘olawe) (USFWS 2004, p. 6). However, by 1951, only about 30 nēnē remained on the island of Hawai‘i (Smith 1952, p. 8). It is thought that nēnē populations on the higher islands, Maui and the island of Hawai‘i persisted into the historical periods due to the availability of larger tracts of habitat in remote rugged upland areas, where hunting and predation by introduced mammals were less intense (Banko et al. 1999, p. 3). The release of captive-bred nēnē, which began in 1960, helped save the species from imminent extinction (USFWS 2004, pp. 2–3).

Nēnē have made substantive advances in recovery due to collaborative conservation efforts from private, state, and Federal partners. These efforts included a successful captive propagation and release program, which has resulted in an increased number of nēnē and re-established populations throughout the species’ range on the islands of Hawai‘i, Kaua‘i, Maui, and Moloka‘i. Other efforts included studies of foraging behavior, which identified nēnē food preferences and nutritional value of food resources contributing to a greater understanding of habitat requirements during the breeding and non-breeding seasons.

Substantial self-sustaining populations of nēnē are well distributed in multiple localities on the

islands of Hawai‘i, Kaua‘i, and Maui, totaling 3,797 individuals comprised of 1,048 individuals on Hawai‘i, 2,314 individuals on Kaua‘i, 429 individuals on Maui, and 6 individuals on Moloka‘i (Nēnē Recovery Action Group (NRAG) 2024, in litt.). Populations on Maui and Hawai‘i have been observed to be stable without external supplementation since about 2011, when active translocations from Kaua‘i were discontinued; Kaua‘i populations have been stable to increasing for several decades while also providing stock for translocation.

Nēnē continues to be conservation-reliant (i.e., dependent on long-term management commitments to active predator control and habitat management), but with ongoing management we expect populations on these three islands to continue to be self-sustaining without additional releases of captive-bred birds.

Life History

Nēnē currently occupy various habitats and vegetation community types ranging from coastal dune vegetation and non-native grasslands (e.g., golf courses, pastures, and rural areas) to sparsely vegetated low and high-elevation lava flows, mid-elevation native and non-native shrubland, cinder deserts, native alpine grasslands and shrublands, and open and non-native alpine shrubland-woodland community interfaces (Banko et al. 1999, pp. 4–6). The current distribution of wild nēnē has been highly influenced by the location of release sites for captive-bred birds. On Kaua‘i, nēnē are primarily found using lowland habitat, such as coastal wetlands at Hanalei and Hulē‘ia National Wildlife Refuges (NWR), with the exception of the Nā Pali Coast (USFWS 2004, pp. 15–19).

Nēnē have an extended breeding season with eggs reported from all months except May, June, and July (Banko et al. 1999, p. 12); however, the majority of birds in the wild nest between October and March (USFWS 2004, p. 19). Nesting peaks in December and most goslings hatch from December to January (Banko et al. 1999, p. 12). Nēnē nest on the ground in a shallow scrape in the dense shade of a shrub or other vegetation. A clutch typically contains three to five eggs and incubation lasts for 29 to 31 days. Once hatched, young remain in the nest for one to two days (Banko et al. 1999, pp. 16–17). Fledging of captive birds occurs at 10 to 12 weeks, but may take longer in the wild. During molt (March to June), adults are flightless for a period of four to six weeks and generally attain their flight feathers around the same time as their offspring. When flightless, goslings and adults are extremely vulnerable to predators, such as cats and dogs. From June to September, family groups join others in post-breeding flocks often far from nesting areas.

Nēnē reach sexual maturity at one year of age, but usually do not form pair bonds until their second year. Historical reports from the island of Hawai‘i indicate that nēnē bred and molted primarily in the lowlands during winter months and moved upslope in the hotter and drier summer months (Henshaw 1902, p.105; Perkins 1903; Munro 1944, pp.41–42; Banko 1988, p. 35). Reproductive success is relatively low in upland habitats on Maui and the island of Hawai‘i and higher in lowland habitat on Kaua‘i (Telfer 1995, 1996; Banko et al. 1999, p. 19).

Nēnē are browser-grazers; and the composition of their diet depends largely on the vegetative composition of their surrounding habitats. They appear to be opportunistic in their choice of food plants, as long as they meet nutritional demands (Banko et al. 1999, pp. 6–8; Woog and Black

2001, p. 324). It is thought that this adaptability in their use of food items allowed nēnē to survive in marginal habitats to which they were relegated, as habitats that are more traditional were lost to humans (Black et al. 1994, p. 103; Banko et al. 1999, p. 6). However, it is believed that nēnē require a diverse suite of food availability that may include non-native and native vegetation (Banko et al. 1999, p. 6), due to the loss of traditional foraging habitats (Black et al. 1994, p. 103).

Threats

Current threats to nēnē include (1) depredation of eggs and goslings by introduced mammals (i.e., mongoose (*Herpestes javanicus*), black rats (*Rattus rattus*), cats (*Felis catus*), dogs (*Canis lupus familiaris*), black-crowned night herons or ʻaukuʻu (*Nycticorax nycticorax*), cattle egrets (*Bubulcus ibis*), Hawaiian short-eared owl or pueo (*Asio flammeus sandwichensis*), barn owls (*Tyto alba*), common mynas (*Acridotheres tristis*), bullfrogs (*Rana catesbeiana*), and pigs (*Sus scrofa*)); (2) limited availability of suitable habitat due to habitat loss, fragmentation, and degradation, especially lowland breeding habitat; (3) insufficient nutritional resources due to habitat degradation; and (4) human-caused disturbance (including habituation to humans) and mortality (especially deaths due to collisions with vehicles).

Most nesting failures of wild nēnē on Hawaiʻi and Maui are due to mongoose depredation (Hoshide et al. 1990, p. 154; Banko 1992, pp. 101–102; Black and Banko 1994, p. 400; Baker and Baker 1999, p. 8). Mongooses kill incubating females (Banko 1992, p. 102) and rats are also a predator of nēnē eggs (Baker and Baker 1999, p. 12). Where nēnē nest in areas without protection from predators and other threats, nests are likely to fail; zero to 23 percent of eggs survive to fledge (Rave et al. 2005, p. 11).

Lowlands habitats are often unsuitable for nēnē because of the intense human activity or dense predator populations placing nēnē at greater risk of predation, and hazardous situations such as habituation to human feeding, vehicle collisions, and golf ball strikes (Natural Resources Conservation Service [NRCS] 2007, p. 7). In many instances of gosling mortality, the actual cause of death may be exposure because goslings are weakened by malnutrition (at hatching) and were unable to keep up with parents, and therefore got chilled or overheated and died (Baker and Baker 1999, p. 13). Emaciation was the most common cause of death diagnosed in 71 out of 300 adult and gosling mortalities submitted to the National Wildlife Health Research Center between 1992 and 2013 for which a cause of death was identified (Work et al. 2015, p. 692).

Climate Change

Analysis of the historical records indicate the surface temperature in Hawaiʻi has been increasing since the early 1900s, with relatively rapid warming over the past 30 years. The average increase since 1975 has been 0.48 degrees Fahrenheit (0.27 degrees Celsius) per decade for annual mean temperature at elevations above 2,600 ft (800 m) and 0.16 degrees Fahrenheit (0.09 degrees Celsius) per decade for elevations below 2,600 ft (800 m) (Giambelluca et al. 2008, pp. 3–4). Based on models using climate data downscaled for Hawaiʻi, the ambient temperature is projected to increase by 3.8 to 7.7 degrees Fahrenheit (2.1 to 4.3 degrees Celsius) over the 21st century, depending on elevation and the Intergovernmental Panel on Climate Change's (IPCC) Shared Socio-economic Pathway (SSP) emission scenario (SSP1-1.9, SSP1-2.6, SSP2, SSP2-4.5, SSP3-7, and SSP5-8.5) (Liao et al. 2015, p. 4344; van Vuuren et al. 2011, p.5; Intergovernmental

Panel on Climate Change 2014, p. 8; IPCC Sixth Assessment Report's (AR6 Report) 2023, entire)

On the main Hawaiian islands, predicted changes associated with increases in temperature include a shift in vegetation zones upslope, a similar shift in animal species' ranges, changes in mean precipitation with unpredictable effects on local environments, increased occurrence of drought cycles, and increases in intensity and numbers of hurricanes (tropical cyclones with winds of 74 miles per hour or higher) (Loope and Giambelluca 1998, pp. 514–515; U.S. Global Change Research Program (US-GCRP) 2009, pp. 10, 12, 17–18, 32–33; Giambelluca 2013, p. 6).

Periods of drought are expected to continue and are likely to be exacerbated by the effects of climate change. To minimize the effects of drought on the food availability and adequate nutrition for nēnē, habitat enhancement activities to provide foraging opportunities, especially during the breeding season, will need to be maintained. The rise in sea level projected by climate change models (Spada et al. 2013, p. 484; Polhemus 2015, p. 7; Sweet et al. 2017, p. 9; Sweet et al. 2022, entire) may threaten any low-lying habitats used by nēnē.

Sea level rise and associated erosion caused by the effects of climate change are not anticipated to bring extensive alterations to nēnē habitat, as nēnē are not dependent on coastal areas. Increases in frequency and intensity of both drought and hurricanes are anticipated to bring direct and indirect impacts to nēnē; however, to what extent and when such impacts may occur is unknown.

Forecast of changes in precipitation are highly uncertain because they depend, in part, on how the El Nino-La Nina weather cycle (an episodic feature of the ocean-atmosphere system in the tropical Pacific having important global consequences for weather and climate) might change (State of Hawai‘i 1998, pp. 2–10). Overall, more frequent El Nino events are predicted to produce less precipitation for the Hawaiian Islands. These projected decreases in precipitation are important stressors for nēnē because they experience substantially higher mortality from starvation in drought years (Hess 2011, p. 59). In addition, the drying trend, especially on leeward sides of islands, creates suitable conditions for increased invasion by non-native grasses and enhances the risk of wildfire.

On Kaua‘i, where nēnē are most abundant, flooding has decreased nest success for the past two years (Webber et al. 2017, in litt.; Uyehara 2018, in litt.). Flooding also pushes nēnē out of their habitat and closer to roads, placing them at risk of vehicular strikes (Webber et al. 2017, in litt.). Another impact from flooding is an increased subsequent risk of an avian botulism outbreak (Uyehara 2018, in litt.). Finally, sea-level rise resulting from thermal expansion of warming ocean water; the melting of ice sheets, glaciers, and ice caps; and the addition of water from terrestrial systems (Climate Institute 2011, in litt.) has the potential for direct effects on nēnē habitat. Flooding related to sea-level rise would result in the additional loss of lowland habitat occupied by nēnē in low-lying coastal areas such as at Hulē‘ia NWR on Kaua‘i.

Although the effects of climate change do not constitute a threat to nēnē at the present, we do expect them to exacerbate the effects of drought and tropical storms, and to constitute a threat in

the foreseeable future. Over this time frame, we anticipate that threats to nēnē associated with climate change (e.g., increased duration and intensity of drought, increased frequency and intensity of hurricanes, and flooding associated with hurricanes and sea-level rise) to continue to increase, although we expect the primary issues driving nēnē population viability will continue to be depredation events and habitat degradation. Impacts associated with climate change may become a threat in the future.

Ongoing Conservation Actions
Many of the areas where nēnē occur in the wild are afforded some level of habitat enhancement that focuses on increasing the survival and reproduction of nēnē. Current populations are sustained by one or more of the following management actions (1) predator control and monitoring of invasive mammalian predators; (2) construction and maintenance of predator exclusion fences; (3) minimizing human disturbance; (3) enhancing grasslands with native shrubland plant communities to provide habitat structure and function for nēnē (e.g., naupaka, ʻakoko, and nehe for nēnē food and cover); (4) mowing for conservation management purposes; (5) mechanical and physical or chemical control of invasive pest and undesirable plant species; and (6) supplemental feeding. For example, Hawaiʻi Volcanoes National Park has areas where many of these types of enhancement occur. Park staff maintain two predator-resistant, open-topped pens, which are 10 and 13 acres (ac) (4 and 5 hectares (ha)) in size, as safe-breeding sites with supplemental feed and occasional mowing. Traditional movements are being restored on the island of Hawaiʻi, which could be expected to improve survival and breeding, as well as genetic exchange between subpopulations. On Kauaʻi, the State of Hawaiʻi Division of Forestry and Wildlife also has predator control programs for nēnē and may provide supplemental feed during drought years. On Maui, Haleakalā National Park has controlled ungulate populations and horses intermittently grazing in Palikū pasture to benefit nēnē. Certain key populations are expected to maintain current levels or increase into the future if the current level of management is continued.

Status of Aeʻo

Listing Status
The aeʻo (kukuluaeʻo, Hawaiian stilt, *Himantopus mexicanus knudseni*) was listed as an endangered species on October 13, 1970 (35 FR 16047). A recovery plan for Hawaiian waterbirds, including the aeʻo, was issued in 1978 (Service 1978, entire), and the first revision of this plan was issued in 1985, with a revised draft version in 2005. The final Recovery Plan for four Hawaiian Waterbirds, Second Revision (Service 2011, entire), was made publicly available January 19, 2012 (77 FR 2753). The most recent 5-year review of the aeʻo was made available in March 2020, in which the Service recommended downlisting the aeʻo (Service 2020, entire). On March 25, 2021, the Service proposed to reclassify the aeʻo from “endangered” to “threatened” (86 FR 15855); no final reclassification of aeʻo has been published. Critical habitat has not been designated for the aeʻo.

Species Description
The aeʻo is a long-lived waterbird endemic to the Hawaiian Islands (Stejneger 1887, entire), widely recognized as a subspecies of the black-necked stilt *Himantopus mexicanus* (American Ornithology Union (AOU) 1998). The aeʻo is black and white with long, pink legs (Bryan 1901,

p. 26; Shallenberger 1977, p. 24), is slender in appearance, and grows to about 16 inches (in) (40 centimeters (cm)) in height. Plumage is black on the back, and white on the front and underside of the bird. Juveniles have a brownish back, and more extensive white on the cheeks and forehead than adults. Chicks are well camouflaged in a downy plumage that is tan with black speckling (Coleman 1981, pp. 33, 35, 86−87). The oldest recorded ae‘o was 30 years (Reed et al. 2014, p. 4).

Historic and Current Distribution
Ae‘o have been historically documented on all major islands except Lāna‘i and Kaho‘olawe. Currently ae‘o are considered to comprise a single population occupying the islands of Ni‘ihau, Kaua‘i, O‘ahu, Moloka‘i, Maui, Lāna‘i, and Hawai‘i (March 25, 2021; 86 FR 15857–15858). Ae‘o move between islands, based on observations of sudden large increases in numbers at certain sites (from several hundred to a thousand or more), and concomitant decreases at other sites. The most recent population estimate of ae‘o in the Hawaiian Islands is 1,511 (1,317–1,718; 95% CI) individuals based on a 5-year average (2019–2023) (Paxton et al. 2021, entire; Gorresen et al. 2024, p. 4). On Maui, the average from the same survey is 499 (350-669; 95% CI) individuals (Paxton et al. 2024, p. 4). The annual population of ae‘o fluctuates with variation in climatic and hydrologic conditions as well as success in reproduction and the toll of predation. Ae‘o disperse readily, exploiting seasonally flooded wetlands, and readily colonize newly restored or created habitats (van Rees et al. 2020, p. 3). Recent data indicated ae‘o may have reached a population equilibrium within existing managed wetlands (van Rees et al. 2022, p. 7).

Life History
Ae‘o primarily occur in natural and human-made lowland coastal wetlands from sea level up to 656 ft (200 m) in elevation, though ae‘o have been observed at slightly higher elevations and outside of the coastal wetlands, such as foothill impoundments, reservoirs, and other wetlands (USFWS 2005, p. 31; USFWS 2011, pp. 50–60; Kawasaki et al. 2020, p. 431). The Recovery Plan for Hawaiian waterbirds classify wetlands as core and supporting. Core wetlands provide habitat for all life history stages and support many individuals, supporting wetlands are additional areas that provide habitat important for smaller populations or provide habitat needed seasonally by segments of the population during part of their life cycle.

Ae‘o use a wide range of water salinity ranging from zero to 200 parts per thousand (ppt) (e.g., Waiawa Unit at Pearl Harbor NWR) (Coleman 1981, p. 48; Reed et al. 2011, p. 4; Nadig 2017, pers. comm.). While adults have a tolerance to salinity, we know that young Hawaiian stilt chicks unable to fly require a freshwater source nearby (Nadig 2022, in litt.). Hawai‘i has many freshwater springs scattered along the coastlines of larger islands, which are within or adjacent to wetlands (Nadig 2022, in litt.).

Ae‘o use areas of sparse, low-growing (up to 18 in (46 cm) tall) perennial vegetation or exposed tidal flats for nesting and breeding, and sometimes foraging (March 25, 2021; 86 FR 15855, Service 2020 pp. 1–2). Nests are often a simple scrape on the ground, sometimes using grass stems, small rocks, or mullusk shells for nesting material (Coleman 1981, p. 63; Smith and Polhemus 2003, p. 61; Gee 2007, p. 98; M. Morin, pers. comm. 1994 cited in USFWS 2011, p. 57). Ae‘o are often observed foraging in shallow water. The most common foraging depth for adults appears to be 5 in (13 cm) or less below the surface of the water (Ohashi and Burr 1977, p.

3; Smith and Polhemus 2003, pp. 60−61; Gee 2007, p. 62; Reed et al. 2011, pp. 3−4). Shallow water (approximately 2-3 in [7.6 cm]) and wet mudflats are particularly important for foraging chicks (March 25, 2021; 86 FR 15859).

Ae‘o are opportunistic feeders. They eat a wide variety of invertebrates and other aquatic organisms found in shallow water and mudflats (Perkins 1903, p. 452; Shallenberger 1977, pp. 23−25; Robinson et al. 1999, pp. 8–9; USFWS 2011, p. 58). They also sometimes forage in grasslands adjacent to wetlands. Managed wetlands with desirable water depth are common foraging sites (Underwood et al. 2013, p. 6). Hawaiian stilts move within island and between island as they exploit food resources (Engilis and Pratt 1993, pp. 155−156).

Ae‘o typically begin breeding at age two (Reed et al. 1998, p. 36). During the nesting season, incubating pairs move between their nest site and a foraging area (USFWS 2011, p. 60). Pairs usually lay three to four eggs that are incubated for approximately 24 days (Coleman 1981, p. 56; Chang 1990, p. 43). Within a few hours of the last chick hatching, parents lead their brood to shallow feeding areas that may be the same feeding areas used by the adults during incubation (Coleman 1981, p. 77). Foraging areas may be directly adjacent to the nest site or quite a distance away, depending on food availability (Coleman 1981, p. 77; Engilis and Pratt 1993, pp. 155−156; Reed and Oring 1993, p. 57). Chicks fledge approximately 28 days post-hatching (Reed et al. 1999, p. 478), and young may remain with both parents for several months after hatching (Coleman 1981, pp. 83–84).

Threats

The primary threats to ae‘o are (1) nonnative predators (including mongooses (*Herpestes javanicus*), black rats (*Rattus rattus*), feral cats (*Felis catus*), feral dogs (*Canis lupus familiaris*), black-crowned night herons or ‘auku‘u (*Nycticorax nycticorax*), cattle egrets (*Bubulcus ibis*), Hawaiian short-eared owl or pueo (*Asio flammeus sandwichensis*), barn owls (*Tyto alba*), common mynas (*Acridotheres tristis*), bullfrogs (*Rana catesbeiana*), and sometimes pigs (Sus scrofa)); (2) habitat loss and degradation (due to urban development, ground and surface water alterations that affect core and supporting wetlands, nonnative plants, and foreseeable changes in habitat quality and quantity due to sea level rise (such as groundwater flooding and inundation and coastal flooding and inundation)); (3) avian disease (primarily botulism from the anaerobic bacteria *Clostridium botulinum* type C, but avian influenza H5N1 and West Nile virus are emerging diseases that may impact ae‘o in the foreseeable future); (4) environmental contaminants; and (5) foreseeable tropical cyclone intensity and frequency resulting from climate change (March 25, 2021; 86 FR, 15865–15869). Depredation is a leading cause of nest failure and chick mortality, particularly in unmanaged wetland habitat (Underwood et al. 2013, entire; Underwood 2014, entire; Idle 2023, entire).

Climate Change

Analysis of the historical records indicate the surface temperature in Hawai‘i has been increasing since the early 1900s, with relatively rapid warming over the past 30 years. The average increase since 1975 has been 0.48 degrees Fahrenheit (0.27 degrees Celsius) per decade for annual mean temperature at elevations above 2,600 ft (800 m) and 0.16 degrees Fahrenheit (0.09 degrees Celsius) per decade for elevations below 2,600 ft (800 m) (Giambelluca et al. 2008, pp. 3–4). Based on models using climate data downscaled for Hawai‘i, the ambient temperature is

projected to increase by 3.8 to 7.7 degrees Fahrenheit (2.1 to 4.3 degrees Celsius) over the 21st century, depending on elevation and the Intergovernmental Panel on Climate Change's (IPCC) Shared Socio-economic Pathway (SSP) emission scenario (SSP1-1.9, SSP1-2.6, SSP2, SSP2-4.5, SSP3-7, and SSP5-8.5) (Liao et al. 2015, p. 4344; van Vuuren et al. 2011, p.5; Intergovernmental Panel on Climate Change 2014, p. 8; IPCC Sixth Assessment Report's (AR6 Report) 2023, entire).

On the main Hawaiian islands, predicted changes associated with increases in temperature include a shift in vegetation zones upslope; a similar shift in animal species' ranges; changes in mean precipitation with unpredictable effects on local environments, including coastal wetlands; increased occurrence and intensity of drought cycles; and increases in intensity and numbers of hurricanes (tropical cyclones with winds of 74 miles per hour or higher) (Loope and Giambelluca 1998, pp. 514–515; U.S. Global Change Research Program (US-GCRP) 2009, pp. 10, 12, 17–18, 32–33; Giambelluca 2013, p. 6). All of these predicted changes can lower the reproductive success of aeʻo (March 25, 2021; 86 FR 15855).

Global mean sea level (GMSL) is rising and is expected to continue to rise for centuries due to thermal expansion resulting global warming, even if all Nations ceased production of greenhouse gasses today (Meehl et al. 2012, p. 576; Golledge et al. 2015, pp. 421, 424; DeConto and Pollard 2016, p. 591; Intergovernmental Panel on Climate Change (IPCC) 2021, p. SPM-28). This is because of the warming that has already occurred. Additionally, GMSL may rise even more due to warming that is yet to occur from the still uncertain level of future greenhouse gas emissions (Sweet et al. 2017 and 2022, entire; IPCC 2021, p. SPM-28−SPM-29).

Both marine inundation and groundwater inundation resulting from GMSL will contribute to wetland habitat loss and modification in Hawaiʻi, but as sea level rise increases beyond 2.4 ft (0.74 m), marine inundation will be the dominant source of inundation (Polhemus 2015, p. 25). Research is needed in Hawaiʻi to understand where new wetland habitats may form due to groundwater inundation and what geomorphological changes (e.g., wetland migration, increase in salinity and/or sedimentation) might occur for existing wetlands resulting from both seawater and groundwater inundation. Global mean sea level rise is not expected to be a slow, gradual, and linear phenomenon, in the Hawaiian Islands or elsewhere; it is anticipated to accelerate and at times be quite rapid (Polhemus 2015, pp. 6−7). Sea level rise is of particular concern for conservation of aeʻo because most wetlands of Hawaiʻi are located just inland of a narrow coastal strand and are dependent upon natural or pumped groundwater sources to maintain pond water levels (Kane 2014, p. 7 and references therein). Nest failure due to flooding is a current threat to aeʻo, which will be exacerbated by flooding resulting from marine and/or groundwater inundation. Further, altered sedimentation and chemical changes resulting from sea level rise may create habitat conditions favorable to Clostridium botulinum type C.

Torrential rains associated with increases in hurricane frequency and intensity resulting from climate change will increase incidence of nest flooding and could directly injure adults and goslings. Torrential rains will also increase the amount of urban runoff of oil, heavy metals, and other undesirable chemicals into the lowland coastal wetlands subsequently resulting in nest failure and chick mortality. Further, torrential rain can increase sedimentation which, as noted above, is linked to increased botulism outbreak events (Rocke and Samual 1999, pp. 1250, 1255−1256). Forecast of changes in precipitation are highly uncertain because they depend, in

part, on how the El Nino-La Nina weather cycle (an episodic feature of the ocean-atmosphere system in the tropical Pacific having important global consequences for weather and climate) might change (State of Hawai‘i 1998, pp. 2–10). Overall, more frequent El Nino events result in a decrease in precipitation for the Hawaiian Islands.

An increase in the intensity and duration of drought resulting from climate change could decrease the amount of available ephemeral wetlands used as steppingstones between protected, managed wetland habitat. Multiple instances of prolonged severe drought, or near back-to-back episodes, could lead to water conflicts if water becomes very scarce, including at managed wetlands. Many protected managed wetlands have some water management capacity to add or withdraw water as needed; while some wetlands can withdraw but not add (Goodale 2021, pers. comm.; Nadig 2021, pers. comm.). Water inlet most typically comes from pumping wells or natural springs and streams. On Maui, stream water that feeds wetland habitat at Keālia National Wildlife Refuge can be unpredictable due to changes in upstream use and diversion.

In addition to the impacts on ae‘o life history described above, loss or degradation of wetland habitat due to climate change (e.g., sea level rise, drought) could force ae‘o to compete for brood territories and nesting ground in mudflats and shallow water, resulting in reduced reproductive success for the subspecies. Additionally, ae‘o forced to use nest sites and brood rearing habitat outside predator control areas are likely to suffer higher mortality (Price and Harmon 2019, p. 10). The magnitude of threats associated with climate change, particularly sea level rise, may not be revealed for decades or more to come.

Ongoing Conservation Actions

The ae‘o is considered a conservation-reliance species, meaning it requires management for survival (Underwood et al. 2013, entire). The main management actions that benefit ae‘o are predator control, water level and vegetation control, and predator proof fencing. These actions are implemented primarily on Federal and state land, but also on some private lands.

The State of Hawai‘i and the Department of Defense have been important partners with the NWRs’ efforts to protect, manage, conserve, and restore the significant wetland habitats and to support the Hawaiian stilt population over the last 30 years. The State is currently expanding their wetland restoration efforts, including at Kanahā Pond on Maui and Mānā Plain (March 25, 2021; 86 FR 15859). The Service manages wetlands on Kaua‘i, O‘ahu, and Maui through the National Wildlife Refuge System. The Service also facilitates recovery implementation through section 7 consultation, Habitat Conservation Plans (HCPs), and cooperative agreements. Local and county governments also contribute to conservation actions.

Numerous conservation organizations and academic researchers are voluntarily contributing to the recovery of endangered waterbirds, including the ae‘o. The Nature Conservancy (TNC) manages several ecological preserves in the State and is actively planning and coordinating restoration of habitats within the Action area once the highway is completed, including at Ukumehame wetlands that are known to support nēnē and ae‘o (TNC 2025, entire). ‘Ahahui Mālama I Ka Lōkahi and Kawainui Heritage Foundation are watchdog organizations that oversee the future of Kawainui Marsh on O‘ahu, providing additional confidence that management of

this important wetland will continue into the foreseeable future. They sponsor and lead educational tours and coordinate plant restoration projects at Nā Pōhaku o Hauwahine.

The Pacific Bird Habitat Joint Venture (PBHJV) has wetland restoration projects in motion at varying stages across the main Hawaiian Islands (PBHJV 2024, entire). Ducks Unlimited, a nonprofit wetlands conservation organization, works cooperatively with state and Federal agencies as well as with private landowners and local corporations on wetlands conservation and habitat restoration and protection efforts (Ducks Unlimited 2022, entire). Ducks Unlimited also provides funding to PBHJV. The Nature Center, Wildlife Society, and researchers at the University of Hawai‘i all work on waterbird recovery issues, ranging from aiding injured or sick birds to conducting research on waterbird life history, threats, and habitat.

Private landowners that also contribute to waterbird recovery include Kamehameha Schools, Midler Family Trust, Arleone Dibben-Young (Nēnē O Moloka‘i), and Ka‘elepulu Wetland Preserve. There are also several academic researchers who continue to produce data that help guide ae‘o management actions and inform related policy (Price and Harmon 2019, entire; Kawasaki 2020, entire; Dibben-Young et al. 2021, entire; Harmon et al. 2021a, entire; Harmon 2021b, entire; Opie 2022, entire; Idle 2023, entire; van Rees and Reed 2022, entire;). These researchers are now fostering a growing number of up and coming academic researchers who also focus on the ecology and conservation of the ae‘o and wetland conservation in Hawai‘i. This growing interest in ae‘o and wetland conservation raises awareness and will help inform adaptive management for the subspecies.

On Maui, Save the Wetlands is working to identify critical wetlands in Kīhei in need of restoration, map and monitor the hydrological flow and habitat conditions of these critical remaining wetlands, and conduct ecological and wetland restoration work. The Maui Land Trust is actively working to restore the wetlands at Waihe‘e Coastal Dunes and Wetlands Refuge in Kaupō. The State is installing a predator proof fence around Kanahā Pond State Wildlife Sanctuary to protect ae‘o and other listed waterbirds. Lastly, as mentioned above, The Nature Conservancy is currently in the planning phase for restoring wetland habitat in Ukumehame after the realigned highway is constructed (TNC 2025, entire).

In collaboration with multiple other Federal agencies, the Service has adopted the resist-accept-direct (RAD) framework, to identify the best conservation decisions to help native habitats and species adapt to climate change (Morton 2019, entire; Schuurman et al. 2020, entire; Lynch et al. 2021, entire). Resist refers to making management decisions based on historical or acceptable current conditions, accept means to allow ecosystems to function or change autonomously without intervening, and direct refers to attempts to actively shape change in ecosystems toward preferred new conditions. The Service is applying the RAD framework to wetland conservation efforts, which includes ae‘o.

ENVIRONMENTAL BASELINE

Regulations implementing the ESA (50 CFR 402.02) define the environmental baseline as the past and present impacts of all federal, state, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated and/or ongoing impacts of all proposed federal projects in the action area that have undergone Section 7

consultation, and the impacts of state and private actions which are contemporaneous with the consultation in progress.

Status of Nēnē within the Action Area

On the leeward side of Mauna Kāhālawai, where the proposed Project is located, there are several confirmed nēnē use areas spanning from Honokahua ahupuaʻa (north of the Action Area) down through the southern end of the Ukumehame ahupuaʻa (Figure 8) (NRAG 2024, entire). In 2024, the biological survey for the Project reported 7 nēnē in the Ukumehame section of the Action Area. In both 2023 and 2024, the DOFAW reported up to 30 nēnē occurring in the Action Area, primarily in the Ukumehame section, and 3 nēnē nests each year, all in Ukumehame except for 1 nest in Olowalu in 2024 (DOFAW 2025, in litt.). Not all nests may have been detected, we estimate there are fewer than 6 nest per year in the Action Area. In March of 2023, Service biologists observed a nēnē with several goslings at the Ukumehame firing range in the vicinity of the proposed viaduct (Harrington and Yrigoyen 2023, in litt.). In February of 2024, an anonymous worker at the Ukumehame firing range reported seeing multiple nēnē within a temporary work site and shared photos with the Service (Figure 8). While the nēnē habitat in the Action Area is largely degraded, there are habitat features that provide for life history needs of nēnē. Nēnē graze and browse on the leaves, seeds, flowers, and fruits of at least 50 native and nonnative grasses, sedges, composites, and shrubs (Banko et al. 2020 and references within). Native plants used by nēnē that are found in the Action Area include naupaka kahakai (*Scaevola taccada*) for foraging and nesting under, ʻilima (*Sida fallax*) for foraging and nesting under, and ʻaʻaliʻi (*Dodonaea viscosa*) for nesting under (Service 2004, Appendices B and C). Nēnē will nest under a variety of native and nonnative shrubs and trees, including the nonnative haole koa (*Leucaena leucocephala*), which is abundant in the Action Area (Banko et al. 2020). Further, proximity to water is an important factor during molting (Leopold and Hess 2013, p. 17) and there is approximately 21.4 acres of wetland habitat in and around Ukumehame within the Action Area (H.T. Harvey and Associates 2024, p. 11). Because there may be 30 nēnē (15 pairs) in the Action Area, up to 30 nests (2 nest attempts per pair) per year may occur.

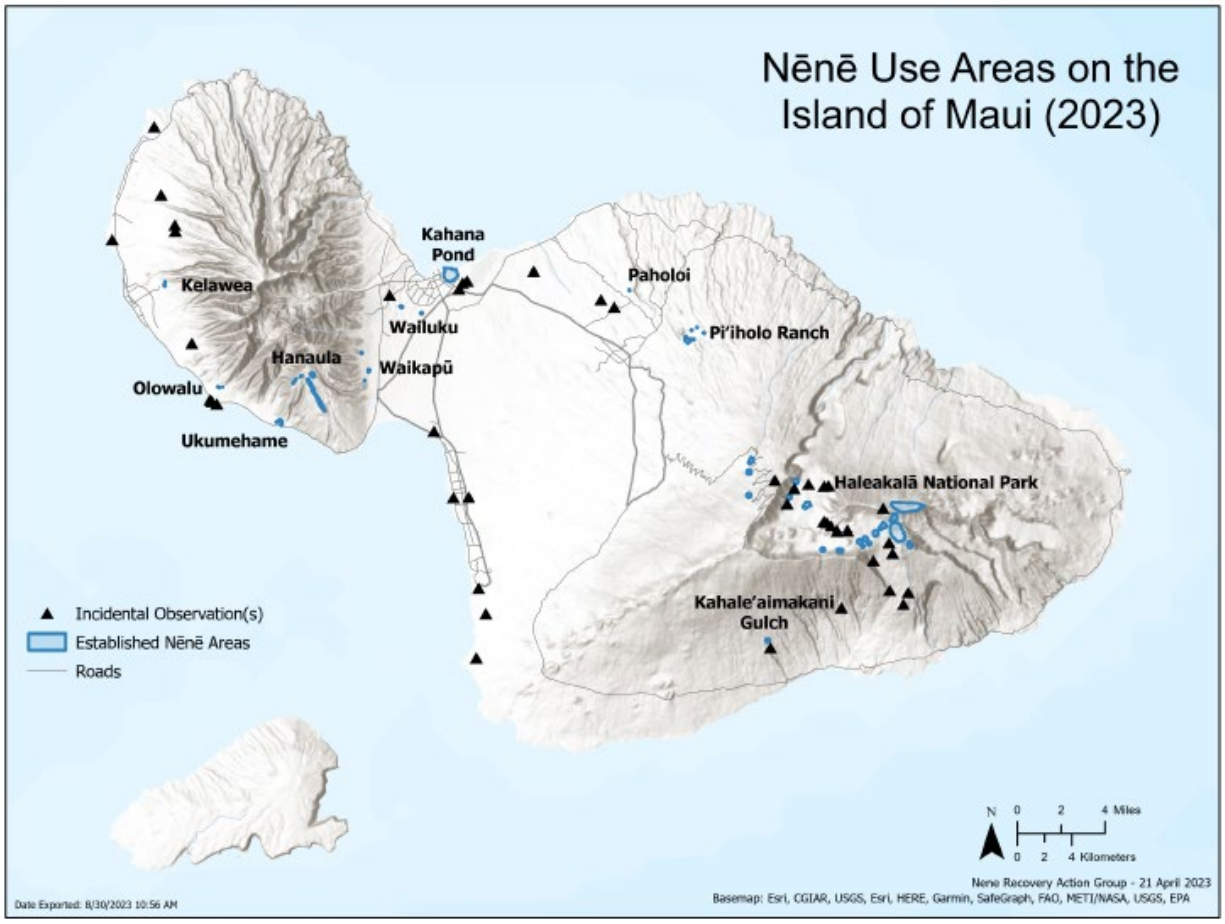


Figure 8. Nēnē Recovery Action Group's 2023 nēnē use areas on Maui.



Figure 9. Nēnē at Ukumehame firing range: (a) Two nēnē in the middle of the parking lot and temporary work site in the daytime; (b) Three nēnē in the middle of the parking lot and temporary work site, at night.

Factors affecting the environment for nēnē within the action area: nēnē are at risk from several threats in the area. Eggs, goslings, and molting adults are at risk of depredation due to the presence of mammalian predators (e.g., mongooses, rats, pigs, and feral cats); all life stages are at risk of poisoning from toxins (e.g., lead) in the soil, water, and air at and around the firing range; eggs crushed by Axis deer or feral pigs; and all life stages are at risk from being run over or hit by a vehicle. Additionally, while nēnē have adapted to using nonnative plants, invasive nonnative plants are considered a threat to their habitat and life history needs (Service 2004, p. 23, 29-30). Despite these threats, there appears to be at least some successful breeding in or adjacent to the Ukumehame firing range; however, overall, nest failure is likely to be high in the Action Area due to ongoing predation and other uncontrolled threats (see Status of Nēnē section above).

Status of Aeʻo within the Action Area

The most recent data (Gorresen et al. 2024, entire) estimates the 5-year average number of aeʻo on Maui is 499 birds [350-699 95 percent CI]. This is approximately one third of the statewide 5-year average (1,511 aeʻo [1,317-1,718 95 percent CI]). The initial biological survey for the Project documented four aeʻo in wetland habitat at the Ukumehame firing range (Figure 5). Service biologists have also recently observed a half dozen or so aeʻo in the Ukumehame area. Two Service funded surveys from the late 1990s reported between 20 and 30 aeʻo at the firing range, including adults and subadults (Young 1996 and Harper 1997, cited in Pacific Environmental and Information Technologies, LLC 2001, p. 4-14). During site visits to the Ukumehame firing range in 2023 and 2024, Service biologists observed several aeʻo; however, during 2023, 2024, and winter 2025 biannual waterbird surveys, DOFAW reported zero aeʻo in Ukumehame and surrounding areas within the Action Area (DOFAW 2025, in litt.). There are multiple shallow perennial and ephemeral wetlands with adjacent mudflats and sparse or low growing vegetation in and around the Ukumehame firing range, providing desirable foraging and nesting habitat for aeʻo. There is approximately 21.4 acres of wetland habitat in the Action Area (H.T. Harvey and Associates 2024, p. 13). While no nests or chicks have been observed in the Ukumehame wetland areas, it is probable that some nesting does occurs. Because there may be up to 4 aeʻo in the Action Area, up to 4 nests per year (2 nest attempts per pair) may occur.



Figure 10. Aeʻo in wetland habitat the Ukumehame firing range (photo credit: H.T. Harvey and Associates, 2023).

Factors affecting the environment for aeʻo within the action area: Eggs and chicks are at risk of depredation due to the presence of mammalian predators (e.g., mongooses, rats, pigs, and feral cats); all life stages are at risk of poisoning from toxins (e.g., lead) in the soil, water, and air at and around the firing range; eggs crushed by Axis deer or feral pigs; nonnative plants degrading habitat quality; and all life stages are at risk from being run over or hit by a vehicle. Nest failure is likely to be high in the Action Area due to ongoing predation and other uncontrolled threats as in similar unmanaged habitat (See Status of Aeʻo section above).

EFFECTS OF THE ACTION

Nēnē and aeʻo are known to occur throughout the action area, primarily within the wetland habitat in and adjacent to the Ukumehame firing range (Figure 1). Nēnē are known to nest in the vicinity of the Ukumehame firing range and it is highly probably that aeʻo do as well, especially after heavy rain. The proposed action is expected to affect both species at all life stages. Direct adverse effects to nēnē and aeʻo are anticipated to occur due to the location and timing of the action occurring during each of their respective breeding seasons (nēnē September through April, aeʻo March through September). Federal Highway Administration activities are anticipated to start in late 2025, with the goal of being completed and operational by 2031. The likely impacts to both species occurring from the proposed action include: (1) accidental crushing by vehicles, equipment, or construction/staging materials; (2) nest or brood disturbance from humans, vehicles, equipment, vibrations, and noise associated with Project activities; (3) attractive nuisance created by the stormwater detention ponds near the temporary roads and realigned highway; and (4) temporary loss of habitat. Species specific affects are outlined below.

Effects of the Action on Nēnē

1) Accidental crushing of nēnē by vehicles, equipment, or construction/staging materials

Nēnē in the Action Area may be difficult to see and may be run over by vehicles or heavy equipment or crushed by construction/staging materials. However, we expect that because a qualified biologist will train project personnel through the Environmental Awareness training to identify and avoid interactions with nēnē, in all life stages, it will help to minimize unintentional crushing of adults, nests, and goslings when using vehicles or heavy machinery. Additional conservation measures that will minimize unintentional crushing of adults, nests, and goslings include implementing a biological survey prior to initiating work and after any delay of 72 hours or more, buffering around all discovered nests or broods, installing large temporary orange signs reminding workers of nēnē in the Action Area and to drive 15 mph (10 mph in Ukumehame area), and installing permanent yellow signs alerting drivers on the new road about the presence of nēnē.

Despite all of the conservation measures noted here and above, given the enormous size of the proposed Action Area, the broad scope of the proposed action (e.g., multiple staging areas, excavation, construction of large water crossings and stormwater detention ponds, and hundreds of workers), and project duration (6-years) unintentional crushing of nēnē, nests, and/or broods by vehicles, equipment, or construction/staging materials is likely to occur leading to injury or mortality. Because nēnē broods may suddenly appear unexpectedly and some nēnē nests may go undiscovered, a construction vehicle or equipment could run over a nest with egg(s), gosling(s), or adult(s). Additionally, construction or staging materials could crush a nest with egg(s), gosling(s), or adult(s). Vehicles, equipment, or construction/staging materials accidentally crushing nēnē is expected to be a rare occurrence, and by implementing the conservation measures, we expect it will continue to be rare. Up to 2 nēnē (1 pair) and 2 nēnē nests or 4 goslings may be injured or killed over the duration of the Project due to accidental crushing by vehicles, equipment, or construction/staging materials.

2) Disturbance of nests or broods

Construction that occurs during the nēnē breeding season is likely to disturb nēnē nest(s) and/or brood(s). If an adult is flushed from its nest, it may lead to nest abandonment or exposure of the eggs or goslings to predators (short term effects), thus resulting in loss of reproduction (long term effect). Although nēnē have an extended breeding season with eggs reported from all months except May, June, and July (Banko et al. 1999, p. 12), the majority of birds in the wild nest between October and March (USFWS 2004, p. 19). Nesting peaks in December and most goslings hatch from December to January (Banko et al. 1999, p. 12). As much as possible, a 150 ft buffer will be placed around nēnē nests/broods. Conservation measures will minimize adverse effects by having a qualified biologist implement a biological survey prior to initiating work and after any delay of 72 hours or more, installing large yellow signs reminding workers of nēnē in the Action Area and to drive 15 mph (10 mph in Ukumehame area), and establishing and implementing an Environmental Awareness training program for all on-site workers to identify nēnē in the Action Area and avoid and minimize adverse effects. However, given the enormous size of the proposed Action Area, the broad scope of the proposed action, and duration of the proposed Project, disturbance of nest and brood is likely to result in adverse effects including injury or mortality.

The proposed Project may cause disturbance of nests or broods resulting from exposure to elevated noise levels during construction activities. Noise could also impact molting adults since they cannot fly away from the noise. The effects of exposure to sound vary with the frequency, intensity, duration of the sound source, and the hearing characteristics of the affected animal. While data on the physiological impacts of noise on nēnē is limited, it indicates that noise can disturb nests and broods resulting in subsequent impacts such as reduced foraging and disrupted normal behaviors. Typical construction noise associated with the equipment used in the Project will be between 77 and 85 dBA at 50 ft (15 m) (FHWA 2017) and noise associated with existing average highway traffic at 50 ft (15 m) will be between 70 to 80 dBA (Corbisier 2003). Due to the size of the Action Area and scope of the activities, it is anticipated that noise will disturb nēnē nests and/or broods that occur within the Action Area, but avoidance and minimization measures (e.g., surveys, on-site training, and buffer areas) will minimize the disturbance on the birds.

Due to all the above risks associated with Project activities, up to 6 nests (12 eggs or goslings) may fail to survive per year due to disturbance of nests and broods leading to injury or mortality.

3) Attractive Nuisance

Approximately eight 1.0 ac stormwater detention ponds are proposed within the Action Area as part of the permanent features for the Project. While retaining water following heavy and/or long periods of rains, the ponds will attract nēnē because they are attracted to areas of standing water. Nēnē will forage and take refuge near standing water. The detention ponds will have chain linked fences around them for human safety, which may also keep out molting adult nēnē and goslings. The FHWA will also try to minimize the size and drain the ponds quickly to limit the time the ponds have standing water and are attractive to nēnē, along with balancing the function of the stormwater detention ponds, which are to limit runoff into the biologically and culturally important Olowalu reef. The eight 1.0 ac stormwater detention ponds will attract more nēnē to the proposed Project Action Area, and near temporary roads within the Action Area increasing the risk of vehicle strikes during construction (short term effect). Long term effects of the attraction and proximity to roadways to nēnē will be minimized by installing large permanent signs along the road alerting drivers about the presence of nēnē, fencing along some road sections, and installing diversion poles along both sides of the viaduct. Due to the increased risk of vehicle strikes associated with constructing 8 large stormwater detention ponds that will create an attractive nuisance for nēnē, up to 2 nēnē (1 pair) and 2 nests or 4 goslings may be injured or killed over the duration of Project activities.

4) Temporary and Permanent Habitat Loss

The Action Area is expansive and will temporarily greatly reduce foraging and nesting habitat for the nēnē that occupy the area, likely leading to reduced foraging and nesting, subsequently leading to reduced reproduction and weight loss. The most common cause of nēnē death is emaciation, and goslings are most susceptible (Work et al. 2015, p. 688). Molting adults and goslings are most at risk from temporary habitat loss since they cannot fly away to forage for food resources and nest in other areas.

According to the BA, temporary wetland habitat loss is estimated at 3.09 ac. This habitat would become available again after the project is completed, which is anticipated to occur at the end

2031. There will also be permanent loss of wetland habitat (estimated at 0.15 ac, not to exceed 0.3 ac) due to the placement of the new viaduct and associated permanent features. The viaduct also acts as a wildlife underpass, which could benefit nēnē by potentially reducing long term road disturbance, injury, or mortality to nēnē in the Ukumehame wetland area. Approximately 124 ac of both native and alien vegetation will be removed and lost including grasses, shrubs, immature trees, and mature trees, some of which nēnē rely on for foraging and/or nesting. Loss of habitat means less habitat for foraging and nesting.

Other temporary effects habitat includes discharge of construction materials, spills of hazardous liquids such as hydraulic oil, gasoline, and diesel fuel. These impacts would be mitigated with construction BMPs and cleanup procedures. Wetland habitat would also likely experience a temporary increase in sedimentation from disturbance during construction. Actual construction methods will be determined by the contractor, but it is anticipated that the installation of drill shafts would require dry work areas. To create dry work areas, the contractor would need to install a barrier such as a cofferdam and use pumps to remove existing water and pump out ground water infiltration. These activities would result in a temporary increase in sedimentation of wetland habitat. To reduce excess sedimentation, BMPs would be implemented to treat pumped water before discharging back into the wetland area.

While there are alternative foraging and nesting areas on Maui, nēnē have high site fidelity and we expect molting adults and goslings would occur in the Action Area and this loss of habitat may result in adverse effects in the form of injury or mortality of adults and nests, or goslings due to decrease in food resources. Similarly, the temporary loss of wetland habitat in Ukumehame may result in adverse effects on nēnē specifically in that area. Though the loss of foraging and nesting habitat is temporary, the disturbed habitat will be revegetated with native plants, which will increase wetland habitat prior to construction and the wetland habitat will again provide foraging and nesting habitat for nēnē.

Due to the above outlined adverse effects associated with habitat loss, up to 2 adult nēnē (1 pair) and 2 nests or 4 goslings may be injured or killed due to decrease in food resources associated with temporary habitat loss resulting from Project activities.

Nēnē Response to the Proposed Action

There are approximately 30 nēnē (15 adult pair) in the Action Area, predominantly in and around the Ukumehame wetlands. Each nēnē family has two adults, and each brood has an average of 2 goslings. Nēnē mate for life and have high site fidelity. It is anticipated that up to 2 adult nēnē pairs, or 4 adult individuals, and subsequently 2 nests or 4 goslings, will be injured or killed over the duration of the Project due to accidental crushing by vehicles, equipment, or construction/staging materials; up to 6 nests or 12 eggs or goslings will be harassed or harmed leading to injury or mortality over the duration of the Project resulting from nest or brood disturbance associated with Project activities; up to 2 nēnē (1 pair) and 2 nests or 4 goslings may be injured or killed resulting from attractive nuisance created by the stormwater detention ponds near the temporary roads and realigned highway; and up to 2 adult nēnē (1 pair) and 2 nests or 4 eggs or goslings will be injured or killed due to decrease in food resources and nesting habitat resulting from temporary loss of habitat. Based on the information above, in total up to 8 adult nēnē (4 pairs), and 12 nests or 24 goslings may be injured or killed over the Project timeline.

This loss of 8 adults over the Project duration (6-years, 2026 through 2031) represents 20 percent of the local population in the Action Area, and 1.9 percent of the 429 nēnē on Maui, and less than 0.2 of the statewide population. The loss of 12 nests (24 goslings) out of the estimated 36 nests or 72 potential goslings (36 x 2) over the duration of the Project is approximately 33 percent of the nests and potential goslings in the Action Area. However, these nests are unlikely to be successful due to ongoing threats, primarily predation, and emaciation due to lack of food resources. Nēnē distribution is not expected to be reduced because of the proposed action.

Effects of the Action on Aeʻo

1) Accidental crushing of aeʻo by vehicles, equipment, or construction/staging materials

Aeʻo, particularly nests with eggs and/or chicks, in the Action Area may be difficult to see and may be run over by vehicles or heavy equipment or crushed by construction/staging materials. However, we expect that because a qualified biologist will train project personnel through the Environmental Awareness training to identify and avoid interaction with aeʻo, during all life stages, adverse effects resulting from unintentional crushing of adults, chicks, and eggs when using vehicles or heavy machinery will be minimized. Additional conservation measures that will minimize accidental crushing of adults, nests with eggs, and/or chicks include implementing a biological survey prior to initiating work and after any delay of 72 hours or more, buffering around all discovered nests or broods, installing large temporary orange signs reminding workers of aeʻo in the Action Area and to drive 15 mph (10 mph in Ukumehame area), and installing permanent yellow signs alerting drivers on the new road about the presence of aeʻo. Despite all the conservation measures noted here, and above, given the enormous size of the proposed Action Area and the broad scope of the proposed action (e.g., multiple staging areas, excavation, construction of large water crossings and stormwater detention ponds, and hundreds of workers) increases the risk of nest or brood disturbance resulting from Project activities. Because aeʻo broods may suddenly appear unexpectedly and some aeʻo nests may go undiscovered, a construction vehicle or equipment could run over a nest with egg(s), chick(s), or adult(s). Additionally, construction or staging materials could crush a nest with egg(s), chick(s), or adult(s). Vehicles, equipment, or construction/staging materials accidentally crushing aeʻo is expected to be a rare occurrence, and by implementing the conservation measures, we expect it will continue to be rare. Aeʻo eggs and chicks are more susceptible to crushing because they cannot fly away to avoid a construction vehicle, equipment, or construction/staging materials. Up to 1 aeʻo adult and 2 nests or 8 eggs or 8 chicks may be injured or killed over the duration of the Project due to accidental crushing by vehicles, equipment, or construction/staging materials.

2) Disturbance of nests or broods

Construction that occurs during the aeʻo breeding season is likely to disturb aeʻo nest(s) or brood(s). If an adult is flushed from its nest, it may lead to nest abandonment or exposure of the eggs or chicks to predators, thus resulting in loss of reproduction. Although aeʻo can breed year-round, the majority of birds nest from mid-February through August, with some observations of nesting as early as January and chicks fledging as late as September (Schwartz and Schwartz 1951, p. 505; Ueoka et al. 1978, pp. 10, 15; Coleman 1981, pp. 19, 24, 61; Chang 1990, p. 42; Morin 1998, p. 10; Gee 2007, p. 99). Each aeʻo family has 2 adults and the typical brood size is approximately 2 chicks (Reed et al. 1998, p. 37). Predation is a primary factor resulting in a lower survivability of eggs and chicks. Because it cannot be known which eggs would survive to produce chicks, for the purposes of this analysis eggs and chicks are equivalent.

Conservation measures will minimize adverse effects to aeʻo nests or broods such as establishing a 100-ft buffer around discovered aeʻo nests and broods. Additionally, a qualified biologist will implement a biological survey prior to initiating work and after any delay of 72 hours or more, installation of large orange signs throughout the Action Area during construction reminding workers of aeʻo in the Action Area and to drive 15 mph or slower (10 mph in wetland area), installation of permanent yellow signs along the realigned highway alerting drivers of the presence of aeʻo through Ukumehame, and establishment and implementation of an Environmental Awareness training program for all on-site workers to identify aeʻo in the Action Area and to avoid and minimize adverse effects to nests or broods. However, given the size and scope of the Project, the proposed activities will likely cause aeʻo to abandon their nests and expose the eggs or chicks to predators, resulting in nest failure.

The proposed Project may cause disturbance of nests or broods resulting from exposure to elevated noise levels during construction activities. The effects of exposure to sound vary with the frequency, intensity, duration of the sound source, and the hearing characteristics of the affected animal. While data on known physiological impacts of noise on aeʻo are limited, noise can result in nest and brood disturbance resulting in subsequent impacts such as reduced foraging and disrupted normal behaviors. In contrast, aeʻo can be resilient to elevated noise levels. At Nuʻu Pond, Marine Corps Base Hawaiʻi (MCBH), aeʻo reportedly have adapted to the noise at the base and appear unphased (MCBH 2017). Aeʻo have nested largely successfully at the managed Nuʻu Pond for decades. The effects of elevated noise levels on aeʻo vary. Typical construction noise associated with equipment used in the Project ranges between 77 and 85 dBA at 50 ft (15 m) (FHWA 2017) and noise associated with existing average highway traffic at the same distance is between 70 to 80 dBA (Corbisier 2003). Due to the size of the Action Area and scope of the activities, it is anticipated that noise will temporarily disturb aeʻo nests and/or broods that occur within the Action Area over the duration of the Project, but conservation measures (e.g., surveys, on-site training, and buffer areas) will minimize this disturbance on the birds.

At least 4 adult aeʻo or 2 pairs are currently known to inhabit the Action Area in the Ukumehame section. Aeʻo can have 2 nest attempts per year, so it is possible that up to 4 nests attempts could occur per year if nest success is adversely affected by Project activities. Therefore, the 4 adults or 2 aeʻo pairs may attempt up to 24 nests (4 nests/year x 6 years) over the Project's duration (6-years, 2026 through 2031). A typical aeʻo clutch is 4 eggs, which means up to 96 eggs or chicks could be adversely affected due to Project activities resulting from nest or brood disturbance. Because it cannot be known which eggs would survive to produce chicks, for the purposes of this analysis eggs and chicks will not be considered separately. The conservation measures outlined above are expected to decrease the impacts associated with nest and brood disturbances. Therefore, factoring in the risks associated with Project activities and conservation measures, up to 4 adult aeʻo (2 pairs) will be harassed by Project activities that disturb nests or broods over the duration of the Project resulting from humans, equipment, vehicles, and noise. Also, up to 12 nests or 48 eggs or chicks will be harmed leading to injury or mortality due to nest or brood disturbance resulting from Project activities over the duration of the Project.

3) Attractive Nuisance

Approximately eight 1.0 ac stormwater detention ponds are proposed within the Action Area as

part of the permanent features for the Project. Aeʻo are a resilient and resourceful bird and will forage at a wide variety of sites and nest at any newly created pond with adjacent mudflats, including areas of standing water at construction sites after a heavy rain. Because aeʻo appear to prefer nesting adjacent to open water where there is a slope of less than 6:1 (Reed et al. 2011, entire), FHWA's designs will ensure that the slope along the stormwater detention pond's boarder is 6:1 or greater to deter aeʻo from foraging and nesting along the border of the detention ponds. When retaining water following heavy and/or long periods of rains, the stormwater detention ponds will serve as an attractive nuisance to aeʻo. Aeʻo may forage, nest, rear young, or take refuge in the vegetation of areas containing temporary standing water. Shallow water (approximately 2-3 in) and wet mudflats are particularly important for foraging chicks.

The detention ponds will each have a chain linked fence around them for human safety, but these fences will not likely discourage foraging aeʻo. The FHWA will also make an effort to minimize the size and drain the ponds quickly to limit the time the ponds have standing water and are attractive to aeʻo, while at the same time balance the function of the stormwater detention ponds, which are to limit runoff. Because the detention ponds are being constructed in eight separate areas in the Action Area, in which there will be many temporary roads, aeʻo that are attracted to ponds have an increased risk of vehicle strikes during construction (short term effect). Long term effects attraction and the proximity of the roadways to aeʻo will be minimized by installing large signs along the road alerting drivers about the presence of aeʻo in the area, fencing along some road sections, and installing diversion poles on both sides of the viaduct. Due to the increased risk of vehicle strikes associated with constructing 8 large stormwater detention ponds that will create an attractive nuisance for aeʻo, up to 1 adult and 1 nest or 4 eggs or 4 chicks may be injured or killed from vehicle strikes over the Project timeline.

4) *Temporary and Permanent Habitat Loss*
The Action Area is expansive and will temporarily greatly reduce foraging and nesting habitat for aeʻo that occupy the area, likely leading to reduced foraging and nesting, subsequently leading to reduced reproduction and weight loss. According to the BA, temporary wetland habitat loss is estimated at 3.09 ac. There will also be permanent loss of wetland habitat (estimated at 0.15 ac, not to exceed 0.3 ac) due to the placement of the new viaduct and associated permanent features in Ukumehame wetlands. The viaduct also acts as a wildlife underpass, which could benefit aeʻo by potentially reducing long term vehicle disturbance, injury, or mortality to aeʻo in the Ukumehame wetlands area. Approximately 124 ac of both native and alien vegetation will be removed and lost including grasses, shrubs, immature trees, and mature trees. Loss of habitat means less habitat for foraging and nesting. Loss of foraging habitat is most important for newly hatched chicks since they are not physically able to fly to other wetlands on Maui.

Other temporary effects on habitat include discharge of construction materials, spills of hazardous liquids such as hydraulic oil, gasoline and diesel fuel. These impacts would be mitigated with construction BMPs and cleanup procedures. Wetland habitat would also likely experience a temporary increase in sedimentation from disturbance during construction. Actual construction methods will be determined by the contractor, but it is anticipated that the installation of drill shafts would require dry work areas. To create dry work areas, the contractor would need to install a barrier such as a cofferdam and use pumps to remove existing water and

pump out ground water infiltration. These activities would result in a temporary increase in sedimentation of wetland habitat. To reduce excess sedimentation, BMPs would be implemented to treat pumped water before discharging back into the wetland area.

Most of the wetland habitat loss is anticipated to be temporary, except for the foundation of the viaduct and supporting permanent features. While there are alternative foraging and nesting areas on Maui that provide higher quality habitat for aeʻo, such as Keālia NWR and Kanahā Pond, aeʻo may have site fidelity. A network analysis revealed strong evidence for fidelity among individual stilts to specific wetlands, indicating different groups of wetlands supported different birds (Paxton et al. 2022, p. 688). This suggests that temporary loss of wetland habitat in Ukumehame may result in adverse effects in the form of injury or mortality of nests or chicks due to decrease in food resources. Though the loss of foraging and nesting habitat is temporary, the disturbed habitat will be revegetated with native plants, which will increase the available wetland habitat prior to construction will again provide foraging and nesting habitat for aeʻo.

Due to the above outlined adverse effects associated with habitat loss, up to 2 nests or 8 eggs or chicks may be harmed leading to injury or mortality due to decrease in food resources associated with temporary habitat loss resulting from Project activities.

Aeʻo Response to the Proposed Action
Data indicate that there are at least 4 aeʻo (2 pairs) in the Action Area. Because aeʻo often attempt to nest a second time if their first nest fails, between the 2 pairs of aeʻo present in the Action Area, they could produce up to 4 nests per year over the duration of the Project. Therefore, up to 24 nests or 96 eggs (4 eggs/nest x 24 nests) or 96 chicks may occur in the Action Area over the 6-years. Each aeʻo family has 2 adults, and the typical brood size is approximately 2 chicks (Reed et al. 1998, p. 37). Because it cannot be known which eggs would survive to produce chicks, for the purposes of this analysis, eggs and chicks will not be considered separately.

Factoring in the risks associated with Project activities and the incorporation of conservation measures discussed above, it is anticipated that up to 1 aeʻo adult and 2 nests or 8 eggs or 8 chicks may be injured or killed over the duration of the Project due to accidental crushing by vehicles, equipment, or construction/staging materials; up to 4 adult aeʻo will be harassed by Project activities that disturb nests or broods over the duration of the Project resulting from humans, equipment, vehicles, and noise; up to 12 nests and 48 aeʻo eggs or chicks will be harmed leading to injury or mortality over the duration of the Project resulting from nest or brood disturbance associated with Project activities; up to 1 adult aeʻo, 1 nest or 4 eggs or chicks may be injured or killed resulting from attractive nuisance created by the stormwater detention ponds near the temporary roads and realigned highway; and 2 nests or 8 eggs or 8 chicks will be injured or killed due to temporary loss of habitat.

Therefore, based on the information above, the total amount of aeʻo take resulting from Project activities is 2 adult aeʻo, 17 nests, and 68 eggs or 68 chicks in the form of injury or mortality; and 4 adult aeʻo in the form of harassment not leading to physical injury, over the duration of the Project (2026 through 2031). The loss of 2 adult aeʻo constitutes the loss of 50 percent of the aeʻo in the Action Area, 0.4 percent of the aeʻo on Maui, and 0.13 percent of the aeʻo population

statewide. The loss of 68 eggs or chicks is 70 percent of the anticipated eggs or chicks in the Action Area resulting from the potential 24 nests. However, these nests are unlikely to be successful due to the ongoing presence of predators and other ongoing threats. Aeʻo distribution is not expected to be reduced because of the proposed action.

CUMMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. The Service is not aware of any future state, tribal, local, or private actions that are reasonably certain to occur within the action area at this time; therefore, no cumulative effects are anticipated.

CONCLUSION

Nēnē

The proposed Project is anticipated to have low impacts on nēnē reproduction and numbers. Up to 8 adults, 12 nests or 24 goslings may be injured or result in its mortality due to accidental crushing by a vehicle or heavy machinery due to Project activities, nest or brood disturbance, attractive nuisance, and/or habitat loss. The loss of 8 adults over the Project duration (6-years, 2026 through 2031) represents 27 percent of the local population in the Action Area, and 1.9 percent of the 429 nēnē on Maui, and less than 0.2 of the statewide population. The loss of 12 nests (24 goslings) out of the estimated 36 nests or 72 potential goslings (36 x 2) over the duration of the Project is approximately 33 percent of the nests and potential goslings in the Action Area. These nests are unlikely to be successful due to ongoing threats, primarily depredation and emaciation due to lack of food resources. This proposed Project is not expected to have population or species level impacts and is not expected to appreciably reduce the overall long term total population of nēnē, since the project impacts a small portion of the population. On the basis of these findings, the Service concludes that the effects of the subject action, taken together with cumulative effects, are not likely to appreciably reduce the likelihood of both the survival and recovery of the nēnē in the wild.

Aeʻo

The proposed Project is anticipated to have low impacts on aeʻo reproduction and numbers. Up to 2 adult aeʻo, 17 nests or 68 eggs or chicks in the form of injury or mortality; and 4 adult aeʻo in the form of harassment not leading to physical injury, over the duration of the Project (2026 through 2031). The loss of 2 adult aeʻo constitutes the loss of 50 percent of the aeʻo in the Action Area, 0.4 percent of the aeʻo on Maui, and 0.13 percent of the aeʻo population statewide. The loss of 68 eggs or chicks is 70 percent of the anticipated eggs or chicks in the Action Area resulting from the potential 24 nests. However, these nests are unlikely to be successful due to the ongoing presence of predators and other ongoing threats. Aeʻo distribution is not expected to be reduced because of the proposed action. This proposed Project is not expected to have population or species level impacts and is not expected to appreciably reduce the overall long-term total population of aeʻo since the project impacts a small portion of the population. Based on these findings, the Service concludes that the effects of the subject action, taken together with

cumulative effects, are not likely to appreciably reduce the likelihood of both the survival and recovery of the aeʻo in the wild.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary and must be undertaken by the FHWA so that they become binding conditions in order for the exemption in section 7(o)(2) to apply. The FHWA has a continuing duty to regulate the activity covered by this incidental take statement. If the FHWA (1) fails to assume and implement the terms and conditions or (2) fails to require any contractors to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to any permit or contract, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the FHWA must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement and reporting requirements below [50 CFR §402.14(i)(3)].

Amount or Extent of Take Anticipated

The Service anticipates that take of nēnē and aeʻo may occur in the form of harm due to injury, mortality, or capture because of activities described in this biological opinion. The Service believes that no more than the following number of nēnē and aeʻo will be incidentally taken because of the proposed action.

The Service anticipates the following take of nēnē:

- Up to eight (8) adults and 12 nests or 24 eggs or goslings may be taken in the form of harm due to injury or mortality from accidental crushing by a vehicle or heavy equipment, disturbance of nests or broods, attractive nuisance, and/or emaciation or starvation, during all phases of the duration (2026 through 2031) of the Honoapiʻilani Highway Realignment Project.

The Service anticipate the following take of aeʻo:

- Up to two (2) adults and 17 nests or 68 eggs or chicks may be taken in the form of harm due to injury or mortality from accidental crushing by a vehicle or heavy equipment, disturbance of nests or broods, attractive nuisance, and/or emaciation or starvation, during all phases of the duration (2026 through 2031) of the Honoapiʻilani Highway Realignment Project.

Effect of Take
After reviewing the status of nēnē and aeʻo, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the Honoapiʻilani Highway Realignment Project, as proposed, is not likely to jeopardize the continued existence of the nēnē or aeʻo.

Reasonable and Prudent Measures
The Service believes the following reasonable and prudent measure is necessary and appropriate to minimize impacts of incidental take of nēnē and aeʻo:

1. FHWA will minimize the potential for injury and mortality of nēnē during project activities.
2. FHWA will minimize the potential for injury and mortality of aeʻo during project activities.

Terms and Conditions
In order to be exempt from the prohibitions of section 9 of the Act, FHWA must comply with the following terms and conditions, which implement the reasonable and prudent measure described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

The following terms and conditions implement the reasonable and prudent measure to minimize the potential for injury or mortality of nēnē and aeʻo.

1. The on-call biologist will be notified by telephone and email immediately upon the discovery of an injured or dead nēnē or aeʻo in the Action Area. The on-call biologist will arrange for the bird(s) (or other listed animal species) to be picked up by DOFAW and provide guidance on temporary handling prior to DOFAW pickup. The on-call biologist will use the Service's SOP for handling and transporting injured birds or other listed animal species. The on-call biologist will provide PIFWO with a written notification using the Avian Injury/Mortality Form in Appendix D of the Opinion, summarizing the event, within 3 days and will contact and arrange for care from the Hawaiʻi Wildlife Center (HWC) or other permitted rehabilitation facility for any injured bird. Should transport to and care at the HWC or other permitted rehabilitation facility be necessary, HDOT would provide funds to facilitate necessary and appropriate actions. Care must be taken in handling any dead or injured specimens of proposed or listed species to preserve biological material in the best possible state. In conjunction with the preservation of any dead specimens, the finder has the responsibility to ensure that evidence intrinsic to determining the cause of death of the specimen is not unnecessarily disturbed. The

finding of dead or injured specimens does not imply enforcement proceedings pursuant to the Act. This reporting requirement enables the Service to determine if take has been reached or exceeded and to ensure that the terms and conditions are appropriate and effective.

a. FHWA shall submit an annual report to PIFWO within 45-days after each year-end in which Project actions occur. Annual reports will include all nēnē hazing activities, including the number of birds hazed during each hazing incident, the date and time, banding information (if available), and any other noteworthy behavioral observations and/or physical features and environmental conditions at the time. Annual reports will also include all observations of nēnē, aeʻo, and/or other listed birds (and any other listed species) in the Action Area, including number of individuals and/or nests, life stage, banding information (if relevant), brood structure (if relevant), date and time, any noteworthy behavioral observations or physical features on the species, environmental conditions at the time, and a detailed description of any incident(s) that resulted in take in the form of harm (injury), mortality, and capture using the Injury/Mortality Form in Appendix D. Lastly, the annual reports should include all of the conservation measures implemented each year. Upon the final year during which Project actions occur, a final report will be submitted to PIFWO within 45-days after the Project has been completed containing the annual report for the last year, followed by an analysis and summary of all the annual reports combined.
b. The depository designated to receive specimens that are found is the B.P. Bishop Museum, 1525 Bernice Street, Honolulu, Hawaiʻi, 96817 (telephone: 808/847-3511). If the B.P. Bishop Museum does not wish to accession the specimens, contact the Service's Division of Law Enforcement in Honolulu, Hawaiʻi (telephone: 808/861-8525; fax: 808/861-8515) for instructions on disposition.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. FHWA must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

Conservation Recommendations

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

The PIFWO recommends FHWA undertake the following conservation recommendations:

- Construction activities for this Project and similar future projects should be planned to take place outside of nēnē and aeʻo breeding seasons to the maximum extent practicable.
- FHWA collaborates with PIFWO to learn more about endangered and threatened species,

and the Section 7 Endangered Species Act consultation process.

In order for the PIFWO to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, PIFWO requests notification of the implementation of any conservation recommendations.

Reinitiation-Closing Statement

This concludes formal consultation on the action(s) outlined in this biological opinion. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and: (1) if the amount or extent of taking specified in the incidental take statement is exceeded; (2) if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or (4) if a new species is listed or critical habitat designated that may be affected by the identified action.

We appreciate your cooperation and assistance in helping us prepare this biological opinion. If you have any questions about this consultation, please contact Carrie Harrington, Fish and Wildlife Biologist, at carrie_harrington@fws.gov. When referring to this project, please include the following reference number: 2023_0041712-S7-001.

Sincerely,

Deputy Field Supervisor
Pacific Islands Fish and Wildlife Office

LITERATURE CITED

American Ornithologists' Union. 1998. Check-list of North American birds: The species of birds of North America from the Arctic through Panama, Including the West Indies and Hawaiian Islands. Prepared by the Committee on Classification and Nomenclature of the American Ornithologists' Union. Seventh Addition 1998. 694 pp. + Appendix.

Baker, H. and P.E. Baker. 1999. Nēnē Gosling Mortality in Haleakalā National Park, Maui, 1995/96 Breeding Season. Unpublished report to Hawai'i Division of Forestry and Wildlife; Honolulu, HI.

Banko, P.C., J.M. Black, and W.E. Banko. 2020. Hawaiian Goose (*Branta sandvicensis*), version 1.0. Birds of the World (A. F. Poole and F. B. Gill, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.hawgoo.01.

Banko, P.C., J.M. Black, and W.E. Banko. 1999. Hawaiian Goose (Nene). The Birds of North America, No. 434, A. Poole and F. Gill (editors). The Birds of North America, Inc., Philadelphia, PA.

Banko, P.C. 1992. Constraints on Productivity of Wild Nēnē or Hawaiian Geese *Branta sandvicensis*. Wildfowl 43:99–106.

Banko, P.C. 1988. Breeding Biology and Conservation of the Nēnē, Hawaiian Goose (*Nesochen sandvicensis*). Ph.D. dissertation, University of Washington, Seattle, WA. 255 pp.

Bard, A.M., H.T. Smith, E.D. Egensteiner, R. Muholland, T.V. Harber, G.W. Heath, W.J.B. Miller, and J.S. Weske. A simple structural method to reduce road-kills of royal terns at bridge sites. Wildlife Society Bulletin (1973–2006), Summer, 2002 30(2): 603–605.

Black, J.M. and P.C. Banko. 1994. Is the Hawaiian Goose (*Branta sandvicensis*) Saved from Extinction? Pages 394–410 in Creative Conservation-Interactive Management of Wild and Captive Animals (P. J. S. Olney, G. M. Mace, and A. T. C. Feistner, eds.). Chapman and Hall, London.

Black, J. M., J. Prop, J. M. Hunter, F. Woog, A. P. Marshall, and J. M. Bowler. 1994. Foraging Behaviour and Energetics of the Hawaiian Goose *Branta sandvicensis*. Wildfowl 45:65–109.

Chang, P.R. 1990. Strategies for managing endangered waterbirds on the Hawaiian National Wildlife Refuges. MS Thesis, University of Hawaii at Manoa. Department of Forestry and Wildlife Management. 106 p.

Coleman, R.A. 1981. The reproductive biology of the Hawaiian subspecies of the Black-necked Stilt, *Himantopus mexicanus knudseni*. Ph.D. dissertation, Pennsylvania State University, PA. 106 pp.

Corbisier, C. 2003. Living with Noise. US Department of Transportation, Federal Highway Administration. Public Roads 67(1). July/August 2003. https://www.fhwa.dot.gov/publications/publicroads/03jul/06.cfm.

County of Maui. 2022. West Maui Greenway Plan. https://www.westmauigreenway.org/.

County of Maui. 2022. Maui Dark Skies Ordinance 5434.

County of Maui. 2003. Re County of Maui Planting Guidelines. https://www.mauicounty.gov/242/Maui-Planting-Guidelines.

DeConto, R.M. and D. Pollard. 2016. Contribution of Antarctica to past and future sea-level rise. Nature 000: 1-7, + Methods and Extended Data Figures. DOI:10.1038/nature17145

Dibben-Young, A. K.C. Harmon, A. Lunow-Luke, J.L. Idle, D.L. Christensen, and M.R. Price. 2021. Cooperative breeding behaviors in the Hawaiian stilt (Himantopus mexicanus knudseni). Ecology and Evolution. 00:1–7. DOI: 10.1002/ece3.7509

Ducks Unlimited. 2022. Background information on DU's Hawaii conservation priority area. Available at: https://www.ducks.org/conservation/where-ducks-unlimited-works/hawaii/hawaii-more-information. Last accessed May 2, 2022

Engilis, Jr., A. and T. K. Pratt. 1993. Status and population trends of Hawaii's native waterbirds, 1977-1987. The Wilson Bulletin 105(1): 142-158.

Gee, H.K.W. 2007. Habitat characteristics of refuge wetlands and taro lo'i used by endangered waterbirds at Hanalei NWR, Hawaii. MS Thesis, South Dakota State University. 154 pp. (including Appendices 1 through 24)

Giambelluca, T.W. 2013. Hawaii's rainfall patterns. *In* Rainfall Atlas of Hawaii, Geography Department, University of Hawaii at Manoa, Honolulu. 8 pp. http://rainfall.geography.hawaii.edu/rainfall.htm, accessed 13 APR 2015.

Giambelluca, T.W., Diaz, H.F., and M.S.A. Luke. 2008. Secular temperature changes in Hawaii (abstract). Geophysical Research Letters 35: 1.

Golledge, N.R., D.E. Kowalewski, T.R. Naish, R.H. Levy, C.J. Fogwill, and E.G.W. Gasson. 2015. The multi-millennial Antarctic commitment to future sea-level rise. Nature 526: 421-424 + Methods and Extended Data Figures. DOI: 1038/nature15706.

Gorresen, Marcos P., Richard J. Camp, and Eben H. Paxton. 2024. Distribution and trends of endemic Hawaiian waterbirds, 1986–2023. Hawai'i Cooperative Studies Unit Technical Report HCSU-113. University of Hawai'i at Hilo. 40 pages. http://hdl.handle.net/10790/5396.

Grant, G. 1982. Avian incubation: egg, temperature, nest humidity, and behavioral thermoregulation in a hot environment. Department of Biology, University of California, Los Angeles. ISBN: 0-943610-30-3.

[FHWA] Federal Highway Administration. 2025. Manual on Uniform Traffic Control Devices. https://mutcd.fhwa.dot.gov/.

[FHWA] Federal Highway Administration. 2017. Construction Noise Handbook. https://www.fhwa.dot.gov/Environment/noise/construction_noise/handbook/handbook09.cfm.

[FHWA] Federal Highway Administration. 2009. Chapter 4c. Traffic Control Signal Needs Studies *In* Manual on Uniform Traffic Control Devices for Streets and Highways. U.S. Department of Transportation, Federal Highway Administration.

Harmon, K.C., N.H. Wehr, and M.R., Price. 2021a. Seasonal patterns in nest survival of a subtropical wading bird, the Hawaiian Stilt (Himantopus mexicanus knudseni). PeerJ 9:e10399

Harmon, K.C., K.B. Winter, N. Kurashima, C.H. Fletcher, H.H. Kane, and M.R. Price. 2021b. The roles of indigenous practices in expanding waterbird habitat in the face of rising seas. Anthropocene 34 (2021) 100293.

Henshaw, H.W. 1902. Birds of the Hawaiian Islands, Being a Complete List of the Birds of the Hawaiian Possessions, with notes on their habits. Thos. G. Thrum, Honolulu, HI. 146 pp.

[HDOT] Hawai‘i Department of Transportation. 2022. Permanent Best Management Practices (PBMPs) – Inspection & Maintenance. https://www.stormwaterhawaii.com/wp-content/uploads/2022/07/2015-Storm-Water-Management-Permanent-Best-Management-Practices-Manual-for-projects-initiated-prior-to-July-1-2022.pdf.

[HDOT] Hawai‘i Department of Transportation. 2011. Highway Manual for Sustainable Landscape Maintenance. https://hidot.hawaii.gov/highways/landscape-architecture-program/.

Hess, S.C. 2011. The nene: Hawaii’s iconic goose, a mixed bag of successes, setbacks, and uncertainty. The Wildlife Professional. The Wildlife Society, Fall 2011.

Hoshide, H.M., A.J. Price, and L. Katahira. 1990. A Progress Report on Nēnē *Branta sandvicensis* in Hawai‘i Volcanoes National Park from 1974–89. Wildfowl 41:152–155.

H.T. Harvey and Associates. 2024. Biological Survey Report Supplement for the Honoapi‘ilani Highway Realignment Project. Prepared for the FHWA in cooperation with HDOT. October 2024. Prepare by H.T. Harvey and Associates Ecological Consultants. 17 pp.

Idle, Jessica L. 2023. Ae‘o (Hawaiian stilt, Himantopus mexicanus knudseni) reproduction and survival. Master Thesis. Natural Resources and Environmental Management. University of Hawai‘i at Manoa. 24 pp.

Intergovernmental Panel on Climate Change (IPCC). 2023. Sections. In: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee

and J. Romero (eds.)]. IPCC, Geneva, Switzerland, pp. 35-115, doi: 10.59327/IPCC/AR6-9789291691647.

IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. In Press.

Intergovernmental Panel on Climate Change (IPCC). 2014. Summary for policymakers. *In* Climate Change 2014, Impacts, Adaptation, and Vulnerability, Part A: global and sectoral aspects. Working Group II contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge. 32 pp.

Jacobson, S. 2005. Mitigation measures for highway-caused impacts to birds. U.S. Department of Agriculture [USDA], Forest Service General Technical Report PSW-GTR-191. 2005.

Kane, H.H. 2014. Temporal and spatial patterns of sea-level rise impacts to coastal wetlands and other ecosystems. MS, University of Hawaii at Manoa, Department of Geology and Geophysics. May 2014. 39 pp.

Kawasaki, M.T., Hart, P.J. and Paxton, E.H., 2020. Frequent Use of Upland Habitats by the Endangered Hawaiian Stilt (*Himantopus mexicanus knudseni*). *Waterbirds*, *42*(4), pp.431-438.

Liao, W., O.E. Timm, C. Zhang, C.T. Atkinson, D.A. LaPointe, and M.D. Samuel. 2015. Will a warmer and wetter future cause extinction of native Hawaiian forest birds? Global Change Biology 21: 4342-4352.

Loope, L. and T.W. Giambelluca. 1998. Vulnerability of island tropical montane cloud forests to climate change, with special reference to east Maui, Hawaii. Climate Change 39: 503–517.

Lynch, A.J., L.M. Thompson, E.A. Beever, D.N. Cole, A.C. Engman, C.H. Hoffman, S.T. Jackson, T.J. Krabbenhoft, D.J. Lawrence, D. Limpinsel, R.T. Magill, T.A. Melvin, J.M. Morton, R.A.Newman, J.O. Peterson, M.T. Porath, F.J. Rahel, G.W. Schuurman, S.A. Sethi, and J.L. Wilkensing. 2021. Managing for RADical ecosystem change: applying the Resist-Accept-Direct (RAD) framework. Frontiers in Ecology and the Environment. 19(8): 461–469. doi:10.1002/fee.2377.

Meehl, G.A., A. Hu, C. Tebaldi, J.M. Arblster, W.M. Washington, H. Teng, B.M. Sanderson, T. Ault, W.G. Strand, and J.B. White III. 2012. Relative outcomes of climate change mitigation related to global temperature versus sea-level rise. Nature Climate Change 2: 576-580. DOI: 10.1038/NCLIMATE1529

[MCBH]. Marine Corps Base Hawaii. 2017. Integrated Natural Resources Management Plan Update (2017-2021). Environmental Compliance and Protection Department; Kanehoe Bay, HI. 406 pp.

Morton, J. 2019. Resisting, Accepting, or Directing Change: a new way to think about climate adaptation. Presentation on the Resist-Direct-Accept framework for conservation planning and implementation in light of climate change, given by John Morton, Kenai National Wildlife Refuge, USFWS.

Munro, G.C. 1944. Birds of Hawai‘i. Tongg Publishing Company, Honolulu, HI. 192 pp.

Natural Resources Conservation Service (NRCS). 2007. Biology Technical Note – No. 16 Nene habitat enhancement and management. 14 pp. + appendices.

Ohashi, T.J. and T.A. Burr. 1977. Description of waterbird habitats as related to food availability and feeding behavior of endangered waterbird species on the island of Kauai and Oahu. Hawaii Statewide non-game and endangered species program, Progress Report, Project No. W-18-R-2, Job No. R-III-D, July 1, 1976 to June 30, 1977.

Olsen, Penny & Allen, T. 1997. The Trials of Quarry-Nesting Peregrine Falcons. *Australian Field Ornithology*. 17. 87–90.

Pacific Birds Habitat Joint Venture. 2024. Strategic Plan for Hawai‘i Wetlands. Prepared by H. Raine, M. McFarlin, and M. Iglecia (PBHJV); and J. Idle and K. Harmon (Hawaiian Islands Conservation Collective. 327 pp.

Pacific Environmental and Information Technologies, LLC. 2001. Final environmental assessment and conservation and landscape management plan for the Ukumehame Firing Range, Lahaina, Maui. Prepared for the Hawai‘i Army National Guard, State of Hawaii. 110 pp.

Paxton, Eben H., Brinck, Kevin, Henry, Adonia, Siddiqi, Afsheen, and Rounds, Rachel. 2021. Distribution and trends of endemic Hawaiian waterbirds. Waterbirds 44(4): 425–437.

Perkins, R.C.L. 1903. Vertebrata. Pages 365–466 *in* D. Sharp (editor). Fauna Hawaiiensis, Vol. 1, Part IV. The University Press, Cambridge, U.K.

Polhemus, D. 2015. The effects of climate change on wetlands in the Main Hawaiian Islands, An initial assessment. Pacific Islands Fish and Wildlife Service (USFWS-PIFWO) and Pacific Islands Climate Science Center. doi: https://doi.org/10.21429/C9890F 49 pp.

Price, M.R., and K.C. Harmon. 2019. Habitat use of Hawaiian waterbirds in Kawainui Marsh. Technical Report for the Department of Land and Natural Resources, Division of Forestry and Wildlife. Department of Natural Resources and Environmental Management, University of Hawaii at Manoa; Honolulu, HI.

Rave, E.H., Cooper, A., Hu, D., Swift, R., and K. Misajon. 2005. Population and reproductive trends of Nene *Branta sandvicensis* in Hawaii Volcanoes National Park, 1989-1999. Wildfowl 55: 7−16.

Reed, J.M., N. Fefferman, C.S. Elphick, D.W. DesRochers, and M. Silbernagle. 2011. Software for optimal wetland design for endangered Hawaiian waterbirds. MESHH: Managing endangered species habitat in Hawaii, Version 1.0. 19 Pp.

Reed, J.M., C.R. Field, M.D. Silbernagle, A. Nadig, K. Goebel, A. Dibben-Young, P. Donaldson, and C.S. Elphick. 2014. Application of the complete-data likelihood to estimate juvenile and adult survival for the endangered Hawaiian stilt. Animal Conservation 18(2): 176-185.

Reed, J.M., E.M. Gray, D. Lewis, L.W. Oring, R. Coleman, T. Burr, and P. Luscomb. 1999. Growth patterns of Hawaiian Stilt chicks. The Wilson Bulletin III (4): 478−487.

Reed, J.M. and L.W. Oring. 1993. Long-term population trends of the endangered Aeo (Hawaiian Stilt, *Himantopus mexicanus knudseni*). Transactions of the Western Section of the Wildlife Society 29: 54−60.

Rocke, T.E. and M.D. Samual. 1999. Water and sediment characteristics associated with avian botulism outbreaks in wetlands. The Journal of Wildlife Management 63(4): 1249−1260.

Schuurman, G.W., C.H. Hoffman, D.N. Cole, D.J. Lawrence, J.M. Morton, D.R. Magness, A.E. Cravens, S. Covington, R. O'Malley, and N.A. Fisichelli. 2022. Resist-Accept-Direct (RAD)−A framework for the 21st century natural resource manager. Natural Resource Report NPS/NRSS/CCRP/NRR−2020/2213. National Park Service, Fort Collins, Colorado. https://doi.org/10.36967/nrr-2283597. 30 pp.

[Service] U. S. Fish and Wildlife Service. 2022. Nationwide Avian Roadside BMPs.

[Service] U.S. Fish and Wildlife Service. 2020. Aeo or Hawaiian stilt (*Himantopus mexicanus knudseni*) Five-year Status Review. U.S. Fish and Wildlife Service, Portland, Oregon. March 2020. 26pp.

[Service] U.S. Fish and Wildlife Service. 2011. Recovery Plan for Hawaiian waterbirds, Second Revision. U.S. Fish and Wildlife Service, Portland, Oregon. xx+233 pages.

[Service] U.S. Fish and Wildlife Service. 2005. Draft revised recovery plan for four endangered Hawaiian waterbirds, Second draft of second revision. USFWS, Portland, Oregon. 155 Pp.

[Service] U. S. Fish and Wildlife Service. 2004. Draft Revised Recovery Plan for the Nēnē or Hawaiian Goose (*Branta sandvicensis*). U.S. Fish and Wildlife Service, Portland, OR. 161 pp.

Shallenberger, R. J. 1977. An ornithological survey of Hawaiian wetlands, Volume 1a. Ahuimanu Productions, Honolulu, Hi. Contract No. DACW 84-77-C-0036. U. S. Army Corps of Engineers. 133 Pp.

Smith, J.D. 1952. The Nēnē Restoration Program. Journal of Wildlife Management 16:1–9.

Spada, C., J.L. Bamber, and R.T.W.L. Harkmans. 2013. The gravitationally consistent sea-level fingerprint of future terrestrial ice loss. Geophysical Research Letters 40: 482−486.

State of Hawai‘i. 1998. Hawai‘i Climate Change Action Plan. Energy, Resources, and Technology Division, Dept. of Business, Economic Development & Tourism and the Clean Air Branch, Dept. of Health, State of Hawaii. Honolulu: 1997.

Stejneger, L. 1887. Birds of Kauai Island, Hawaiian Archipelago, collected by Mr. Valdemar Knudsen, with descriptions of new species. Proceedings of United States National Museum. Smithsonian Institution, Washington, D.C., January 13, 1887. Pp. 75−102.

Sweet, W.V., B.D. Hamlington, R.E. Kopp, C.P. Weaver, P.L. Barnard, D. Bekaert, W. Brooks, M. Craghan, G. Dusek, T. Frederikse, G. Garner, A.S. Genz, J.P. Krasting, E. Larour, D. Marcy, J.J. Marra, J. Obeysekera, M. Osler, M. Pendleton, D. Roman, L. Schmied, W. Veatch, K.D. White, and C. Zuzak, 2022: Global and Regional Sea Level Rise Scenarios for the United States: Updated Mean Projections and Extreme Water Level Probabilities Along U.S. Coastlines. NOAA Technical Report NOS 01. National Oceanic and Atmospheric Administration, National Ocean Service, Silver Spring, MD, 111 pp. https://oceanservice.noaa.gov/hazards/sealevelrise/noaa-nos-techrpt01-global-regional-SLR-scenarios-US.pdf.

Sweet, W.V., R. Horton, R.E. Kopp, A.N. LeGrande, and A. Romanou. 2017: Sea level rise. In: Climate Science Special Report: Fourth National Climate Assessment, Volume I [Wuebbles, D.J., D.W. Fahey, K.A. Hibbard, D.J. Dokken, B.C. Stewart, and T.K. Maycock (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 333-363.

[TNC] The Nature Conservancy, Hawai‘i and Palmyra. 2025. Increasing resilience of coral reefs and coastal communities in Olowalu, Maui, by managing land-based sediments. Prepared by K. Falinksi, M. Ane, E. Fielding, N. Sampson, and T. Farnsworth for the Office of Conservation, Restoration Center, NOAA Fisheries, U.S. Department of Commerce.

Underwood, J.G., M. Silbernagle, M. Nishimoto, and K.J. Uyehara. 2014. Non-native mammalian predator control to benefit endangered Hawaiian waterbirds. Proceedings of the 26th Vertebrate pest Conference. R.M. Timm and J.M. O’brien, Eds. University of California, Davis Publishing. 39pp.

Underwood, J.G., M. Silbernagle, M. Nishimoto, and K. Uyehara. 2013. Managing conservation reliant species: Hawaii’s endangered endemic waterbirds. PLos One 8(6): e67872. Doi:10.1371/journal.pone.0067872. 9pp.

U.S. Global Change Research Program (US-GCRP). 2009. Global climate change impacts in the United States. T.R. Karl, J.M Melillo, and T.C. Peterson (eds.), Cambridge University Press, Cambridge. 188 pp.

van Rees, C., C. Elphick, and J.M. Reed. 2022. Assessing extinction risk, conservation reliance, and down-listing potential for two endangered Hawaiian waterbirds. Avian Conservation and Ecology 17(1). https://www.ace-eco.org/vol17/iss1/art29/.

van Rees, C.B., G. Surya, and J.M. Reed. 2020. Multiple sources of evidence of density dependence in the endangered Hawaiian stilt (*Himantopus mexicanus knudseni*). Population Ecology, 2020;1-13. https://doi.org/10.1002/1438-390X.12037.

Van Vuuren, D.P., Edmonds, J., Kainuma, M., Riahi, K., Thomson, A., Hibbard, K., Hurtt, G.C., Kram, T., Krey, V., Lamarque, J.F. and Masui, T., 2011. The representative concentration pathways: an overview. Climatic change, 109(1-2), p.5.

Woog, F. and J.M. Black. 2001. Foraging Behavior and the Temporal Use of Grasslands by Nēnē: Implications for Management. Studies in Avian Biology 22:319–328.

Work, T.M., Dagenais, J., Rameyer, R., and R. Breeden. 2015. Mortality patterns in endangered Hawaiian geese (nene, *Branta sandvicensis*). Journal of Wildlife Diseases 51: 688–695.

WSP 2005. Biological Assessment for the Proposed Honoapi‘ilani Highway Realignment Project on the island of Maui. WSP.

Zhang, J., Peng, W., Tang, W., & Wang, M. 2017. Experimental Study on the Geometrical and Mechanical Properties of Goose Eggshells. Revista Brasileira de Ciência Avícola, 19(3), 455–463.

84 FR 69918; December 19, 2019. Endangered and Threatened Wildlife and Plants; Reclassifying the Hawaiian Goose from Endangered to Threatened with a Section 4(d) Rule. U.S. Fish and Wildlife Service. Final Rule. Docket No. FWS-R1-ES-2017-0050, 69918–69947.

84 FR 44976; August 27, 2019. Regulations for Interagency Cooperation. U.S. Fish and Wildlife Service, Interior; National Marine Fisheries Service, National Oceanic Atmospheric Administration, Commerce. Docket FWS-HQ-ES-2018-0009, 44976–45017.

32 FR 4001; March 11, 1967. Native Fish and Wildlife. Endangered Species. U.S. Department of the Interior.

50 CFR 402.02. Code of Federal Register. Title–50 Wildlife and Fisheries. Chapter IV–Joint Regulations (USFWS, Department of Interior and NMFS, NOAA, Department of Commerce); Endangered Species Committee Regulations. Subchapter A. Part 402–Interagency Cooperation–Endangered Species Act of 1973, as Amended. Subpart A–General. July 1, 2025.

In Litteris

Climate Institute. 2011, in litt., Oceans & sea level rise. 9 pp. *http://www.climate.org/topics/sea-level/index.html*, accessed 29 AUG 2011.

[DOFAW] Hawai‘i Department of Land and Natural Resources, Division of Forestry and Wildlife. 2025, in litt. Nēnē and ae‘o observations in the ahupua‘a of Ukumehame and surrounding areas on Maui. Provided to the Service in July 2025.

[FHWA] Federal Highway Administration. 2025, in litt. Note to file with minutes from an in person meeting on Thursday, July 3, 2025, between the USFWS and FHWA regarding avoidance and minimization measures being implemented by FHWA for the Honoapi‘ilani Highway Realignment Project on Maui.

Harrington, C. and Yrigoyen, J. 2023, in litt. Observations of nēnē with goslings at the Ukumehame firing range on Maui in March 2023. Note to file.

Nadig, A. 2022, in litt. Email response from Aaron Nadig (USFWS) to Carrie Harrington (USFWS) regarding wetland salinity in Hawaii. May 3, 2022.

[NRAG] Nēnē Recovery Action Group, in litt. 2024. Population numbers of Nēnē across Hawa‘i with details on Maui distribution. Email from Annie Marshall (USFWS biologist) to Carrie Harrington (USFWS biologist) regarding Nēnē population numbers and Maui distribution. May 22, 2024.

Smith, D.G. and J.T. Polhemus. 2003. Habitat use and nesting activity by the Hawaiian Stilt (*Himantopus mexicanus knudseni*) and Hawaiian Moorhen (*Gallinula chloropus sandvicensis*) at the Hamakua Marsh State Wildlife Sanctuary, Kailua, Oahu. ‘Elepaio 60: 59−62.

Uyehara, K. 2018, in litt. Hanalei National Wildlife Refuge Endangered Waterbird Flood Assessment. April 21, 2018.

Webber, B., K. Uyehara, and T. Luxner. 2017, in litt. 2016-2017 Breeding phenology summary for nene (*Branta sandvicensis*).

Websites

Banko, P.C., J.M. Black, and W.E. Banko. 2020. Hawaiian Goose (*Branta sandvicensis*), version 1.0. Birds of the World (A. F. Poole and F. B. Gill, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.hawgoo.01.

Personal Communications

Goodale, Kelly. 2021, pers. comm. Telephone conservation between Kelly Goodale, USFWS NWR biologist at Pearl Harbor and James Campbell NWR, and Carrie Harrington, USFWS Ecological Services lead biologist for Hawaiian stilt downlisting rule, regarding nest success, fledglings, and recruitment at Pearl Harbor NWR and impacts of management on Hawaiian stilt breeding.

Nadig, A. 2021, pers. comm. Aaron Nadig (USFWS Manager) responses to questions from Carrie Harrington (USFWS Fish and Wildlife Biologist) regarding the Hawaiian stilt life history needs. Pacific Islands Fish and Wildlife Office, U.S. Fish and Wildlife Service, Honolulu, HI.

Nadig, A. 2017, pers. comm. Aaron Nadig (USFWS Manager) responses to questions from Carrie Harrington (USFWS Fish and Wildlife Biologist) regarding the Hawaiian stilt life history needs. Pacific Islands Fish and Wildlife Office, U.S. Fish and Wildlife Service, Honolulu, HI.

APPENDIX A – Informal Consultation

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawai‘i 96850

In Reply Refer To:
2023-0041712-S7-002

July 16, 2025

Ms. Richelle M. Takara
Division Administrator
Federal Highway Administration
U.S. Department of Transportation
300 Ala Moana Blvd., Rm 3-229
Honolulu, Hawai‘i 96850

Subject: Informal Consultation for the Proposed Honoapi‘ilani Highway Realignment Project on the island of Maui

Dear Ms. Takara,

The U.S. Fish and Wildlife Service (Service) Pacific Islands Fish and Wildlife Office received your letter dated March 10, 2025, requesting informal consultation for the proposed Honoapi‘ilani Highway Realignment Project along leeward Mauna Kāhālawai on Maui. You have determined that the proposed project may affect, but is not likely to adversely affect the following federally listed species:

- ‘Ōpe‘ape‘a or Hawaiian hoary bat (*Lasiurus cinereus semotus*)
- Hawaiian seabirds, including Hawai‘i Distinct Population Segment of the ‘akē‘akē or band-rumped storm-petrel (*Hydrobates castro*), ‘a‘o or Newell’s shearwater (*Puffinus newelli*), ‘ua‘u or Hawaiian petrel (*Pterodroma sandwichensis*)
- ‘Alae ke‘oke‘o or Hawaiian coot (*Fulica alai*) and koloa maoli or Hawaiian duck (*Anas wyvilliana*)
- Blackburn’s sphinx moth (*Manduca blackburni*)
- Honu or green sea turtle (*Chelonia mydas*) and honu ‘ea or Hawksbill sea turtle (*Eretmochelys imbricata*)
- Hawaiian yellow-faced bees, *Hylaeus anthracinus*, *H. assimulans*, *H. longiceps*, and *H. facilis*.

The findings and recommendations in this consultation are based on: (1) your consultation request and accompanying documents; (2) email correspondence between Service and Federal Highway Administration between March 10, 2025, and July 10, 2025; and (3) other biological information available to us. A complete administrative record is on file in our Pacific Islands

Fish and Wildlife Office in Honolulu, Hawai‘i. This response is in accordance with section 7 of the Endangered Species Act of 1973, as amended (ESA) (16 U.S.C. 1531 *et seq.*).

The Federal Highway Administration (FHWA) is providing Federal funding to the State of Hawai‘i Department of Transportation (HDOT) to support the realignment of Honoapi‘ilani Highway on Leeward Kāhālawai, Maui, between Milepost 11 in Ukumehame near Pāpalaua Beach Park and Milepost 17 in Launiupoko. This work is funded through a competitive BUILD grant, Federal aid (FHWA), congressionally earmark spending, and State funds.

Project Description

The project description and action area are the same as described for the formal consultation.

Conservation Measures

To avoid and minimize impacts to ‘ōpe‘ape‘a the following measures will be implemented:

- No woody plants greater than 15 feet tall will be disturbed, removed, or trimmed during the bat birthing and pup rearing season (June 1 through September 15).
- No barbed wire fencing will be used.

To avoid and minimize impacts to Hawaiian seabirds the following measures will be implemented:

- All outdoor lights will be fully shielded so the bulb(s) can only be seen from below.
- Automatic motion sensor switches and controls will be installed on all outdoor lights or lights will turn off when human activity is not occurring in the lighted area.
- Nighttime construction will not occur during the seabird fledging period, September 15 through December 15.

To avoid and minimize the likelihood of collision by Hawaiian seabirds the following measures will be implemented:

- For powerlines, guy-wires and other cables, exposure above vegetation height and vertical profile will be minimized.
- The tops of monopoles, cranes and crane wire/cables that extends above vegetation will be flagged.

To avoid and minimize project impacts to Hawaiian waterbirds the following measures will be implemented:

- In areas where waterbirds are known to be present, large visible signs will be posted to reduce speed limits, and all project personnel and contractors will be informed about the presence of endangered species on-site.
- A biological monitor (e.g., the on-call biologist) that is familiar with the species’ biology will conduct Hawaiian waterbird nest surveys where appropriate habitat occurs within the vicinity of the proposed project site prior to project initiation. Surveys will be repeated again within 72 hours days of project initiation and after any subsequent delay of work of 72 hours or more (during which the birds may attempt to nest). If a nest or active brood is found:
    - The Service will be contacted within 48 hours for further guidance.

  - A 100-foot buffer will be established and maintain around all active nests and/or broods until the chicks/ducklings have fledged. No potentially disruptive activities or habitat alteration will occur within this buffer.
  - The biological monitor (that is familiar with the species' biology) will be present on the project site during all construction or earth moving activities until the chicks/ducklings fledge to ensure that Hawaiian waterbirds and nests are not adversely impacted.

To avoid and minimize project impacts to Blackburn's sphinx moth the following measures will be implemented:

- A biologist familiar with the species will survey areas of proposed activities for Blackburn's sphinx moth and its larval host plants prior to work initiation.
  - Surveys should be conducted during the wettest portion of the year (usually November-April or several weeks after a significant rain) and within 4-6 weeks prior to construction.
  - Surveys should include searches for adults, eggs, larvae, and signs of larval feeding (chewed stems, frass, or leaf damage).
  - If moths, eggs, larvae, or native ʻaiea or tree tobacco over 3 feet tall, are found during the survey, the Service will be contacted within 48 hours for additional guidance to avoid impacts to this species.
- If no Blackburn's sphinx moth, ʻaiea, or tree tobacco are found during surveys, measures will be taken to avoid attracting Blackburn's sphinx moth to the project location and prohibiting tree tobacco from entering the site.
  - Tree tobacco less than 3 feet tall will be removed.
  - The site will be monitored every 4 to 6 weeks for new tree tobacco growth before, during, and after the proposed ground-disturbing activity.

To avoid and minimize project impacts to sea turtles and their nests the following measures will be implemented:

- Vehicle use on or modification of the beach/dune environment will not occur during the sea turtle nesting or hatching season (May to December).
- No native dune vegetation will be removed.
- A biologist or employee who has successfully completed the Environmental Awareness Program who is familiar with sea turtles will conduct a visual survey of the project site to ensure no basking sea turtles are present. The Service's standard avoidance and minimization measures solely allows for a biologist familiar with the species; however, the Environmental Awareness Program is a unique project feature that requires rigorous training of project staff.
  - If a basking sea turtle is found within the project area, cease all mechanical or construction activities within 50 meters until the animal voluntarily leaves the area. The Service's standard avoidance and minimization measures include a 100-foot buffer.
  - Cease all activities between the basking turtle and the ocean.
- Any project-related debris, trash, or equipment will be removed from the beach or dune if not actively being used.
- No project-related materials will be stockpiled in the intertidal zone, reef flats, sandy beach and adjacent vegetated areas, or stream channels.

To avoid and minimize project impacts to sea turtles from lighting the following measures will be implemented:

- Nighttime work will be avoided during the nesting and hatching season (May to December).
- Use of lighting will be minimized on or near beaches and all project-related lights will be shielded so the light is not visible from any beach.
    - If lights can't be fully shielded or if headlights must be used, the light source(s) will be fully enclosed with light filtering tape or filters.
- Design measures will be incorporated into the construction or operation of buildings adjacent to the beach to reduce ambient outdoor lighting such as:
    - tinting or using automatic window shades for exterior windows that face the beach;
    - reducing the height of exterior lighting to below 3 feet and pointed downward or away from the beach; and
    - minimizing light intensity to the lowest level feasible and, when possible, including timers and motion sensors.

To avoid and minimize project impacts to yellow-faced bees and their nests, the following measures will be implemented:

- If an action will occur in or adjacent to known occupied habitat, a buffer area around the habitat will be required and determined on a site-specific basis through consultation with the Service.
- For coastal species, all coastal strand habitat will be protected from human disturbance, including:
    - No fires or wood collecting.
    - Leave woody debris in place.
    - Restrict vehicles to existing roads and trails.

Additional conservation measures will be implemented:

- An Environmental Awareness Program will be established and implemented to train all on site personnel about the presence of listed species in the Action Area and associated avoidance and minimization measures. Employees that have completed the training will receive a sticker to be prominently displayed on their hardhat.
- To protect all listed birds in the Ukumehame wetlands, the highway section through the wetland will be a viaduct reaching approximately 20 feet at its peak height. The viaduct allows for birds to move across the wetland without having to cross a road. Further, the viaduct will have diversion poles as tall as the anticipated tallest vehicles on both sides to deter birds from flying across the road.
- Large visible signs will be placed around the Action Area during all phases of the project to inform employees about the presence of listed species in the project area and to reduce vehicle speed; and permanent signs will be placed along the completed highway through Ukumehame informing drivers that listed birds are in the area.

Analysis of Effects

ʻŌpeʻapeʻa
By incorporating the conservation measures described above for ʻōpeʻapeʻa, including not clearing trees or vegetation greater than 15 feet tall between June 1 and September 15, it is unlikely that ʻōpeʻapeʻa be harmed or killed because of project activities. Also, because barbed wire will not be used, it is unlikely that foraging ʻōpeʻapeʻa become entangled. Therefore, effects to ʻōpeʻapeʻa are discountable.

Hawaiian seabirds
By implementing the conservation measures described above, including avoiding nighttime construction during the seabird fledging season from September 15 through December 15, fully shielding all outdoor lights, ensuring lights are only visible from below, and turning off lights when human activity is not occurring in the area, it is unlikely that Hawaiian seabirds become attracted to lights, become disoriented, and fallout, resulting in injury or mortality. Additionally, because the 2022 Maui Dark Skies Ordinance will be implemented, it is unlikely that Hawaiian seabirds become attracted to lights. Lastly, because flagging will be added to the tops of monopoles, cranes and crane wire/cables, and fencing that extends above vegetation, it is unlikely that Hawaiian seabirds will collide with these structures. Because impacts from the proposed project are unlikely, effects are considered discountable.

Hawaiian waterbirds: ʻalae keʻokeʻo and koloa maoli
By implementing the above-described conservation measures, including conducting surveys shortly before starting on the ground Project activities by a biologist knowledgeable about the species' biology and again after any delay of work 72 hours or more, stopping work in areas where ʻalae keʻokeʻo and/or koloa maoli are present and creating a buffer around the birds, implementing the Environmental Awareness Program to educate all on-site workers about the presence or potential presence of listed species in the Action Area and associated conservation measures, and posting large reduced speed limit signs throughout the Action Area (15 mph in the greater Action Area, 10 mph in Ukumehame wetlands area), it is unlikely that adult ʻalae keʻokeʻo and koloa maoli be crushed by human or vehicular activities. Therefore, effects to ʻalae keʻokeʻo and koloa maoli are discountable.

Blackburn's sphinx moth
By implementing the conservation measures above, including conducting surveys for both Blackburn's sphinx moth and its larval host plants prior to starting construction activities by a biologist knowledgeable about the species' biology and contacting the Service immediately if moths, eggs, larvae, or native ʻaiea or tree tobacco over 3 ft tall are found, it is unlikely that Blackburn's sphinx moth larvae or eggs be crushed. Therefore, effects to the Blackburn's sphinx moth are discountable.

Sea turtles
Vehicle use or stockpiling project related materials on the beach or dune environment will be avoided during the Hawaiian sea turtle nesting or hatching season, it is unlikely that Hawaiian sea turtle nests or hatchlings will be crushed by human or vehicular activities. Nighttime lighting during the nesting and hatching season (mid-April to December) will not occur, it is unlikely that

Hawaiian sea turtles would become disoriented or deterred from nesting. Therefore, effects are discountable.

Hawaiian yellow-faced bees
By implementing the conservation measures above, including not working or placing staging areas on the beach or makai side of the highway, restricting vehicles to existing and designated temporary roads, avoiding collection of wood, avoiding starting fires, and leaving woody debris in place, it is unlikely that yellow-faced bees will be disturbed, and their nests be crushed by human or vehicular activities. Therefore, effects to yellow-faced bees are discountable.

Summary
We have reviewed our data and conducted an effects analysis of your project. Based on the project actions as described above and the incorporation of conservation measures, effects to listed species are unlikely to occur and are therefore considered discountable. Because impacts from the proposed action are considered discountable, the Service concurs with your determination that the proposed action may affect but is not likely to adversely affect ʻōpeʻapeʻa, Hawaiian seabirds, ʻalae keʻokeʻo, koloa maoli, Blackburn's sphinx moth, Hawaiian sea turtles (honu and honu ʻea), and Hawaiian yellow-faced bees.

Reinitiation of consultation is required and shall be requested by the Federal agency or by the Service, where discretionary Federal involvement or control over the action has been retained or is authorized by law and:

1) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered;
2) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the written concurrence; or,
3) If a new species is listed or critical habitat designated that may be affected by the proposed actions.

We appreciate your efforts to conserve protected species. If you have questions regarding this letter, please contact Carrie Harrington, Fish and Wildlife Biologist at carrie_harrington@fws.gov. When referring to this project, please include this reference number: 2023-0041712-S7-002.

Sincerely,

Deputy Field Supervisor
Pacific Islands Fish and Wildlife Office

APPENDIX B – Service BMPs for Work in or Around Aquatic Environments

U.S. Fish and Wildlife Service
Recommended Standard Best Management Practices (BMPs) For Work In or Around Aquatic Environment

The U.S. Fish and Wildlife Service (Service) recommends the following measures are incorporated into project planning to avoid or minimize impacts to fish and wildlife resources. Incorporation of these BMPs may reduce negative impacts to aquatic habitats from project construction-related activities. These BMPs are recommended in addition to, and do not over-ride any terms, conditions, or other recommendations prepared by the Service, other Federal, state, or local agencies. Please contact the Service Aquatic Ecosystems Conservation Program at 808-792-9400 with any questions.

1. Authorized dredging and filling-related activities that may result in the temporary or permanent loss of aquatic habitats should be designed to avoid indirect, negative impacts to aquatic habitats that extend beyond the planned project area.
2. Dredging/filling in the marine environment should be scheduled to avoid coral spawning and recruitment periods, and sea turtle nesting and hatching periods. Because these periods vary throughout the Pacific islands, we recommend contacting the relevant local, state, or Federal fish and wildlife resource agency for site specific guidance.
3. Turbidity and siltation from project-related work should be minimized and contained within the project area by silt containment devices and curtailing work during flooding or adverse tidal and weather conditions. The BMPs should occur for the life of the construction period until turbidity and siltation within the project area is stabilized. All project construction-related debris and sediment containment devices should be removed and disposed of at an approved site.
4. All project construction-related materials and equipment (i.e., dredges, vessels, backhoes, silt curtains, etc.) to be placed in an aquatic environment should be inspected for pollutants including, but not limited to; marine fouling organisms, grease, oil, etc., and cleaned to remove pollutants prior to use. Project related activities should not result in any debris disposal, nonnative species introductions, or attraction of nonnative pests to the affected or adjacent aquatic or terrestrial habitats. Implementing both a litter-control plan and a Hazard Analysis and Critical Control Point plan (HACCP – see https://www.fws.gov/policy/A1750fw1.html) can prevent attraction and introduction of nonnative species.
5. Project construction-related materials (i.e., fill, revetment rock, pipe, etc.) should not be stockpiled in, or in close proximity to aquatic habitats and should be protected from erosion (e.g., with filter fabric, etc.), to prevent materials from being carried into waters by wind, rain, or high surf.
6. Fueling of project-related vehicles and equipment should occur away from the aquatic environment and a contingency plan to control petroleum products accidentally spilled during the project should be developed. The plan should be retained on site with the person responsible for compliance with the plan. Absorbent pads and containment booms should be stored on-site to facilitate the clean-up of accidental petroleum releases.
7. All deliberately exposed soil or under-layer materials used in the project near water should be protected from erosion and stabilized as soon as possible with geotextile, filter fabric or native or non-invasive vegetation matting, hydro-seeding, etc.

APPENDIX C – Service General and Species-Specific Biosecurity Protocols

PIFWO General and Species-Specific Invasive Species Biosecurity Protocols
(Updated July 2024)

Project activities may introduce or spread invasive species, causing negative ecological consequences to new areas or islands, resulting in potential impacts to fish, wildlife, and their habitat. For example, seeds of invasive plant species (e.g., *Chromolaena odorata*, *Senecio madagascariensis*, *Cyathea cooperi*, or *Miconia calvescens*) can be inadvertently transported on equipment from a previous work site to a new site where the species are not present. Likewise, equipment used in an area infected with a pathogen or insect pest that can have ecological consequences (e.g., rapid ʻōhiʻa death (*Ceratocystis spp.*), black twig borer (*Xylosandrus compactus*), or naio thrips (*Klambothrips myopori*), if not properly decontaminated, can act as a vector to introduce the pathogen into a new area. Additionally, vehicles must be properly inspected and cleaned to ensure vertebrate or invertebrate pests do not stowaway and spread to other areas. These are just a few examples of how even well-intended project activities may inadvertently introduce or spread invasive species.

To avoid and minimize invasive species potential impacts to fish, wildlife, and their habitat we recommend incorporating general biosecurity protocols into your project planning (see below). Additional consultation is recommended if project activities involve transportation of materials, equipment, vehicles, etc. between islands or transpacific movement of materials or equipment.

Invasive Species Biosecurity Protocol

The following biosecurity protocol is recommended to be incorporated into planning for your project to avoid or minimize transportation of invasive species with potential to impact to fish, wildlife, and their habitat. Cleaning, treatment, and/or inspection activities are the responsibility of the equipment or vehicle owner and operator. However, it is ultimately the responsibility of the action agency to ensure that all project materials, vehicles, machinery, equipment, and personnel are free of invasive species before entry into a project site. Please refer to the resources listed below for current removal/treatment recommendations that may be relevant to your project.

1. Cleaning and treatment:
   Project applicants should assume that all project materials (i.e., construction materials, or aggregate such as dirt, sand, gravel, etc.), vehicles, machinery, and equipment contain dirt and mud, debris, plant seeds, and other invasive species, and therefore require thorough cleaning. Treatment for specific pests, for example, trapping and poison baiting for rodents, or baiting and fumigation for insects, should be considered when applicable. For effective cleaning we offer the following recommendations prior to entry into a project site:
   a. Project materials, vehicles, machinery, and equipment must be pressure washed thoroughly (preferably with hot water) in a designated cleaning area. Project materials, vehicles, machinery, and equipment should be visibly free of mud/dirt (excluding aggregate), seeds, plant debris, insects, spiders, frogs (including frog eggs), other vertebrate species (e.g., rodents, mongoose, feral cats, reptiles, etc.), and rubbish. Areas of particular concern include bumpers, grills, hood compartments, wheel wells, undercarriage, cabs, and truck beds. Truck beds with accumulated material are prime sites for hitchhiking invasive species.

   b. The interior and exterior of vehicles, machinery, and equipment must be free of rubbish and food, which can attract pests (i.e., rodents and insects). The interiors of vehicles and the cabs of machinery should be vacuumed clean particularly for any plant material or seeds.

2. Inspection:
   a. Following cleaning and/or treatment, project materials, vehicles, machinery, and equipment, must be visually inspected by its user, and be free of mud/dirt (excluding aggregate), debris, and invasive species prior to entry into a project site. For example, careful visual inspection of a vehicle's tires and undercarriage is recommended for any remaining mud that could contain invasive plant seeds.
   b. Any project materials, vehicles, machinery, or equipment found to contain invasive species (e.g., plant seeds, invertebrates, rodents, mongoose, cats, reptiles, etc.) must not enter the project site until those invasive species are properly removed/treated.

3. For all project site personnel:
   a. Prior to entry into the project site, visually inspect and clean your clothes, boots or other footwear, backpack, radio harness, tools and other personal gear and equipment for insects, seeds, soil, plant parts, or other debris. We recommend the use of a cleaning brush with sturdy bristles. Seeds found on clothing, footwear, backpacks, etc., should be placed in a secure bag or similar container and discarded in the trash rather than being dropped to ground at the project site or elsewhere.

4. Additional considerations:
   a. Consider implementing a Hazard Analysis and Critical Control Point (HACCP) plan (https://www.fws.gov/policy/A1750fw1.html) to improve project planning around reducing the risk of introducing or spreading invasive species.
   b. When applicable, use pest-free or low-risk sources of plants, mulch, wood, animal feed or other materials to be transported to a project site.
   c. For projects involving plants from nurseries (e.g., outplanting activities, etc.), all plants should be inspected, and if necessary, appropriately cleaned or treated for invasive species prior to being transported to the project site.
   d. Avoid unnecessary exposure to invasive species at a particular site (to the extent practical) to reduce contamination and spread. For example, if your project involves people or equipment moving between multiple locations, plan and organize timelines so that work is completed in native habitat prior to working in a disturbed location to reduce the likelihood of introducing a pest into the native habitat.
   e. Maintain good communication about invasive species risks between project managers and personnel working on the project site (e.g., conduct briefings and training about invasive species). Ensure prevention measures are communicated to the entire project team. Also consider adding language on biosecurity into contracts or permitting mechanisms to provide clarity to all involved in the project. Report any species of concern or possible introduction of invasive species to appropriate land managers.

For current removal/treatment recommendations please refer to the following:
Hawaiian Islands:

- Maui – https://mauiinvasive.org/

Species-Specific Biosecurity Protocols

The following section contains specific protocols for a few select invasive species of concern in the Pacific Islands highlighted because of their potential to easily spread and cause great harm to native species and habitats. Other invasive species may not have existing specific protocols or may already be minimized by implementing the general invasive species protocols above (e.g., invasive plants, invertebrates, larger vertebrates). Information on other invasive species can be found in the island specific links below. As new threats emerge that require development of species-specific protocols, those may be added to this list.

Table 1. Current island distribution of invasive species with specific biosecurity protocols in the Pacific Islands (PIFWO jurisdiction).

Island	Invasive Species with Specific Protocols			
	Rapid ʻŌhiʻa Death	**Little Fire Ant**	**Coconut Rhinoceros Beetle**	**Brown Treesnake**
Island of Hawaiʻi	widespread	widespread	detected in Waikoloa, Oct 2023 and Sept 2024	not present
Maui	present	incipient	detected in Kīhei, Sept and Nov 2023, not observed since but we recommend implementing related biosecurity BMPs	not present
Oʻahu	incipient	incipient	widespread	not present
Kauaʻi	widespread	not present	detected in May 2023	not present

Rapid ʻŌhiʻa Death (ROD)

If working directly with ʻōhiʻa trees (e.g., sampling suspected trees, clearing an area of ʻōhiʻa, etc.) or in an area(s) known to be highly infested with ROD, additional consultation is recommended.

Current Distribution of ROD: island of Hawaiʻi, Maui, Oʻahu, Kauaʻi
https://cms.ctahr.hawaii.edu/rod

While ROD is not currently reported on Molokaʻi at this time, if you are in ʻōhiʻa forest it would be prudent to take precautions. Also, consider where the equipment to be used on Molokaʻi will be coming from, and if from an island with confirmed ROD, take the necessary precautions.

Rapid ʻŌhiʻa Death (ROD) is a caused by a fungal pathogen (*Ceratocystis* spp.) that attacks and kills ʻōhiʻa trees (*Metrosideros polymorpha*). ʻŌhiʻa is endemic to the Hawaiian Islands and is the most abundant native tree species, comprising approximately 80 percent of remaining native forests in Hawaiʻi.

For more information about ROD including its current distribution, ROD science updates, and the latest on ROD protocol, please visit www.rapidohiadeath.org.

To reduce the risk of spreading ROD, the following best management practices and decontamination protocol are recommended:

Best Management Practices for ROD

1. Never transport any part of an ʻōhiʻa tree between different areas of an island or to a different island.
2. Do not use equipment from ROD infected islands on another island unless it is very specialized equipment and follows the decontamination protocol described below.
3. Avoid wounding ʻōhiʻa trees and roots with mowers, chainsaws, weed eaters, and other tools. If an ʻōhiʻa receives a minor injury like a small broken branch, then give the injury a clean, pruning type cut (close to the main part of the trunk or branch) to promote healing, and then spray the entire wounded area with a pruning seal.
4. Always report suspect ROD ʻōhiʻa trees observed within you project area. ROD is a wilt disease that cuts off the supply of water and nutrients to the tree. The primary symptom to look for is an entire canopy or a large branch with dying leaves or red discolored leaves. Please record the GPS coordinates and location and take a picture of the tree if possible. Please report suspected ROD ʻōhiʻa trees to the following agencies:
    a. Island of Hawaiʻi – BIISC: 808-969-8268 (ohialove@hawaii.edu)
    b. Maui – MISC: 808-573-6472 (miscpr@hawaii.edu)
    c. Molokaʻi – TNC: 808-553-5236 ext. 6585 (lbuchanan@tnc.org)
    d. Oʻahu – OISC: 808-266-7994 (oisc@hawaii.edu)
    e. Kauaʻi – KISC: 808-821-1490 (kisc@hawaii.edu)

ROD Decontamination Protocol

1. Clothes, footwear, backpacks, and other personal equipment
    a. Before leaving the project site, remove as much mud and other contaminants as possible. Use of a brush with soap and water to clean gear is preferred. Footwear, backpacks, and other gear must be sanitized by spraying with a solution of >70 percent isopropyl alcohol or a freshly mixed 10 percent bleach solution.
2. Vehicles, machinery, and other equipment
    a. Vehicles, machinery, and other equipment must be thoroughly hosed down with water (pressure washing preferred) and visibly free of mud and debris, then sprayed with a solution of >70 percent isopropyl alcohol or a freshly mixed 10 percent bleach solution. Use of a "pump-pot" sprayer is recommended for the solution and a hot water wash is preferred. Be sure to thoroughly clean the undercarriage, truck bed, bumpers, and wheel wells.
    b. If non-decontaminated personnel or items enter a vehicle, then the inside of the vehicle (i.e., floor mats, etc.) must be subsequently decontaminated by removing mud and other contaminants and sprayed with the one of the same aforementioned sanitizing solutions.

3. Cutting tools
    a. All cutting tools, including machetes, chainsaws, and loppers must be sanitized to remove visible mud and other contaminants. Tools must be sanitized using a solution of >70 percent isopropyl alcohol or a freshly mixed 10 percent bleach solution. One minute after sanitizing, one may apply an oil-based lubricant to chainsaw chains or other metallic parts to prevent corrosion as bleach is corrosive to metal.

NOTE: When using a 10 percent bleach solution, surfaces should be cleaned with a minimum contact time of 30 seconds. Bleach must be mixed daily and used within 24 hours, as once mixed it degrades. Bleach will not work to disinfect surfaces that have high levels of organic matter such as sawdust or soil. Because bleach is also corrosive to metal, a water rinse after proper sanitization is recommended to avoid corrosion.

Little Fire Ant (LFA)

For the most current status on distribution and infestations, please visit http://stoptheant.org/lfa-in-hawaii/

The little fire ant (*Wasmannia auropunctata*), or LFA, is an invasive species with a painful sting that can inhabit many different environments. In Hawai‘i, it often infests agricultural fields and farms, damaging crops and stinging unsuspecting workers. Little fire ants are also highly disruptive to native tropical ecosystems and harmful to wildlife. Slow moving, but tiny and capable of foraging 24 hours a day with multiple queens per colony, LFA is a formidable threat to biodiversity, agriculture, and quality of life on tropical islands in the Pacific.

For more information about LFA including helpful guides and workshops for treating or detecting LFA, please visit www.littlefireants.com.

To reduce the risk of spreading LFA, the following biosecurity protocol is recommended:

Biosecurity Protocol for LFA

1. For projects involving plants from nurseries (e.g., outplanting activities, etc.), all plants should be inspected for little fire ants and other pests prior to being transported to the project site. If plants are found to be infested by ants of any species, plants should be sourced from an alternative nursery and the infested nursery should follow treatment protocols recommended by the Hawai‘i Ant Lab (https://littlefireants.com/wp-content/uploads/2020-Management-of-Pest-Ants-in-Nurseries-min.pdf).
2. All work vehicles, machinery, and equipment should follow steps 1 and 2 in the “Invasive Species Biosecurity Protocol” for (1) cleaning and treatment and (2) inspection for invasive ants prior to entering a project site.
3. Any machinery, vehicles, equipment, or other supplies found to be infested with ants (or other invasive species) must not enter the project site until it is properly treated (https://littlefireants.com/how-to-treat-for-little-fire-ants-for-homeowners/#recommended-bait-products) and re-tested. Infested vehicles must be treated following recommendations by the Hawai‘i Ant Lab (https://littlefireants.com/resource-center/) or another ant control expert and in

accordance with all State and Federal laws. Treatment is the responsibility of the equipment or vehicle owner. Ultimately however, it is the responsibility of the action agency to ensure that all project materials, vehicles, machinery, and equipment follow the appropriate protocol(s).

4. General Vehicle Ant Hygiene: Even the cleanest vehicle can pick up and spread little fire ant. Place MaxForce Complete Brand Granular Insect Bait (1.0 percent Hydramethylnon; https://labelsds.com/images/user_uploads/Maxforce%20Complete%20Label%201-5-18.pdf) into refillable tamper resistant bait stations. An example of a commercially available refillable tamper resistant bait station is the Ant Café Pro (https://www.antcafe.com/). Place a bait station (or stations) in the vehicle and note that larger vehicles, such as trucks, may require multiple stations. Monitor bait stations frequently (every week at a minimum) and replace bait as needed. If the bait station does not have a sticker to identify the contents, apply a sticker listing contents to the station.
5. Gravel, building materials, or other equipment such as portable buildings should be baited using MaxForce Complete Brand Granular Insect Bait (1.0 percent Hydramethylnon; https://labelsds.com/images/user_uploads/Maxforce%20Complete%20Label%201-5-18.pdf) or AmdroPro (0.73 percent Hydramethylnon; https://connpest.com/labels/AMDROPRO.pdf) following label guidance.
6. Storage areas that hold field tools, especially tents, tarps, and clothing should be baited using MaxForce Complete Brand Granular Insect Bait (1.0 percent Hydramethylnon; https://labelsds.com/images/user_uploads/Maxforce%20Complete%20Label%201-5-18.pdf) or AmdroPro (0.73 percent Hydramethylnon; https://connpest.com/labels/AMDROPRO.pdf) following label guidance.
7. Vehicles that have entered a project site known or thought to overlap with areas infested with LFA should subsequently be tested for LFA with baiting in accordance with protocol recommended by the Hawai‘i Ant Lab (https://littlefireants.com/survey-your-home-for-lfa/).
8. If LFA are detected, please report it to 808-643-PEST (Hawai‘i), 671-475-PEST (Guam), or 684-699-1575 (American Samoa). Please visit https://littlefireants.com/identification-of-little-fire-ants/ for assistance in identifying LFA.

Coconut Rhinoceros Beetle (CRB)

Current Distribution of CRB in Hawai‘i: O‘ahu, detected on Maui in November 2023 but not observed since (there are ongoing search efforts: https://governor.hawaii.gov/newsroom/hdoa-news-release-on-on-going-efforts-against-the-coconut-rhinoceros-beetle-on-maui/)

The coconut rhinoceros beetle (*Oryctes rhinoceros*), or CRB, is a large, horned scarab beetle native to Southeast Asia. An invasive pest where it occurs outside of its native range, the adult beetles primarily attack coconut palms by boring into the crowns to feed on developing leaves. It is also known to feed on bananas, sugarcane, pineapples, oil palms, and pandanus trees. The larval grub stage burrow into and feed upon decomposing mulch and vegetation. On most Pacific Islands it lacks natural predators, leading to severe declines and extirpations of palm species where it has become established. On Guam, researchers have recently documented a shift of CRB to the island's native and threatened cycad tree (*Cycas micronesica*) (Marler et al. 2020). In the Hawaiian Islands, CRB is a documented threat to archipelago's native *Pritchardia* palm species.

For more information about CRB including the current situation in Guam and high/low-risk areas on O‘ahu, please visit http://cnas-re.uog.edu/crb/ or https://www.crbhawaii.org/.

To reduce the risk of spreading CRB, the following biosecurity protocol is recommended:

Biosecurity Protocol for CRB used on O‘ahu (most can be applied to Maui)

1. Never transport green waste between islands and minimize the creation, storage, and transport of green waste within O‘ahu, this also includes:
    a. Mulch, bark, compost
    b. Soil of any kind
    c. Potted plants of any kind

    Additional consultation is recommended if the project involves transportation of materials, soil, equipment, vehicles, etc. between islands.
2. If felling or trimming palms, contact CRB Response for a free inspection ((808) 679-5244 or email at info@crbhawaii.org).
3. Keep green waste whole until it is ready to be treated and removed.
    a. Chip green waste on site and transport it on the same day to a secure and managed green waste disposal site/facility.
    b. For chipped green waste in high-risk areas, re-chip prior to movement outside the infested area, treat with pesticide (when applicable), heat treatment (>130 degrees F), spread and dry, or store in sealed durable containers.
4. Minimize accumulations of green waste by regularly treating mulch piles or depositing it in sealed green waste bins. In low-risk areas, we also recommend thinly spreading mulch (less than 2 inches deep) and allowing it to dry (no irrigation).
5. If injured or dying coconut palm trees are observed or if CRB are detected, contact CRB Response at (808) 679-5244 or email at info@crbhawaii.org or online at https://www.crbhawaii.org/report.

APPENDIX D – Avian Injury/Mortality Form

Avian Injury/Mortality Form

Report Date:

Species (common name):

Date Found:

Time Found:

Age:

Bands:

Found by:

Documented by:

GPS Coordinates:

Location Found (including closest structure & distance to structure):

Condition of Specimen (include a description of general condition, as well as any visible injuries):

Probable Cause of Injury or Mortality and Supportive Evidence (attach photos and map, next page):

Action Taken (include notifications, reporting dates and times):

Additional Comments:

HONOAPIʻILANI HIGHWAY IMPROVEMENTS PROJECT,
WEST MAUI: UKUMEHAME TO LAUNIUPOKO

Appendix 3.13 – Climate Change and Sea Level Rise - Supplemental Information

November 2025

Prepared for

Honoapiʻilani Highway Improvements

Prepared by

wsp

November 2025

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Sea Engineering, Inc Sea Level Rise Wave Inundation Study

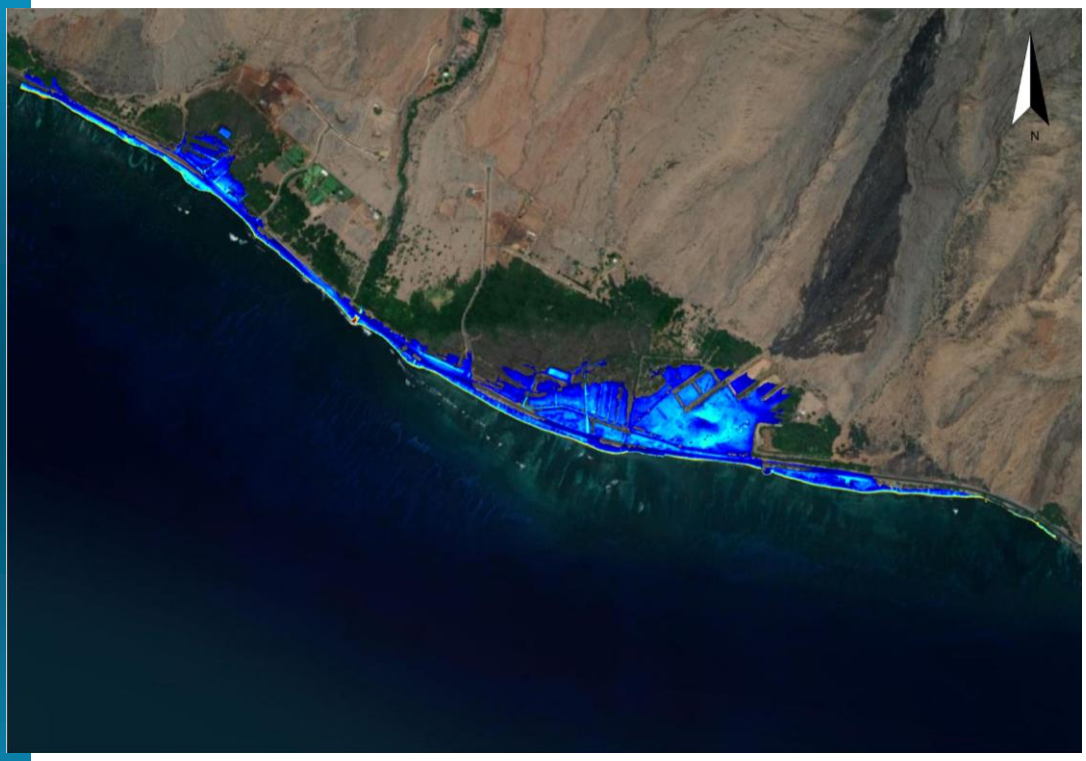
Sea Engineering, Inc
Sea Level Rise Wave Inundation Study

November 2025

Sea Level Rise Wave Inundation Study
Honoapiilani Highway Realignment

Honoapiilani Highway
Olowalu and Ukumehame, Maui, Hawaii

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EXECUTIVE SUMMARY

Sea Engineering, Inc. (SEI) has been contracted by WSP to conduct a sea level rise (slr) and wave inundation study for proposed roadway alignment alternatives along Honoapiilani Highway at Ukumehame and Olowalu, Maui. Four (4) alternative highway realignments are being proposed. Due to the low-lying nature of this portion of coastline, the alignment alternatives may be susceptible to future wave flooding with slr. Project tasks included a comprehensive summary of the current slr projections, review of existing Hawaii sea level rise data tools such as SLR-XA, site-specific numerical modeling of wave induced flooding for a future sea level of 0.98 m (3.2 ft) for existing topography and each of the four (4) highway realignment alternatives, summary of project area FEMA flood hazard zones, and general summary of coastal highway adaptation strategies. Key findings are summarized below.

Sea Level Rise Projections

Sea level rise projections are provided by the Intergovernmental Panel on Climate Change (IPCC) and the *Sea Level Rise and Coastal Flood Hazard Scenarios and Tools Interagency Task Force* ("Task Force"). Key guidance from the most recent IPCC AR6 and Task Force reports specific to Maui are the following:

- According to the new IPCC AR6 report, the most aggressive, plausible sea level rise scenario is the SSP5-8.5. On Maui, SSP5-8.5 projects that the sea level will rise 0.30 m (1.0 ft) by 2050, 0.50 m (1.7 ft) by 2070, and 0.96 m (3.2 ft) by 2100.
- The Task Force's *Intermediate* scenario projects sea level on Maui will rise 0.32 m (1.1 ft) by 2050, 0.57 m (1.9 ft) by 2070, and 1.21 m (4.0 ft) by 2100.
- The *Intermediate-High* scenario projects 0.40 m (1.3 ft) by 2050, 0.86 m (2.8 ft) by 2070, and 1.83 m (6.0 ft) by 2100.

In Hawaii, there is accepted guidance to use 0.98 m (3.2 ft) of slr as a planning target for 2100 with discussion of 1.83 m (6.0 ft) as an additional target in that time frame. The fifth IPCC report, AR5, was utilized when developing these guidelines. The most aggressive slr curve, resulting from the highest warming scenario (RCP8.5), was used to project this slr elevation (0.98 m [3.2 ft]) by the year 2100. The discussion for 1.83 m (6.0 ft) as an additional safety factor was developed around the 2017 Task Force *Intermediate-High* regional projection for Hawaii, which projected approximately 1.83 m (6.0 ft) of slr by 2100. This was revised in an important conclusion of the 2022 Task Force report. The 2022 report indicates that the Task Force's revised *Intermediate* rate is recommended for planning and design purposes in Hawaii. As outlined above, this projects 1.21 m (4.0 ft) by 2100.

SEI Numerical Modeling of Sea Level Vulnerability

The XBeach non-hydrostatic (XBeach-NH) numerical model was used to simulate nearshore wave propagation and wave-driven overland flooding of the study area. The model is two-dimensional and high resolution, and has been verified to produce accurate representations of wave heights and wave patterns across complex bathymetry, and is able to simulate wave-driven overland flooding for an input wave, sea level, and wind scenario. Model output includes flooding extent and corresponding maximum flood depths and elevations over the study area to assist in planning and design of proposed roadway alignments.

Three (3) individual XBeach-NH model grids were developed to encompass the study areas and proposed roadway alignments along the shoreline. Each model has a spatial resolution of 2 m (6.6 ft). Five (5) model topographies were input into the model to represent existing conditions and alternative highway alignments 1 through 4. Inputs to the model included the same annually recuring wave parameters that have been used in SLR-XA, the mean higher high water (mhhw) level of 0.35 m (1.1 ft) and slr of 0.98 m (3.2 ft) above mean sea level (msl), for a total still water input of 1.33 m (4.3 ft) above msl.

Based on the model results for the Olowalu region, highway alignment alternatives 3 and 4 are the least susceptible to potential flooding for the annual wave event where neither of these highway alignments are impacted by the modeled flooding. Highway alignment alternative 1 was found to be the most susceptible to potential flooding in the Olowalu region for an annual wave event where 45 m (148 ft) of highway is impacted.

Based on the model results for the Ukumehame region, highway alignment alternative 4 is the least susceptible to potential flooding for the annual wave event where only 227 m (745 ft) of highway is impacted. Highway alignment alternative 2 was found to be the most susceptible to potential flooding in the Ukumehame region for an annual wave event where 835 m (2,741 ft) of highway is impacted. The modeled flooding under the bridge crossing region in Ukumehame is not included in the length of highway impacted assuming the bridge structure is higher than the flood waters. However, bridge supporting elements (i.e. piles, abutments, etc.) may be exposed to flood hazards and would require engineered protection against potential scour and hydraulic loading. Based on these modeling results, if fill is to be used instead of a bridge structure, the fill embankment may be exposed to wave-driven and passive flooding and would require bank protection through armoring or other engineered means.

It should be noted that these results are representative of an annually occurring (1-year return period) south swell wave event. Flooding may be more severe for less frequent but larger wave events combined with higher sea levels.

FEMA Flood Hazards and FIRMs

The FEMA coastal hazard zone along the study area consists of Zones VE and AE with base flood elevations (BFEs) between 1.8 m (6 ft) and 3.4 m (11 ft) along the shoreline. All alternative alignments cross over the AE Zone at the southeast end of the study area with BFEs between 1.82 m (6 ft) and 2.7 m (9 ft). These flood levels and zones were defined by the greater of the inundation from a 1-percent chance tsunami or hurricane storm surge under existing topography and sea level.

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1. INTRODUCTION

Sea Engineering, Inc. (SEI) has been contracted by WSP to conduct a sea level rise (slr) and wave inundation study for proposed roadway alignment alternatives along Honoapiilani Highway on Maui shown in Figure 1-1. The project area includes sections of the highway at Ukumehame and Olowalu where four (4) alternative highway realignments are being proposed shown in Figure 1-2. Due to the low-lying nature of this portion of coastline, the alignment alternative may be susceptible to future wave flooding with slr. This report summarizes the current slr projections and numerical modeling of wave induced flooding under a discrete future sea level for existing topography and each of the four (4) highway realignment alternatives.

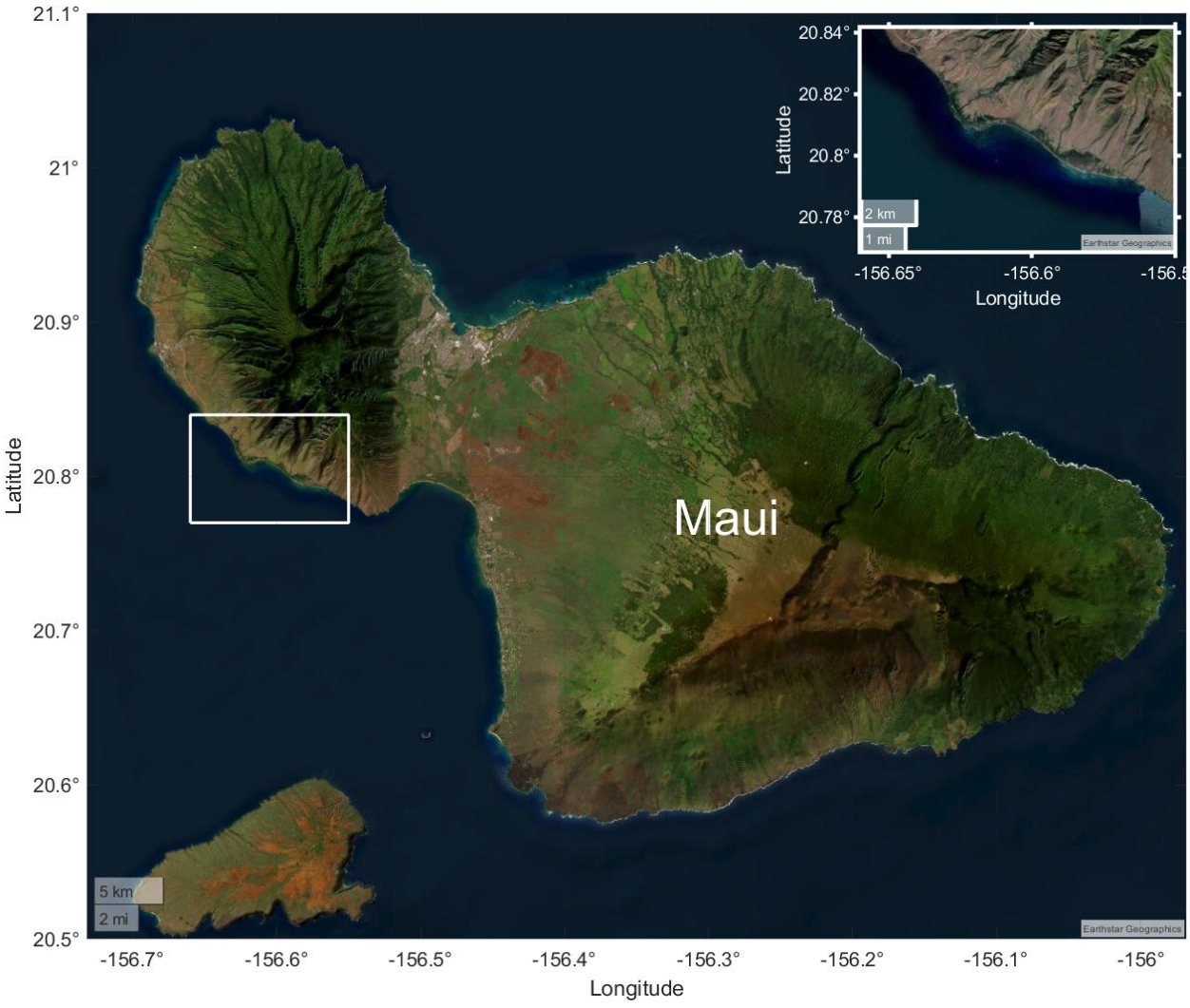


Figure 1-1. Project vicinity map

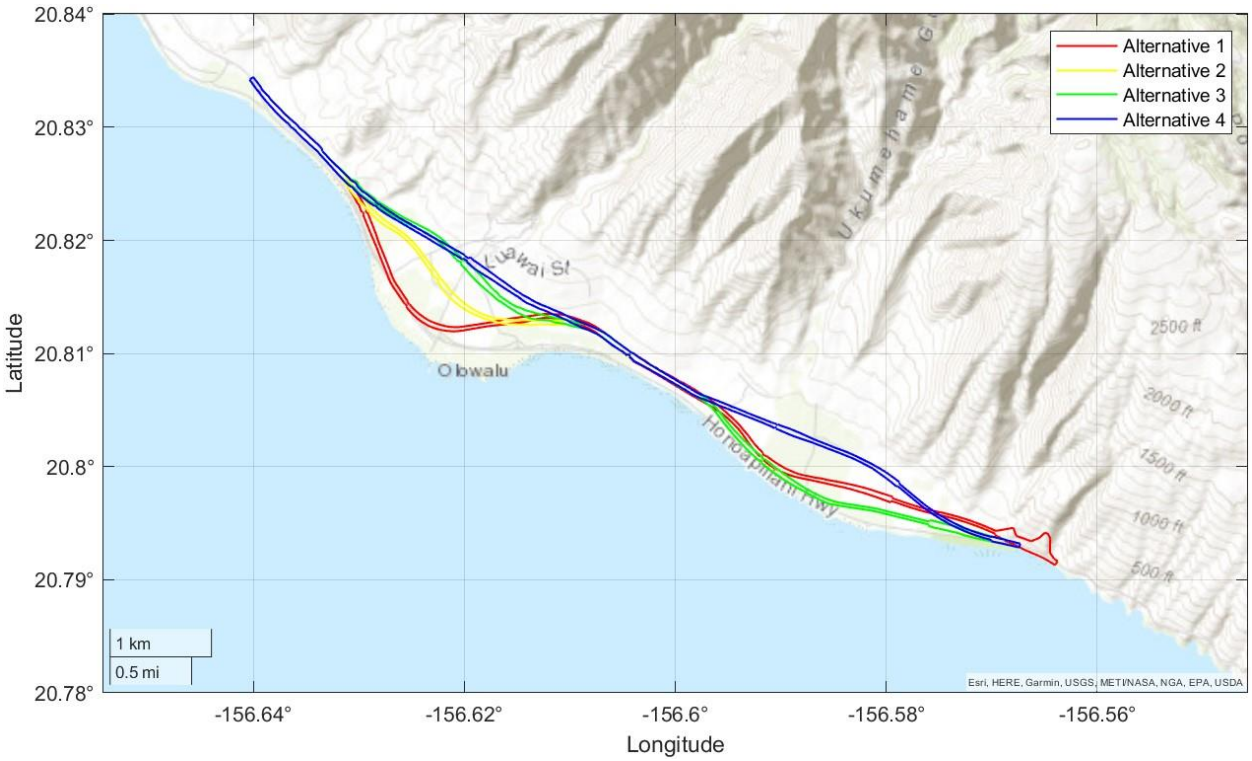


Figure 1-2. Proposed alternative highway realignments

2. SEA LEVEL RISE

2.1 Global Sea Level Rise Projections

Global mean sea level is the average height of the entire ocean surface. The present rate of global mean sea level change is +3.1 mm/yr (Sweet et al., 2022, Figure 2-1), where a positive number represents a rising sea level. Global mean slr has accelerated over preceding decades compared to the mean of the 20th century. Regional effects cause sea levels to increase in some parts of the planet while decreasing or remaining relatively stable in other areas. In the contiguous United States (U.S.), sea level has risen on average by 6.5 inches (in) since 1950 (Sweet et al., 2018). Factors contributing to the observed rise in sea level include melting of land-based glaciers and ice sheets and thermal expansion of the ocean water column.

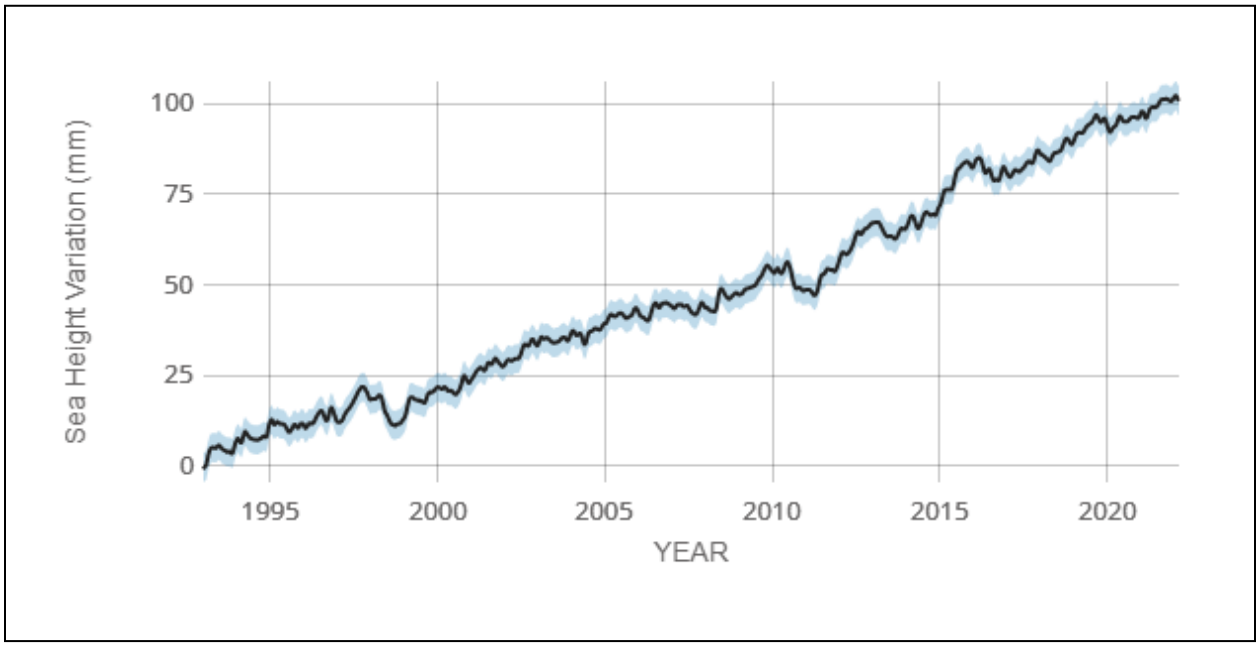


Figure 2-1. Global satellite sea level rise variability from 1993 to 2022 (Sweet et al.), where the black line shows the average sea level rise during the time period.

2.2 Maui Sea Level Rise Projections

Sweet et.al. (2017 and 2022) identify specific regions that are susceptible to a greater-than-average rise in sea level. Hawaii thus far has seen a rate of SLR (+1.55 mm/yr [0.06 in/yr]) less than the global average (+3.1 mm/year [0.12 in/yr]); however, this is expected to change in the future as Hawaii is in the "far-field" of the effects of melting land ice. This means that those effects have been significantly less in Hawaii compared to areas nearer to the ice melt. Over the next few decades, these effects will spread to Hawaii, which is then projected to experience a SLR greater than the global average.

The relative sea level trend for Kahului Harbor for the period of 1947 to present is shown in Figure 2-2 (NOAA, 2023). The relative sea level trend at Kahului Harbor is +2.22± 0.38 mm/yr (0.09± 0.01 in/yr). Figure 2-2 also shows interannual anomalies exceeding 15 cm (0.49 ft) in magnitude due to natural oceanic variability from processes such as the El Niño-Southern Oscillation (ENSO).

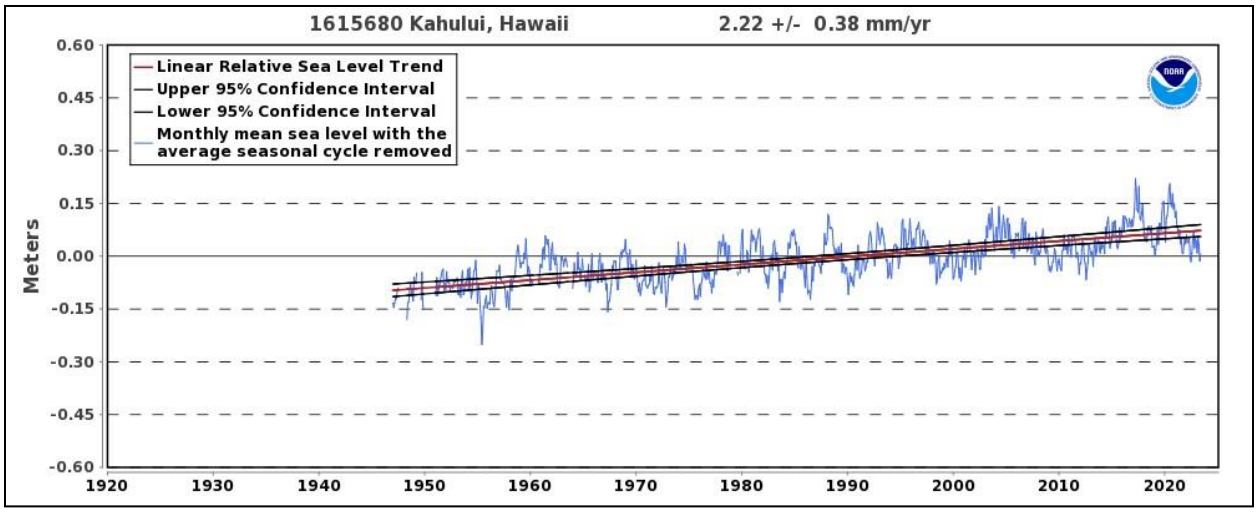


Figure 2-2. Mean sea level trend, Kahului Harbor, Station 1615680, 1947 to present (NOAA, 2023)

2.2.1 *IPCC AR6 - Kahului Sea Level Rise Projections*

The NASA slr projection tool[1] for the IPCC AR6 projections provides adjusted slr curves for individual tide stations around the globe. The IPCC AR6 slr curves for Kahului Harbor from 2020 to 2150 are shown in Figure 2-3 and Table 2-1. Projected timings of when slr reaches 0.98 m (3.2 ft) for each scenario are shown in Figure 2-4. Appendix A summarizes the background for the IPCC AR6 projections.

[1] https://sealevel.nasa.gov/ipcc-ar6-sea-level-projection-tool?psmsl_id=155&data_layer=scenario

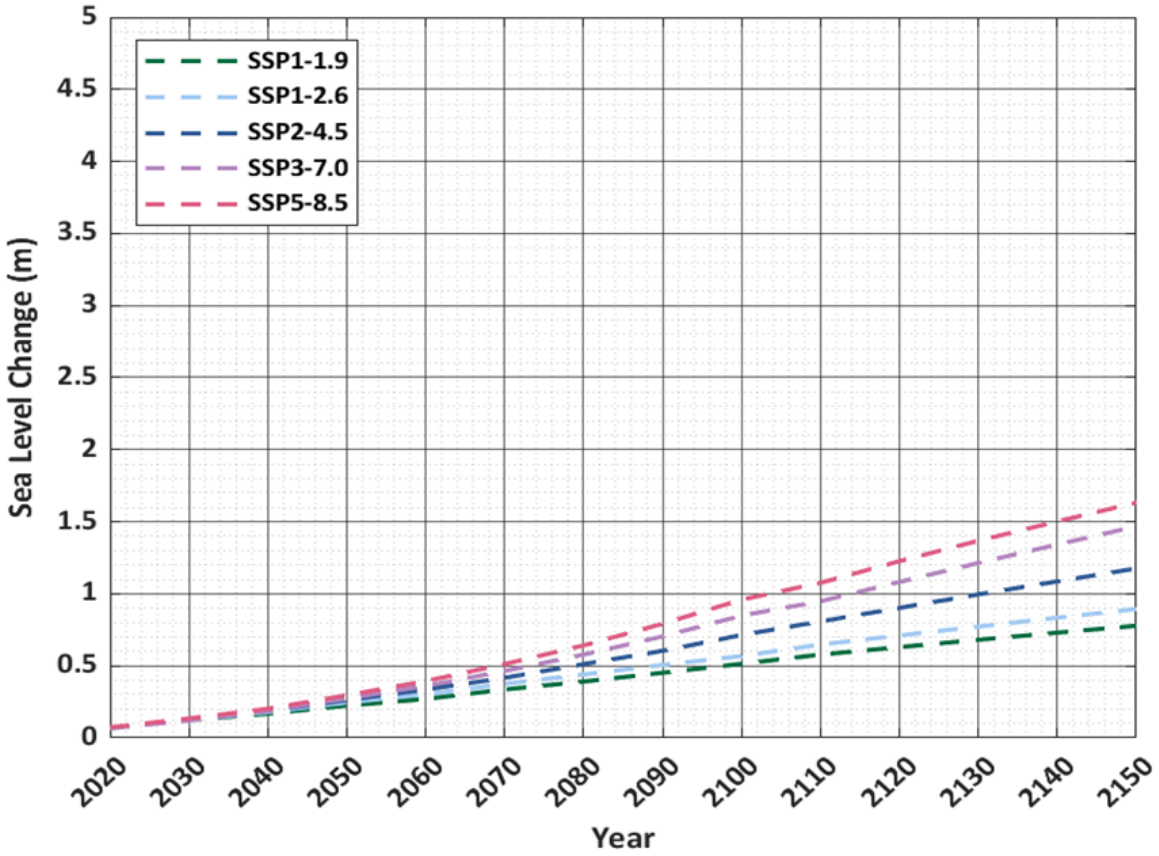


Figure 2-3. IPCC AR6 sea level rise projections for Kahului Harbor, 2020 to 2150 (IPCC, 2021)

Table 2-1. IPCC AR6 sea level rise projections for Kahului Harbor, 2020 to 2150 (IPCC, 2021)

Scenario/Year (m)	2020	2030	2040	2050	2060	2070	2080	2090	2100	2110	2120	2130	2140	2150
SSP1-1.9	0.07	0.12	0.17	0.22	0.27	0.34	0.39	0.45	0.51	0.58	0.63	0.68	0.73	0.78
SSP1-2.6	0.07	0.12	0.18	0.25	0.30	0.38	0.44	0.51	0.57	0.65	0.71	0.77	0.83	0.89
SSP2-4.5	0.07	0.12	0.19	0.26	0.34	0.42	0.51	0.60	0.71	0.81	0.90	1.00	1.09	1.18
SSP3-7.0	0.07	0.12	0.19	0.27	0.36	0.46	0.58	0.70	0.85	0.95	1.08	1.21	1.34	1.47
SSP5-8.5	0.07	0.14	0.20	0.30	0.39	0.51	0.64	0.79	0.96	1.08	1.23	1.37	1.50	1.63

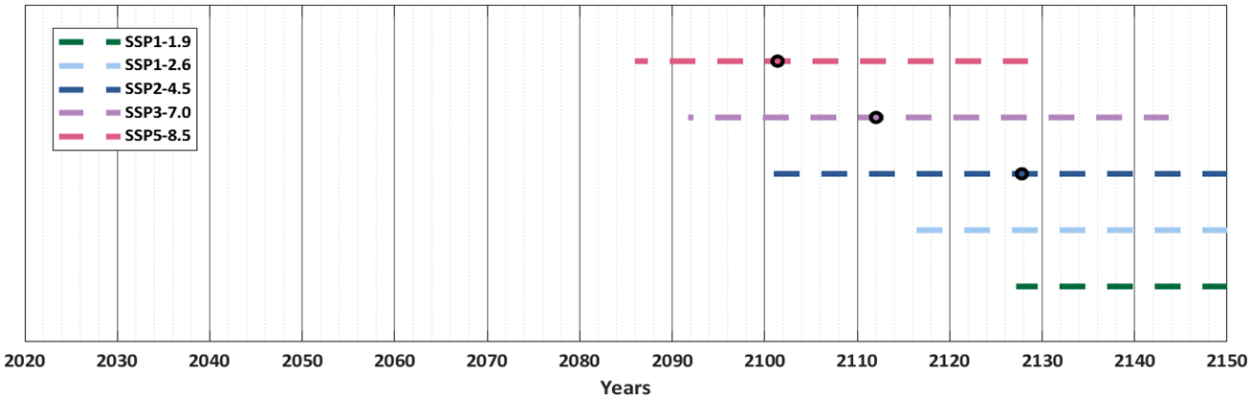


Figure 2-4. IPCC AR6 projected timings of 0.98 m (3.2 ft) of sea level rise for Kahului Harbor (IPCC, 2021)

2.2.2 *U.S. Interagency Task Force - Kahului Sea Level Rise Projections*

The NASA slr projection tool[2] for the Task Force projections provides adjusted slr curves for individual tide stations around the globe. The Task Force slr curves for Kahului from 2020 to 2150 are shown in Figure 2-5 and Table 2-2. Projected timings of when slr reaches 0.98 m (3.2 ft) for each scenario are shown in Figure 2-6. Appendix A summarizes the background for the Task Force projections.

[2] https://sealevel.nasa.gov/task-force-scenario-tool?psmsl_id=155

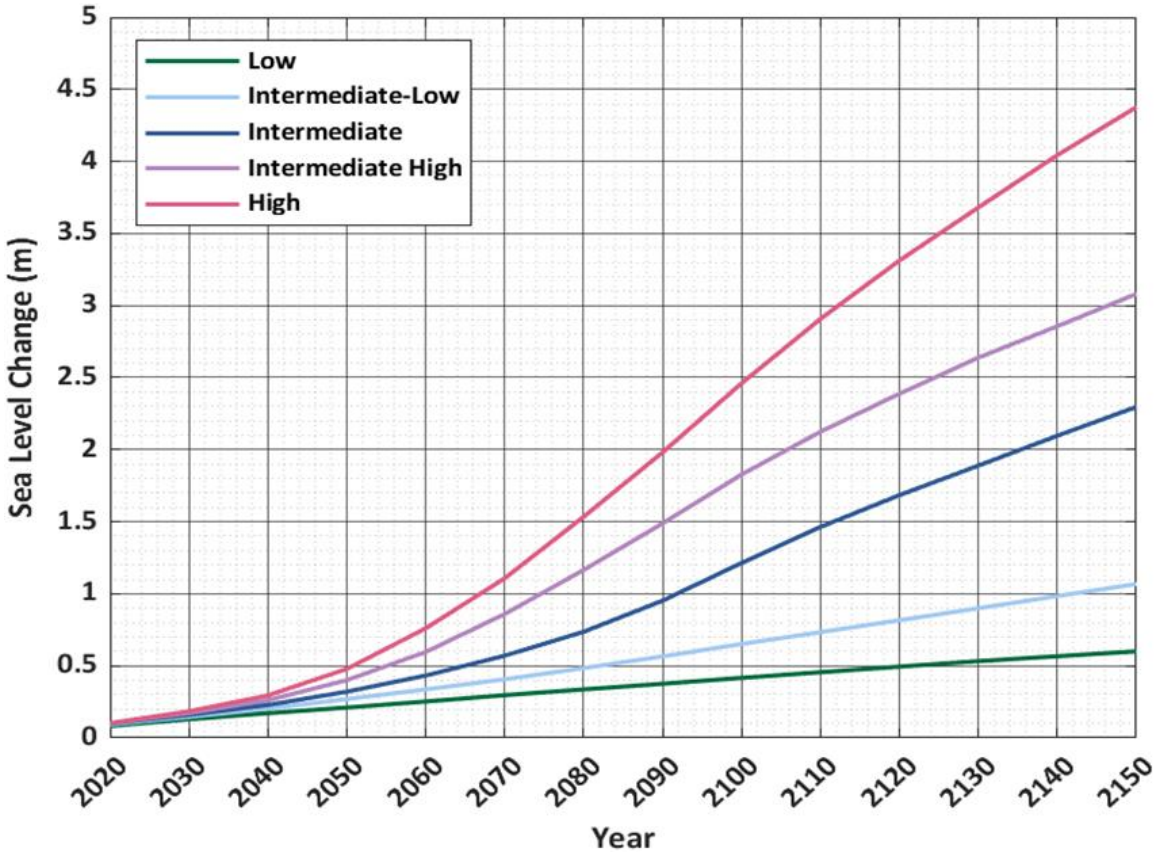


Figure 2-5. Kahului Harbor local mean sea level rise projections (adapted from Sweet et al., 2022)

Table 2-2. Kahului Harbor local mean sea level rise projections (adapted from Sweet et al., 2022)

Scenario/Year (m)	2020	2030	2040	2050	2060	2070	2080	2090	2100	2110	2120	2130	2140	2150
Low	0.08	0.13	0.17	0.21	0.25	0.30	0.34	0.38	0.42	0.46	0.49	0.53	0.57	0.60
Int-Low	0.09	0.15	0.20	0.27	0.34	0.41	0.48	0.57	0.65	0.73	0.82	0.90	0.98	1.07
Int	0.10	0.16	0.23	0.32	0.43	0.57	0.74	0.95	1.21	1.46	1.68	1.89	2.10	2.30
Int-High	0.10	0.17	0.26	0.40	0.60	0.86	1.17	1.49	1.83	2.12	2.39	2.64	2.86	3.08
High	0.10	0.18	0.29	0.48	0.76	1.11	1.53	1.98	2.46	2.91	3.31	3.68	4.04	4.38

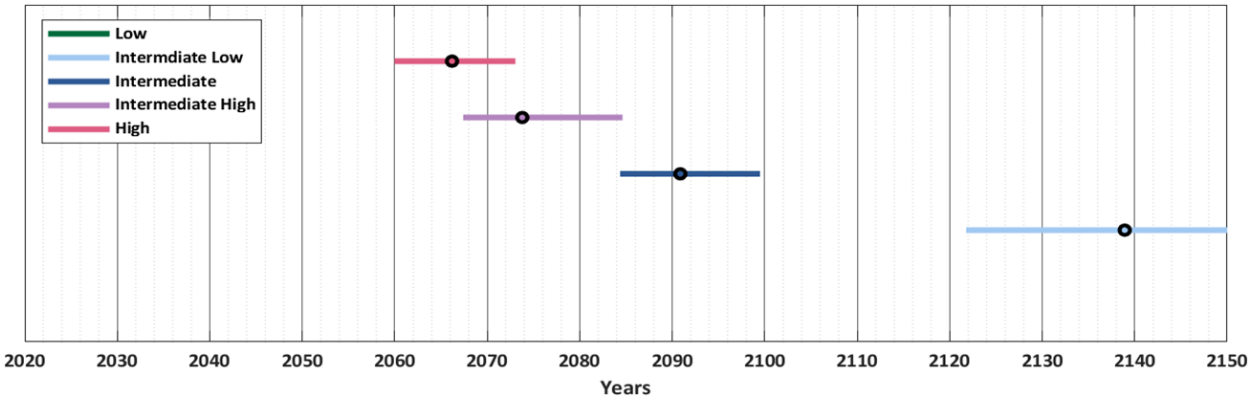


Figure 2-6. Task Force projected timings of 0.98 m (3.2) ft of sea level rise for Kahului Harbor (adapted from Sweet et al., 2022)

2.3 Guidance for Sea Level Rise Planning and Adaptation

While the slr projections described in the previous sections are based on the most current scientific models and measurements, discretion is necessary when selecting the appropriate planning scenario(s). Selecting the appropriate sea level change projection(s) is a function of many parameters, including but not limited to topography, coastal setting, criticality of infrastructure, potential for resilience, budget, and function.

In 2017, the National Oceanic and Atmospheric Administration (NOAA) released Technical Report NOS CO-OPS 083 describing global and regional SLR scenarios for the U.S. The report emphasizes that coastal planners making critical decisions should weigh several factors when choosing which SLR scenario to use, such as the type of decision to be made, expected future performance, planning horizon, and overall risk tolerance, including the criticality of the asset and/or the size and vulnerability of the exposed population (Hall et al., 2016). For example, when designing a patio for a home or a bike path, a lower SLR scenario might be used for the design as it does not support any critical functions and may have a higher risk tolerance. In contrast, when designing a hospital or power plant with a low-risk tolerance and a high criticality of the asset, a higher SLR scenario might be selected to design for future conditions. Scenarios help serve as a starting point for on-the-ground coastal preparedness planning and risk management processes needed to ensure that U.S. coastal communities (and their economies) remain vibrant and resilient to ongoing and future changes in sea level.

In 2018, SEI participated on the Hawaiian Islands and Affiliated Pacific Islands regional climate assessment team, which contributed to the 4th National Climate Assessment (USGCRP, 2018). The consensus from the regional team, which included representatives from NOAA, the U.S. Geological Survey (USGS), and the University of Hawaii (UH), was that the 2017 NOAA *Intermediate-High* scenario projections are recommended for planning purposes in Hawaii.

This was revised in an important conclusion of the 2022 report. The current report indicates that NOAA's revised *Intermediate* rate is recommended for planning and design purposes in Hawaii.

According to the new IPCC AR6 report, the most aggressive, plausible slr scenario is the SSP5-8.5. On Maui, SSP5-8.5 projects that the sea level will rise 0.30 m (1.0 ft) by 2050, 0.50 m (1.7 ft) by 2070, and 0.96 m (3.2 ft) by 2100.

The Task Force's *Intermediate* scenario projects sea level on Maui will rise 0.32 m (1.1 ft) by 2050, 0.57 m (1.9 ft) by 2070, and 1.21 m (4.0 ft) by 2100.

The *Intermediate-High* scenario projects 0.40 m (1.3 ft) by 2050, 0.86 m (2.8 ft) by 2070, and 1.83 m (6.0 ft) by 2100.

3. HAWAII SEA LEVEL RISE FLOODING DATASETS

Coastal hazards associated with future sea level rise include flooding of low-lying areas, wave-driven overland flooding, and coastal erosion. Datasets are available for the Hawaiian Islands and West Maui specifically which utilize available bathymetric/topographic data, numerical models, and empirical formulas to quantify coastal hazards associated with future sea level rise. These datasets provide a useful tool for planners and engineers in the early stages of planning and design of infrastructure near the shoreline. Two datasets available for the study area include the *Hawaii Sea Level Rise Exposure Area* and the *West Maui Wave-Driven Flooding With Sea Level Rise*. The following subsections summarize the background of these datasets and how they were derived.

The focus of this study is to perform higher-resolution site-specific inundation modeling to better define the hazards associated with passive and annual high wave flooding for 3.2 ft of slr. The site-specific modeling analysis in this study accounts for the change in topography for each highway alignment alternative whereas the datasets summarized below only account for existing topography. Additionally, the available datasets were developed for large regional areas around the State and the West Maui shoreline and may not capture localized effects that would likely be resolved by a site-specific analysis.

3.1 Hawaii Sea Level Rise Exposure Area

The Hawaii Sea Level Rise Vulnerability and Adaptation Report (State of Hawaii, 2017) discusses the anticipated impacts of projected future slr on coastal hazards, and the potential physical, economic, social, environmental, and cultural impacts of slr in Hawaii. The report concluded that 3.2 ft of slr may have substantial impacts on the island of Oahu. A key component of the report was a numerical modeling effort by the University of Hawaii Coastal Geology Group (UHCGG) to estimate the potential impacts that a 0.15 (0.5), 0.34 (1.1), 0.61 (2.0), and 0.98 m (3.2 ft) rise in sea level would have on coastal hazards including passive flooding, annual high wave flooding, and coastal erosion. The footprints of these three hazards were combined to map the projected extent of chronic flooding due to slr, referred to as the Sea Level Rise Exposure Area (SLR-XA). The modeling results can be found via the State of Hawaii Sea Level Rise Viewer [3]. The SLR-XA hazard line was used in the preliminary phase of the project to aid in locating the alternative highway alignments.

3.1.1 *SLR-XA Passive Flooding Hazard*

The UHCGG modeled passive flooding using a modified "bathtub" method (Anderson et al., 2018). The method utilizes a detailed digital elevation model (DEM) of the backshore, typically derived from aerial light detection and ranging (LiDAR) data. Elevations within the DEM that are below the elevation of the combined slr and local mean higher high water (MHHW) are considered passive flood areas. Passive flood areas that are connected to the ocean are considered "marine inundation" areas, while areas not connected to the ocean are considered "groundwater inundation" areas. Figure 3-1 shows an idealized cross-shore profile of passive flooding used in the SLR-XA model.

[3] https://www.pacioos.hawaii.edu/shoreline/slr-hawaii/

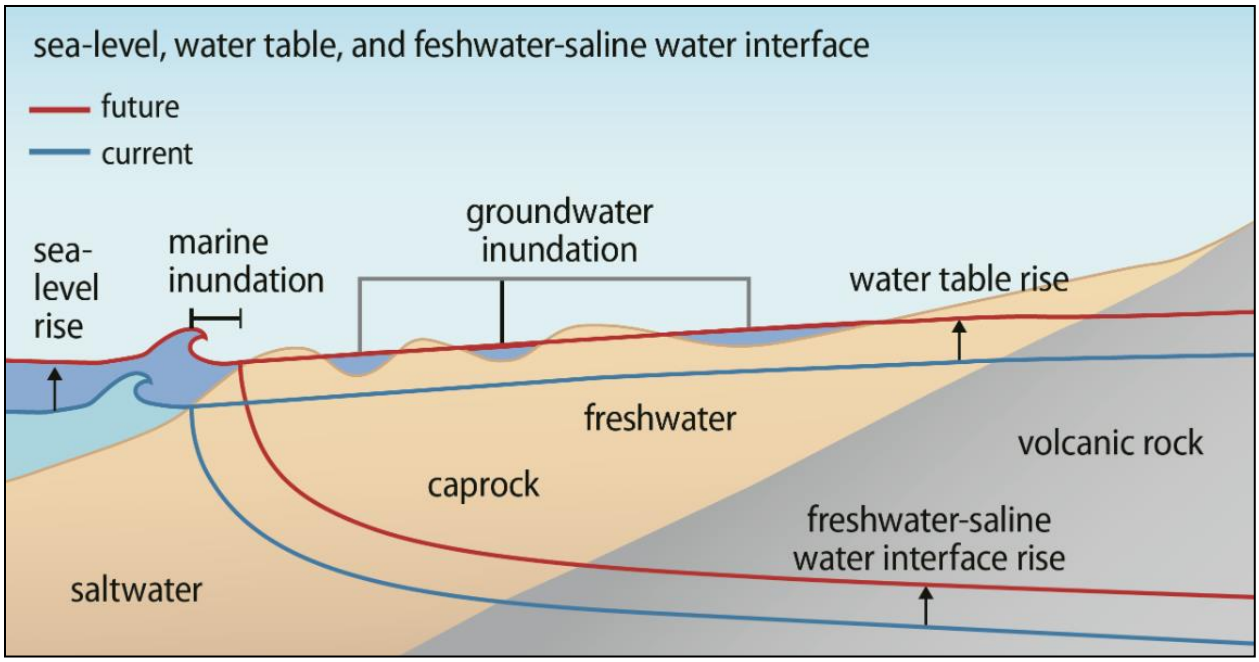


Figure 3-1. Cross-shore profile schematic of SLR-XA passive marine and groundwater flooding (UHCGG, 2017)

3.1.2 *SLR-XA Annual High Wave Flooding Hazard*

The annual high wave flooding model propagates the maximum annually recurring wave, calculated from historical wave buoy data, over the reef and to the shore along 1-dimensional cross-shore profiles spaced 20 meters (m) apart. Topography and bathymetry for each profile was extracted from a 1-m digital elevation model. Model output for areas between the 1-dimensional profiles were interpolated and compiled in a 5-m map grid. The model depicts the spatial extent of inundation that is greater than 10 centimeters (cm) in depth. Figure 3-2 illustrates an idealized cross-shore profile schematic of the SLR-XA annual high wave flooding.

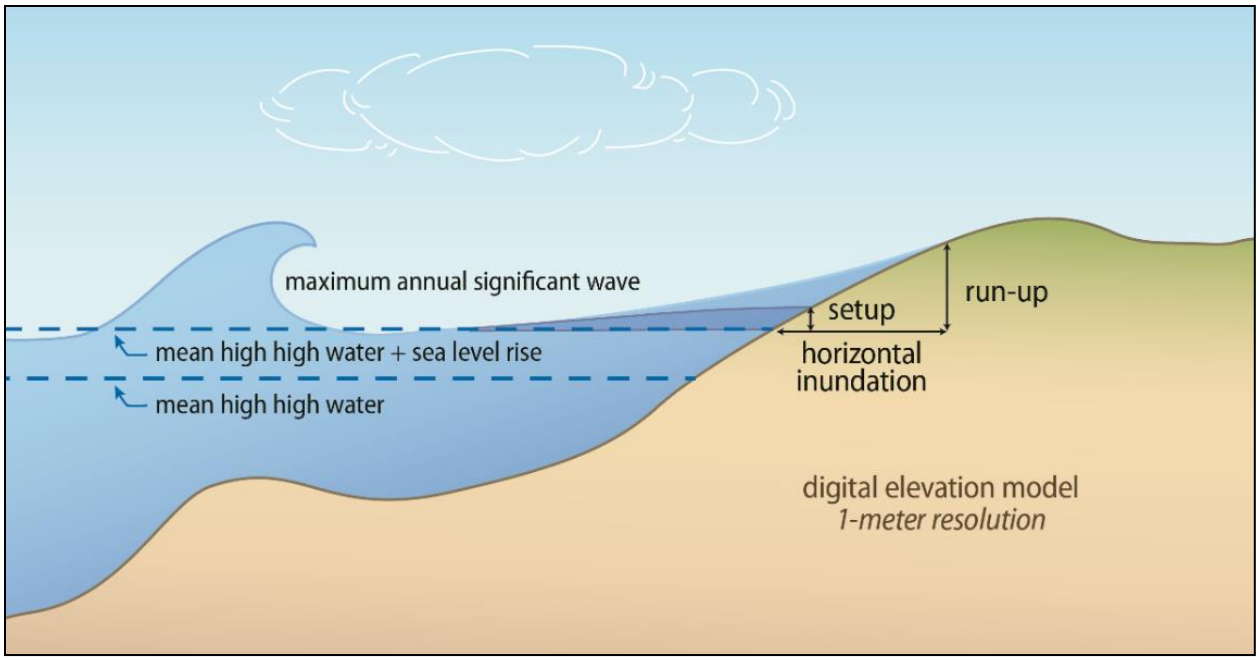


Figure 3-2. Cross-shore profile schematic of SLR-XA annual high wave flooding (UHCGG, 2017)

3.1.3 *SLR-XA Coastal Erosion Hazard Area*

The erosion model (Anderson, 2015) presented in the PacIOOS Sea Level Rise Viewer is based on accepted sea-level rise scenarios. The prediction of 3.2 ft of global mean slr by 2100 is from the aggressive IPCC AR5 sea level curve. This curve represents the upper-end projection from the AR5. This is similar to the upper-end projection in the AR6 report. The erosion model estimates shoreline change resulting from a combination of the historic erosion pressures on the coastline, rising water levels, and the influence of additional water level on coastal erosion processes.

The historic erosion rates are based on shoreline location measurements collected at individual transect located 20 meters apart on the coastline. These measurements capture the real changes occurring in each transect's unique environment. Though projections of historic erosion rates may not be accurate predictions of the distant future, they are accurate for past changes at each individual transect's unique environment. These rates reflect the shoreline changes associated with historic changes in sea level, and do not include any influences of accelerating rates of slr as expected in future decades and centuries.

Sea level rise results in a change to the horizontal shoreline location based purely on higher water levels moving up and typically mauka along the coastal profile. The model includes a change of water level based on the historic rate of sea level (not the projected curves) extrapolated to the year 2100.

Projected erosion impacts as a response to rising sea levels, the amount of rise in excess of historic rates, assumes that coastal changes in the nearshore, shoreline, and backshore (to the maximum extent of erosion) are occurring in mobile sandy substrate (Figure 3-3) (Davidson-Arnott, 2005). The model's implicit assumption is that sand moves freely along the affected dry and submerged profile, allowing the entire system to respond as a whole to the effects of a rising sea

level. Actual shoreline migration may follow a different path and pace in some of the project areas, as some sections of Maui's coastline do not closely match these assumptions. Within the project area, there are shallow fringing reefs in the nearshore, and clay and rock may be present within the backshore, mauka of and sometimes beneath the sandy beach.

The combined result of these inputs (Figure 3-4) is the erosion hazard line, presented in the PacIOOS viewer.

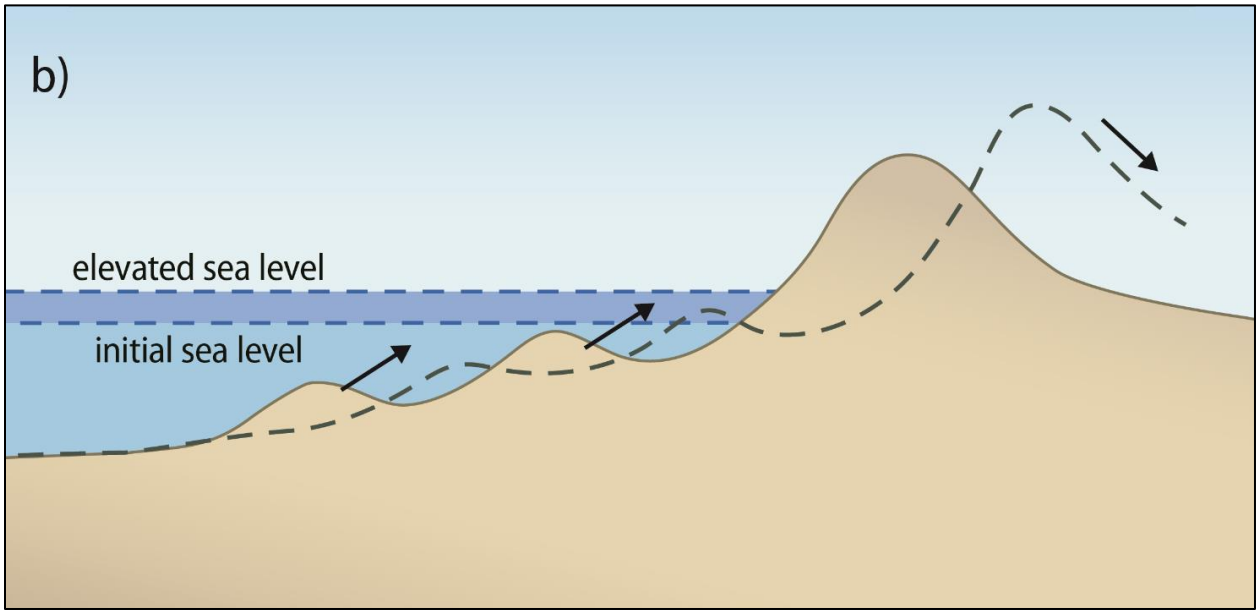


Figure 3-3. Example of Davidson-Arnott Conceptual Model for Shoreline Change Under Rising Sea Levels

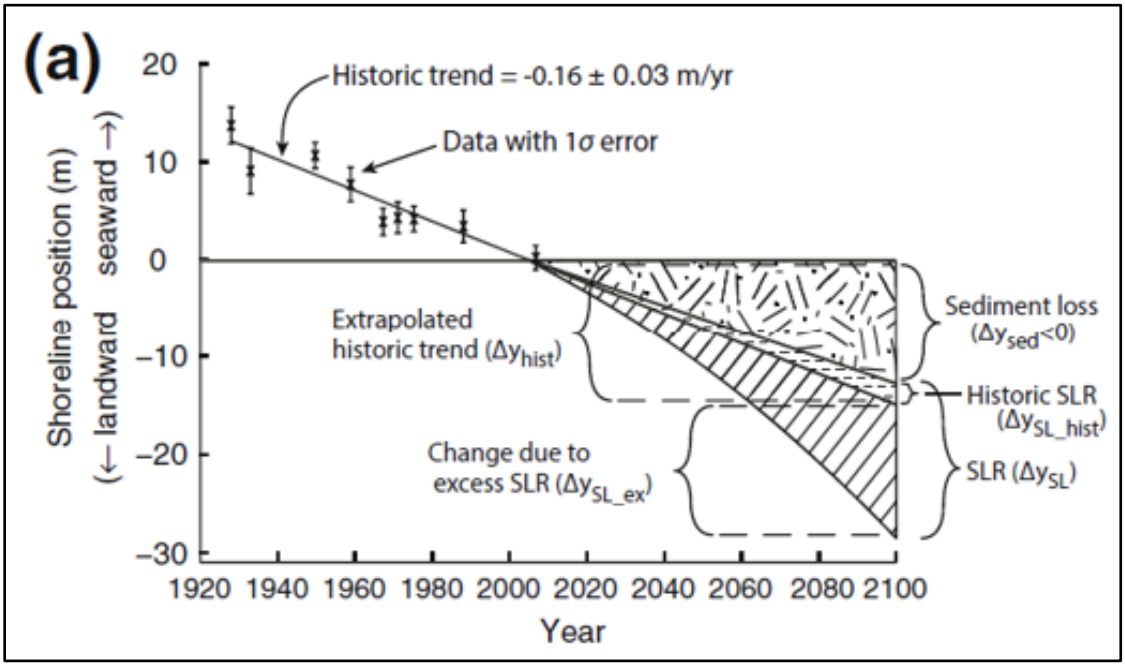


Figure 3-4. Graphic representation of the erosion model components from Anderson, et al., 2015

Below is the list of assumptions and limitations, as presented on PacIOOS website, which should be considered when reviewing the location of the erosion hazard line:

- Existing seawalls or other coastal armoring in the backshore* (may over-predict in these cases)
- Increasing wave energy across the fringing reef with slr (may under-predict in these cases)
- Possible changes in reef accretion and nearshore sediment processes with slr (may over-predict or under-predict based on the case)
- Possible changes to sediment supply from future shoreline development and engineering, such as construction or removal of coastal armoring or other coastal engineering. (may over-predict [e.g. beach nourishment] or under-predict [e.g. sand mining] based on the case)
- Where a beach was lost to erosion fronting coastal armoring, historical shoreline change rates used in the coastal erosion model were calculated using historical shoreline positions up to and including the first shoreline indicating no beach.

3.1.3.1 Evaluating the Erosion Hazard Line

The model results represent a valuable tool for assessing potential erosion along a coastline under the pressure of rising water levels. Understanding that the model may over or underpredict erosion potential based on project area site characteristics allows for prudent use of the results in planning and design efforts.

Using the aggressive AR5 and AR6 slr curve to establish 3.2 ft of slr by 2100 helps to provide a conservative estimate for water level at that point in time. Combining the conservative estimate for water level with a conceptual model to assess potential erosion threat along the project area's coastline provides a useful tool to include in planning.
Using the erosion hazard line (example in Figure 3-5) as a design feature, a location to stay mauka of where possible, is both prudent and proactive for long-range planning that targets the end of century.



Figure 3-5. Erosion Hazard Model projection for shoreline location with 3.2 ft of slr at Ukumehame

3.1.4 *SLR-XA Combined Hazard Exposure Area*

The SLR-XA is an overlay of the combined exposure to passive flooding, annual high wave flooding, and coastal erosion as shown in Figure 3-6 and does not include the interactive nature of these hazards that occurs in reality.

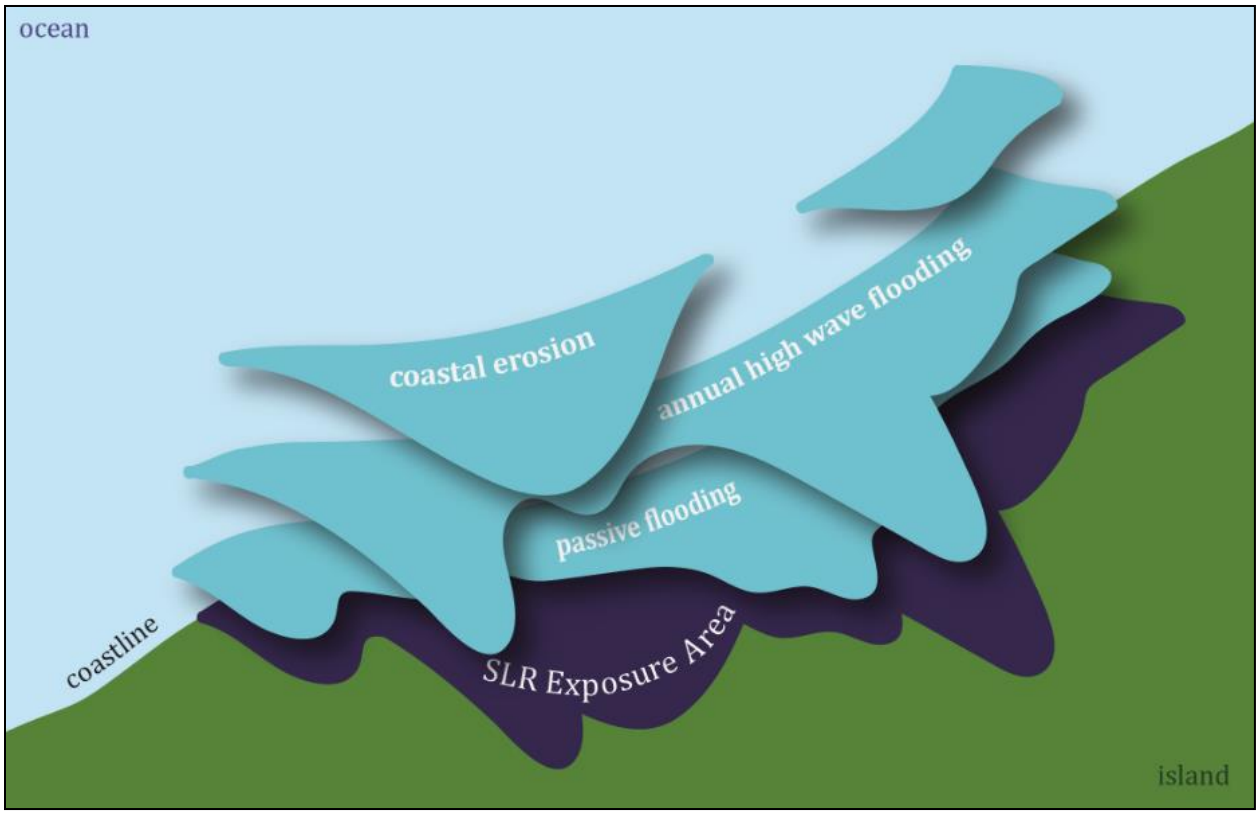


Figure 3-6. Schematic of combined exposure area consisting of passive flooding, annual high wave flooding, and coastal erosion (UHCGG, 2017)

3.2 West Maui Wave-Driven Flooding with Sea Level Rise

The West Maui Wave-Driven Flooding with Sea Level Rise dataset[4] available through PacIOOS, provides additional insight into the effects of wave-driven flooding combined with sea level rise along the West Maui coastline. The tool provides flood extent and flood depths for sea level rise values of 0.0, 0.3 (1.0), 0.6 (2.0), 1.0 (3.3), and 2.0 m (6.6 ft) as well as for wave conditions defined as minimum, annual high, and maximum wave conditions. The modeled flooding is associated with a combination of waves from the north and south pacific swell regimes for each wave type, and the flood layer can be further broken out by specific swell direction if desired. The modeled flooding was simulated by two (2) Boussinesq Ocean and Surf Zone (BOSZ; Roeber and Cheung, 2012) model domains with 5 m resolution encompassing the West Maui coastline (see Figure 3-7).

[4] https://www.pacioos.hawaii.edu/shoreline/slr-westmaui/

The West Maui tool provides improved estimates of wave-driven flooding with slr compared to SLR-XA because it used a 2D modeling approach instead of a 1D approach and includes additional wave conditions. However, the data is valid for existing ground only and does not include any proposed ground changes for this project. The high-resolution site-specific modeling for this study utilizes a similar modeling framework as this tool but utilizes a higher resolution model domain and incorporates the proposed ground changes for each of the four (4) proposed highway alignments to better quantify the flooding hazard along the project shoreline.

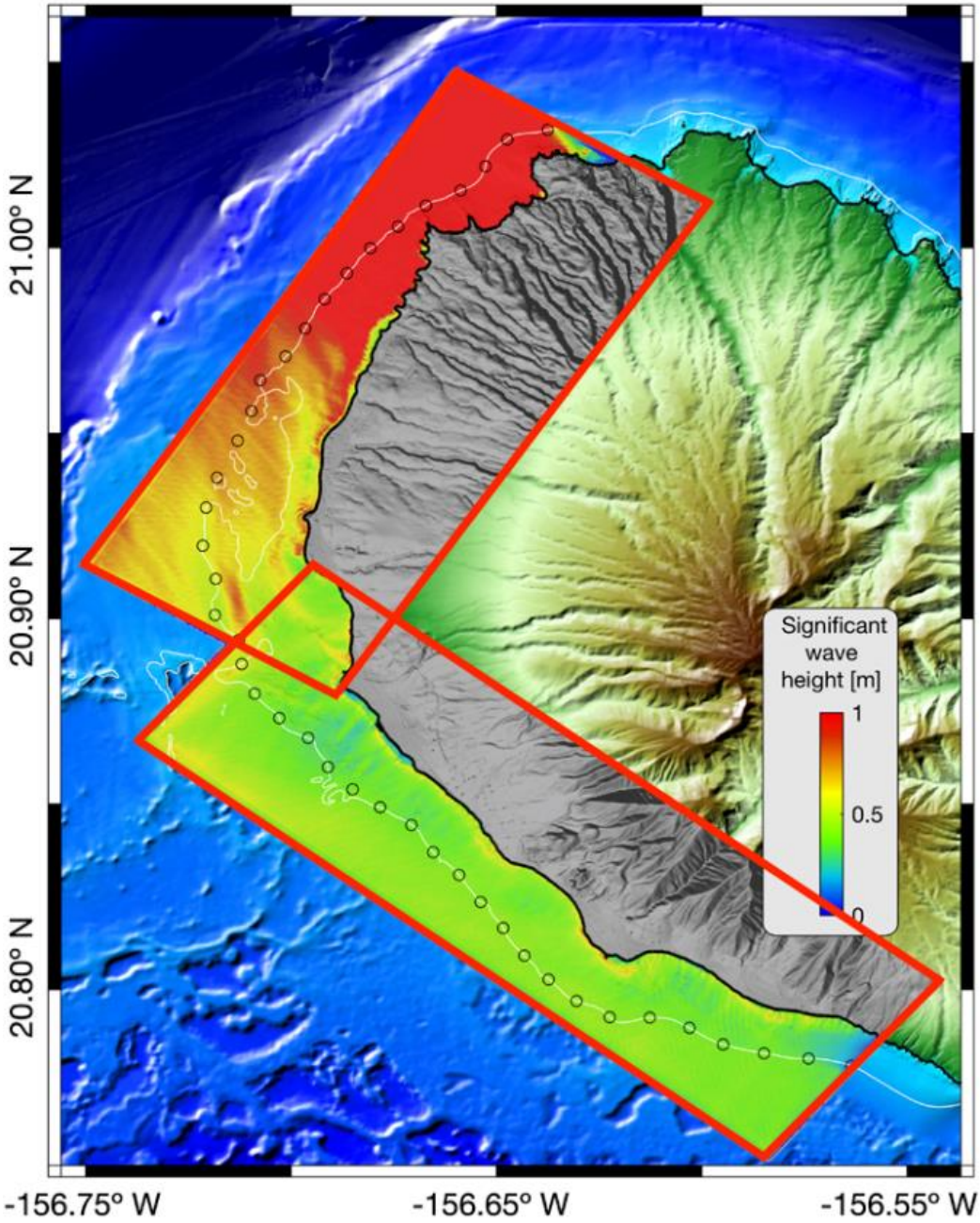


Figure 3-7. BOSZ model domains used for the West Maui Wave-Driven Flooding Tool

4. WAVE CLIMATE

Numerical wave inundation models require offshore wave parameters as primary boundary conditions. This section summarizes the general wave climate in Hawaii and provides background on the specific wave conditions pertinent to the study shoreline to be used as input to the numerical modeling.

4.1 General Wave Climate

The wave climate in Hawaii is dominated by long period swell generated by distant storm systems, by relatively low amplitude, short period waves generated by more local winds, and the occasional bursts of energy associated with intense local storms. Typically, Hawaii receives five general surface gravity wave types: 1) northeast trade wind waves, 2) southeast trade wind waves 3) South Pacific swell, 4) North Pacific swell, and 5) Kona wind waves. The dominant swell regimes for Hawai‘i are shown in Figure 4-1.

Trade wind waves occur throughout the year and are most persistent from April to September when they usually dominate the local wave climate. They result from the strong and steady trade winds blowing from the northeast quadrant over long fetches of open ocean. Trade wind deepwater waves are typically between 3 to 8 ft high with periods of 5 to 10 seconds, depending upon the strength of the tradewinds and how far the fetch extends east of the Hawaiian Islands. The direction of approach, like the trade winds themselves, varies between north-northeast and east-southeast and is centered on the east-northeast direction. The study areas are well sheltered from the direct approach of trade wind waves by the island itself.

During the winter months in the northern hemisphere, strong storms are frequent in the North Pacific in the mid latitudes and near the Aleutian Islands. These storms generate large North Pacific swells that range in direction from west-northwest to northeast and arrive at the northern shores of the Hawaiian Islands with little attenuation of wave energy. These are the waves that have made surfing beaches on the north shores of the island of Oahu and Maui famous. Deepwater wave heights often reach 15 ft and in extreme cases can reach 30 ft. Periods vary between 12 and 20 seconds, depending on the location of the storm. The project site is sheltered by the island of Maui itself for northeasterly swell and by the island of Molokai for swell approaching from the northwest. However, even with island sheltering, the project site is still directly and indirectly exposed to North Pacific swell.

South Pacific swell is generated by storms in the southern hemisphere and is most prevalent during the summer months of April through September. Traveling distances of up to 5,000 miles, these waves arrive with relatively low deepwater wave heights of 1 to 4 ft and periods of 14 to 20 seconds. Depending on the positions and tracks of the southern hemisphere storms, south swells approach from between the southeasterly and southwesterly directions. The study areas are directly exposed to south swell approaching from the south-southwest to southwest directions. More southerly swell would be partially blocked by the island of Kahoolawe.

Kona storm waves can also directly and indirectly approach the study areas; however, these waves are relatively infrequent, occurring only about 10 percent of the time during a typical year. Kona storm waves typically range in period from 6 to 10 seconds with heights of 5 to 10 ft, and approach from between the southwest and west directions. Deepwater wave heights during the severe Kona

storm of January 1980 were about 17 ft. The study areas are directly exposed to Kona storm waves that approach from the west-southwest and south-southwest between the islands of Lanai and Kahoolawe.

Severe tropical storms and hurricanes have the potential to generate extremely large waves, which in turn could potentially result in large waves at the study areas. Recent hurricanes impacting the Hawaiian Islands include Hurricane Iwa in 1982 and Hurricane Iniki in 1992. Iniki directly hit the island of Kauai and resulted in large waves along the southern and western shores of all the Hawaiian Islands. Damage from these hurricanes was extensive.

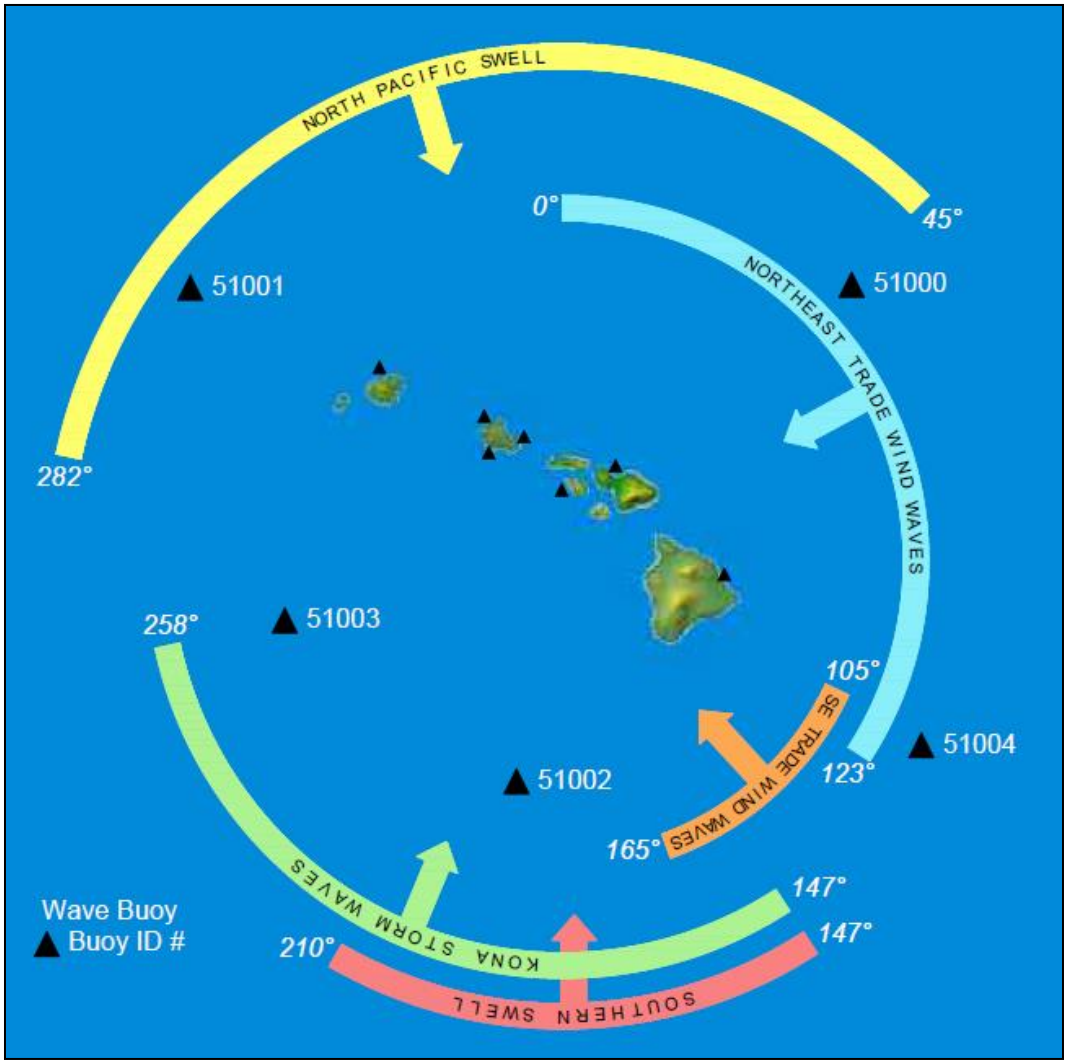


Figure 4-1. Hawai'i dominant swell regimes

4.2 SLR-XA Annual Waves

For this study, annually recuring wave data used in the Sea Level Rise Exposure Area (SLR-XA) model framework is used to define the wave conditions offshore of the study areas. This wave data is defined along, approximately, the 30 m (98 ft) depth contour. Figure 4-2 shows the locations of the SLR-XA annual wave data relative to the study areas. The corresponding wave parameters,

including significant wave height (*Hs)*, peak period (*Tp)*, and direction (*Dir.)*, are listed in Table 4-1. The SLR-XA wave data for this region is representative of an annually recuring south swell event.

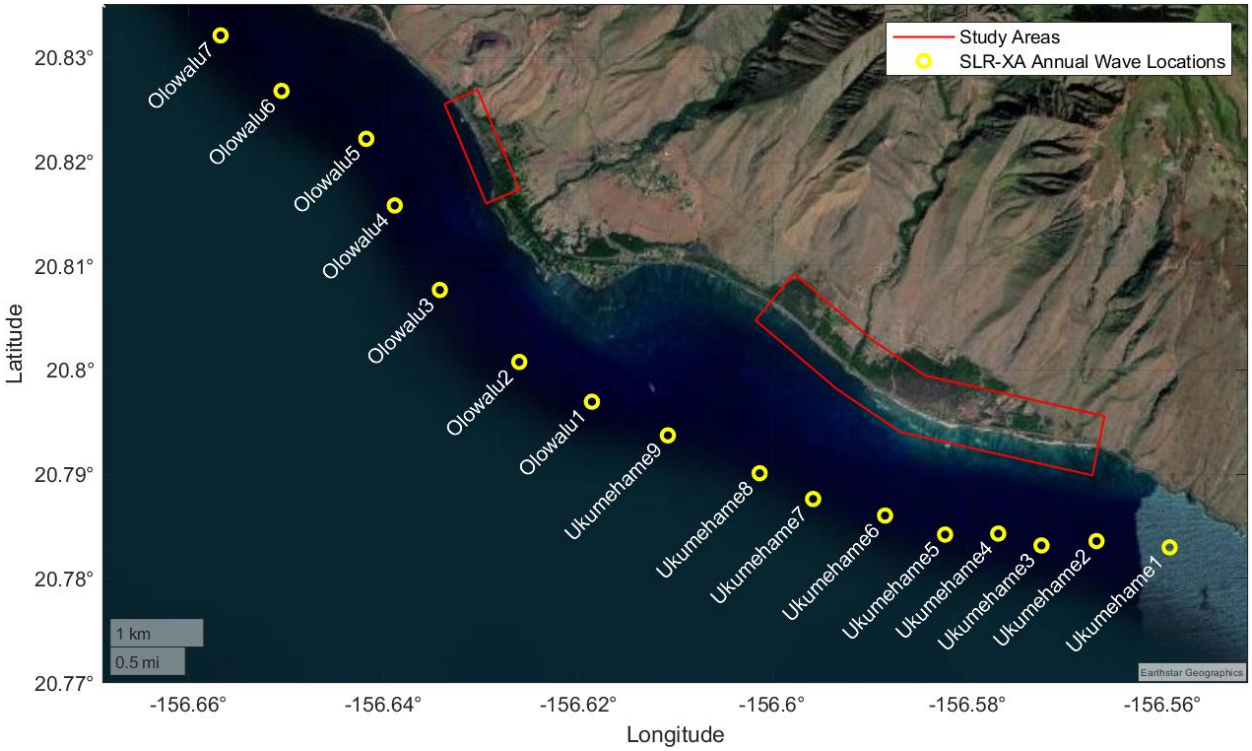


Figure 4-2. SLR-XA annual offshore wave locations relative to the study areas

Table 4-1. SLR-XA annual offshore wave parameters

Location ID	Hs (m)	Tp (s)	Dir (deg. TN)
Ukumehame1	0.718	16.4	215
Ukumehame2	0.790	16.4	212
Ukumehame3	0.799	16.4	212
Ukumehame4	0.712	16.4	203
Ukumehame5	0.722	16.4	203
Ukumehame6	0.931	16.4	207
Ukumehame7	0.942	16.4	207
Ukumehame8	0.946	16.4	207
Ukumehame9	0.983	16.4	208
Olowalu1	0.994	16.4	209
Olowalu2	1.001	16.4	207
Olowalu3	1.030	16.4	215
Olowalu4	0.926	16.4	218
Olowalu5	0.922	16.4	218
Olowalu6	1.068	16.4	213
Olowalu7	1.010	16.4	200

5. WAVE INUNDATION MODELING

Coastal flooding is generally a function of the tide level, wind setup, wave setup, and wave height at the shoreline. For fringing reef type environments, coastal flooding can also be caused by infragravity waves which can create elevated water levels at the shoreline during wave events particularly in steep reef environments. These are long waves with periods in the range of 30 to 300 seconds and are primarily caused by wave breaking on the reef flat. To accurately simulate wave-driven flooding in these environments, a sophisticated computer model capable of resolving all these phenomena at high resolution is required.

For this study the XBeach non-hydrostatic (XBeach-NH) numerical model was chosen to simulate nearshore wave propagation and wave-driven overland flooding of the study area. XBeach is a physics-based open-source numerical wave model originally developed to simulate hydrodynamic and morphological processes along sandy shorelines. The XBeach-NH module (Stelling and Zijlema, 2003) computes the depth-averaged flow due to waves and currents using the non-linear shallow water equations and includes a non-hydrostatic pressure term. The governing equations are valid from intermediate to shallow water and can simulate most of the phenomena of interest in the nearshore zone and in harbor basins, including shoaling and refraction over variable bathymetry, reflection and diffraction near structures, energy dissipation due to wave breaking and bottom friction, breaking-induced longshore/cross-shore ("rip") currents, and harbor oscillations. XBeach-NH is a phase resolving model, meaning that wave crests and troughs are modeled and propagated in time and space.

5.1 Model Setup

Three (3) individual XBeach-NH model grids were developed to encompass the study areas and proposed roadway alignments along the shoreline. The three model grids are labeled as Region 1, 2 and 3 and shown in Figure 5-1. The model topography and bathymetry were adapted from the USACE SHOALS LiDAR dataset and the *Continuously Updated Digital Elevation Model (CUDEM) - Ninth Arc-Second Resolution Bathymetric-Topographic Tiles for the Hawaiian Islands*. Each model has a spatial resolution of 2 m (6.6 ft). For each of the three model domains, five (5) model topography were developed to represent existing conditions and alternative highway alignments 1 through 4. Change in ground elevation for each highway alternative was provided by WSP and incorporated into each of the model domains. Drainage culverts and bridge/causeway areas within each alignment were not adjusted and left as the existing ground level to allow modeled flood waters to pass freely through these areas. Road and bridge deck elevations for these areas are not included in the model with the assumption that modeled flood waters can pass freely under the proposed bridge structures. The model topography uses a bare-earth digital elevation model where buildings and vegetation are not included. Ground elevation for these areas are interpolated using the surrounding ground levels. The model does not account for flooding/drainage through underground utilities or groundwater intrusion. Erosion is also not included in the model.

The offshore wave boundary conditions for each model domain were defined by the SLR-XA annually recuring wave parameters (see Section 4.2). This boundary condition represents a spatially varying time series of the water surface elevation at the 30 m (98 ft) depth contour. Still water level input to the model is the combination of the mean higher high water (mhhw) 0.35 m

(1.1 ft) and slr of 0.98 m (3.2 ft) above mean sea level (msl) for a total still water input of 1.33 m (4.3 ft) above msl. This is representative of high tide conditions for a discrete future sea level.

The model simulation time frame is set to produce a minimum of 500 wave cycles to propagate through the model domain. This corresponds to a simulation time of approximately 2.3 hours after an initial spin-up model time of 30 min. Raw output from the model simulations includes the spatially varying water surface elevation throughout the model domain at set time intervals as well as statistical water surface elevation over the entire simulation time frame. The statistical output includes the mean, variance, maximum, and minimum water surface elevation and depth-averaged flow velocity throughout the model domain.

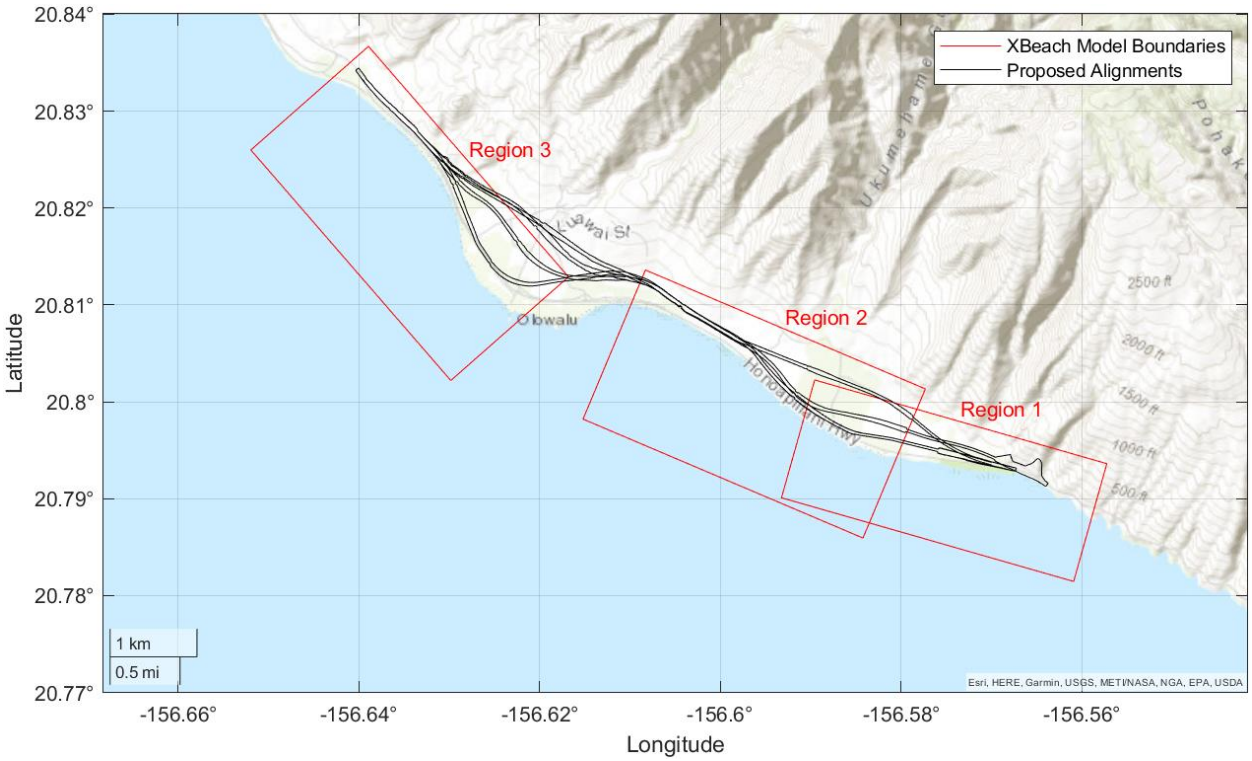


Figure 5-1. XBeach model boundaries relative to proposed alignment areas

5.2 Model Output

Snapshots of the water surface elevation mid-way through the simulation are shown in Figure 5-2, Figure 5-3, and Figure 5-4 for the Region 1, 2, and 3 model domains, respectively. The processed results from regions 1 and 2 are combined to provide continuous results for the stretch of shoreline covered by these regions. Overlapping areas use the maximum flood depths/elevations from either domain. The output area for regions 1 and 2 is identified as "*Ukumehame"* and region 3 is identified as "*Olowalu."* Appendices B through F show the modeled maximum flood depth and elevation for each of the five cases simulated for each area.

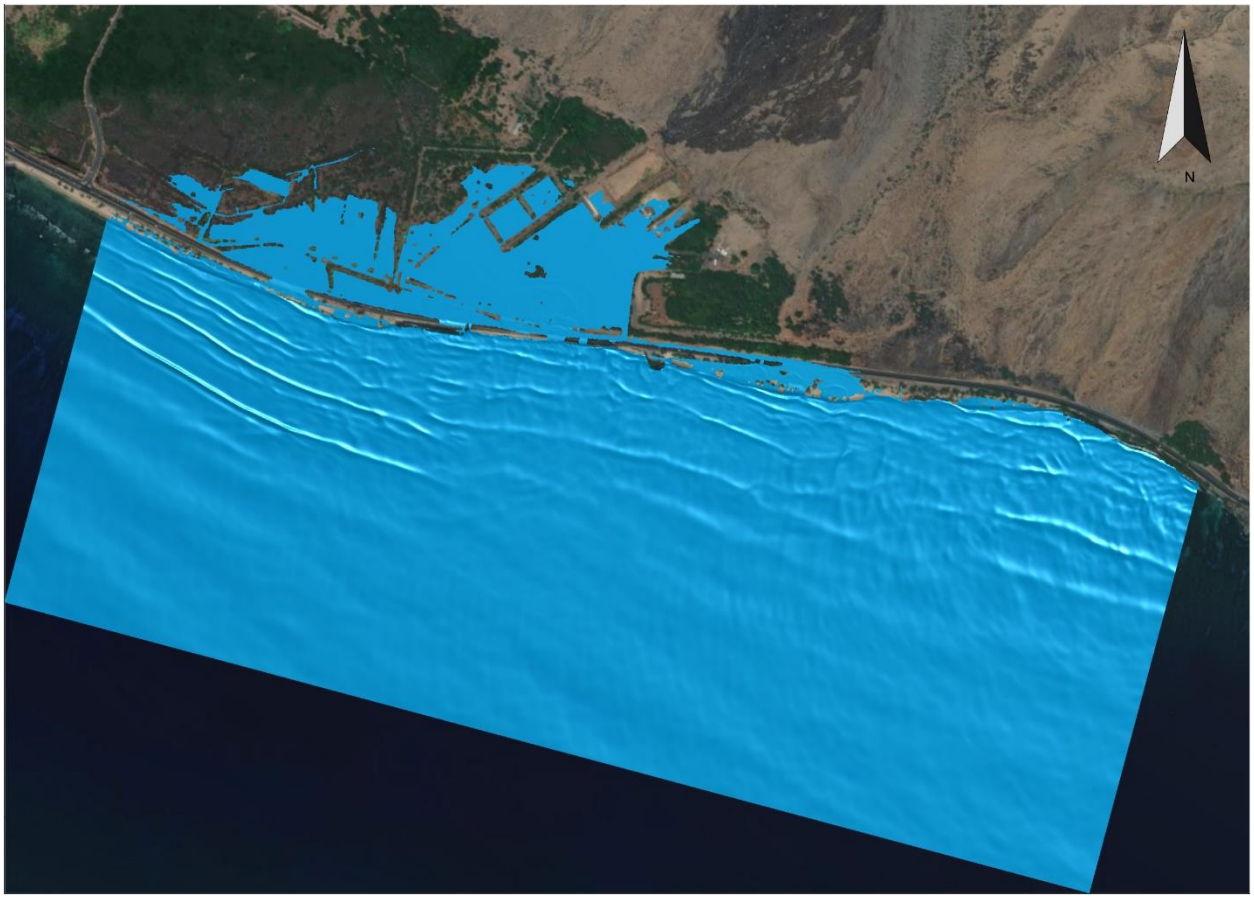


Figure 5-2. Region 1 XBeach-NH modeled water surface elevation snapshot for existing ground

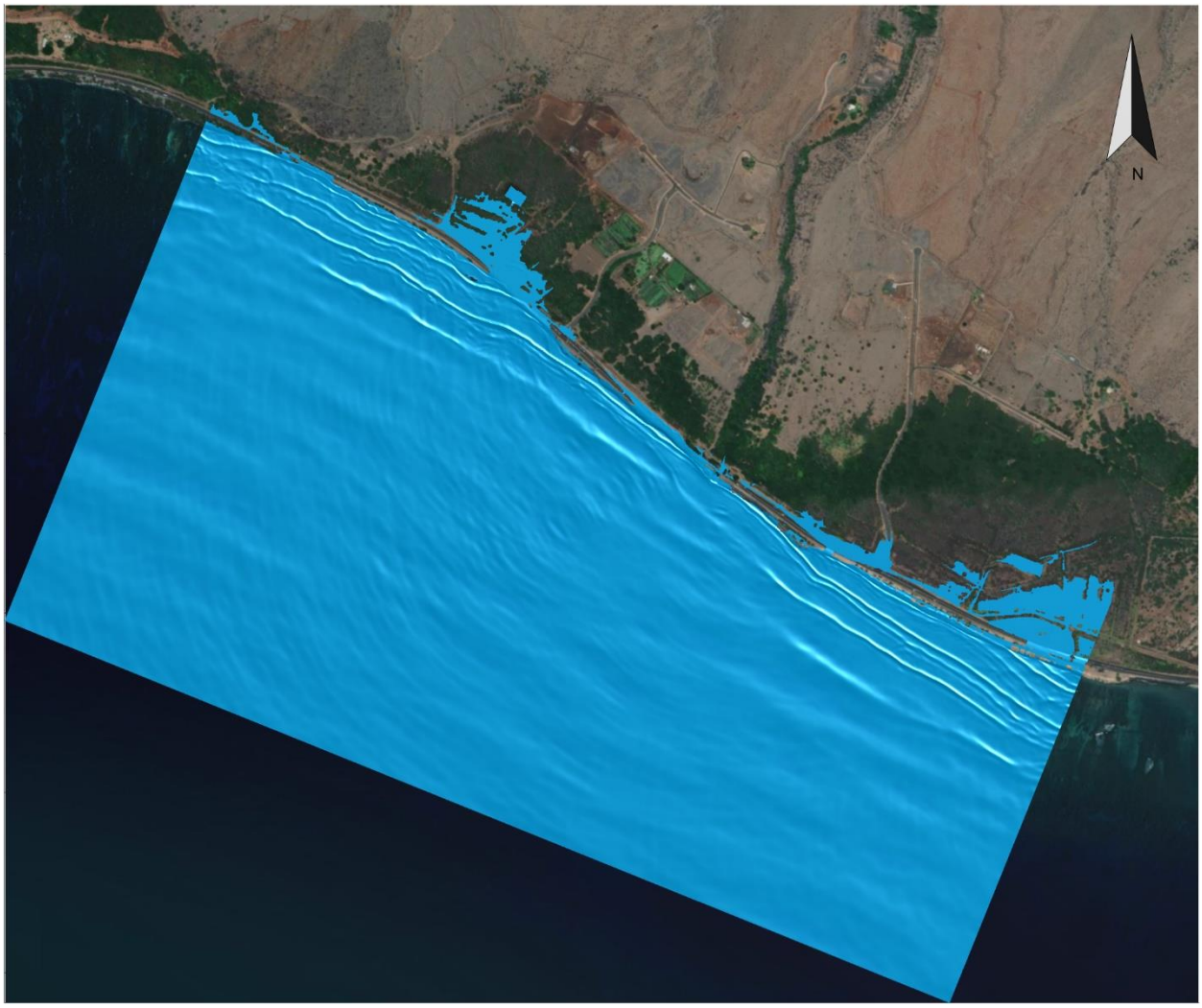


Figure 5-3. Region 2 XBeach-NH modeled water surface elevation snapshot for existing ground

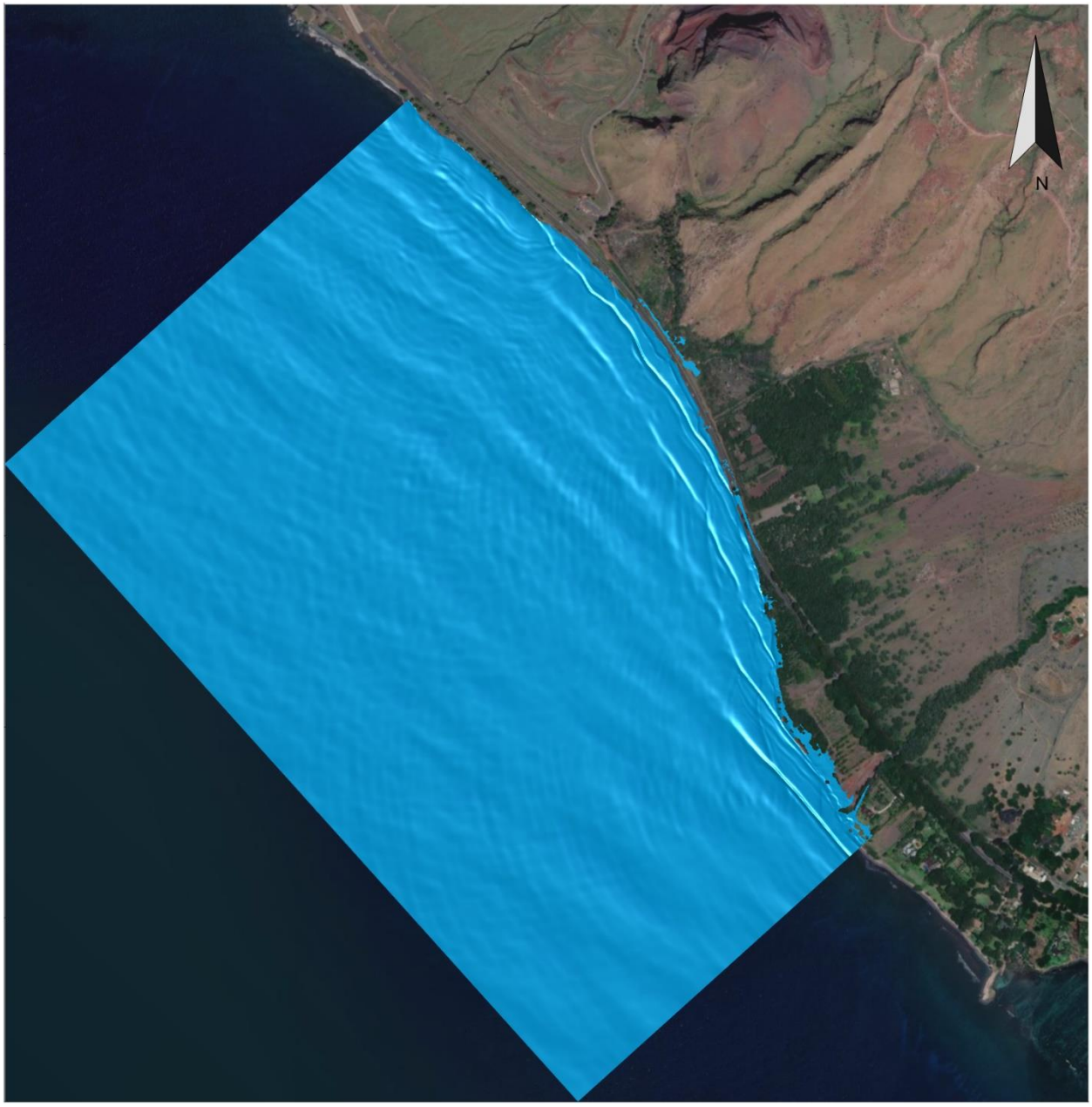


Figure 5-4. Region 3 XBeach-NH modeled water surface elevation snapshot for existing ground

5.2.1 *Existing Ground*

Existing flood extent and corresponding depths, elevations, and depth-averaged velocities are shown in Appendix A attached to this report. Figure 5-5 through Figure 5-12 shows the maximum flood extent for the modeled areas relative to the proposed alignment grading limits. Modeled existing ground flood extents and corresponding depths and elevations are summarized in Table 5-1, Table 5-2, Table 5-3, and Table 5-4 for alternative alignments 1, 2, 3, and 4, respectively.

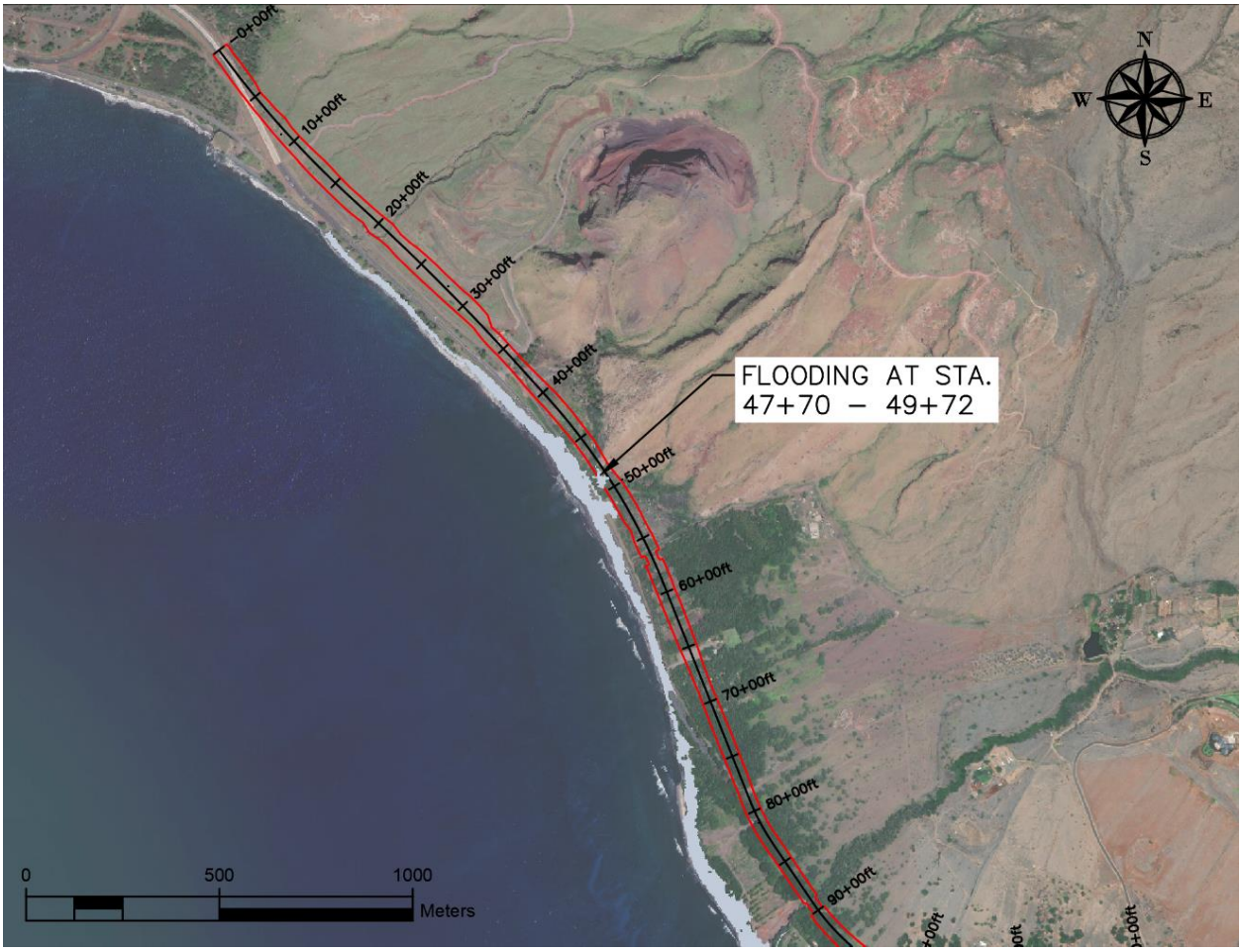


Figure 5-5. XBeach-NH modeled maximum flood extent (gray) for existing ground relative to alternative 1 (red) alignment in the Olowalu region.

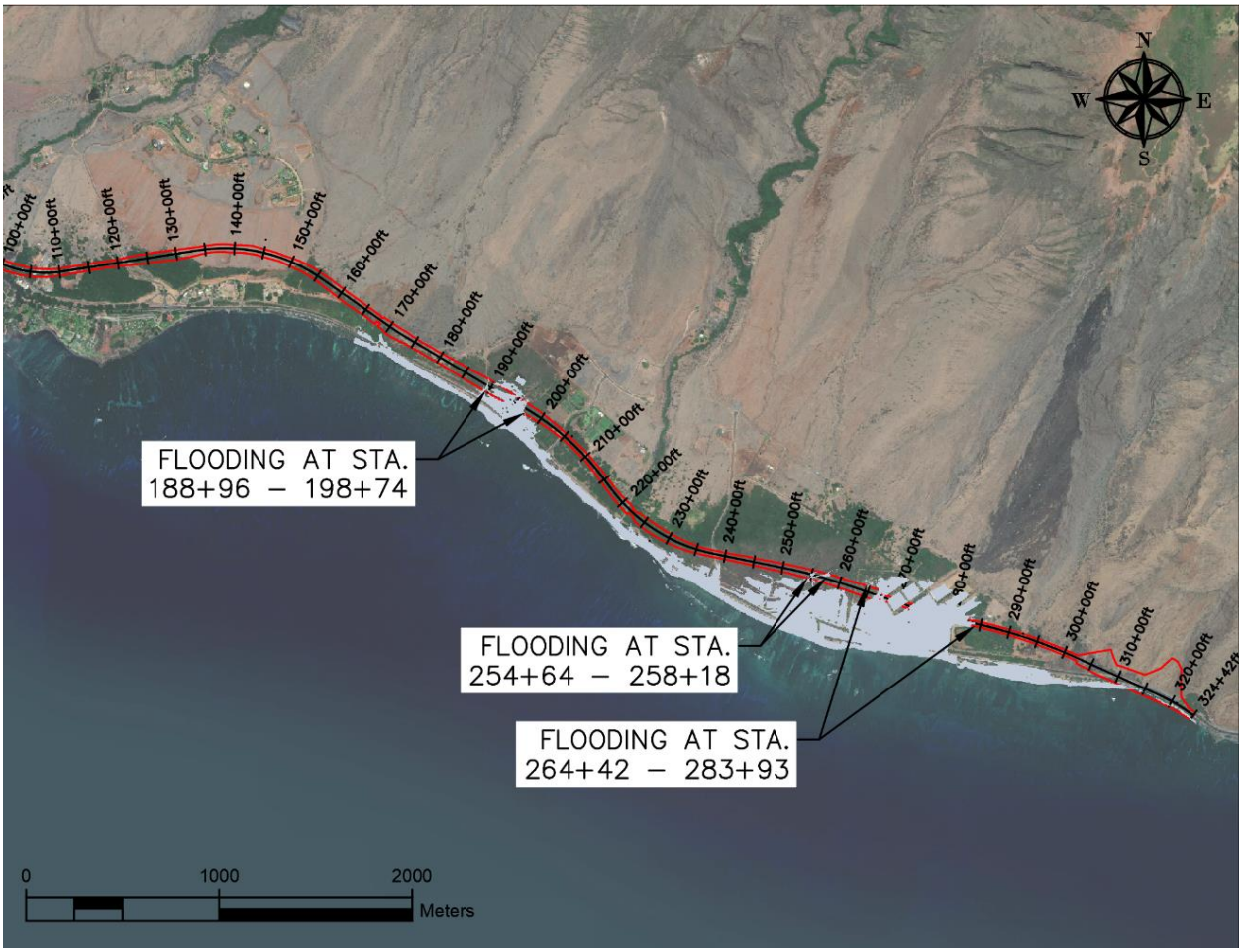


Figure 5-6. XBeach-NH modeled maximum flood extent (gray) for existing ground relative to alternative 1 (red) alignment in the Ukumehame region.

Table 5-1. Modeled maximum flood depth and elevations for existing ground along the alternative 1 alignment

Alignment Station (ft)	Max Flood Depth (m [ft])	Max Flood Elevation (m [ft], msl)
47+70 – 49+72	0.31 (1.0)	2.04 (6.7)
188+96 – 198+74	1.42 (4.7)	2.15 (7.1)
254+64 – 258+18	0.66 (2.2)	1.55 (5.1)
264+42 – 283+93	1.00 (3.3)	1.79 (5.9)

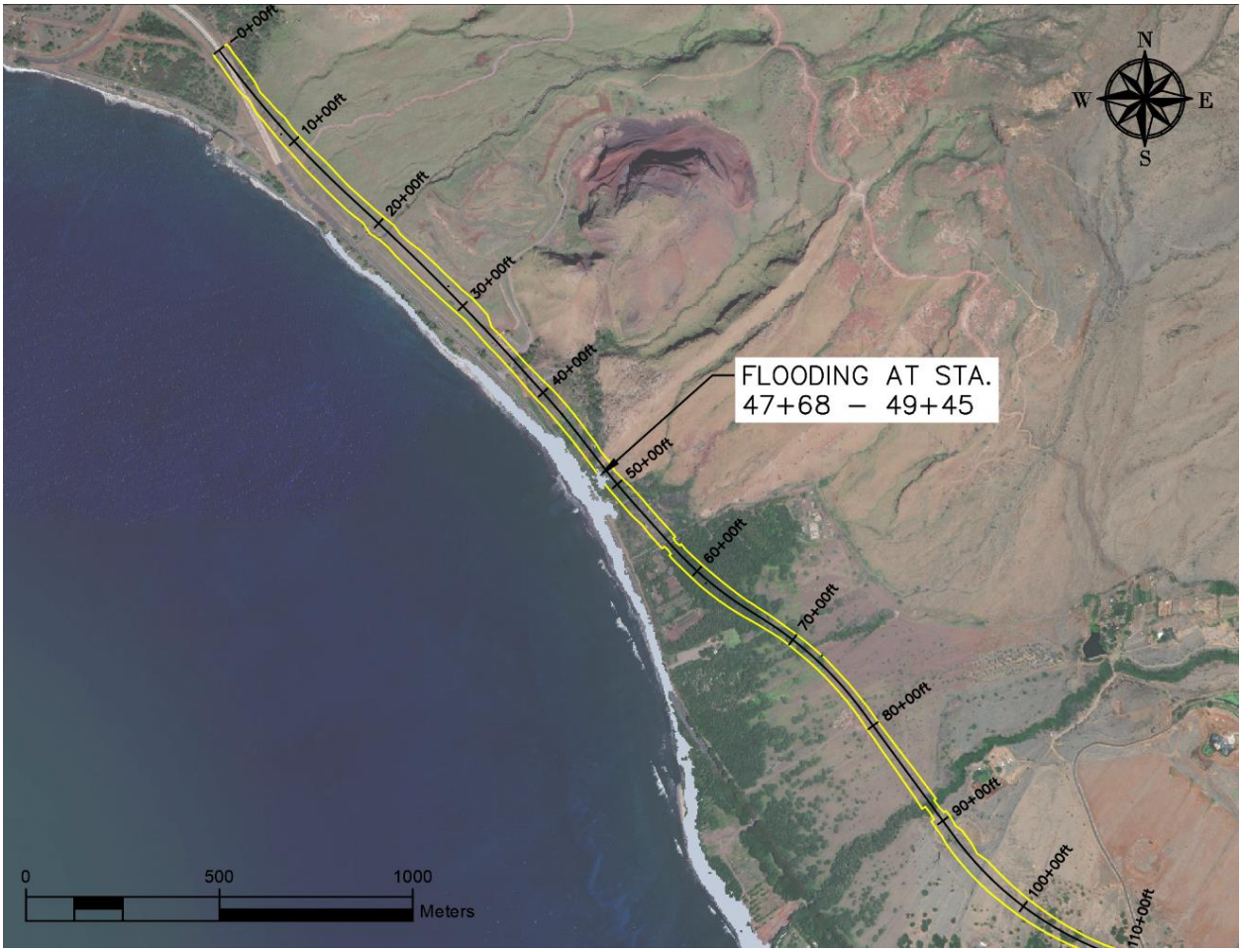


Figure 5-7. XBeach-NH modeled maximum flood extent (gray) for existing ground relative to alternative 2 (yellow) alignment in the Olowalu region.

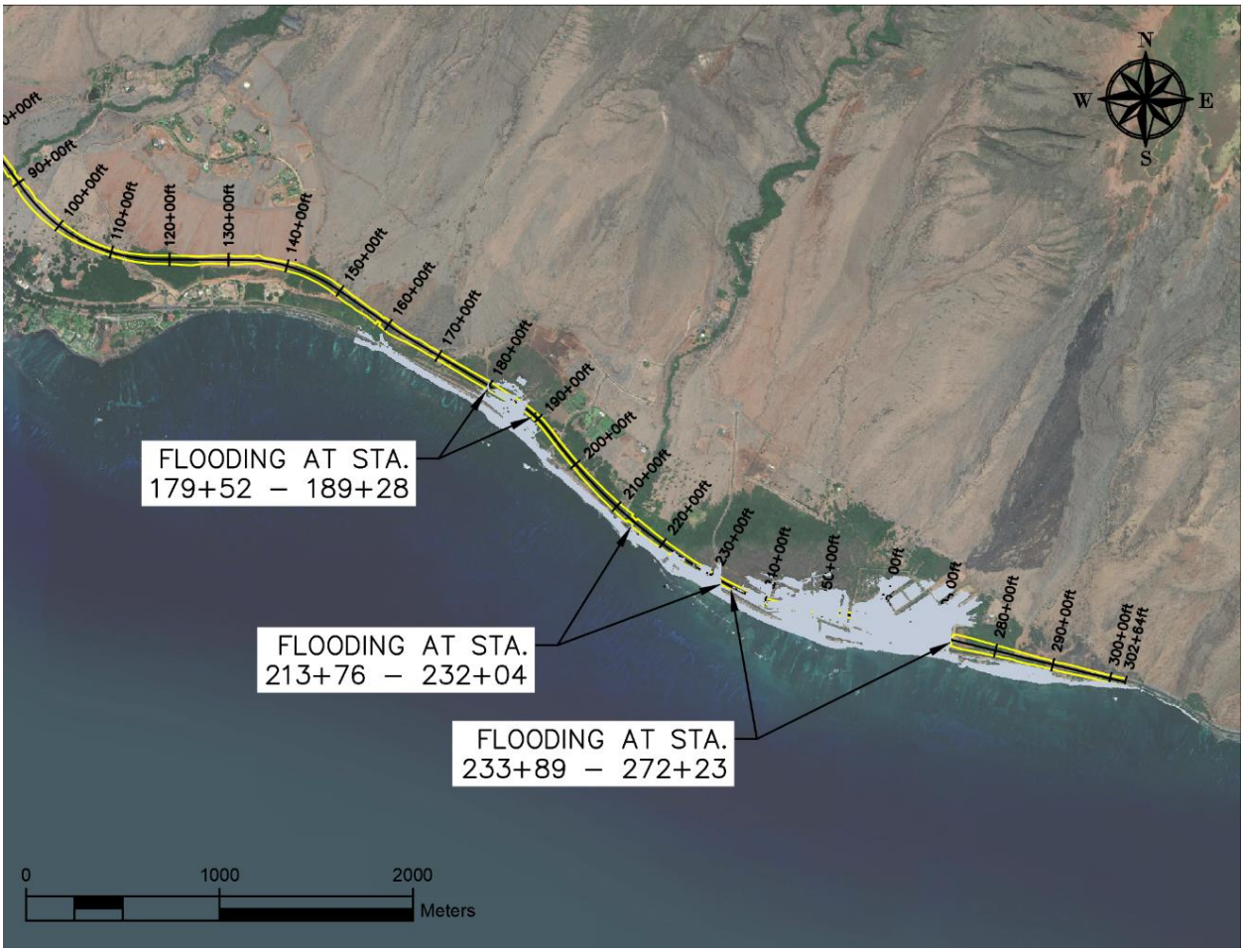


Figure 5-8. XBeach-NH modeled maximum flood extent (gray) for existing ground relative to alternative 2 (yellow) alignment in the Ukumehame region.

Table 5-2. Modeled maximum flood depth and elevations for existing ground along the alternative 2 alignment

Alignment Station (ft)	Max Flood Depth (m [ft])	Max Flood Elevation (m [ft], msl)
47+68 – 49+45	0.25 (0.8)	2.04 (6.7)
179+52 – 189+28	1.42 (4.7)	2.15 (7.1)
213+76 – 232+04	1.03 (3.4)	2.01 (6.6)
233+89 – 272+23	1.16 (3.8)	1.82 (6.0)

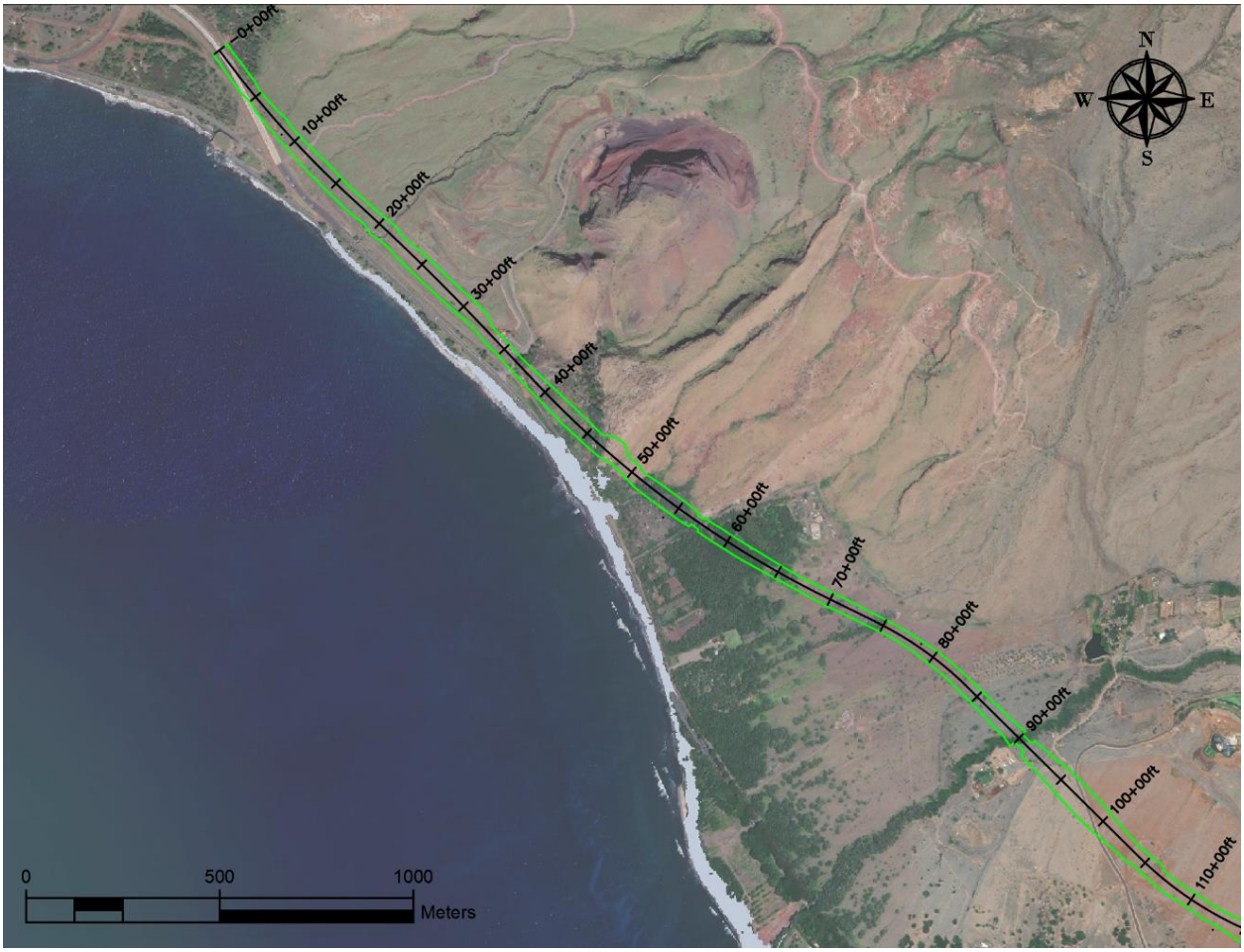


Figure 5-9. XBeach-NH modeled maximum flood extent (gray) for existing ground relative to alternative 3 (geen) alignment in the Olowalu region.

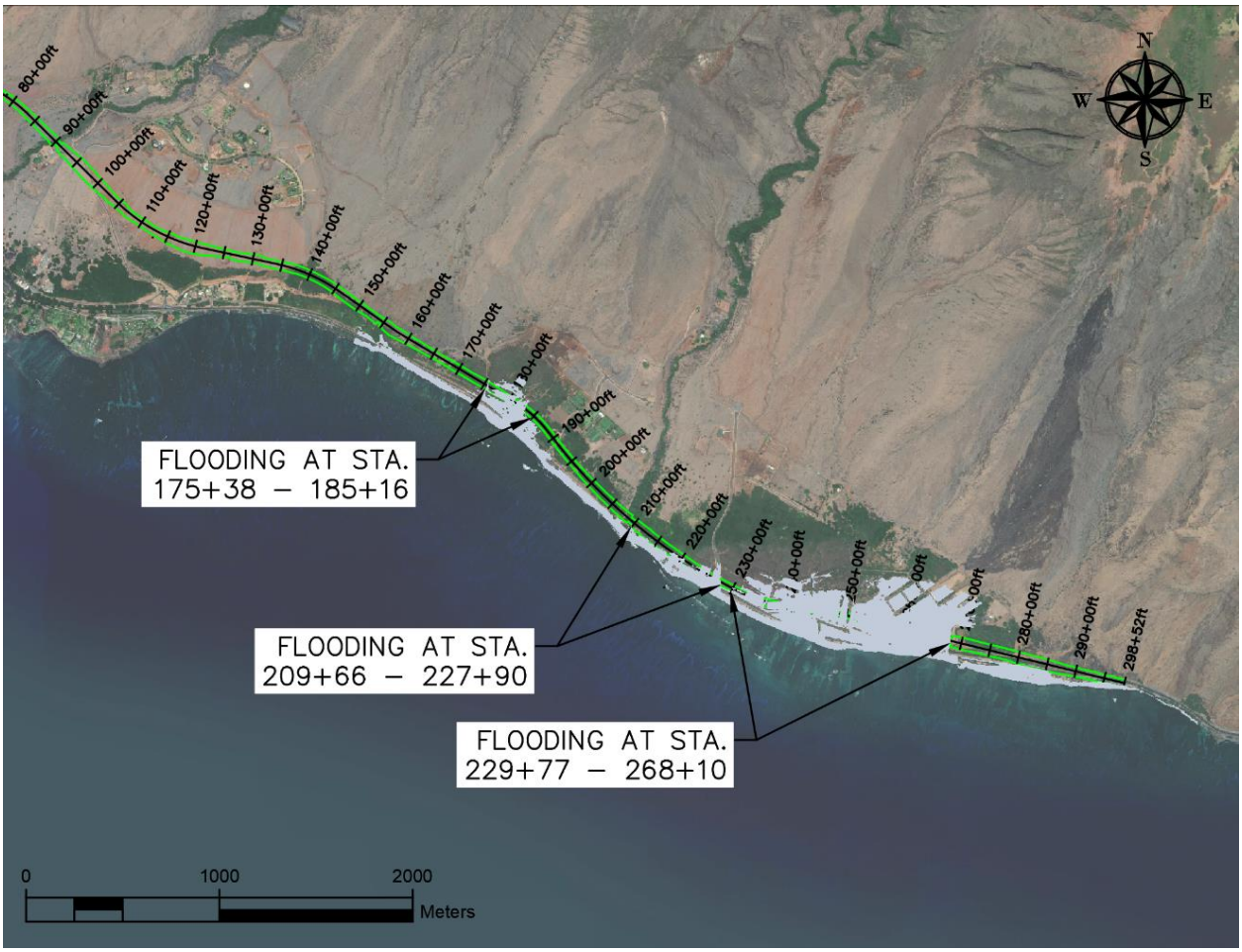


Figure 5-10. XBeach-NH modeled maximum flood extent (gray) for existing ground relative to alternative 3 (geen) alignment in the Ukumehame region.

Table 5-3. Modeled maximum flood depth and elevations for existing ground along the alternative 3 alignment

Alignment Station (ft)	Max Flood Depth (m [ft])	Max Flood Elevation (m [ft], msl)
175+38 – 185+16	1.42 (4.7)	2.15 (7.1)
209+66 – 227+90	1.03 (3.4)	2.01 (6.9)
229+77 – 268+10	1.16 (3.8)	1.82 (6.0)

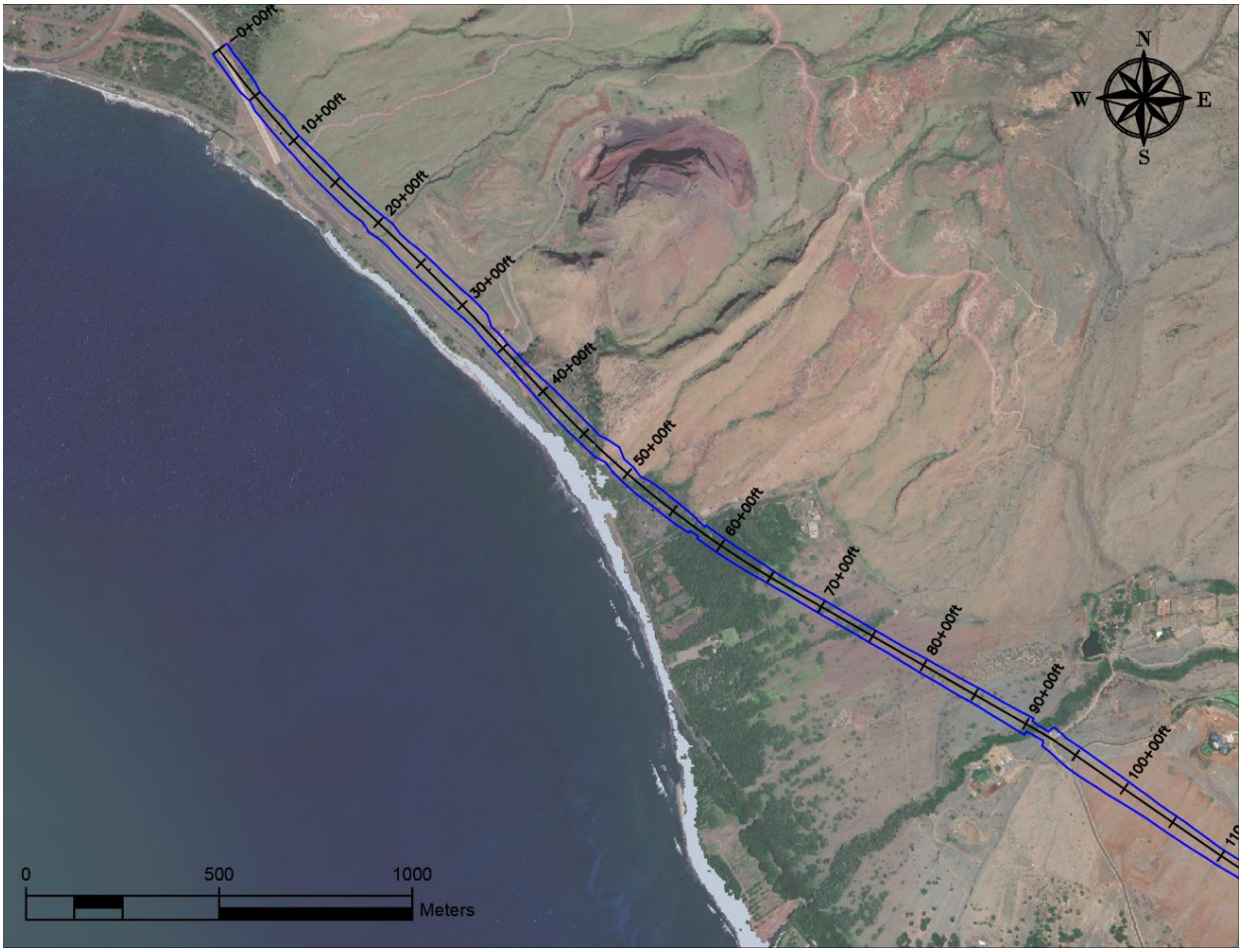


Figure 5-11. XBeach-NH modeled maximum flood extent (gray) for existing ground relative to alternative 4 (blue) alignment in the Olowalu region.

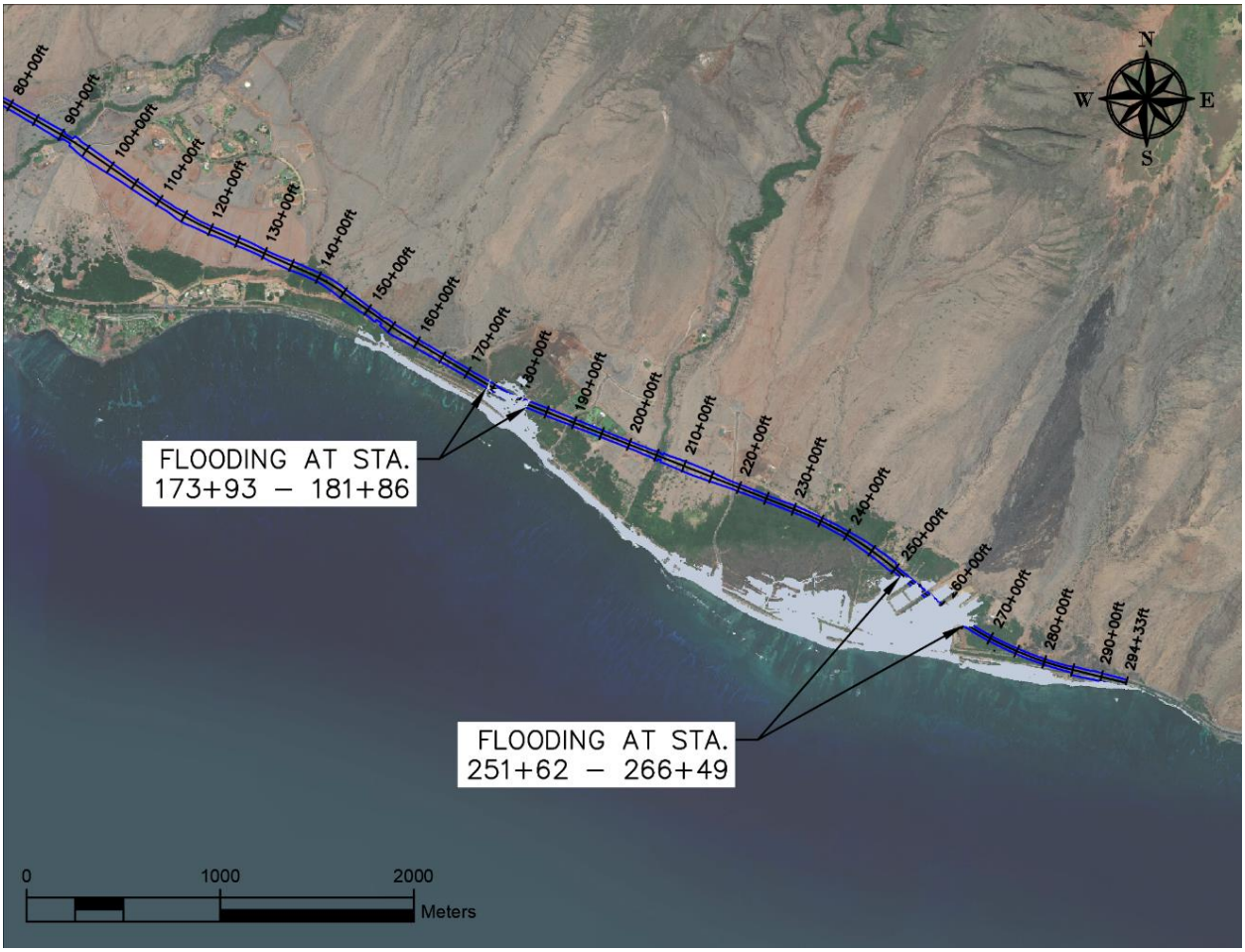


Figure 5-12. XBeach-NH modeled maximum flood extent (gray) for existing ground relative to alternative 4 (blue) alignment in the Ukumehame region.

Table 5-4. Modeled maximum flood depth and elevations for existing ground along the alternative 4 alignment

Alignment Station (ft)	Max Flood Depth (m [ft])	Max Flood Elevation (m [ft], msl)
173+93 – 181+86	0.77 (2.5)	2.06 (6.8)
251+62 – 266+49	0.92 (3.0)	1.78 (5.8)

5.2.2 *Alternative 1 Alignment*

Model results of maximum flood depths and elevations for the proposed alternative 1 alignment ground elevation changes are shown in Appendix B attached to this report. Figure 5-13 and Figure 5-14 show the maximum flood extent for the *Olowalu* and *Ukumehame* areas, respectively, relative to the proposed alignment grading limits.



Figure 5-13. *Olowalu* XBeach-NH modeled maximum flood extent (gray) for alternative 1 (red) alignment



Figure 5-14. *Ukumehame* XBeach-NH modeled maximum flood extent (gray) for alternative 1 (red) alignment

Olowalu

In the *Olowalu* region, the modeled flooding does not cross over the proposed grading limits. Due to the increase in elevation for this highway alignment, flood waters that previously crossed over the proposed grading limits under existing conditions are now blocked and limited to the makai edge of the proposed highway embankment. Modeled flooding reaches the makai edge of the proposed grading limits from stations 48+34 to 49+82 ft with maximum depth-averaged velocities up to 0.25 m/s (0.8 ft/s). This area may be susceptible to erosion without bank protection in the future under higher sea levels.

Ukumehame

In the *Ukumehame* region, the modeled flooding does not cross over the proposed alignment grading limits except for the proposed bridge crossing region between stations 267+00 and 284+00 ft where flood waters are assumed to pass freely below the bridge structure. The modeled maximum flood depth within the bridge crossing area is up to 1.00 m (3.3 ft) with a maximum surface elevation up to 1.79 m (5.9 ft) above msl. Due to the increase in grade for this highway alignment, flood waters that previously crossed over the proposed grading limits under existing conditions are now blocked and limited to the makai edge of the proposed highway embankment. Modeled flooding reaches the makai edge of the proposed grading limits from stations 189+00 to 198+50 ft, 254+59 to 256+50 ft, and 265+50 to 267+00 ft with maximum depth-averaged velocities between 1.09 m/s (3.6 ft/s) and 0.28 m/s (0.9 ft/s). These areas may be susceptible to erosion without bank protection in the future under higher sea levels.

5.2.3 *Alternative 2 Alignment*

Model results of maximum flood depths and elevations for the proposed alternative 2 alignment ground elevation changes are shown in Appendix C attached to this report. Figure 5-15 and Figure 5-16 show the maximum flood extent for the *Olowalu* and *Ukumehame* areas, respectively, relative to the proposed alignment grading limits.



Figure 5-15. *Olowalu* XBeach-NH modeled maximum flood extent (gray) for alternative 2 (yellow) alignment



Figure 5-16. *Ukumehame* XBeach-NH modeled maximum flood extent (gray) for alternative 2 (yellow) alignment

Olowalu

In the *Olowalu* region, the modeled flooding does not cross over the proposed alignment grading limits. Due to the increase in grade for this highway alignment, flood waters that previously crossed over the proposed grading limits under existing conditions are now blocked and limited to the makai edge of the proposed highway embankment. Modeled flooding reaches the makai edge of the proposed grading limits from stations 48+25 to 49+67 ft with maximum depth-averaged velocities up to 0.25 m/s (0.8 ft/s). This area may be susceptible to erosion without bank protection in the future under higher sea levels.

Ukumehame

In the *Ukumehame* region, the modeled flooding partially crosses over the proposed alignment grading limits between stations 185+89 and 187+37 ft with maximum flood depth up to 0.36 m (1.2 ft) and elevation up to 2.12 m (7.0 ft) above msl. Flooding also occurs between stations 229+91 and 233+52 ft with maximum flood depth up to 0.39 m (1.3 ft) and elevation up to 1.95 m (6.4 ft) above msl. This area is low-lying and intersects Pohaku Aeko Street. Due to the increase in grade for this highway alignment, flood waters that previously crossed over the proposed alignment under existing conditions, outside of the area described above, are now blocked and limited to the makai edge of the highway grading limits. Modeled flooding reaches the makai edge of the grading limits from stations 179+72 to 187+25 ft and 213+76 to 232+04 ft with maximum depth-averaged velocities up to 0.93 m/s (3.1 ft/s) and 1.20 m/s (3.9 ft/s), respectively. These areas

may be susceptible to erosion without bank protection in the future under higher sea levels. Modeled flooding also extends past the proposed bridge crossing region between station 240+00 and 272+50 ft where flood waters are assumed to pass freely below the bridge structure. The modeled maximum flood depth within the bridge crossing area is up to 1.16 m (3.8 ft) with a maximum surface elevation up to 1.82 m (6.0 ft) above msl.

5.2.4 *Alternative 3 Alignment*

Model results of maximum flood depths and elevations for the proposed alternative 3 alignment ground elevation changes are shown in Appendix D attached to this report. Figure 5-17 and Figure 5-18 show the maximum flood extent for the *Olowalu* and *Ukumehame* areas, respectively, relative to the proposed alignments grading limits.



Figure 5-17. *Olowalu* XBeach-NH modeled maximum flood extent (gray) for alternative 3 (green) alignment



Figure 5-18. *Ukumehame* XBeach-NH modeled maximum flood extent (gray) for alternative 3 (green) alignment

Olowalu

In the *Olowalu* region, the modeled flooding does not cross over the proposed alignment grading limits or reach the makai embankment.

Ukumehame

In the *Ukumehame* region, the modeled flooding within the proposed alignment grading limits occurs between stations 181+01 and 183+20 ft with maximum flood depth up to 0.36 m (1.2 ft) and elevation up to 2.12 m (7.0 ft) above msl. Flooding also occurs between stations 225+97 and 229+41 ft with maximum flood depth up to 0.39 m (1.3 ft) and elevation up to 1.95 m (6.4 ft) above msl. This area is low-lying and intersects Pohaku Aeko Street. Due to the increase in grade for this highway alignment, flood waters that previously crossed over the proposed alignment under existing conditions, outside of the area described above, are now blocked and limited to the makai edge of the highway grading limits. Modeled flooding reaches the makai edge of the grading limits from stations 175+80 to 183+13 ft and 209+66 to 228+35 ft with maximum depth-averaged velocities up to 0.80 m/s (2.6 ft/s) and 1.40 m/s (4.6 ft/s), respectively. These areas may be susceptible to erosion without bank protection in the future under higher sea levels. Flooding also extends past the proposed bridge crossing region between station 239+00 and 268+00 ft where flood waters are assumed to pass freely below the bridge structure. The modeled maximum flood depth within the bridge crossing area is up to 1.16 m (3.8 ft) with a maximum surface elevation up to 1.82 m (6.0 ft) above msl.

5.2.5 *Alternative 4 Alignment*

Model results of maximum flood depths and elevations for the proposed alternative 4 alignment ground elevation changes are shown in Appendix E attached to this report. Figure 5-19 and Figure 5-20 show the maximum flood extent for the *Olowalu* and *Ukumehame* areas, respectively, relative to the proposed alignments grading limits.



Figure 5-19. *Olowalu* XBeach-NH modeled maximum flood extent (gray) for alternative 4 (blue) alignment



Figure 5-20. *Ukumehame* XBeach-NH modeled maximum flood extent (gray) for alternative 4 (blue) alignment

Olowalu

In the *Olowalu* region, the modeled flooding does not cross over the proposed alignment grading limits or reach the makai embankment.

Ukumehame

In the *Ukumehame* region, the modeled flooding does not occur within the proposed alignment grading limits except for the proposed bridge crossing region between station 251+62 and 266+49 ft where flood waters are assumed to pass freely below the bridge structure. The modeled maximum flood depth within the bridge crossing area is up to 0.92 m (3.0 ft) with a maximum surface elevation up to 1.78 m (5.8 ft) above msl. Due to the increase in grade for this highway alignment, flood waters that previously crossed over the proposed alignment under existing conditions are now blocked and limited to the makai edge of the highway grading limits. Modeled flooding reaches the makai edge of the grading limits from stations 174+16 to 181+61 ft with maximum depth-averaged velocities up to 0.71 m/s (2.3 ft/s). This area may be susceptible to erosion without bank protection in the future under higher sea levels.

5.3 Alternatives Assessment

Table 5-5 and Table 5-6 below summarizes the total length of each highway alternative that is potentially exposed to modeled annual wave flooding with 0.98 m (3.2 ft) of slr for the *Olowalu* and *Ukumehame* regions, respectively. Based on the model results for the *Olowalu* region, highway alignment alternatives 3 and 4 are the least susceptible to potential flooding for the annual wave event where neither of these highway alignments are impacted by the modeled flooding. Highway alignment alternative 1 was found to be the most susceptible to potential flooding in the *Olowalu* region for an annual wave event where 45 m (148 ft) of highway is impacted. Based on the model results for the *Ukumehame* region, highway alignment alternative 4 is the least susceptible to potential flooding for the annual wave event where only 227 m (745 ft) of highway is impacted. Highway alignment alternative 2 was found to be the most susceptible to potential flooding in the *Ukumehame* region for an annual wave event where 835 m (2,741 ft) of highway is impacted. The modeled flooding under the bridge crossing region in *Ukumehame* is not included in the length of highway impacted assuming the bridge structure is higher than the flood waters. However, bridge supporting elements (i.e. piles, abutments, etc.) may be exposed to flood hazards and would require engineered protection against potential scour and hydraulic loading.

Based on these modeling results, if fill is to be used instead of a bridge structure in the *Ukumehame* regions, the fill embankment may be exposed to wave-driven and passive flooding and would require bank protection through armoring or other engineered means. It should be noted that these results are representative of an annually occurring (1-year return period) south swell wave event. Flooding may be more severe for less frequent but larger wave events combined with higher sea levels.

Table 5-5. Comparison of alternative alignments based on model results - *Olowalu*

Highway Alignment	Stationing Impacted by Modeled Flooding	Length of Highway Impacted by Modeled Flooding
Alternative 1	48+34 - 49+82 ft	45 m (148 ft)
Alternative 2	48+25 - 49+67 ft	43 m (142 ft)
Alternative 3	N/A	0 m (0 ft)
Alternative 4	N/A	0 m (0 ft)

Table 5-6. Comparison of alternative alignments based on model results - *Ukumehame*

Highway Alignment	Stationing Impacted by Modeled Flooding	Length of Highway Impacted by Modeled Flooding
Alternative 1	189+00 - 198+50 ft 254+59 - 256+50 ft 265+50 - 267+00 ft	394 m (1,291 ft)
Alternative 2	179+72 - 187+37 ft 213+76 - 233+52 ft	835 m (2,741 ft)
Alternative 3	175+80 - 183+20 ft 209+66 - 229+41 ft	828 m (2,715 ft)
Alternative 4	174+16 - 181+61 ft	227 m (745 ft)

6. FEMA FIRM FLOOD ZONES

The FEMA FIRM flood zones along the study area include Zones VE, AE, A, and AO. Zone VE represents the coastal high hazard zone and is defined by the inundation caused by a 1-percent annual chance tsunami or hurricane storm surge, whichever is greater. For tsunami dominated regions, Zone VE is defined where tsunami flood depths are 1.22m (4 ft) or deeper. For hurricane storm surge dominated regions, Zone VE is defined where wave heights are 0.91 m (3 ft) or higher. Zone AE within the coastal high hazard zone is defined where the tsunami flood depth is less than 1.22m (4 ft) or where the wave height is less than 0.91 m (3 ft) for hurricane storm surge. The flood zones within the coastal hazard zone were defined for existing topography and sea level and do not include future slr. Figure 6-1 shows the FEMA flood zones in relation to the proposed alignments along the study area.

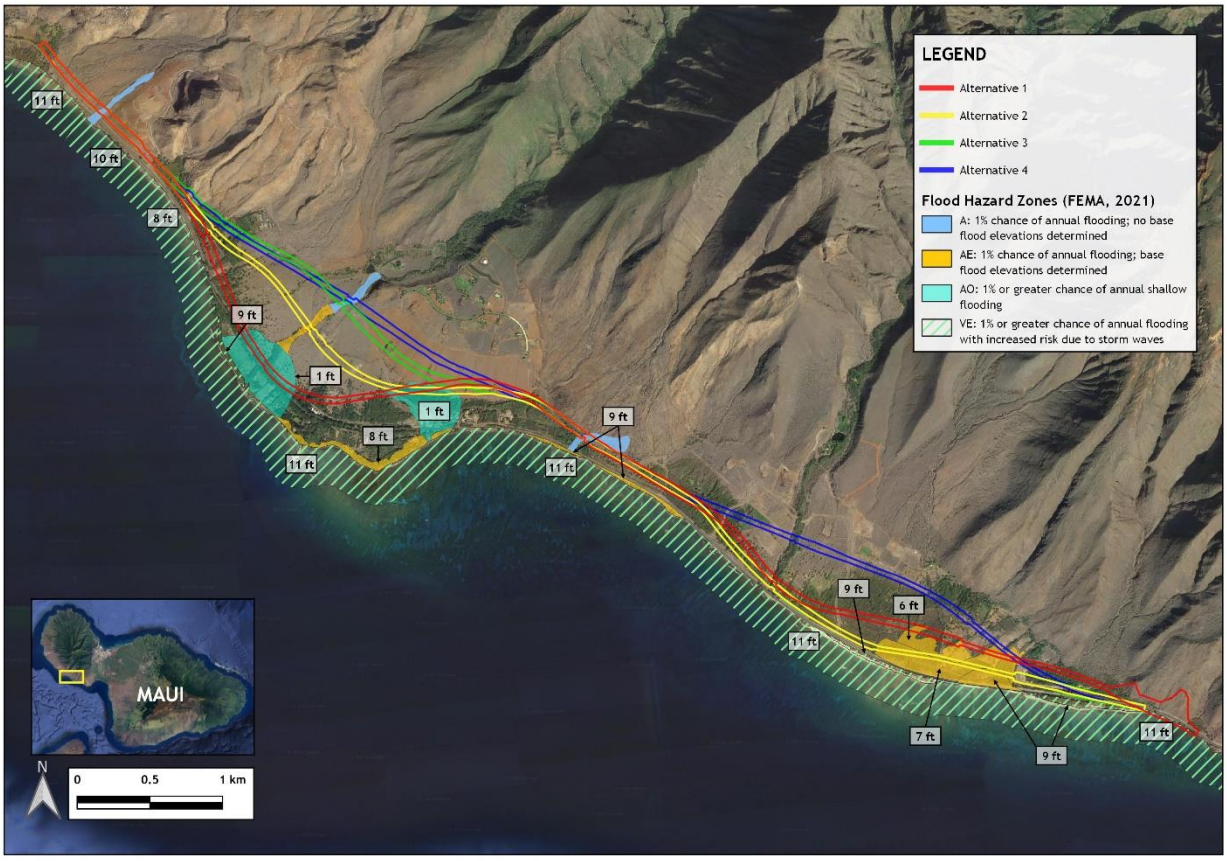


Figure 6-1. FEMA FIRM flood zones relative to the alternative alignments

All alternative alignments cross over the AE Zone at the southeast end of the study area. This area has a base flood elevation (BFE) between 1.82 m (6 ft) and 2.74 m (9 ft) above msl. The BFE of the VE Zones along the study area is between 2.44 m (8 ft) and 3.35 m (11 ft) above msl but do not cross over the proposed alignments.

7. COASTAL HIGHWAY INFRASTRUCUTRE ADAPTATION STRATEGIES

Highway infrastructure in the coastal zone may require special adaptation strategies when potentially exposed to coastal hazards along with future sea level rise. The Federal Highways report titled "*Highways in the Coastal Environment*" Report No. FHWA HIF-19-059 provides five (5) general strategies for highway infrastructure adaptation in the coastal regions. These general strategies include manage and maintain; increase redundancy; protect; accommodate; and relocate. Strategy appropriateness for this project shall be assessed by highway designers considering the varying physical environment along each alternative alignment and relative vicinity of coastal hazards with sea level rise. The following subsections describe each general strategy.

7.1 Manage and Maintain

Manage and maintain involves maintenance of existing highway infrastructure (i.e. sand sweeping, culvert cleaning, etc.) after high wave and water level events and managing the response to these extreme events through preparation (i.e. staging of road construction materials for highway repair). With future sea level rise the frequency of highway maintenance, storm response, and associated highway closure is expected to increase for this adaptation strategy. Depending on the highway elevation, vicinity to the shoreline, and future sea level rise projection, this strategy may become unviable if the coastal hazard impacts to highway infrastructure becomes too frequent.

7.2 Increase Redundancy

Increase redundancy involves providing other means of transportation (i.e. alternative routes or modes of transportation) during closure of the primary road or highway due to storm events. This strategy may become difficult or unviable in regions where alternative roads/highways or other means of transportation are not already in place and would require new infrastructure. If new routes are added away from the coastal hazards, this strategy would allow the existing route to remain open until no longer feasible due to future sea level rise projections.

7.3 Protect

Protect involves protecting existing or new highway infrastructure by a physical barrier to damaging coastal hazards. These barriers may consist of seawalls, revetments, and/or bulkheads. Rubble-mound revetments are a common and effective means to protect roads and/or highways that are exposed to wave action, flooding, and coastal erosion. These structures consist of an engineered slope made up of specifically sized stone or concrete armor unit based on a design wave height (typically 50-yr return period) at the toe of the structure. The crest elevation of a revetment can reduce wave overtopping during extreme events and the structure stability prohibits shoreline erosion and migration inland.

7.4 Accommodate

Accommodate involves highway infrastructure to be modified or re-designed to minimize impacts and to coexist with the future natural environment. An example of this strategy is raising a roadway or highway vertically above potential coastal hazards using an elevated structure (i.e. bridge, causeway, viaduct, etc.). This type of structure typically has a much smaller footprint than a raised highway built on top of fill material. The supporting elements of the elevated structure (i.e. piles,

abutments, etc.) may still be exposed to coastal hazards and should be protected/designed accordingly.

7.5 Relocate

Relocate involves lessening or eliminating the exposure of coastal hazards by relocating the highway away from the shoreline and outside of any potential coastal hazards and future sea level rise. This strategy becomes difficult in narrow regions between the shoreline and steep topographic features, in regions that are low-lying and susceptible to future passive flooding, or in regions that are highly developed with little available land.

8. REFERENCES

Anderson, T., Fletcher, C., Barbee, M., Frazer, N., Romine, B. (2015) Doubling of coastal erosion under rising sea level by mid-century in Hawaii. Natural Hazards. 78. 10.1007/s11069-015-1698-6.

Anderson, T., Fletcher, C., Barbee, M., Romine, B., Lemmo, S., Delevaux, J. (2018) Modeling multiple sea level rise stresses reveals up to twice the land risk compared to strictly passive flooding methods. Scientific Reports 8, 14484 (2018). https://doi.org/10.1038/s41598-018-32658-x

Davidson-Arnott R (2005) Conceptual model of the effects of sea level rise on sandy coasts. J Coast Res 21(6):1166–1172

Department of Land and Natural Resources (DLNR), State of Hawaii Climate Mitigation and Adaptation Commission, NOAA, University of Hawaii Sea Grant College Program (2018) Hawaii Sea Level Rise Viewer

Federal Highway Administration (FWA) (2020), Highways in the Coastal Environment. Hydraulic Engineering Circular Number 25 (HEC-25), Third Edition. Report No. FHWA HIF-19-059.

Hall, J.A., S. Gill, J. Obeysekera, W. Sweet, K. Knuuti, and J. Marburger (2016) Regional Sea Level Scenarios for Coastal Risk Management: Managing the Uncertainty of Future Sea Level Change and Extreme Water Levels for Department of Defense Coastal Sites Worldwide. U.S. Department of Defense, Strategic Environmental Research and Development Program. 224 pp.

Hawaii Climate Change Mitigation and Adaptation Commission. 2021. State of Hawaii Sea Level Rise Viewer. Version 1.06. Prepared by the Pacific Islands Ocean Observing System (PacIOOS) for the University of Hawaii Sea Grant College Program and the State of Hawaii Department of Land and Natural Resources, Office of Conservation and Coastal Lands, with funding from National Oceanic and Atmospheric Administration Office for Coastal Management Award No. NA16NOS4730016 and under the State of Hawaii Department of Land and Natural Resources Contract No. 64064. http://hawaiisealevelriseviewer.org. Accessed October 1, 2022.

Hawaii Sea Level Rise Vulnerability and Adaptation Report (2017) Hawaii Climate Change Mitigation and Adaptation Commission, Prepared by Tetra Tech, Inc. and the State of Hawaii Department of Land and Natural Resources, Office of Conservation and Coastal Lands, under the State of Hawaii Department of Land and Natural Resources.

IPCC, 2021: *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*[Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, In press, doi:10.1017/9781009157896.

NOAA., 2023. *Relative Sea Level Trend 1615680 Kahului, Hawaii*. Retrieved from https://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?id=1615680.

Pacific Islands Ocean Observing System (PacIOOS). 2022. West Maui Wave-Driven Flooding With Sea Level Rise. Version 1.04. http://pacioos.org/shoreline/slr-westmaui/. Accessed December 15, 2023.

Roeber, V. and K.F. Cheung (2012). *Boussinesq-type model for energetic breaking waves in fringing reef environments.* Coastal Engineering, 70, 1-20 https://doi.org/10.1016/j.coastaleng.2012.06.001

Stelling, G. and M. Zijlema. 2003. *An accurate and efficient finite-difference alogorithm for non-hydrostatic free-surface flow with application to wave propagation*, International Journal of Numerical Methods in Fluids. 43(1): 1-23.

Sweet, W.V., R.E. Kopp, C.P. Weaver, J. Obeysekera, R.M. Horton, E.R. Thieler, and C. Zervas (2017) Global and Regional Sea Level Rise Scenarios for the United States. NOAA Technical Report NOS CO-OPS 083. NOAA/NOS Center for Operational Oceanographic Products and Services.

Sweet, W.V., Mercy, D., Dusek, G., Marra, J.J., Pendleton, M. (2018) 2017 State of U.S. High Tide Flooding with a 2018 Outlook. National Oceanic and Atmospheric Administration (NOAA) Center for Operational Oceanographic Products and Services, NOAA Office of Coastal Management, NOAA National Centers for Environmental Information, The Baldwin Group, Inc.
Sweet, W.V., B.D. Hamlington, R.E. Kopp, C.P. Weaver, P.L. Barnard, D. Bekaert, W. Brooks, M. Craghan, G. Dusek, T. Frederikse, G. Garner, A.S. Genz, J.P. Krasting, E. Larour, D. Marcy, J.J. Marra, J. Obeysekera, M. Osler, M. Pendleton, D. Roman, L. Schmied, W. Veatch, K.D. White, and C. Zuzak (2022) Global and Regional Sea Level Rise Scenarios for the United States: Updated Mean Projections and Extreme Water Level Probabilities Along U.S. Coastlines. NOAA Technical Report NOS 01. National Oceanic and Atmospheric Administration, National Ocean Service, Silver Spring, MD, 111 pp.

Appendix A:

Global Sea Level Rise Projections

IPCC AR6 - Global Sea Level Rise Projections

The Intergovernmental Panel on Climate Change (IPCC) is the United Nations (U.N.) body for assessing the science related to climate change. The IPCC was created to provide policymakers with periodic scientific assessments on climate change, its implications, and potential future risks. As part of this effort, the IPCC surveys and distills the existing body of scientific research and provides consensus projections on future sea levels across the globe under a range of possible future scenarios. The most recent iteration of the IPCC's work, the 6th Assessment Report (AR6), was published on August 9, 2021. Five Shared Socioeconomic Pathways (SSPs) representing future scenarios are described (Figure 1) with slr projections for each (Figure 2).

SSP1-1.9 Holds warming in 2100 to approximately 1.5°C relative to the years 1850 to 1900 after a slight overshoot (median) and implies net zero CO_2 emissions around the middle of the century.

SSP1-2.6 Stays below 2.0°C warming relative to the years 1850 to 1900 (median) with implied net zero emissions in the second half of the century.

SSP2-4.5 Approximately in line with the upper end of aggregate Nationally Determined Contribution (NDC) emission levels by 2030. SR1.5 assessed temperature projections for NDCs to be between 2.7 and 3.4°C by 2100, corresponding to the upper half of projected warming under SSP2-4.5. New or updated NDCs by the end of 2020 did not significantly change the emissions projections up to 2030, although more countries adopted 2050 net zero targets in line with SSP1-1.9 or SSP1-2.6. The SSP2-4.5 scenario deviates mildly from a "no-additional-climate-policy" reference scenario, resulting in best-estimate warming of around 2.7°C by the end of the 21st century relative to the years 1850 to 1900.

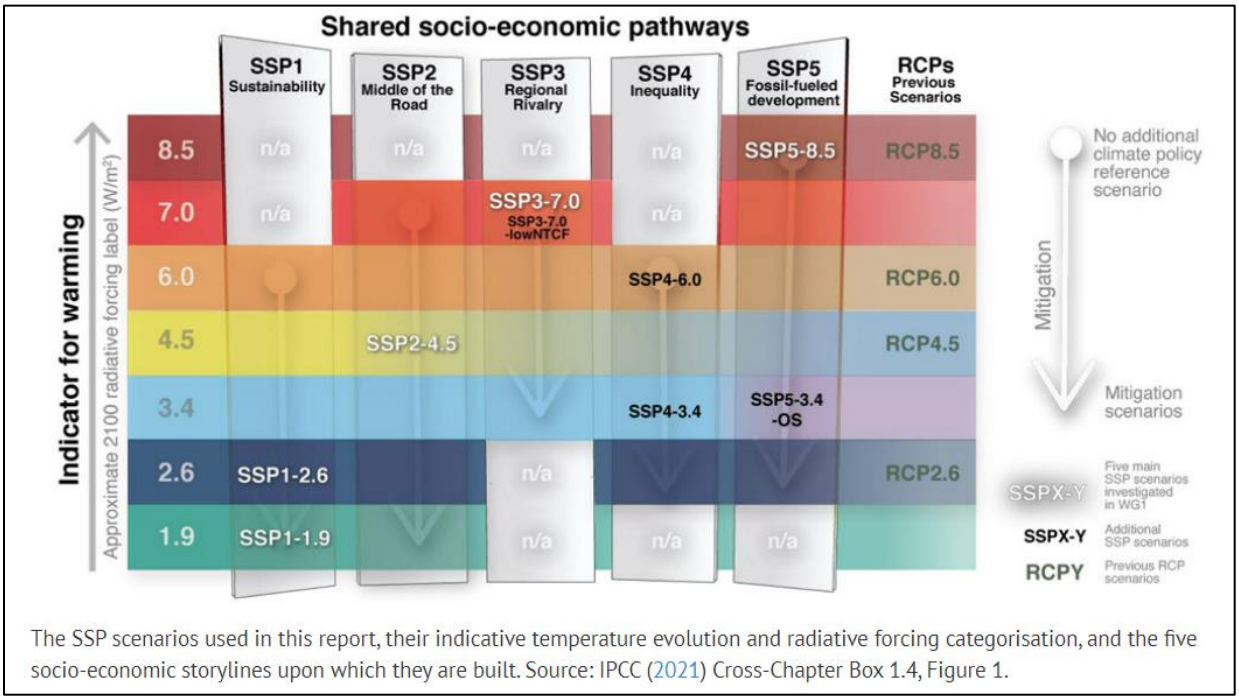
SSP3-7.0 A medium to high reference scenario resulting from no additional climate policy under the SSP3 socio-economic development narrative. SSP3-7.0 has particularly high non-CO_2 emissions, including high aerosol emissions.

SSP5-8.5 A high reference scenario with no additional climate policy. Emission levels as high as SSP5-8.5 are not obtained by Integrated Assessment Models under any of the SSPs other than the fossil-fueled SSP5 socio-economic development pathway.

To visualize the AR6 slr projections globally, NASA created the IPCC AR6 Sea Level Projection Tool [1], which allows users to view both global and regional sea level projections from 2020 to

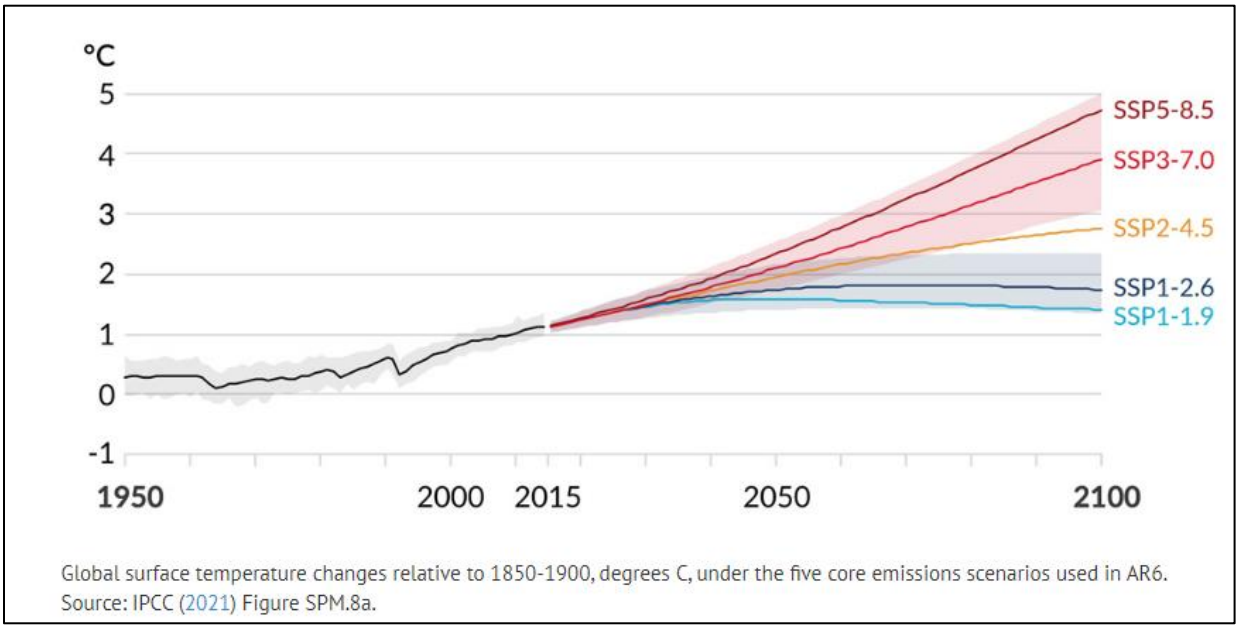
[1] https://sealevel.nasa.gov/ipcc-ar6-sea-level-projection-tool

2150 (Figure 3), along with how these projections differ depending on future scenarios. Users can click on a point anywhere in the ocean to obtain the IPCC projection of sea level for that specific location. The contributions of different physical processes to future slr are also provided, indicating which processes will be the dominant drivers of future sea levels for a given location.



The SSP scenarios used in this report, their indicative temperature evolution and radiative forcing categorisation, and the five socio-economic storylines upon which they are built. Source: IPCC (2021) Cross-Chapter Box 1.4, Figure 1.

Figure 1. IPCC AR6 shared socio-economic pathways (IPCC, 2021)



Global surface temperature changes relative to 1850-1900, degrees C, under the five core emissions scenarios used in AR6. Source: IPCC (2021) Figure SPM.8a.

Figure 2. IPCC AR6 global sea level rise projections, 1950 to 2100 (IPCC, 2021)

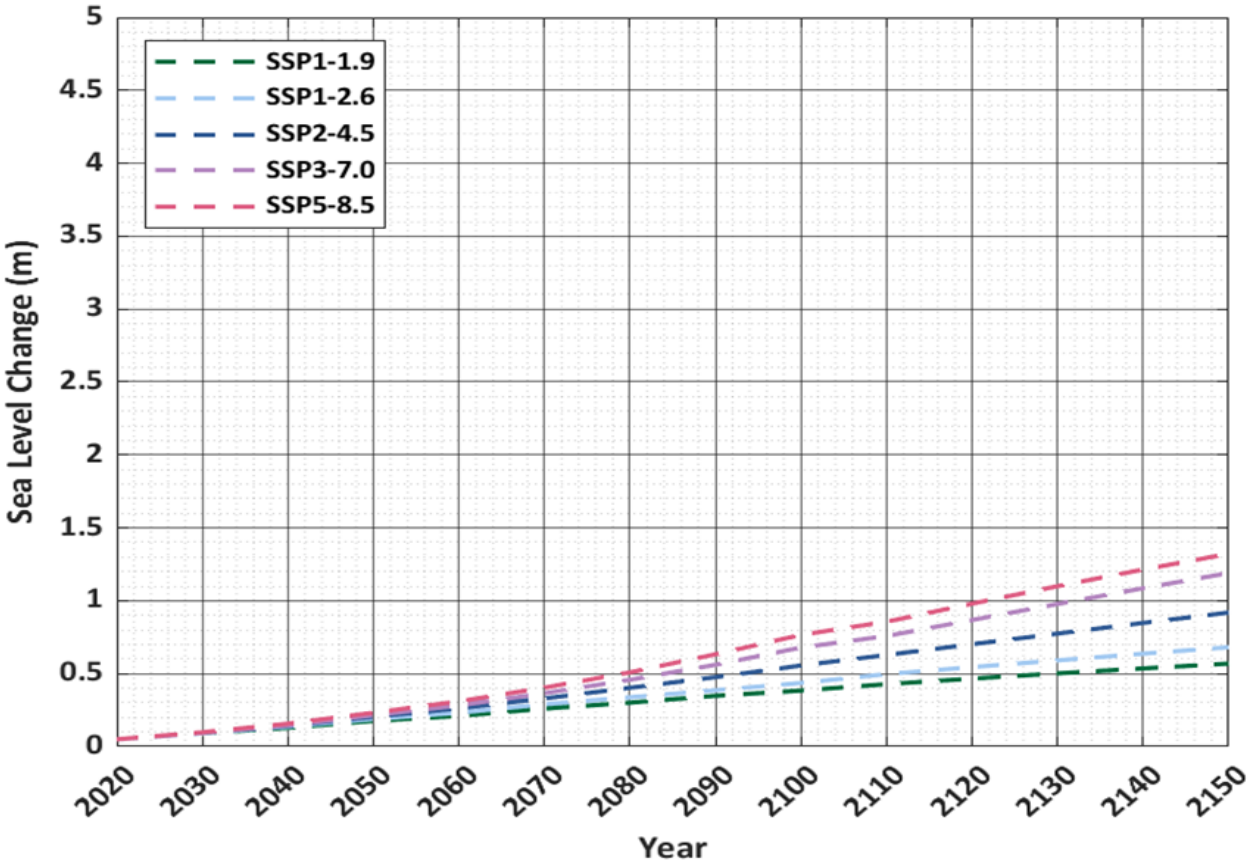


Figure 3. IPCC AR6 global sea level rise projections, 2020 to 2150 (IPCC, 2021)

U.S. Interagency Task Force - Global Sea Level Rise Projections

The Sea Level Rise and Coastal Flood Hazard Scenarios and Tools Interagency Task Force (Task Force) recently revised their sea level change projections through 2150, considering up-to-date scientific research and measurements. The Task Force consists of representatives from the National Aeronautics and Space Administration (NASA), National Oceanic and Atmospheric Administration (NOAA), U.S. Environmental Protection Agency (EPA), U.S. Geological Survey (USGS), U.S. Army Corps of Engineer (USACE), and additional partners within academia. The most recent report entitled *Global and Regional Sea Level Rise Scenarios for the United States: Updated Mean Projections and Extreme Water Level Probabilities Along U.S. Coastlines* (Sweet, et al., 2022), provides the most up to date slr projections for all the U.S. states and territories.

To visualize the Task Force slr projections globally, NASA created the *Task Force Sea Level Projection Tool* [2], which allows users to view both global and regional sea level projections from 2020 to 2150 (Figure 4), along with how these projections differ depending on future scenarios. Users can select a point anywhere in the ocean to obtain the Task Force slr projections for that

[2] https://sealevel.nasa.gov/task-force-scenario-tool

specific location. The contributions of different physical processes to future slr are also provided, indicating which processes will be the dominant drivers of future sea levels for a given location.

The Task Force scenarios are different than the IPCC AR6 scenarios but are based on the same underlying science and slr projection framework as the IPCC efforts. The key difference is that the Task Force created scenarios for targeted slr elevations at specific times in the future, rather than emissions pathways. These targeted slr elevations represent unlikely but possible, or plausible, outcomes compared to IPCC AR6, which are considered likely scenarios. The goal of the Task Force projections is to examine the full range of plausible amounts of future sea level to help bound certain risk planning exercises. The result for the Task Force is that the scenarios are based on target elevations for slr in 2100 of 0.30 m (1.0 ft) (*Low*), 0.49 m (1.6 ft) (*Intermediate Low*), 1.01 m (3.3 ft) (*Intermediate*), 1.49 m (4.9 ft) (*Intermediate High*), and 2.01 m (6.6 ft) (*High*). Comparisons of the global Task Force slr projections to IPCC AR6 global projections are shown in Figure 5.

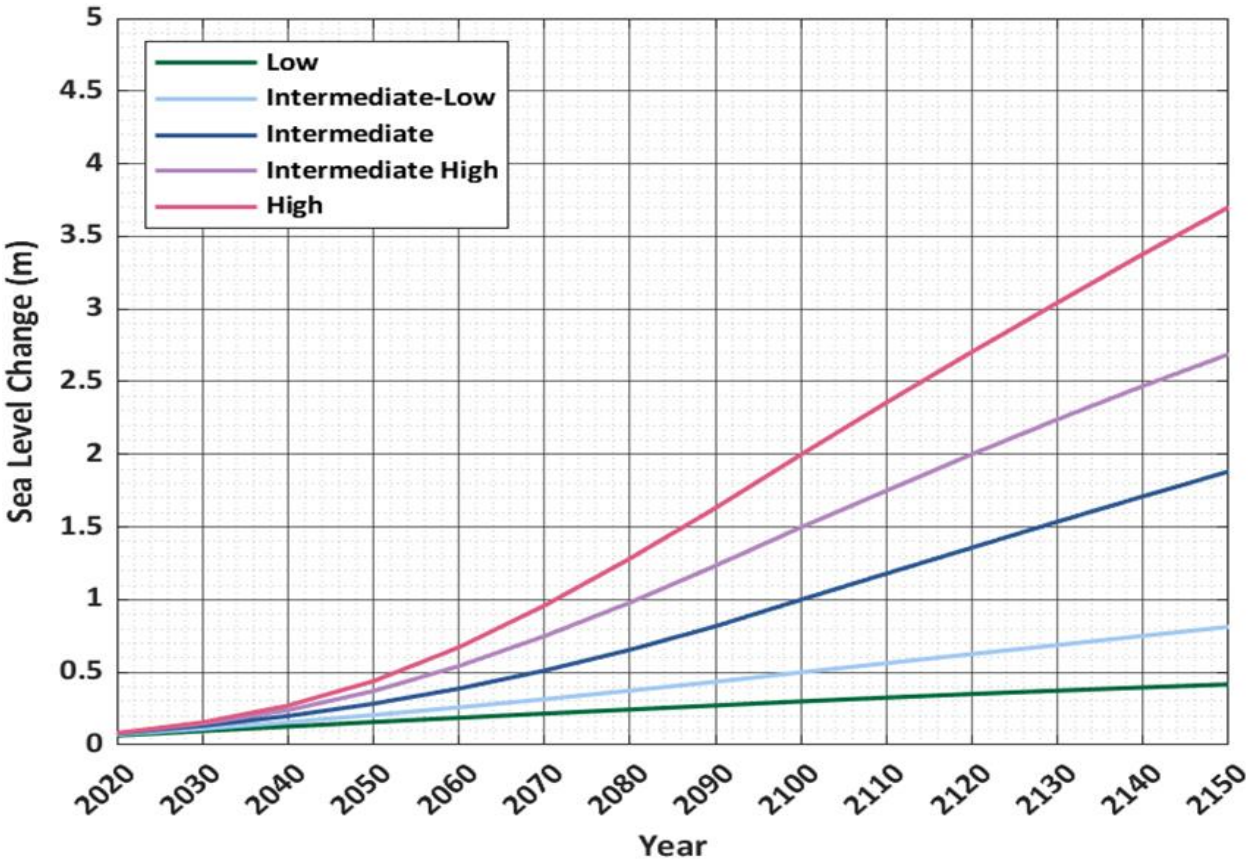


Figure 4. Task Force global sea level rise projections, 2020 to 2150 (Sweet, et al., 2022)

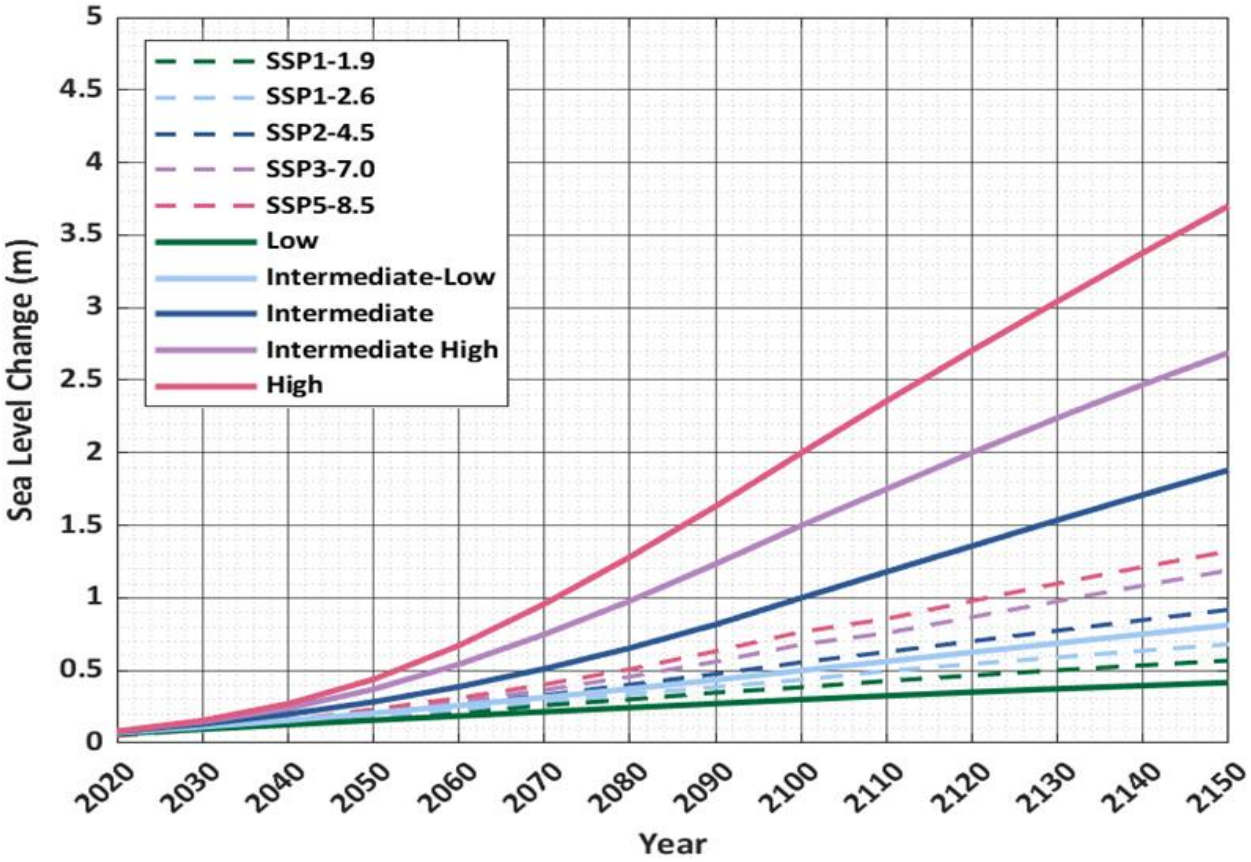


Figure 5. Comparison of IPCC AR6 and Task Force global sea level rise projections

Appendix B:

XBEACH-NH MODELED FLOOD DEPTHS, ELEVATIONS, AND VELOCITIES – EXISTING TOPOGRAPHY

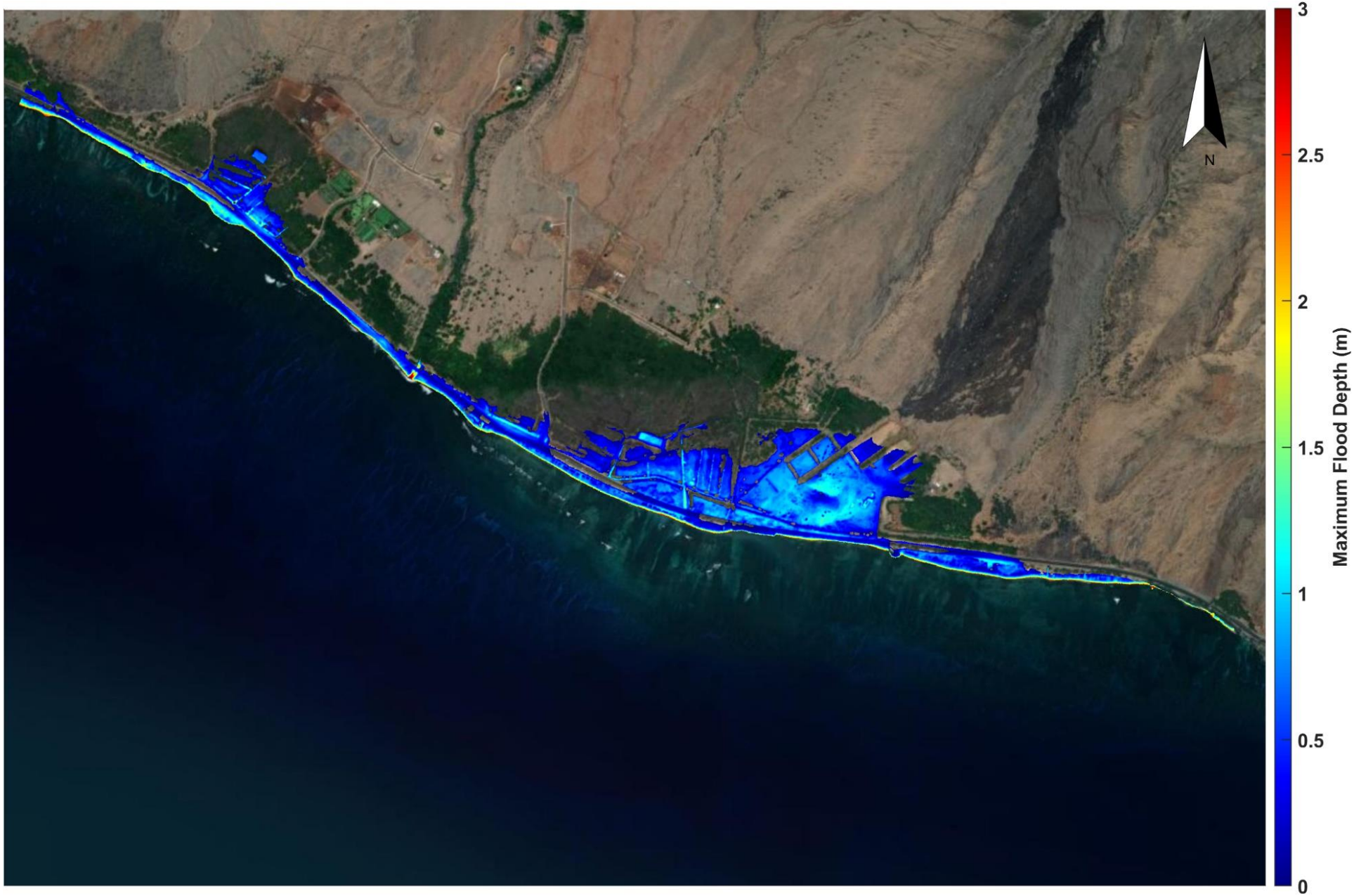


Figure B-1. XBeach-NH modeled maximum flood depth for existing ground (Ukumehame)

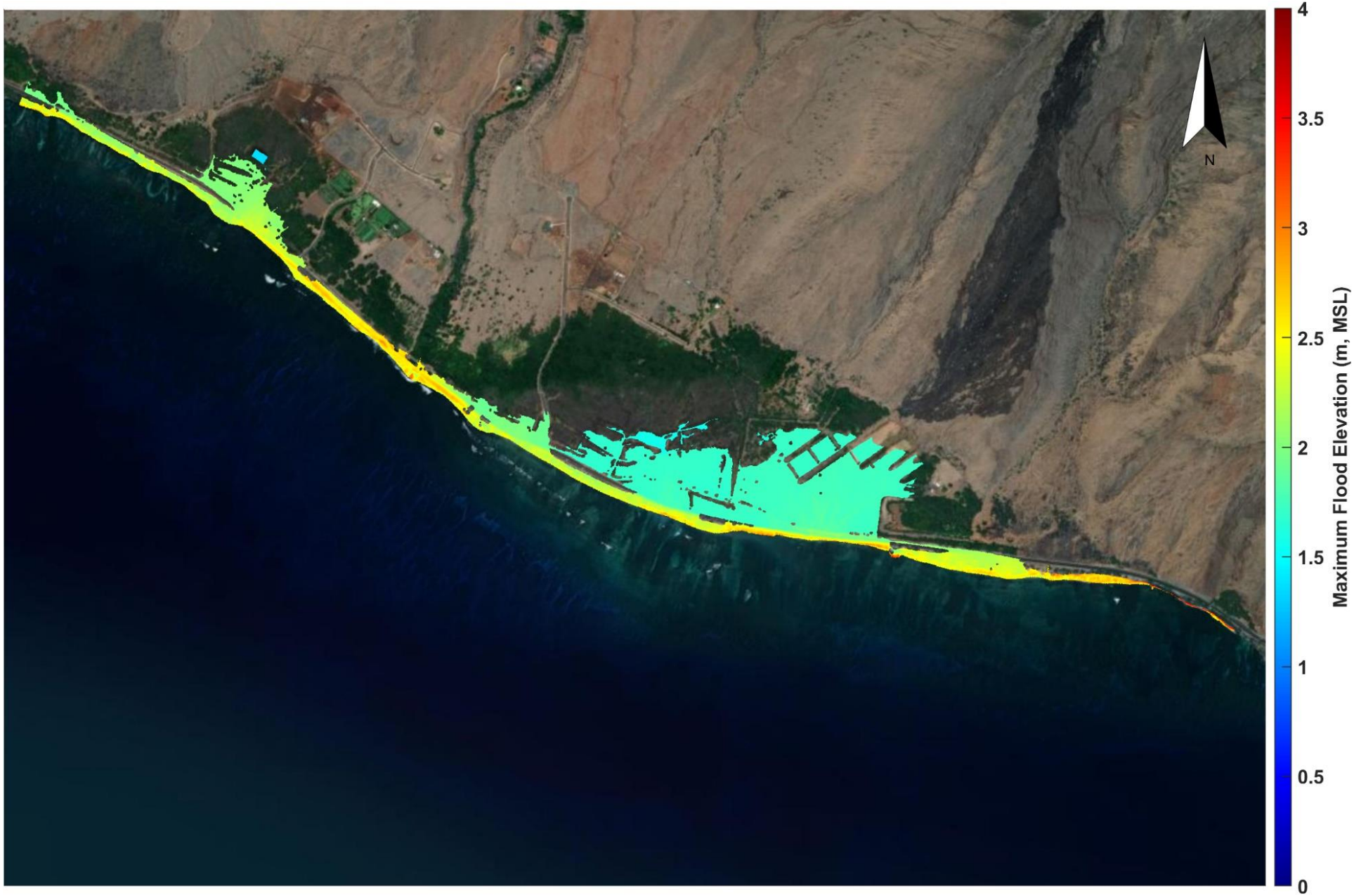


Figure B-2. XBeach-NH modeled maximum flood elevation for existing ground (Ukumehame)

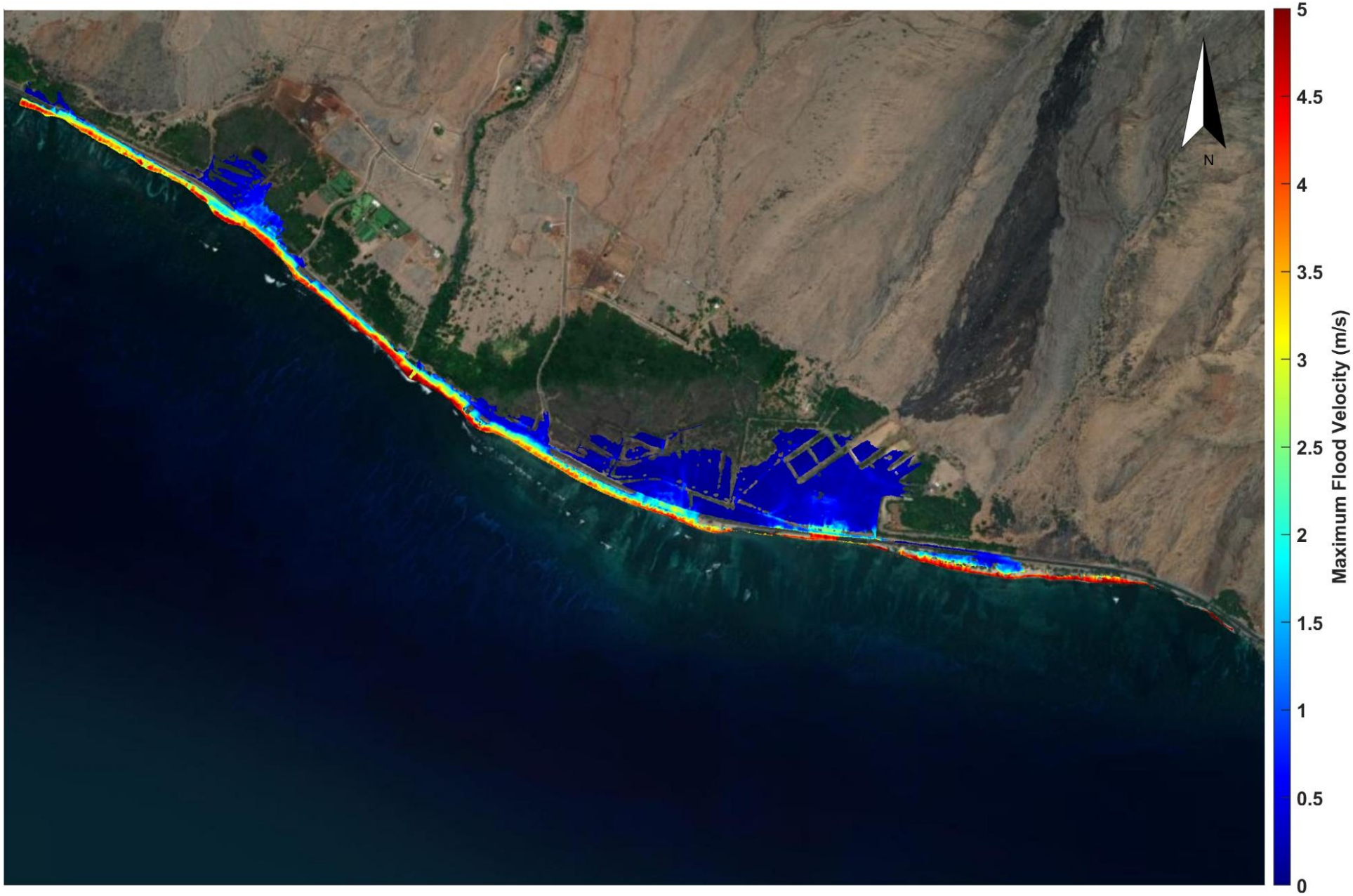


Figure B-3. XBeach-NH modeled maximum flood depth-averaged velocity for existing ground (Ukumehame)

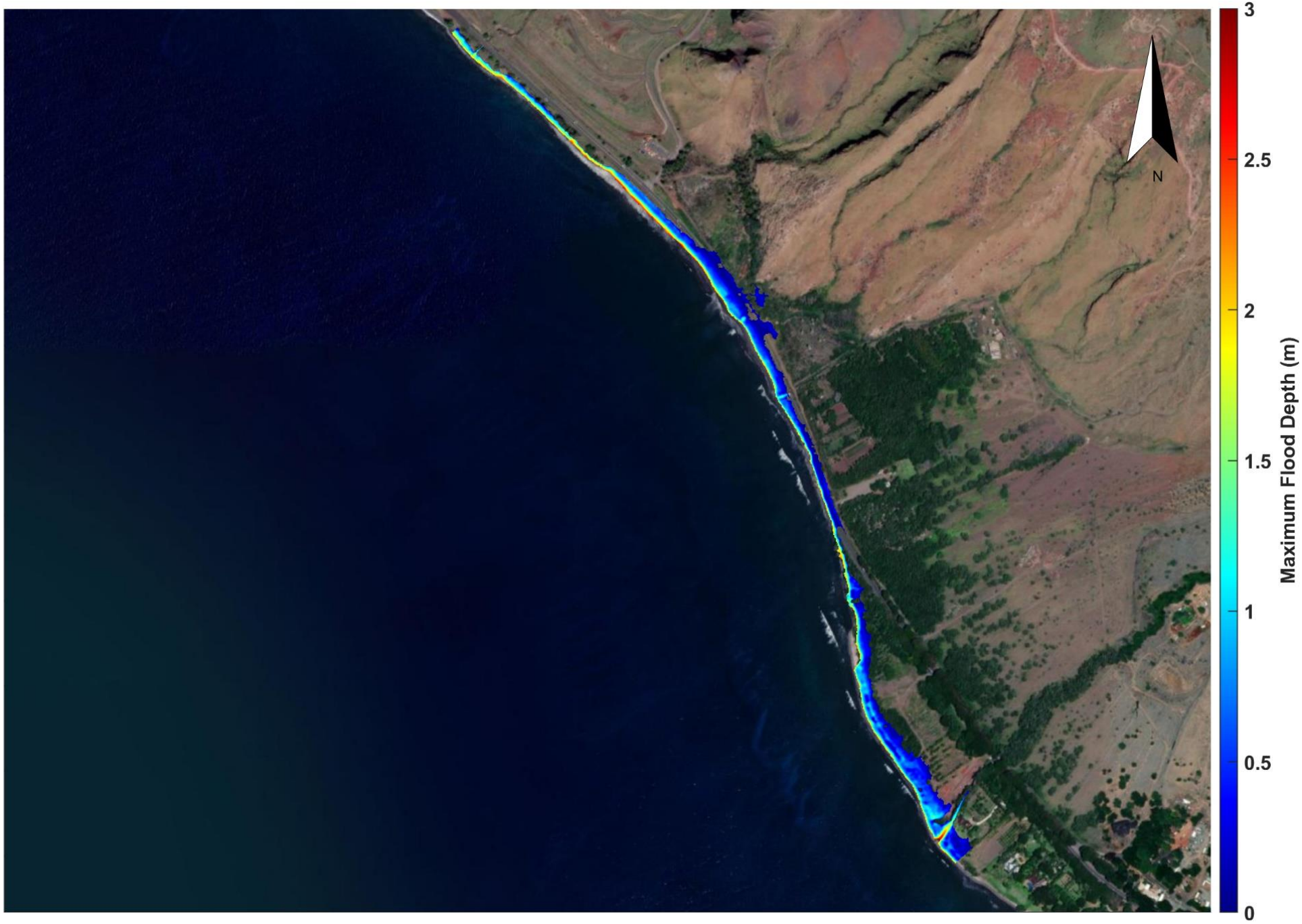


Figure B-4. XBeach-NH modeled maximum flood depth for existing ground (Olowalu)

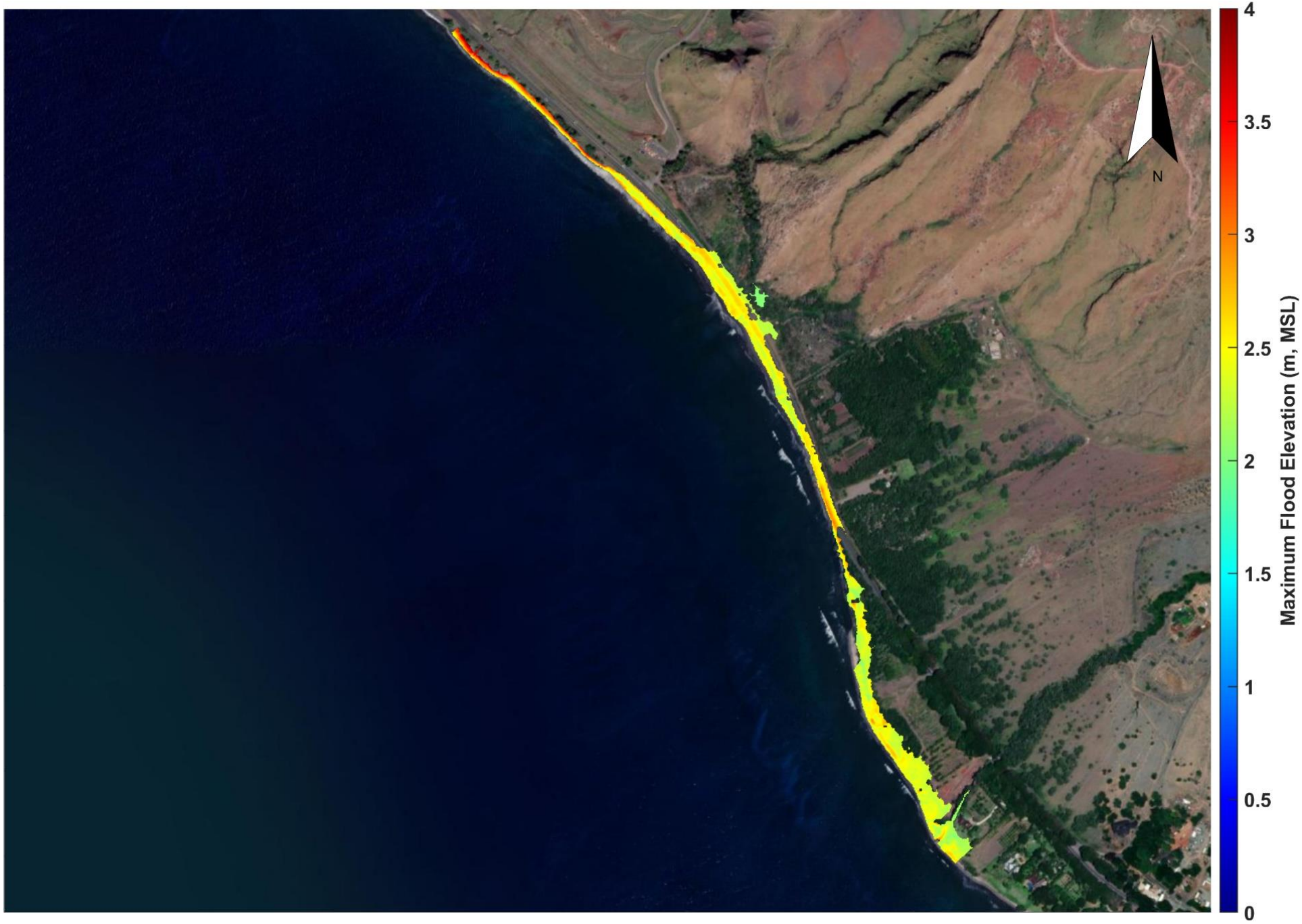


Figure B-5. XBeach-NH modeled maximum flood elevation for existing ground (Olowalu)

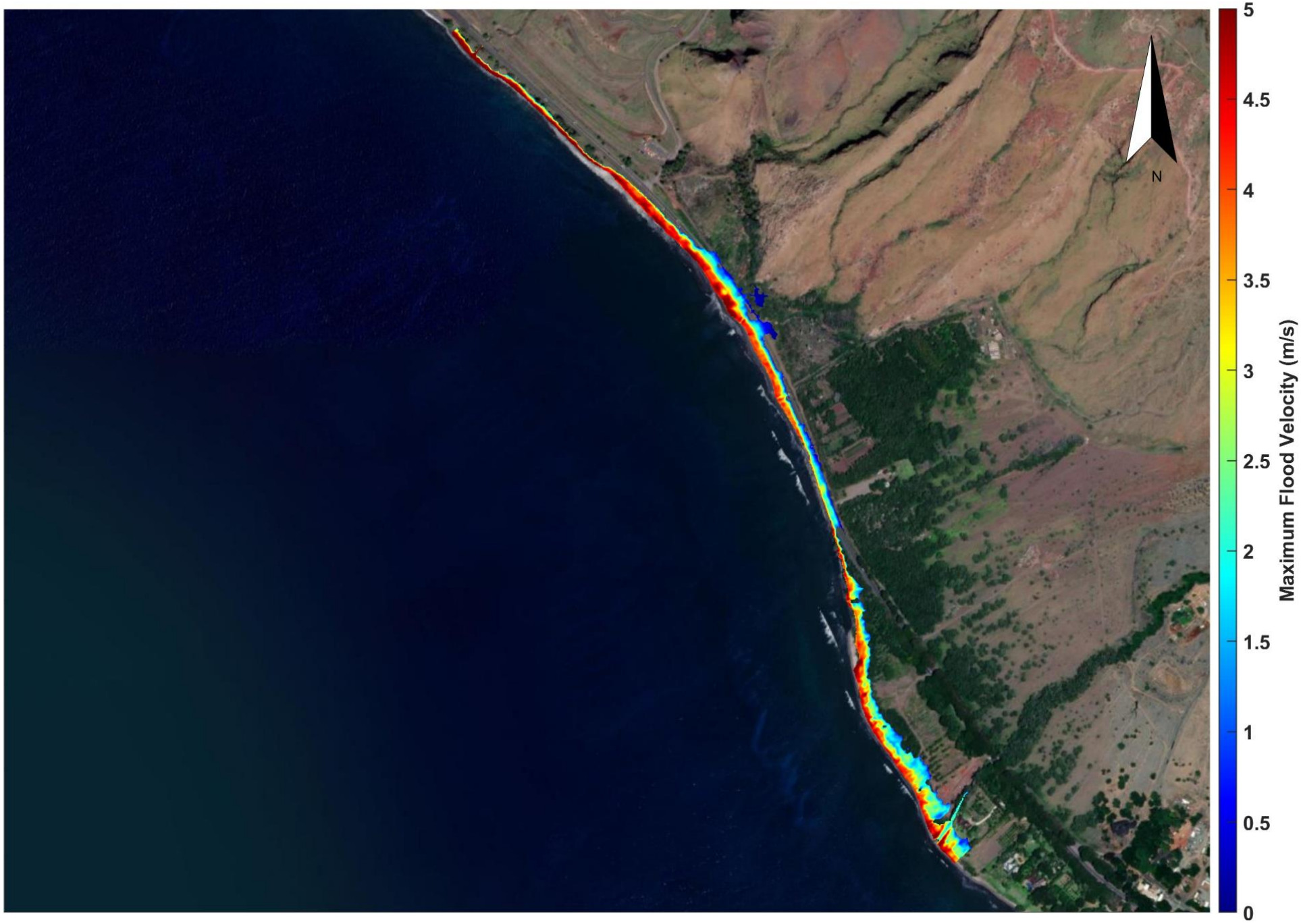


Figure B-6. XBeach-NH modeled maximum flood depth-averaged velocity for existing ground (Olowalu)

Appendix C:

XBEACH-NH MODELED FLOOD DEPTHS, ELEVATIONS, AND VELOCITIES – ALTERNATIVE 1 ALIGNMENT

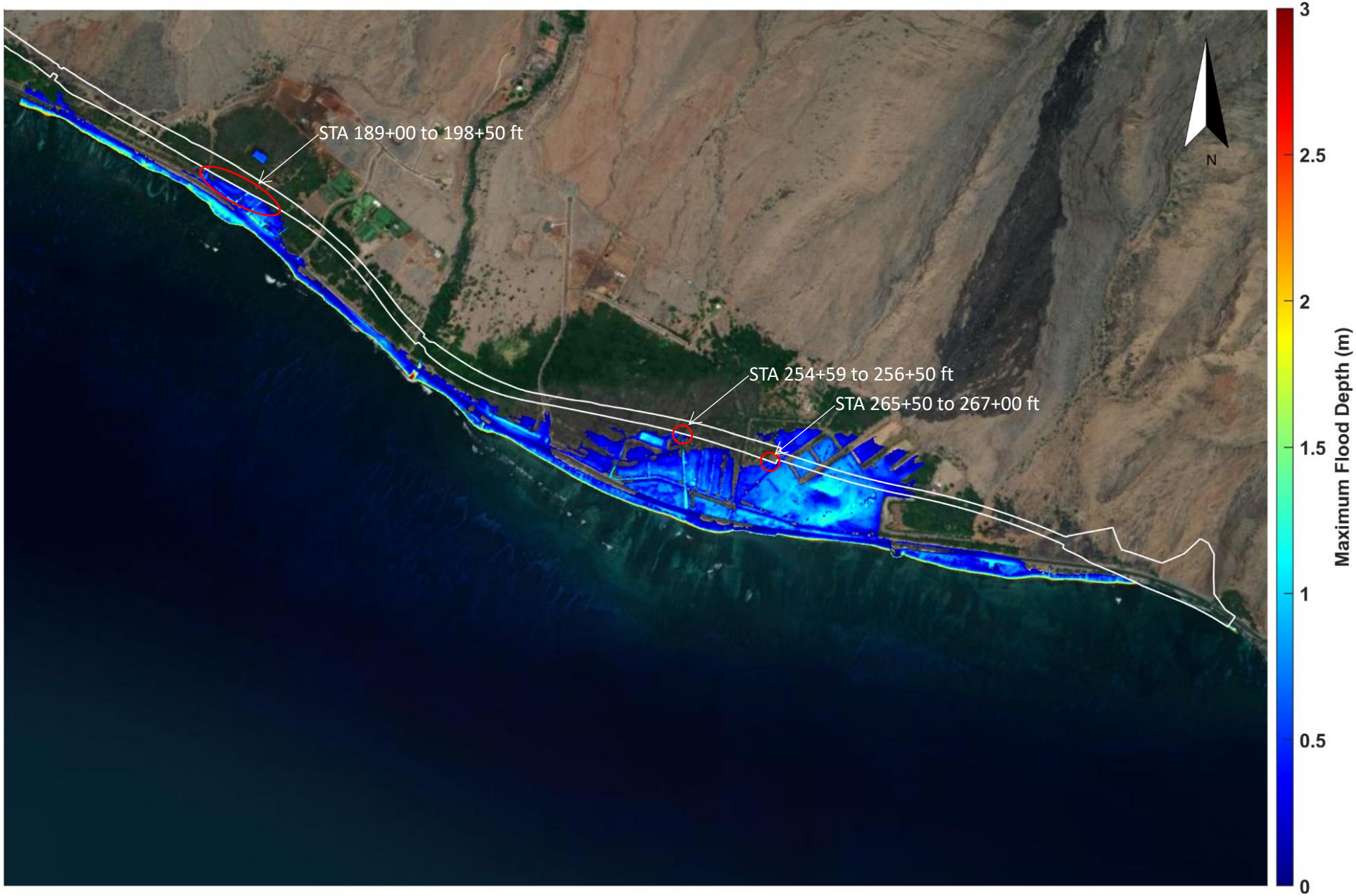


Figure C-1. XBeach-NH modeled maximum flood depth for alternative 1 alignment (Ukumehame)



Figure C-2. XBeach-NH modeled maximum flood elevation for alternative 1 alignment (Ukumehame)

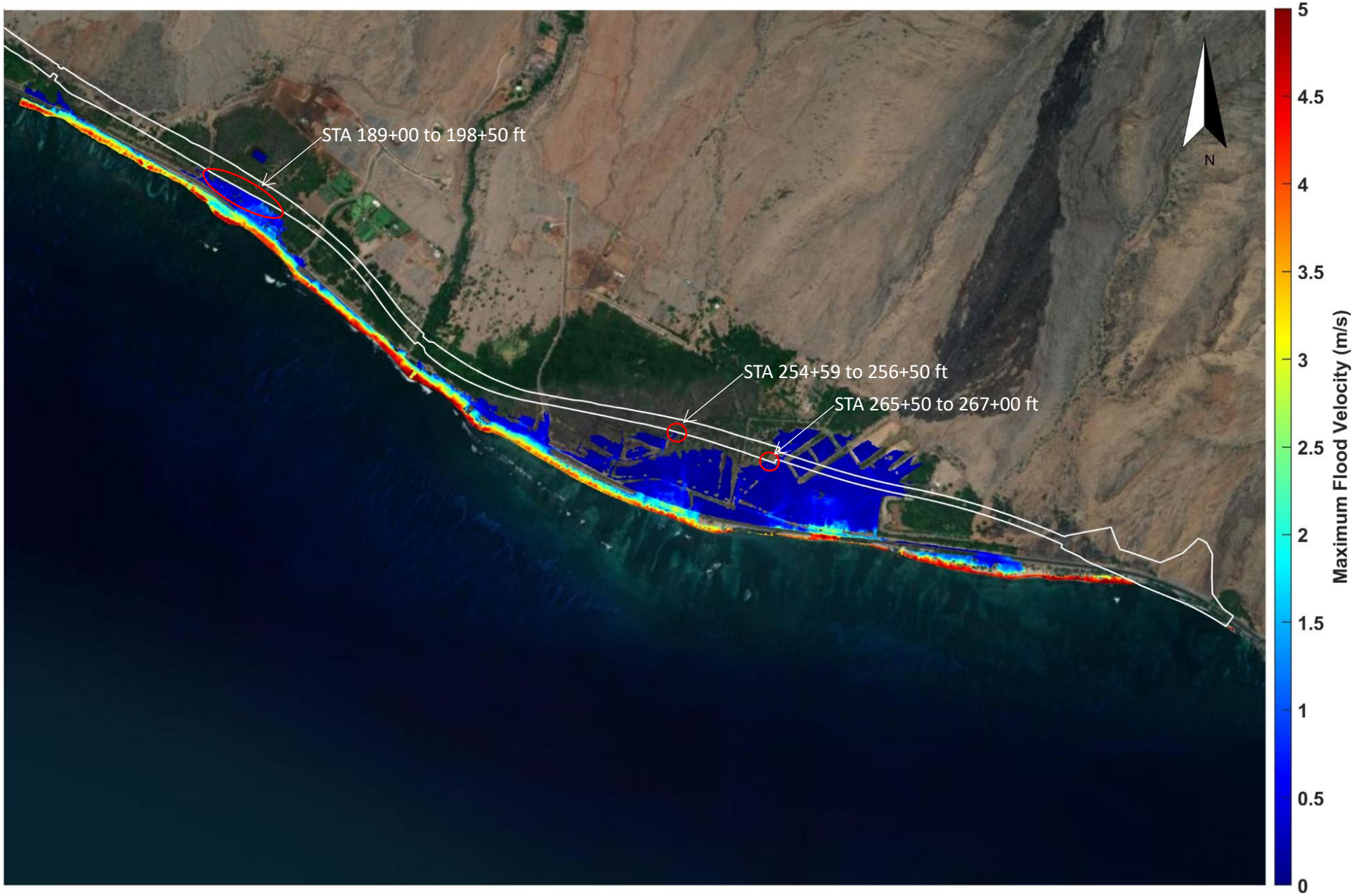


Figure C-3. XBeach-NH modeled maximum flood depth-averaged velocity for alternative 1 alignment (Ukumehame)



Figure C-4. XBeach-NH modeled maximum flood depth for alternative 1 alignment (Olowalu)

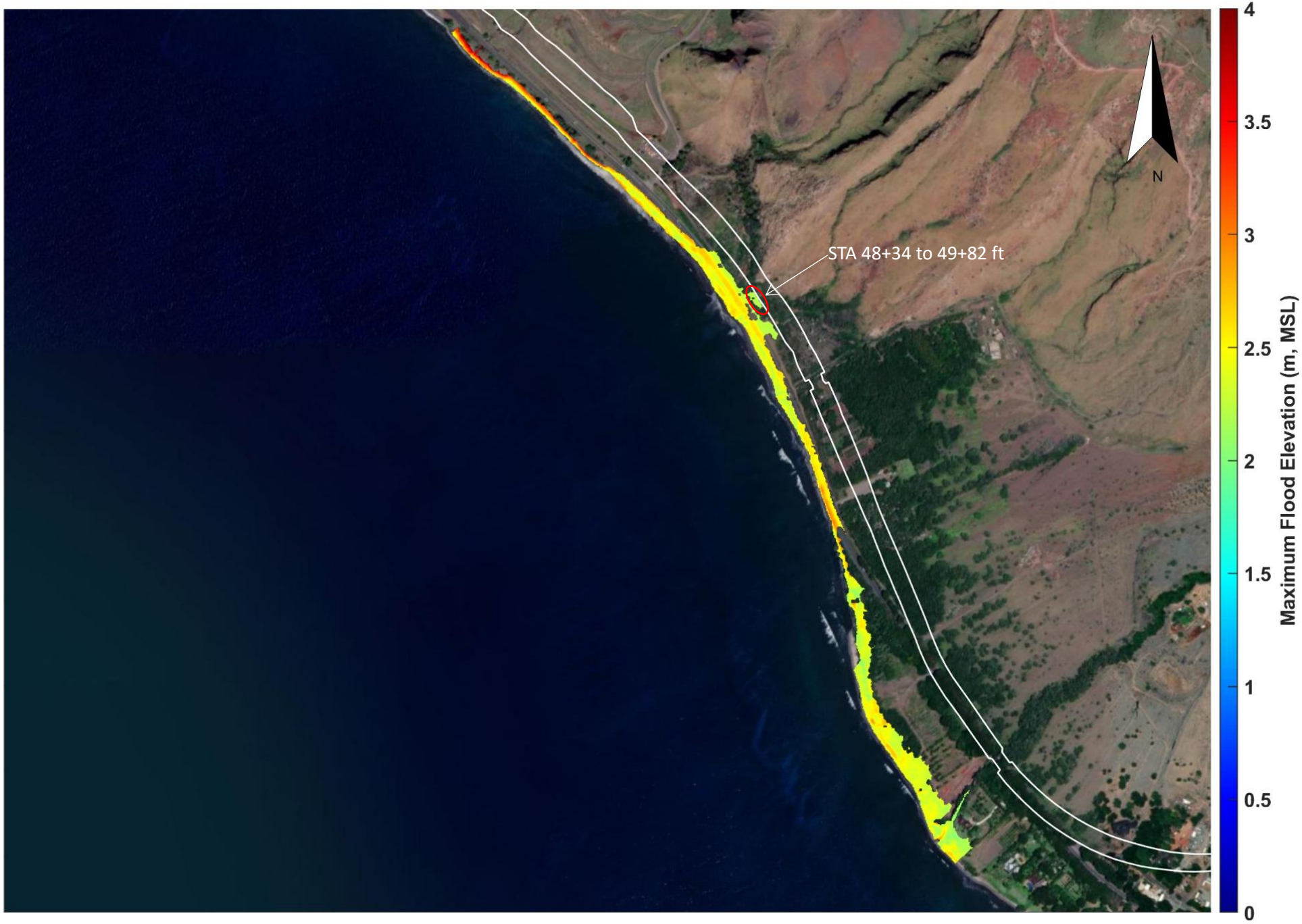


Figure C-5. XBeach-NH modeled maximum flood elevation for alternative 1 alignment (Olowalu)

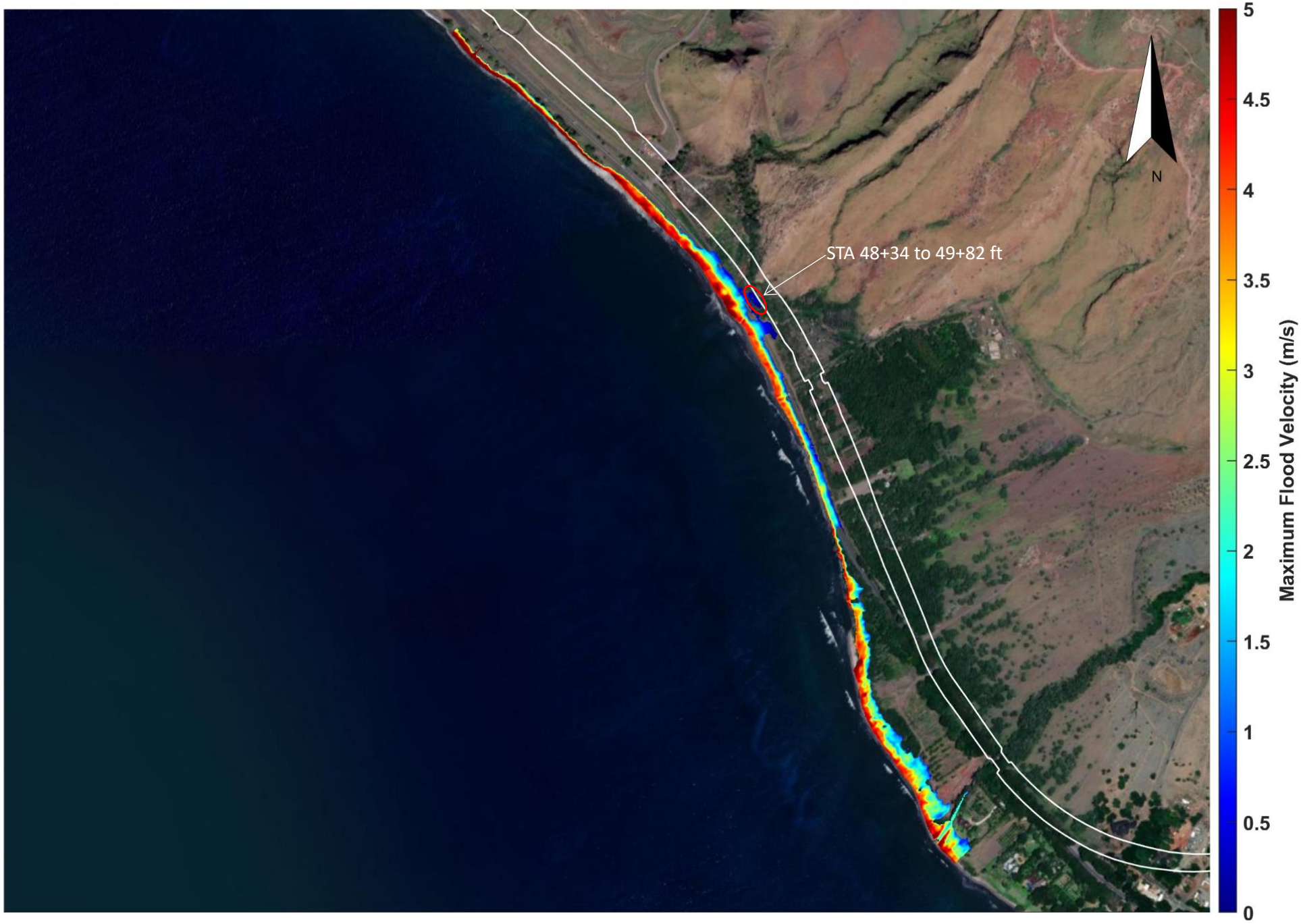


Figure C-6. XBeach-NH modeled maximum flood depth-averaged velocity for alternative 1 alignment (Olowalu)

Appendix D:

XBEACH-NH MODELED FLOOD DEPTHS, ELEVATIONS, AND VELOCITIES – ALTERNATIVE 2 ALIGNMENT

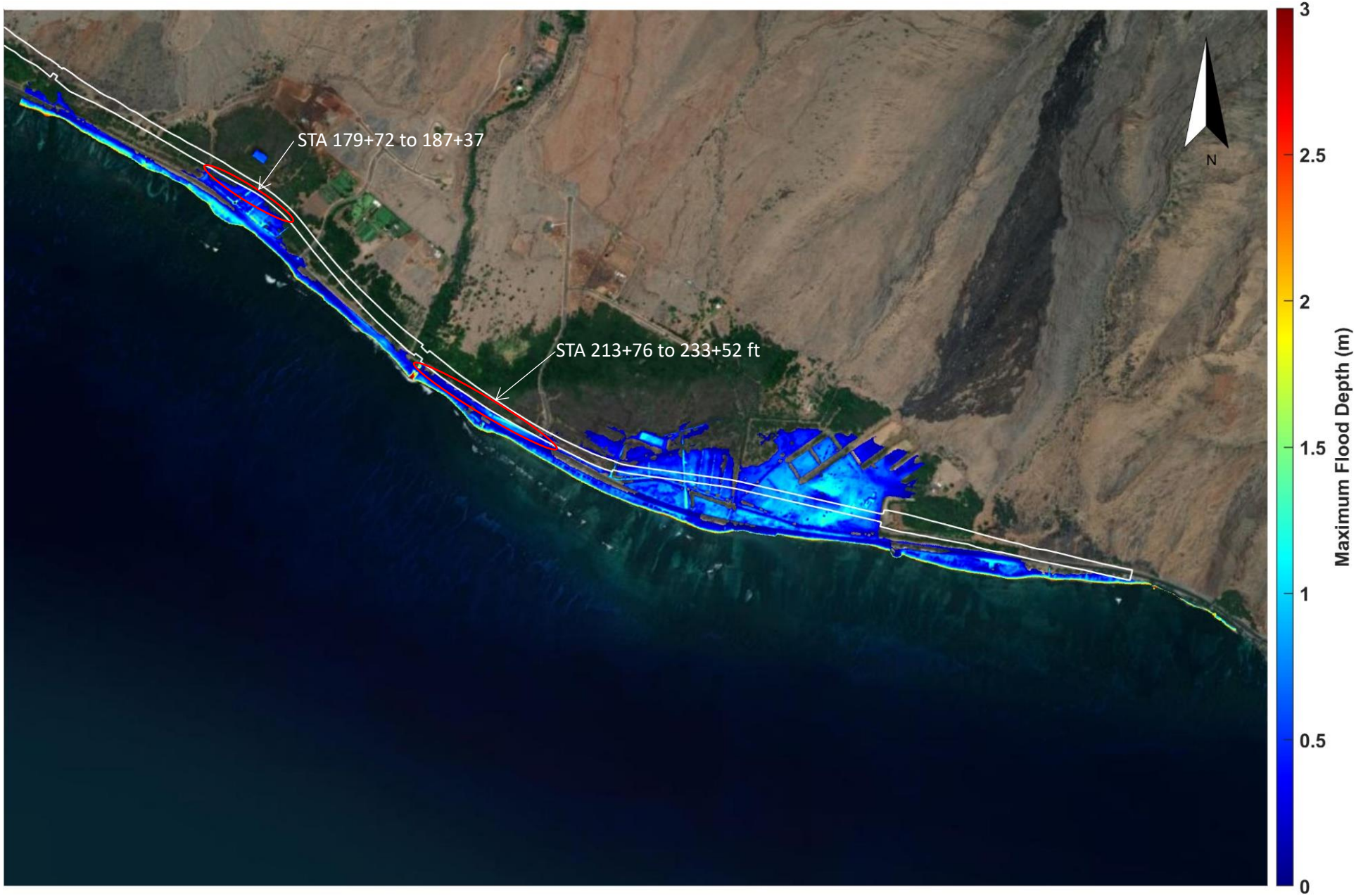


Figure D-1. XBeach-NH modeled maximum flood depth for alternative 2 alignment (Ukumehame)



Figure D-2. XBeach-NH modeled maximum flood elevation for alternative 2 alignment (Ukumehame)



Figure D-3. XBeach-NH modeled maximum flood depth-averaged velocity for alternative 2 alignment (Ukumehame)

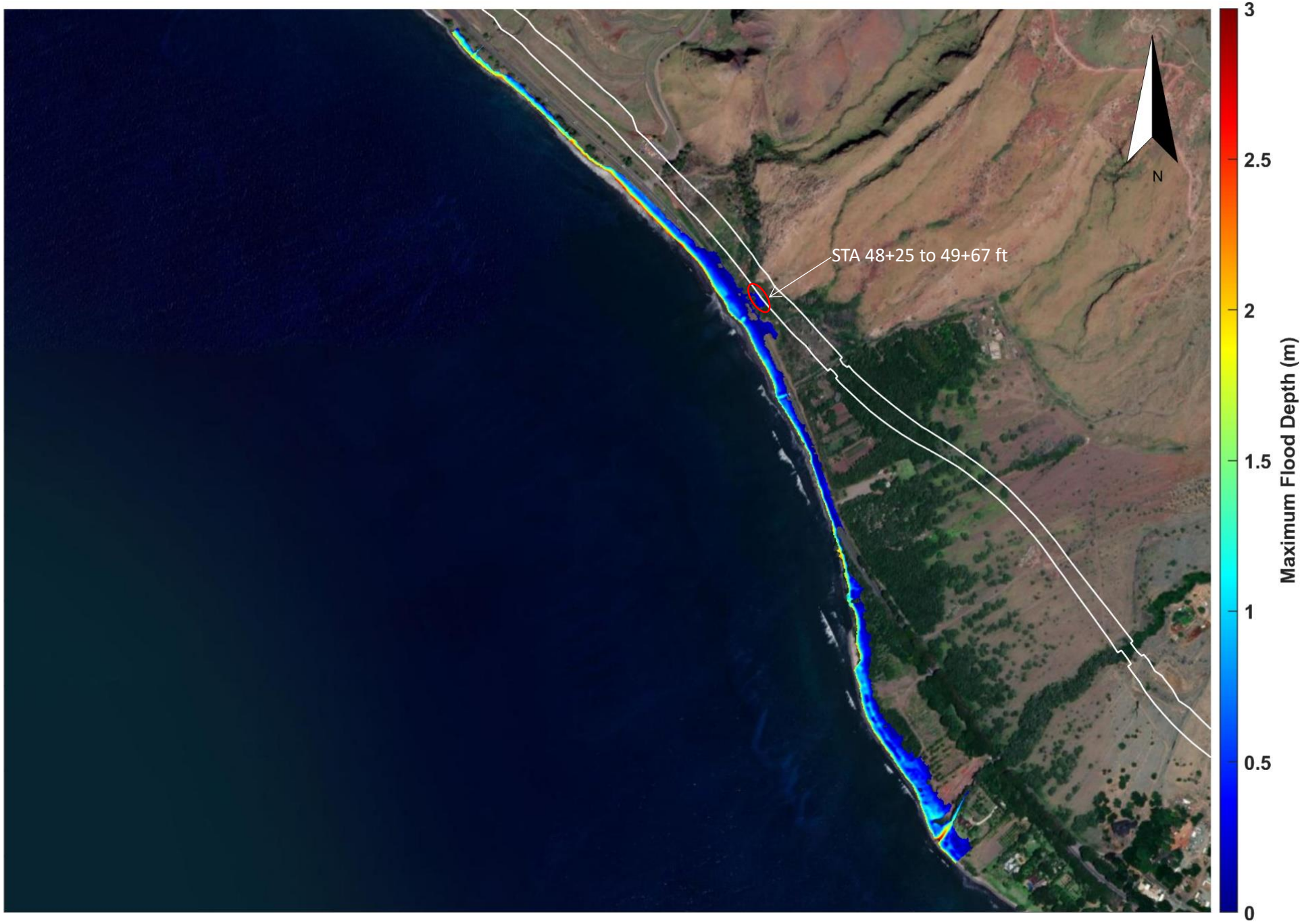


Figure D-4. XBeach-NH modeled maximum flood depth for alternative 2 alignment (Olowalu)

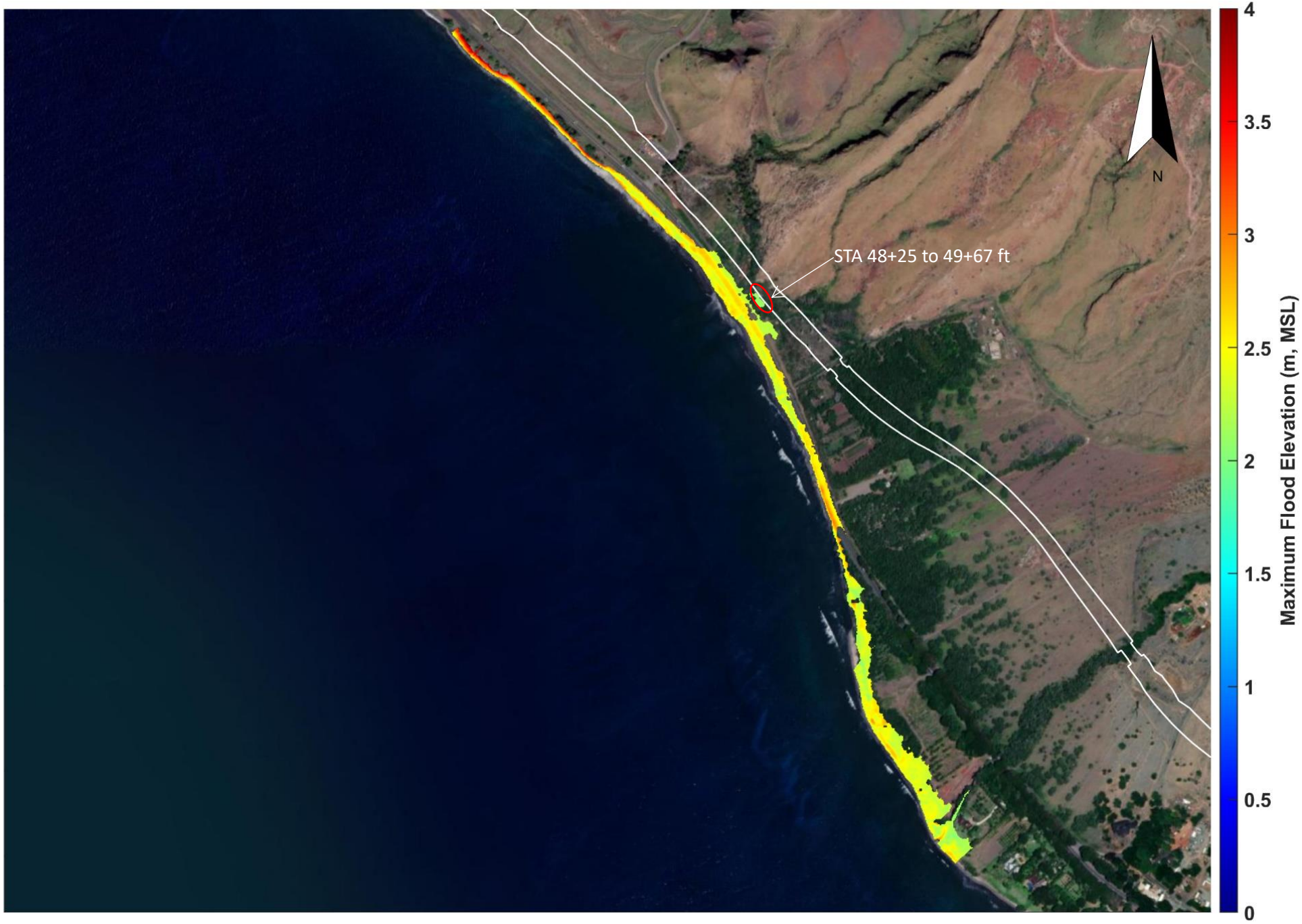


Figure D-5. XBeach-NH modeled maximum flood elevation for alternative 2 alignment (Olowalu)

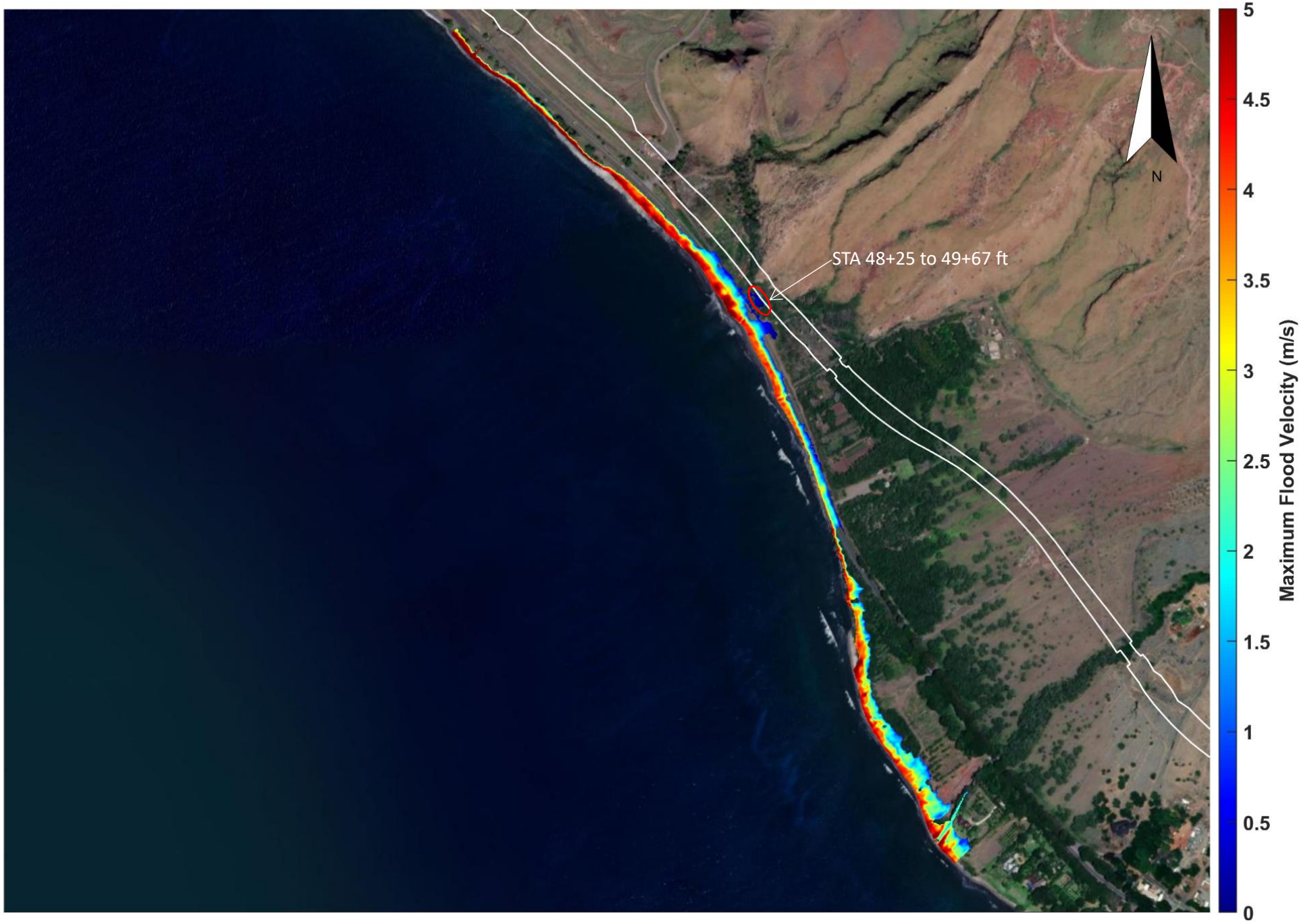


Figure D-6. XBeach-NH modeled maximum flood depth-averaged velocity for alternative 2 alignment (Olowalu)

Appendix E:

XBEACH-NH MODELED FLOOD DEPTHS, ELEVATIONS, AND VELOCITIES – ALTERNATIVE 3 ALIGNMENT

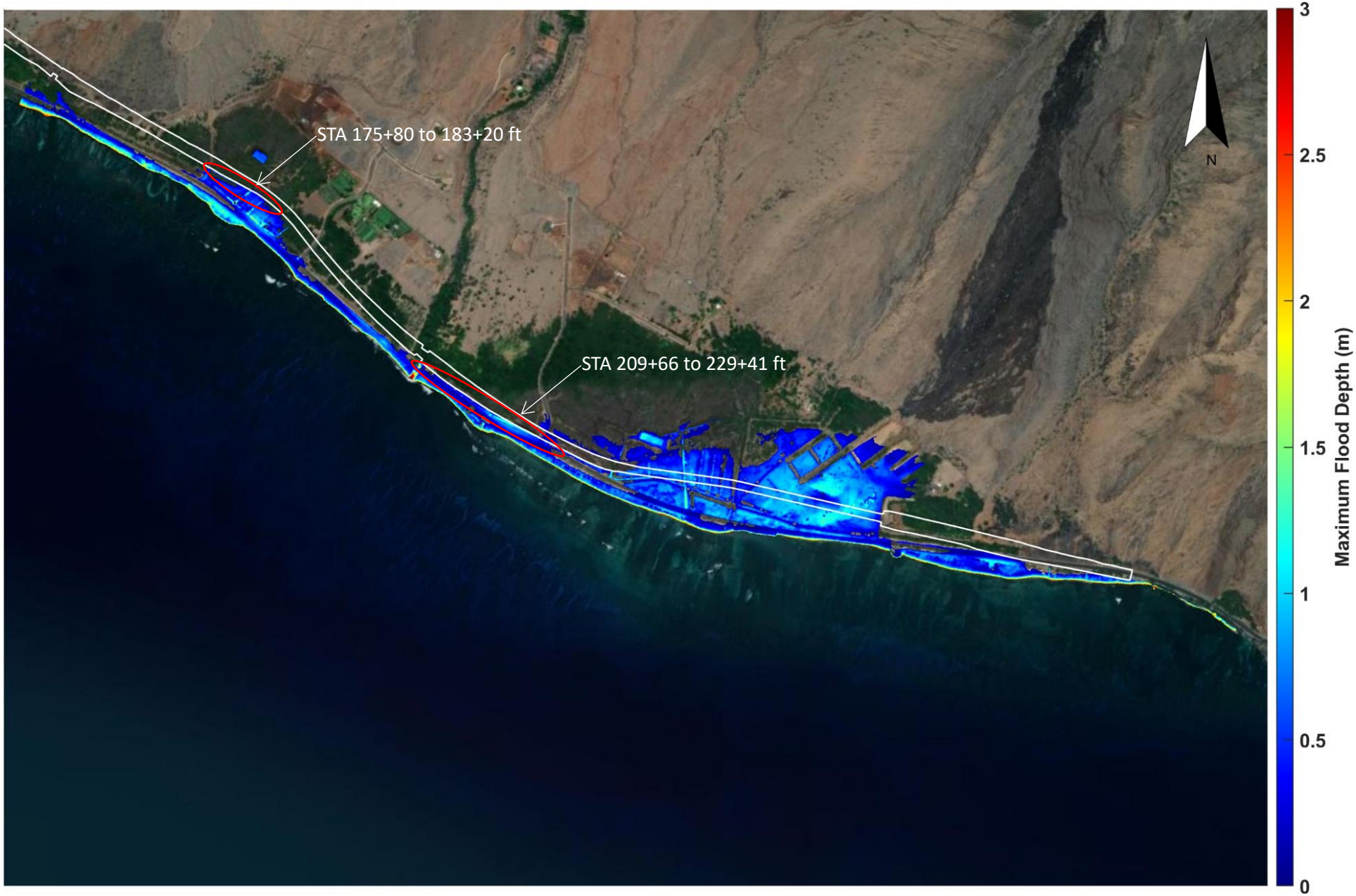


Figure E-1. XBeach-NH modeled maximum flood depth for alternative 3 alignment (Ukumehame)



Figure E-2. XBeach-NH modeled maximum flood elevation for alternative 3 alignment (Ukumehame)



Figure E-3. XBeach-NH modeled maximum flood depth-averaged velocity for alternative 3 alignment (Ukumehame)

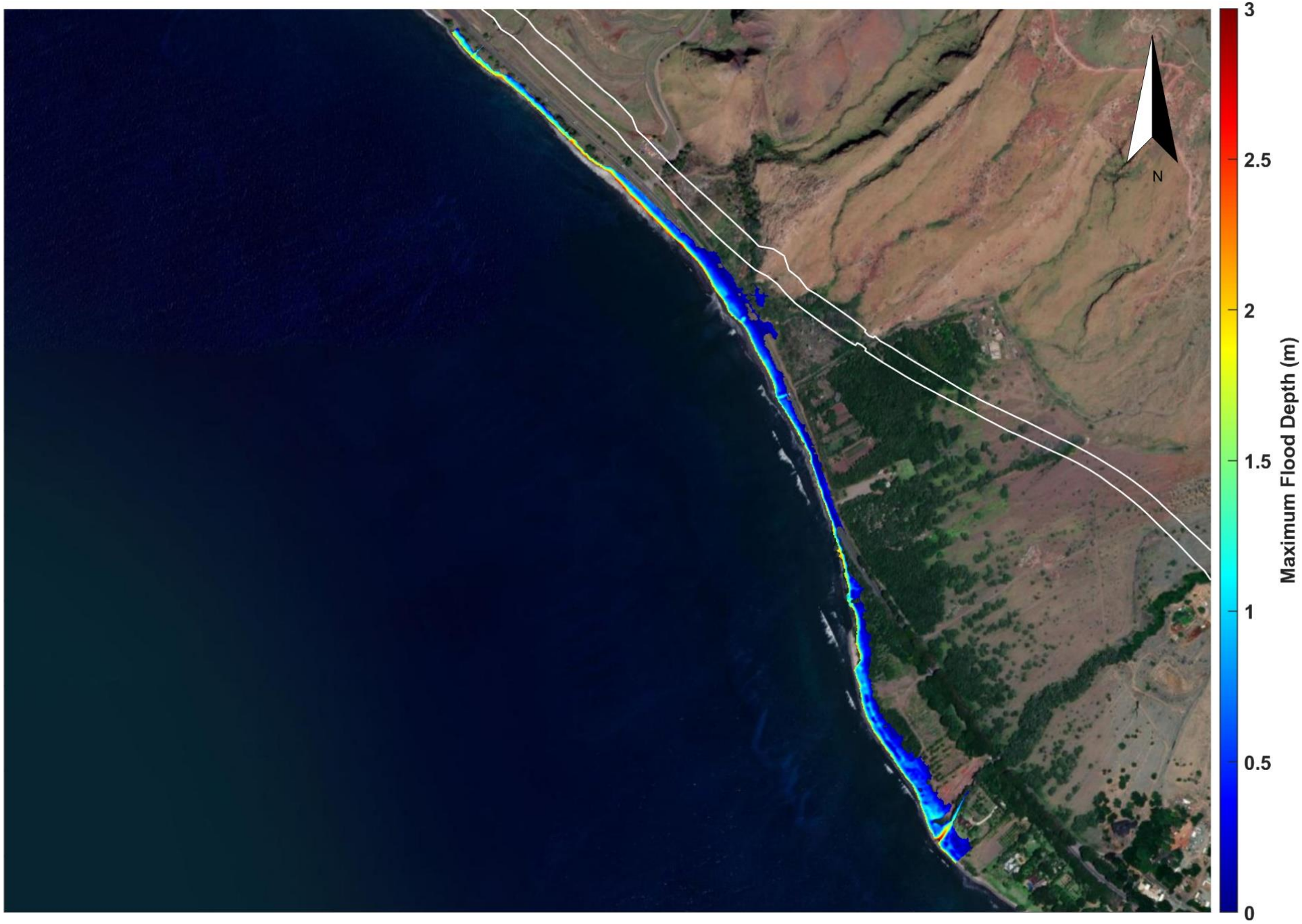


Figure E-4. XBeach-NH modeled maximum flood depth for alternative 3 alignment (Olowalu)

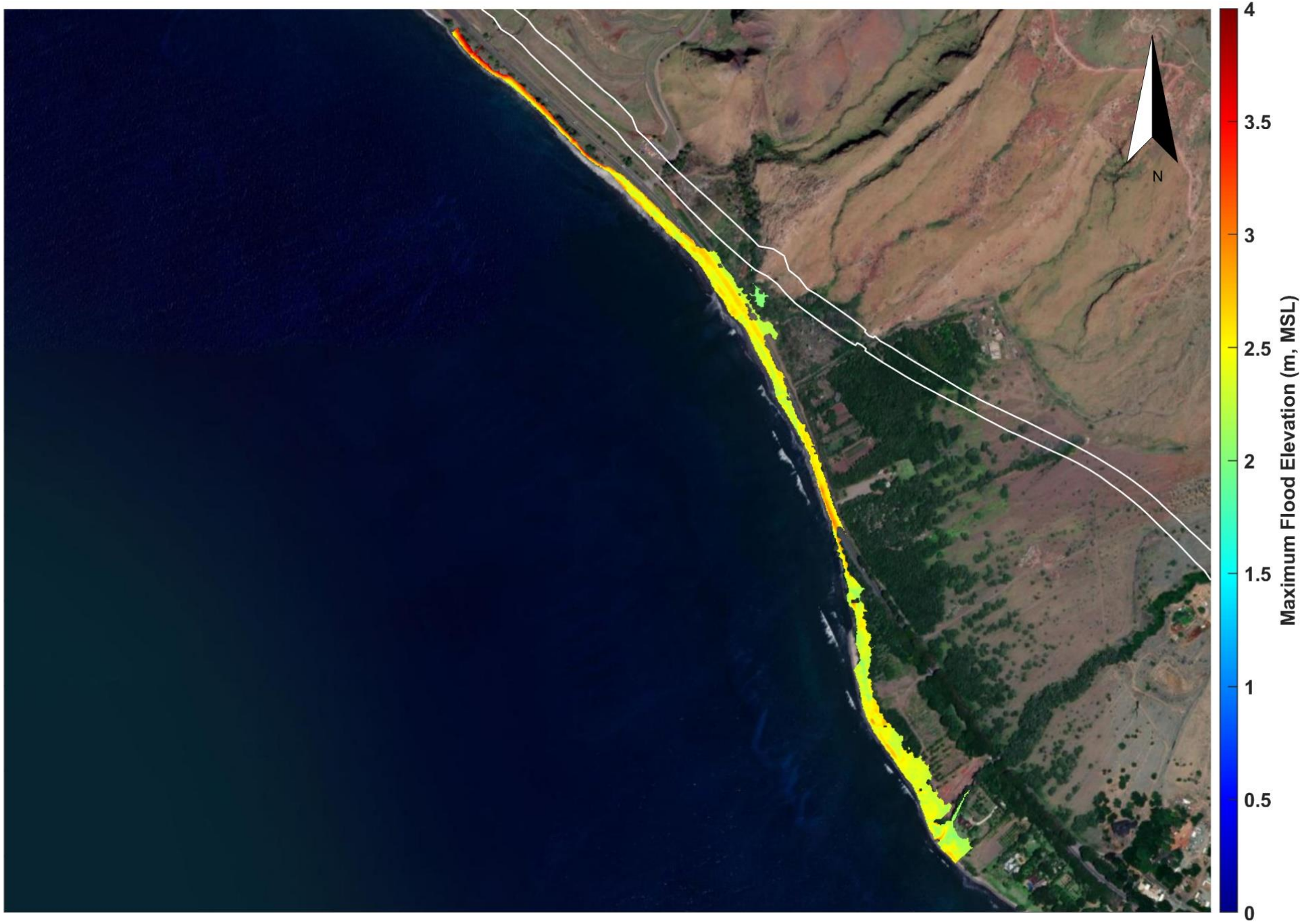


Figure E-5. XBeach-NH modeled maximum flood elevation for alternative 3 alignment (Olowalu)

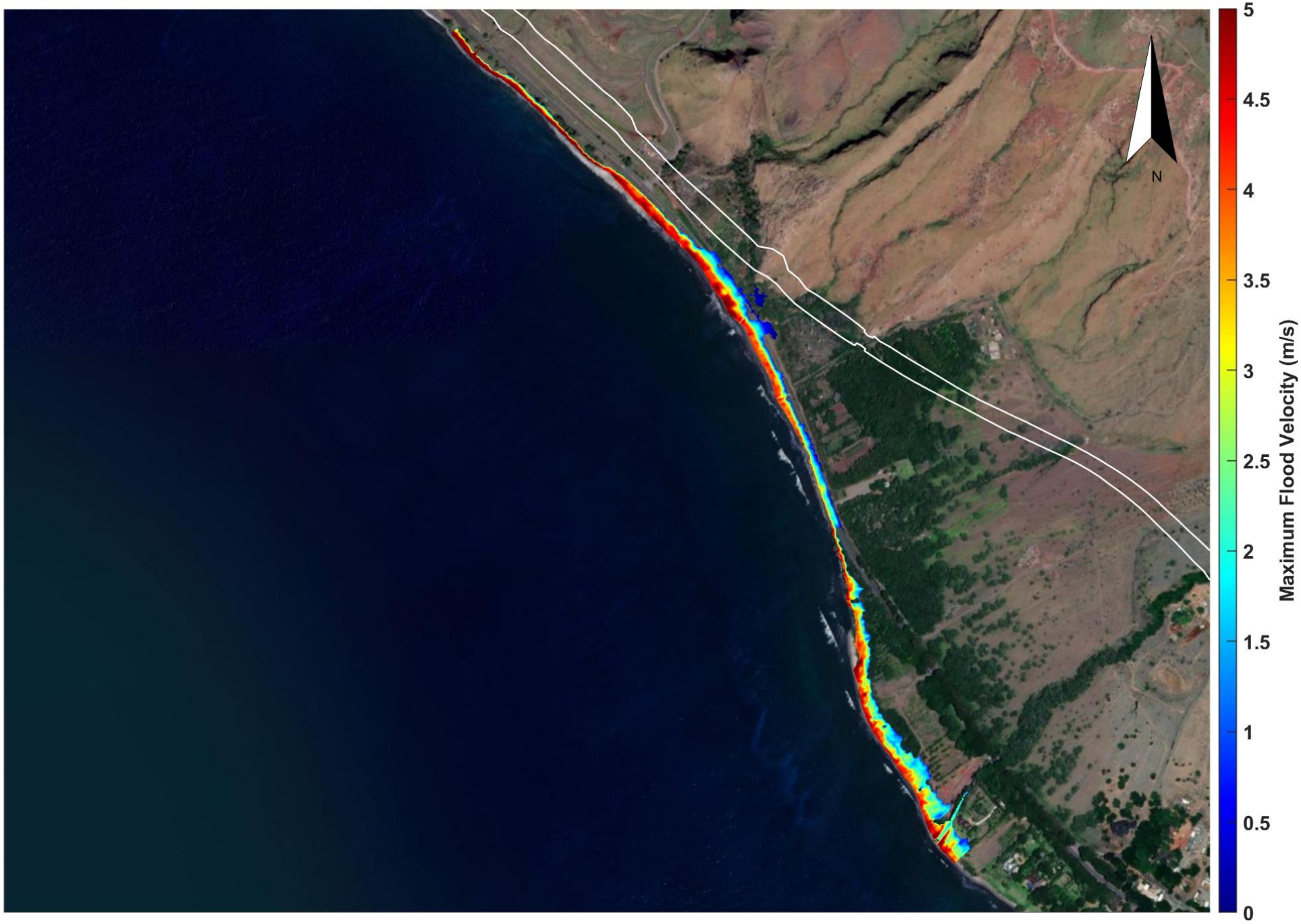


Figure E-6. XBeach-NH modeled maximum flood depth-averaged velocity for alternative 3 alignment (Olowalu)

Appendix F:

XBEACH-NH MODELED FLOOD DEPTHS, ELEVATIONS, AND VELOCITIES – ALTERNATIVE 4 ALIGNMENT



Figure F-1. XBeach-NH modeled maximum flood depth for alternative 4 alignment (Ukumehame)



Figure F-2. XBeach-NH modeled maximum flood elevation for alternative 4 alignment (Ukumehame)



Figure F-3. XBeach-NH modeled maximum flood depth-averaged velocity for alternative 4 alignment (Ukumehame)

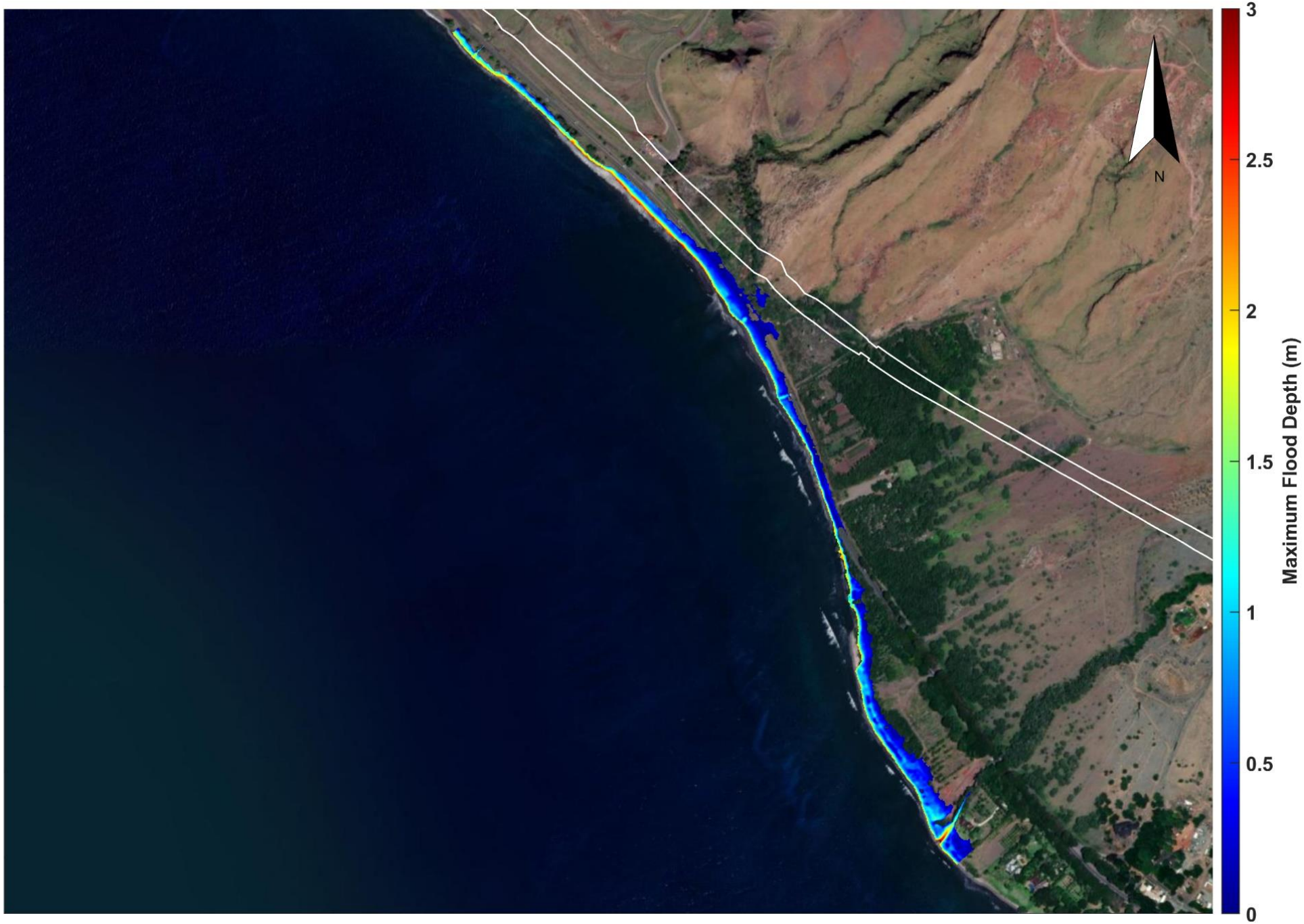


Figure F-4. XBeach-NH modeled maximum flood depth for alternative 4 alignment (Olowalu)

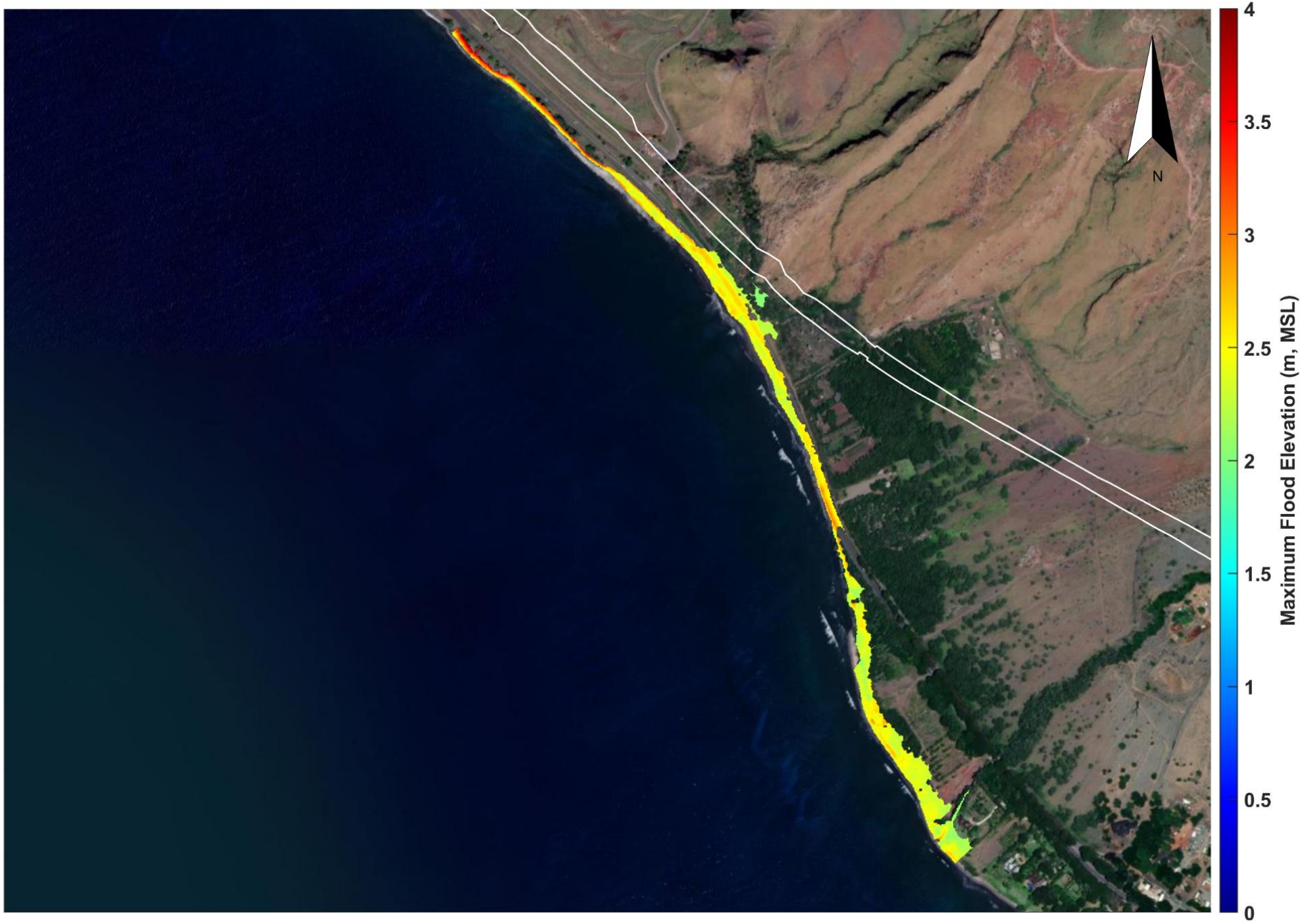


Figure F-5. XBeach-NH modeled maximum flood elevation for alternative 4 alignment (Olowalu)

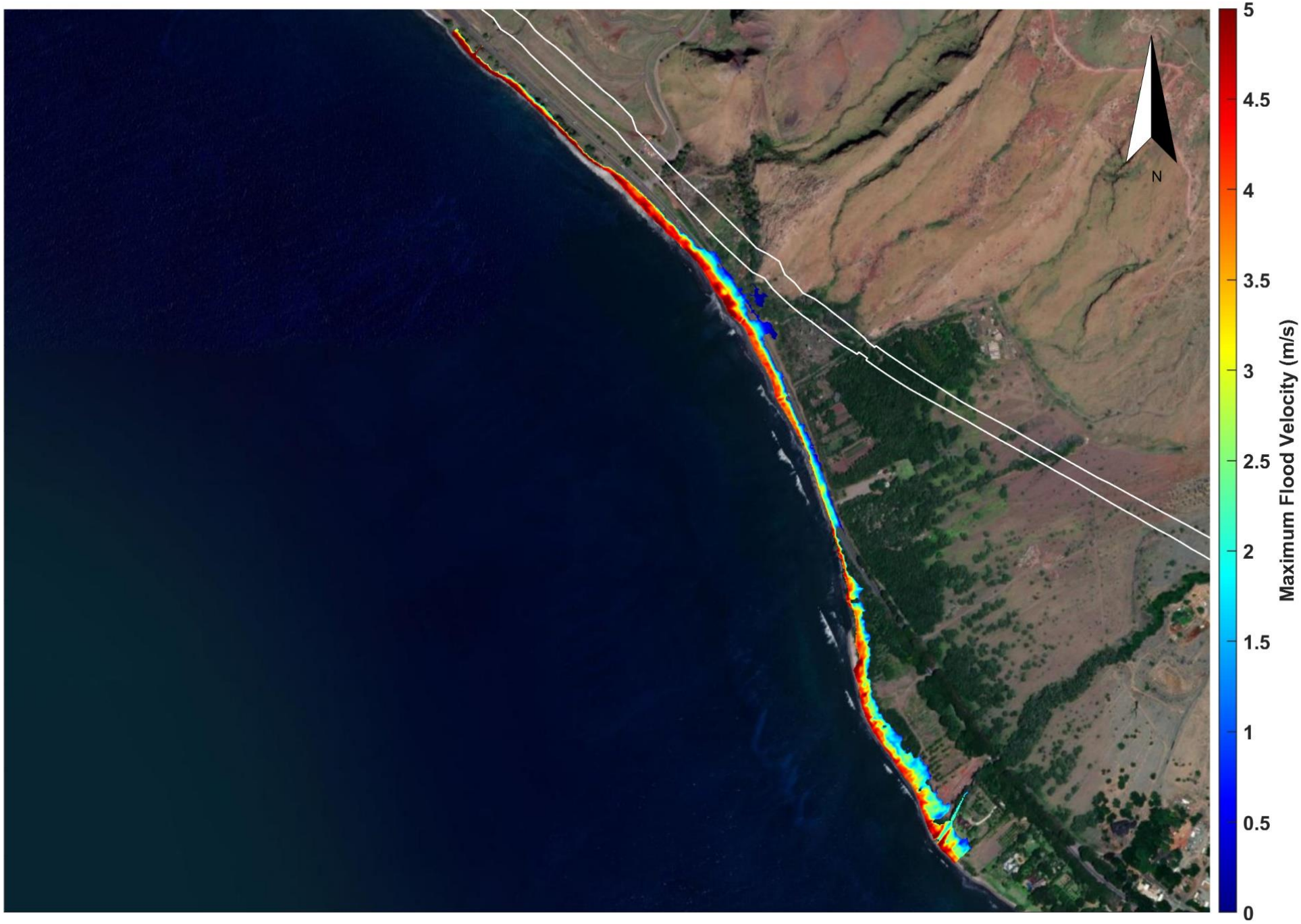


Figure F-6. XBeach-NH modeled maximum flood depth-averaged velocity for alternative 4 alignment (Olowalu)

HONOAPIʻILANI HIGHWAY IMPROVEMENTS PROJECT,
WEST MAUI: UKUMEHAME TO LAUNIUPOKO

Appendix 3.14 – Transportation - Supplemental Information

November 2025

Prepared for

Honoapiʻilani Highway Improvements

Prepared by

wsp

November 2025

Contents

WSP USA, Inc. Transportation Evaluation Report

WSP USA, Inc. Supplemental Transportation Evaluation Report

WSP USA, Inc.
Transportation Evaluation Report

November 2025

TRANSPORTATION EVALUATION REPORT

Honoapiʻilani Highway Improvements Project

West Maui, Ukumehame to Launiopoko

June 2024

Transportation Evaluation Report

Prepared For:

State of Hawaii Department of Transportation
Highways Division-Planning Branch
869 Punchbowl Street, 3rd Floor
Honolulu, Hawaii 96813

Prepared By:
WSP USA, Inc.
1001 Bishop Street, Suite 2400
Honolulu, HI 96813

WSP Reference Number:
US-WSP-31000290.00

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I. Introduction

This technical report documents the transportation evaluation conducted for the proposed realignment of the existing Honoapi‘ilani Highway between Ukumehame and Launiupoko in west Maui, Hawai‘i. This roadway is under the jurisdiction of the State of Hawai‘i Department of Transportation (HDOT). Figure I-1 illustrates the study area.

The primary purpose and need for this Honoapi‘ilani Highway Improvements Project is to increase the resiliency of this segment of Honoapi‘ilani Highway by responding to existing shoreline erosion and effects of projected sea-level rise.

The Project is a new two-lane, divided highway that would be constructed to allow for upgrading to a four-lane, divided highway—if future conditions are appropriate and funds are available. This new two-lane, divided highway would replace the existing two-lane, undivided highway as the primary regional arterial roadway. The existing two-lane highway would become a local roadway, which would primarily provide access to existing uses and is proposed to be under the jurisdiction of Maui County. The transportation impacts evaluated in this report focus on a two-lane highway configuration for both the existing and future conditions.

The evaluation of both existing and future conditions includes documentation of existing and future roadway and intersection configurations, documentation of existing and projected future traffic volumes, and analysis of peak-hour roadway segment and intersection operations. Additionally, public transit, bicycle, and pedestrian conditions for the existing and future conditions are documented. Traffic crash information is summarized for existing conditions and the potential safety benefits of the Project are forecastThe purpose of this report is to describe how the proposed Honoapi‘ilani Highway realignment alternaties compare to the existing condition and to each other.

Industry-accepted methodologies for roadway capacity, intersection operational analyses, and traffic safety were used to evaluate existing and future traffic conditions:

- Roadway segment level of service was determined using ranges of volume/capacity ratios based on guidance contained in the *Highway Capacity Manual, Seventh Edition: A Guide for Multimodal Mobility Analysis*.
- Intersection operational analyses utilized methodologies documented in the *Highway Capacity Manual, Sixth Edition: A Guide for Multimodal Mobility Analysis*—Chapter 19 was referenced for signalized intersections and Chapter 20 was referenced for unsignalized intersections. Cubic Transportation Systems Synchro Studio 11 traffic analysis software was used to apply these methodologies.
- Evaluation of traffic signal warrants were based on procedures documented in the FHWA *Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition* (Chapter 4C, Traffic Control Signal Needs Studies, was applied).

- Intersection configuration recommendations were based on guidelines in *A Policy on Geometric Design of Highways and Streets,* 7th Edition, 2018—commonly referred to as the Green Book—from the American Association of State Highway and Transportation Officials (AASHTO).
- Safety analyses utilized methods documented in the AASHTO *Highway Safety Manual*, Part C – Predictive Method. And crash modification factors obtained from the Oregon DOT *Crash Reduction Factor Manual* were used to estimate benefits of the proposed divided Honoapi‘ilani Highway.

FIGURE I-1 **Existing Honoapi'ilani Highway and Intersections**



II. Existing Conditions

As shown in Figure II-1, the Honoapiʻilani Highway Improvements Project area is in West Maui between Ukumehame (milepost 11) and Launiupoko (milepost 17). The southeastern terminus would connect to the existing Honoapiʻilani Highway in the vicinity of the Pali. The northwestern terminus in Launiupoko would connect to the existing Lāhainā Bypass.

EXISTING ROADWAYS

Honoapiʻilani Highway

Honoapiʻilani Highway is a two-lane, undivided principal arterial that is part of the National Highway System and the Primary Highway Freight System. It is the primary roadway connecting West Maui to the rest of the island of Maui. The posted speed limit varies between 35 miles per hour (mph) in areas with high driveway density and 55 mph with infrequent formal access. Passing is allowed on selected segments of Honoapiʻilani Highway. Intersections within the project area are unsignalized with stop-control on the minor-street approaches.

Olowalu Area

Olowalu Recycling and Refuse Convenience Center Driveway

This driveway is a two-lane, paved mauka-makai road originating at Honoapiʻilani Highway between Launiupoko and Olowalu. It provides access to both the Olowalu Recycling and Refuse Convenience Center and a former cinder mining quarry that is currently ~~being~~ used as a temporary storage site for ash and debris from the Lāhainā wildfire.

Honoapiʻilani Highway Frontage Road

This is a private, partially paved, two-lane frontage road located mauka of and parallel to Honoapiʻilani Highway. It begins at the Olowalu Recycling and Refuse Convenience Center driveway and ends at the north terminus of the Olowalu Village Road. The frontage road, also referred to as a cane haul road, provides access to a farm and the Maui Paintball site. There are gates on this roadway located just south of the farm driveway and at its southern terminus. These gates are often locked, restricting public access to this segment of the frontage road.

Upper Olowalu Access Road

This partially paved two-lane road provides access to the Olowalu Petroglyphs site and residences that are makai and mauka of the site. The roadway begins at Olowalu Village Road and terminates at the driveways into mauka properties and the Olowalu Cultural Reserve area.

Olowalu Village Road

Olowalu Village Road is a paved, two-lane roadway located mauka of and generally parallel to Honoapiʻilani Highway. The drivable segment of this roadway begins approximately at the Upper Olowalu Access Road—north of the Olowalu General Store area—and ends south of Olowalu Village. It

provides traffic circulation within Olowalu Village and in the Olowalu General Store area. On the makai side of Honoapi‘ilani Highway, the roadway leading to Olowalu Landing and Camp Olowalu is also designated as Olowalu Village Road. This roadway intersects Honoapi‘ilani Highway opposite the main driveway into the Olowalu General Store area and provides access to private driveways to the Olowalu Plantation House and a residential neighborhood located makai of Honoapi‘ilani Highway.

Luawai Street

Luawai Street is a paved, two-lane, mauka-makai road originating at Honoapi‘ilani Highway in the vicinity of Olowalu Village. It provides access to a large-lot residential subdivision and can be used to access the Olowalu Petroglyphs. Luawai Street is currently private, but the intention is to dedicate a segment of it to Maui County at the appropriate time.

Ukumehame Area

Ehehene Street

Ehehene Street is a paved, two-lane, mauka-makai road originating at Honoapi‘ilani Highway in the Ukumehame area. It provides access to the Ukumehame Sod Farm, Maui Island Sod, and a large-lot residential subdivision. Ehehene Street is currently private, but the intention is to dedicate a segment of it to Maui County at the appropriate time.

Pōhaku ‘Aeko Street

Pōhaku ‘Aeko Street is a paved, two-lane, mauka-makai road originating at Honoapi‘ilani Highway in the Ukumehame area. It provides access to a large-lot residential subdivision with an internal street, Paeki‘i Place. Pōhaku ‘Aeko Street is currently private, but the intention is to dedicate a segment of it to Maui County at the appropriate time.

Ukumehame Firing Range Driveway

The Ukumehame Firing Range driveway is a paved, two-lane, mauka-makai road originating at Honoapi‘ilani Highway in the Ukumehame area. It provides access to Ukumehame Firing Range and maintenance access to the HDOT sedimentation basin.

EXISTING INTERSECTIONS

Eleven intersections, all unsignalized, were included in the evaluation of existing conditions. Figure II-1 shows their locations on the existing Honoapi‘ilani Highway and Figure II-2 shows their lane configurations. These intersections are the defined intersections on the existing Honoapi‘ilani Highway.

In addition to these defined intersections, there is semicontinuous beach access along the makai side of Honoapi‘ilani Highway. Figure II-3 shows the existing access points and beach access. Although some beaches have designated parking areas, large segments of the beaches allow unrestricted vehicular maneuvers directly on and off Honoapi‘ilani Highway. As shown in FIGURE II-3, much of this unrestricted beach access occurs in the Launiupoko and Ukumehame areas.

FIGURE II-1. **Location of Existing Intersections**.

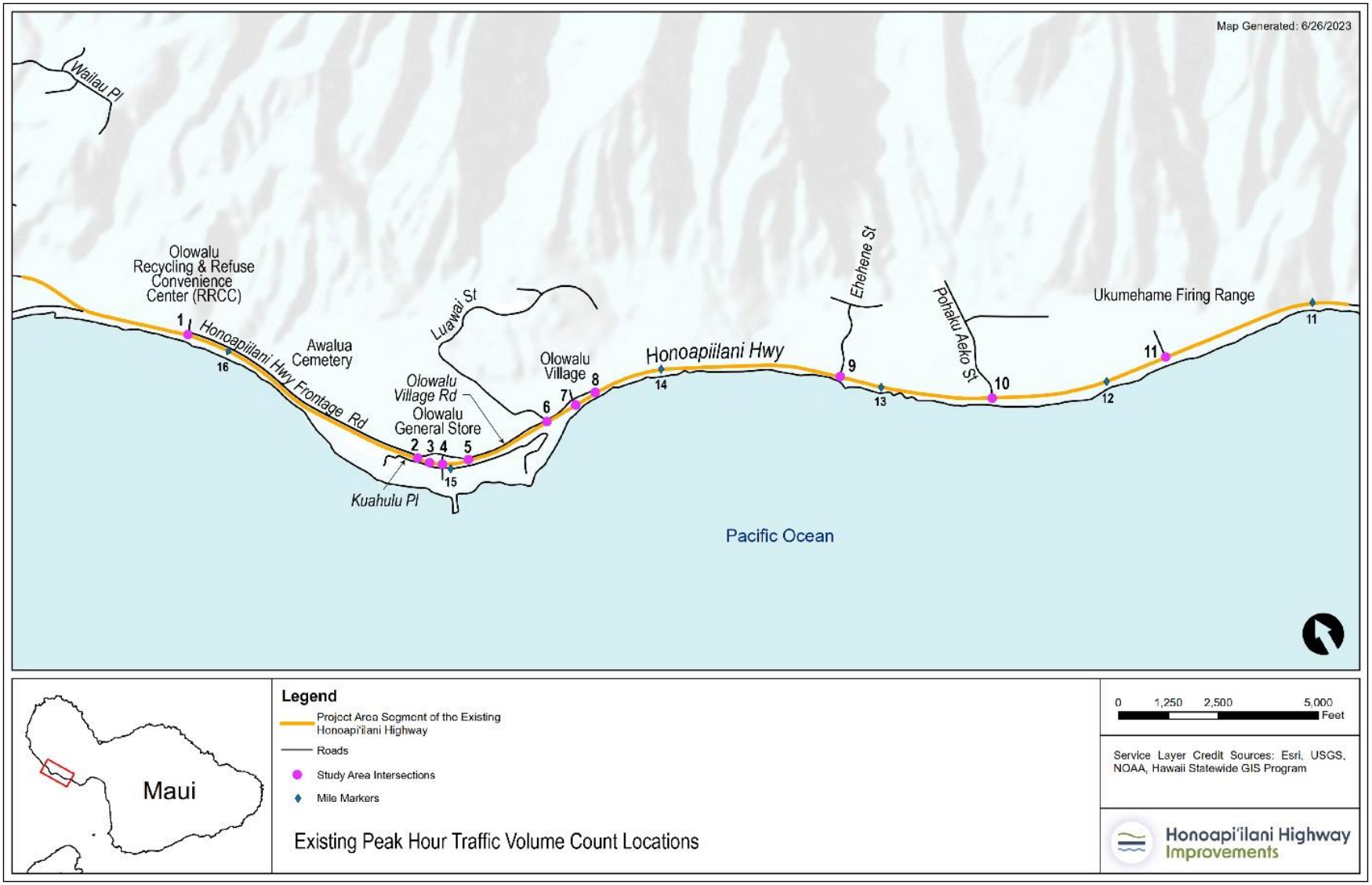


FIGURE II-2. **Existing Lane Configurations**

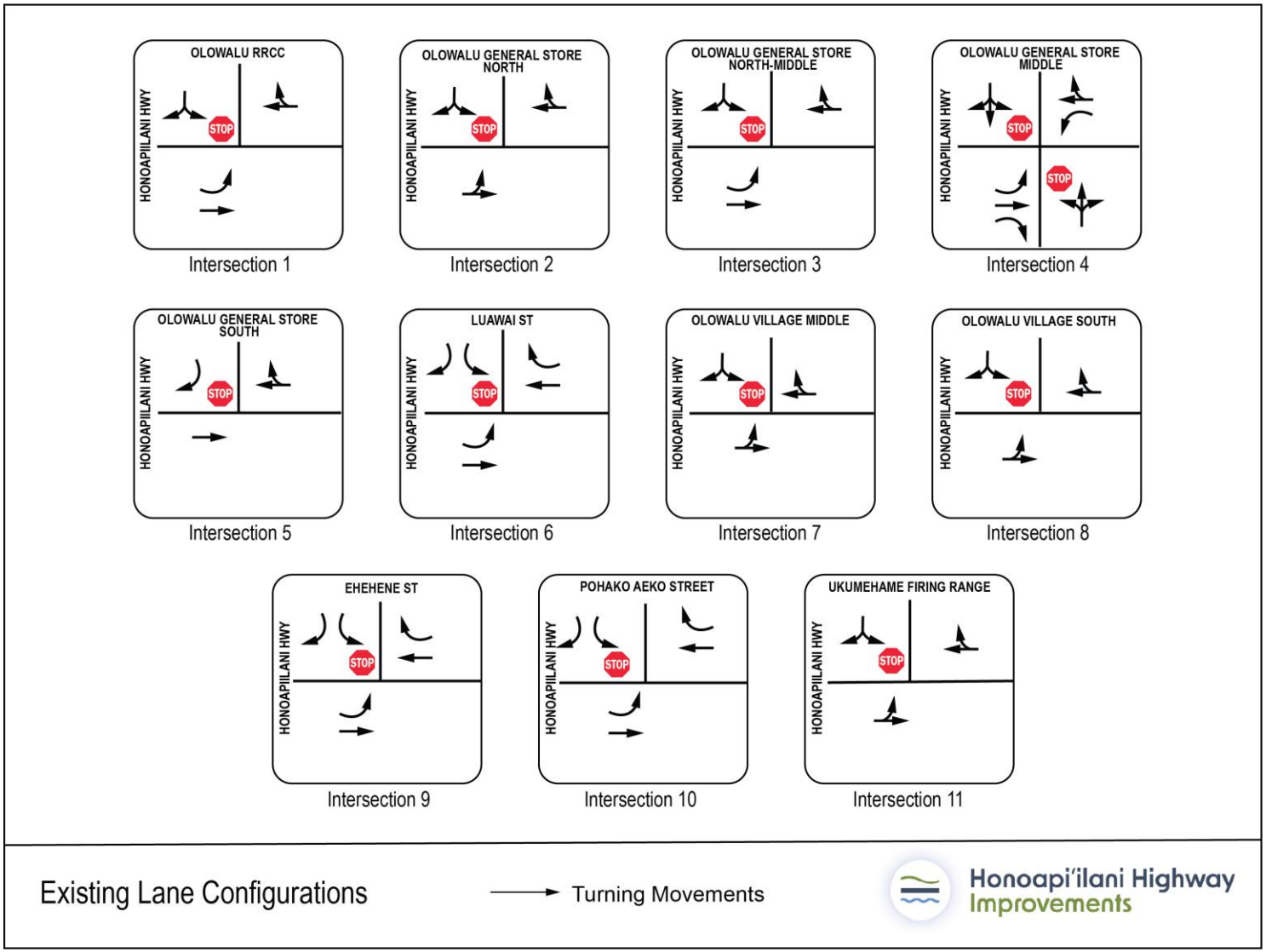


FIGURE II-3. **Existing Access along Honoapi'ilani Highway**



Honoapi‘ilani Highway and Refuse Convenience Center

The Olowalu Recycling and Refuse Convenience Center driveway’s shared-lane approach to Honoapi‘ilani Highway is stop-controlled. An exclusive left-turn lane is provided for the southbound Honoapi‘ilani Highway approach.

Olowalu Area

Honoapi‘ilani Highway/Olowalu General Store Area

There is one major driveway and three minor driveways into this commercial area.

The major access driveway is across from the roadway that provides access to the makai area of Camp Olowalu, Olowalu Landing, and the Olowalu Plantation House. This four-legged, unsignalized intersection has exclusive left-turn lanes on both Honoapi‘ilani Highway approaches. An exclusive right-turn lane into the makai roadway is provided on the southbound Honoapi‘ilani Highway approach. Both driveway approaches from the Olowalu General Store area and the makai roadway are STOP-sign controlled.

All of the minor-street accesses are unsignalized T-intersections and have either explicit (signed) or implicit (unsigned driveway) STOP-control on the driveway approach. The northernmost minor access is near the northern terminus of Olowalu Village Road. A second minor access is just to the south, in the parking area fronting the Olowalu Farmer’s Market and Kamala’s Kitchen. These two minor accesses are full-movement T-intersections with no turn movement restrictions. The third minor access is a right-in/right-out driveway located south of Leoda’s Kitchen and Pie Shop.

Honoapi‘ilani Highway/Luawai Street

The Honoapi‘ilani Highway/Luawai Street intersection is an unsignalized T-intersection with STOP-sign control on the Luawai Street approach. An exclusive left-turn lane is provided for the southbound Honoapi‘ilani approach, and a right-turn deceleration lane is provided for the northbound Honoapi‘ilani approach. A left-turn refuge is provided in the median for vehicles turning left out of Luawai Street. The Luawai Street approach is channelized with separate left- and right-turn lanes.

Honoapi‘ilani Highway/Olowalu Village

Two Olowalu Village access points are provided south of Luawai Street. Both access points are unsignalized T-intersections with implied STOP-sign control on the driveway approaches. Neither access intersection has exclusive left- or right-turn lanes on Honoapi‘ilani Highway.

Ukumehame Area

Honoapiʻilani Highway/Ehehene Street

Honoapiʻilani Highway/Ehehene Street intersection is an unsignalized T-intersection with STOP-sign control on the Ehehene Street approach. An exclusive left-turn lane is provided for the southbound Honoapiʻilani approach, and right-turn deceleration and acceleration lanes are provided on northbound Honoapiʻilani Highway. A left-turn refuge is provided in the median for vehicles turning left out of Ehehene Street. The Ehehene Street approach is channelized with separate left- and right-turn lanes.

Honoapiʻilani Highway/Pōhaku ʻAeko Street

The Honoapiʻilani Highway/Pōhaku ʻAeko Street intersection is an unsignalized T-intersection with STOP-sign control on the Pōhaku ʻAeko Street approach. An exclusive left-turn lane is provided for the southbound Honoapiʻilani approach, and right-turn deceleration and acceleration lanes are provided on northbound Honoapiʻilani Highway. A left-turn refuge is provided in the median for vehicles turning left out of Pōhaku ʻAeko Street. Pōhaku ʻAeko Street approach is channelized with separate left- and right-turn lanes.

Honoapiʻilani Highway/Ukumehame Firing Range Driveway

The Ukumehame Firing Range driveway is an unsignalized T-intersection with STOP-sign control on the driveway approach. No turn lanes are provided on Honoapiʻilani Highway, and there is no channelization of the driveway approach.

EXISTING PUBLIC TRANSIT

The Maui County Department of Transportation works with Roberts Hawaii to provide Maui Bus, which is an island-wide public bus transit system. The Lāhainā Islander Route, which connects the Kahului-Wailuku Area to Lāhainā, passes through the project area on Honoapiʻilani Highway. No bus stops are located within the project area.

EXISTING BICYCLE/PEDESTRIAN FACILITIES

Currently, no formal bike facilities are provided within the project area. For most of the area, paved shoulders on Honoapiʻilani Highway can be used by bicyclists to avoid riding in a through highway lane and by pedestrians walking along the highway.

EXISTING ROADWAY DATA

Existing roadway data was identified and incorporated into the discussion of operations, including the following:

- Number of lanes and shoulder widths
- Intersection Lane configurations

- Bicycle facilities
- Pedestrian facilities and crosswalk locations
- Intersection traffic control
- Posted speed limits

EXISTING SEGMENT OPERATIONS

Traffic volumes on Honoapi‘ilani Highway were collected and general segment operations were evaluated—with the purpose of identifying the relative quality of flow on existing Honoapi‘ilani Highway given the current traffic volume demand.

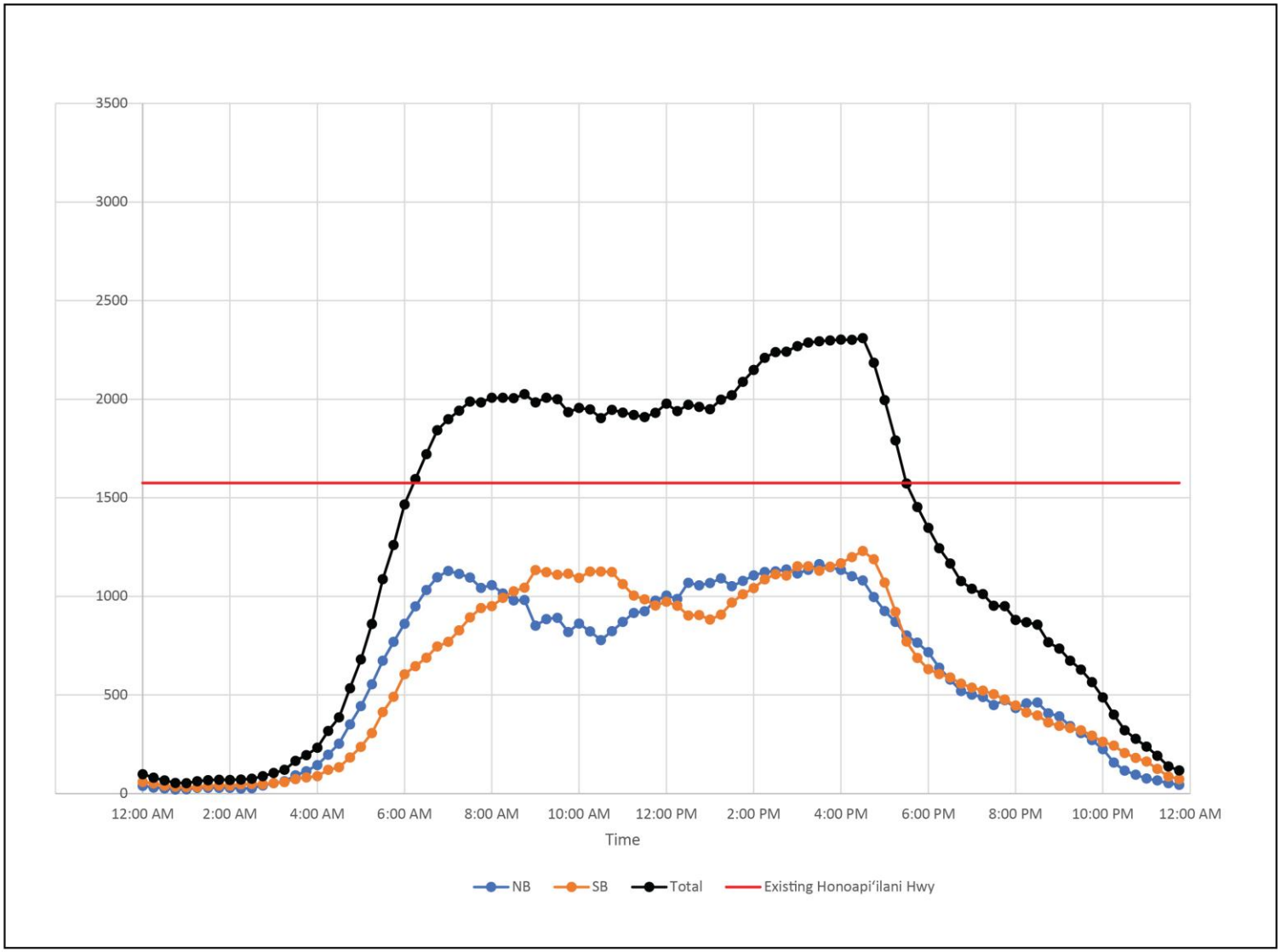
Corridor Traffic Volumes

Existing Honoapi‘ilani Highway traffic volumes obtained from the State of Hawaii Department of Transportation (HDOT) were augmented with counts recorded for the Project over 24 hours—May 3 through May 4, 2023—at the driveways of the Olowalu Recycling and Refuse Convenience Center and the Ukumehame Firing Range. The data from these counts are included in Appendix A of this report. For this analysis, these two intersections represent traffic volumes at the north and south ends of the project area, respectively, and FIGURE II-4 and FIGURE II-5show their distributions—including both directional traffic volumes and the two-way totals. Additionally, reference lines indicate the maximum directional operational volume of Honoapi‘ilani Highway based on its current level of access management and roadway geometrics. These maximum directional operational volumes are used as a measure of capacity, because through traffic on Honoapi‘ilani Highway is largely unconstrained by intersecting street traffic.

Corridor Evaluation

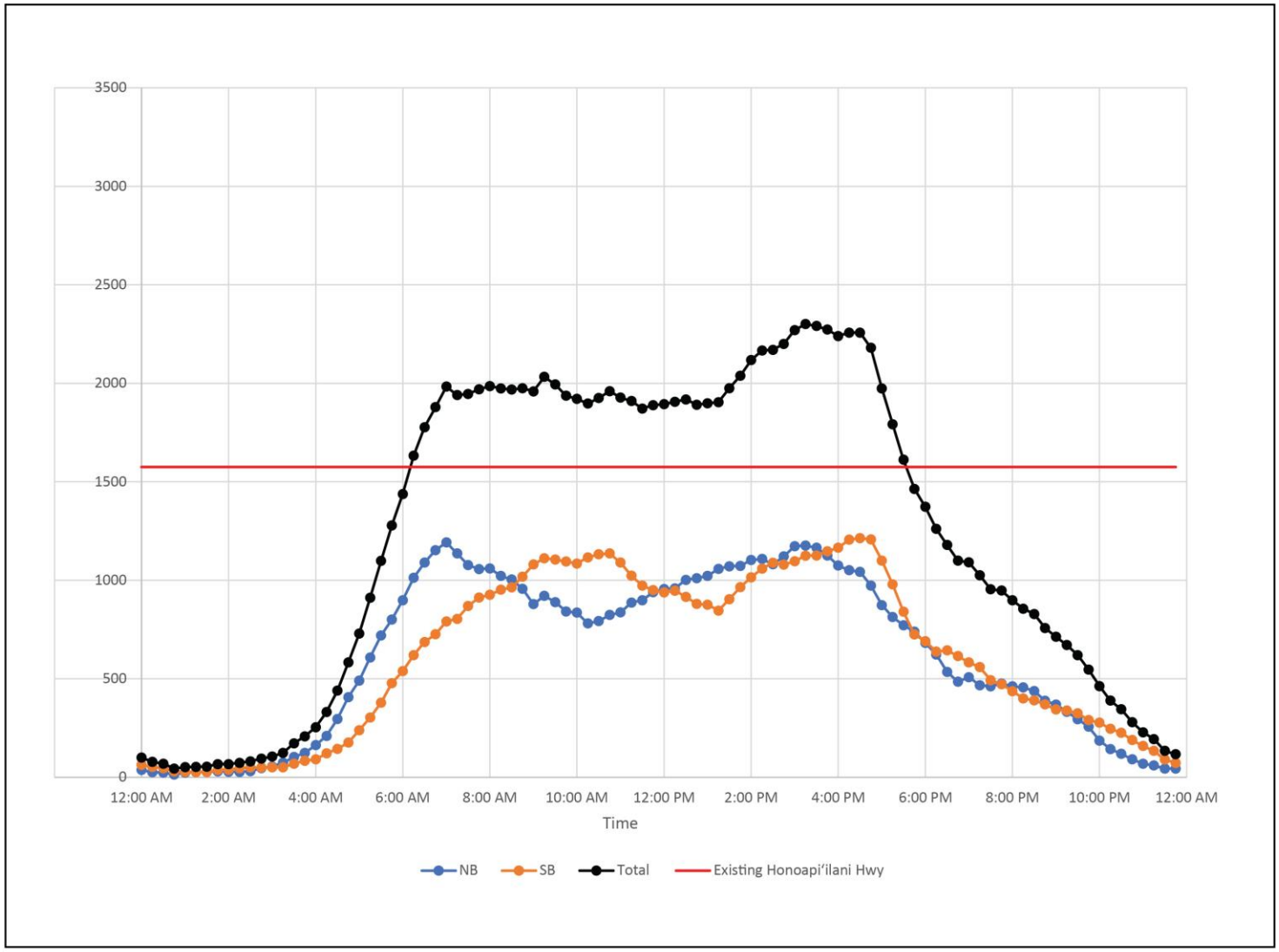
FIGURE II-4 and FIGURE II-5 show that both the Launiupoko and Ukumehame ends of Honoapi‘ilani Highway within the project area experience peak-hour traffic volumes below the maximum directional operational volume. This is consistent with observations indicating that traffic on the highway is substantial but mostly flows well. Occasionally, and especially during the PM peak-hour in the southbound direction, there are minor operational disruptions at intersections that trigger congestion and result in vehicles queuing on Honoapi‘ilani Highway. But these events are intermittent and traffic flows well between them.

FIGURE II-4. **Existing 2023 Honoapi'ilani Highway Traffic Volumes at Launiupoko in the Vicinity of Milepost 16.5**



Existing 2023 Hourly Honoapiilani Highway Traffic Volume North of Project

FIGURE II-5. **Existing 2023 Honoapi‘ilani Highway Traffic Volumes at Ukumehame in the Vicinity of Milepost 11.5**



Existing 2023 Hourly Honoapiilani Highway Traffic Volume South of Project

G. EXISTING INTERSECTION OPERATIONS

Traffic turning movement volumes at eleven intersections on Honoapi'ilani Highway were collected and peak-hour intersection operations were evaluated, the locations of these intersection were shown previously in Figure II-3.

Intersection Turning Movement Traffic Volumes

Traffic turning movement counts and pedestrian/bicycle counts for the Project were conducted on Wednesday, May 3, 2023, at the following numbered intersections:

1. Honoapi'ilani Highway/Olowalu Recycling and Refuse Convenience Center
2. Honoapi'ilani Highway/Olowalu General Store area, north driveway
3. Honoapi'ilani Highway/Olowalu General Store area, north-middle driveway
4. Honoapi'ilani Highway/Olowalu General Store area, middle/Camp Olowalu driveway
5. Honoapi'ilani Highway/Olowalu General Store area, south driveway (right-in/right-out)
6. Honoapi'ilani Highway/Luawai Street
7. Honoapi'ilani Highway/Olowalu Village, middle access
8. Honoapi'ilani Highway/Olowalu Village, south access
9. Honoapi'ilani Highway/Ehehene Street
10. Honoapi'ilani Highway/Pōhaku 'Aeko Street
11. Honoapi'ilani Highway/Ukumehame Firing Range Driveway

The AM and PM peak hours occurred from 8:45 a.m. to 9:45 a.m. and 3:15 p.m. to 4:15 p.m., respectively.FIGURE II-6 shows the existing peak-hour traffic volumes at these intersections. The intersection numbers in this figure correspond to the intersection numbers shown in the intersection location map in Figure II-3 and the list above.

Bicycle and pedestrian volumes were very low—less than five each per hour at any intersection during the peak-hour periods.

Intersection Peak-Hour Operations

The study intersections were analyzed with Synchro Studio 11 software using the methodologies for unsignalized intersections documented in the *Highway Capacity Manual, Sixth Edition: A Guide for Multimodal Mobility Analysis*. Because of the very low bicycle and pedestrian volumes, only vehicular mode operational analyses were conducted. The Synchro worksheets are included in Appendix B of this report.

Unsignalized intersection analyses characterize operating conditions by assigning a scaled qualitative measure, level of service (LOS), to key traffic movements at an intersection. LOS ranges from A to F, with LOS A representing operations with low vehicular delays and LOS F representing operations with relatively high vehicular delays. TABLE II-1 shows the relationship of delays to unsignalized LOS levels.

FIGURE II-6. **Existing Peak-Hour Traffic Volumes**

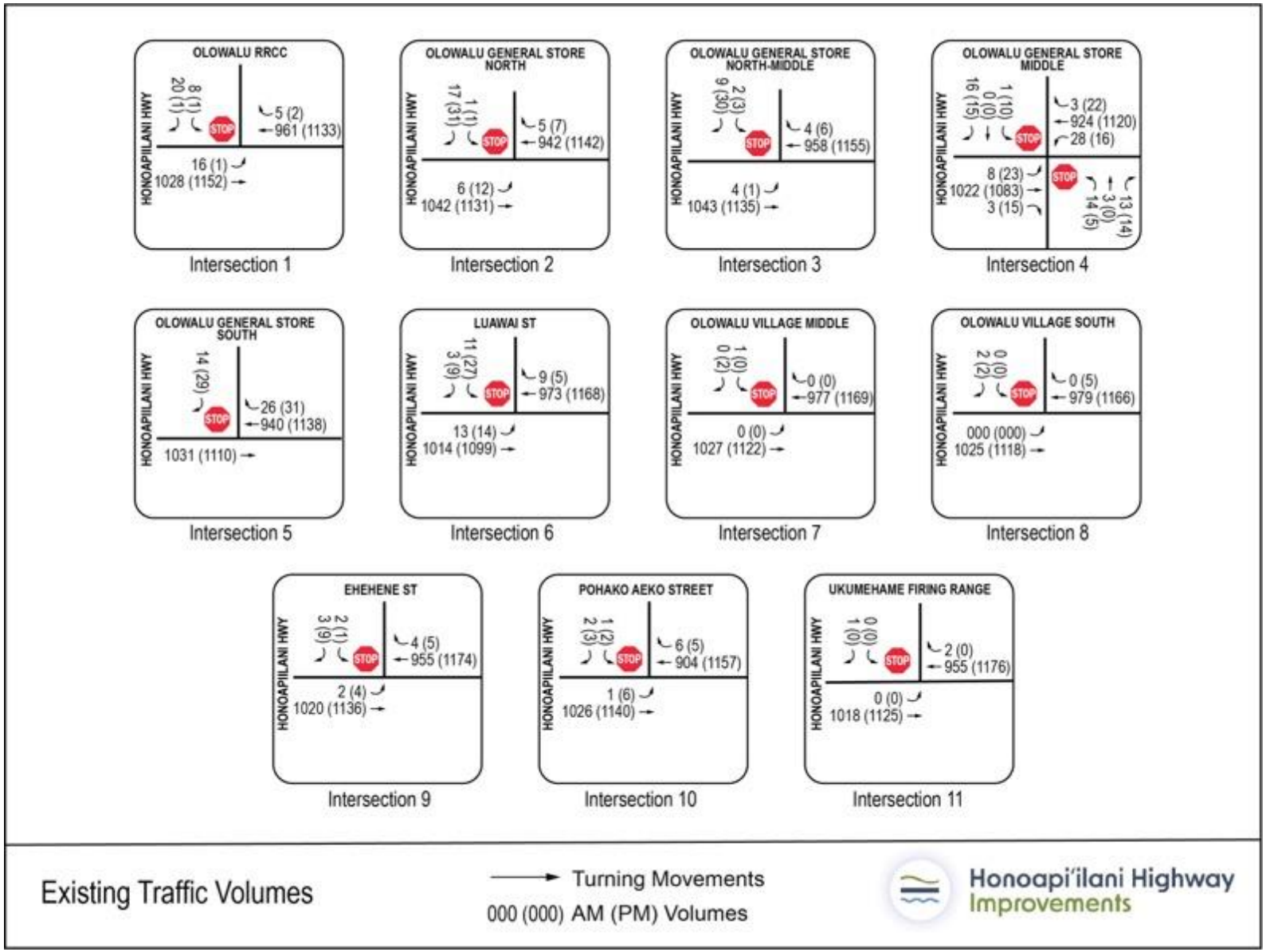


TABLE II-**1**. **Unsignalized Intersection Level of Service Definition**

LEVEL OF SERVICE (LOS)	UNSIGNALIZED LOS DELAY THRESHOLDS (SECONDS/VEHICLE)
A	≤10
B	>10 to 15
C	>15 to 25
D	>25 to 35
E	>35 to 50
F	>50

Note: Highway Capacity Manual, Sixth Edition

All intersections analyzed for the Project are unsignalized two-way STOP-control (TWSC) with uninterrupted flow on Honoapi‘ilani Highway and STOP-control on the intersecting street approaches.

TABLE II-2 displays key existing conditions operating LOS for each intersection. As shown in TABLE II-2, the bolded intersections operate at LOS E or LOS F. The LOS shown relate to the left-turn movements out of the minor streets onto Honoapi‘ilani Highway. This is usually the most difficult movement to execute at an unsignalized intersection, especially when there is substantial traffic volume on the main roadway, as is the case with Honoapi‘ilani Highway. More detailed tables that include all of the evaluated traffic movements are included in the Transportation Analysis Report in the Appendix.

These intersections are incurring LOS E or F because they do not provide median refuge lanes for left turns out from the minor streets. Median refuge would allow these left-turning vehicles to execute the movement in two steps: first from the minor street into the median, and then from the median into the through traffic lane on Honoapi‘ilani Highway. Without this feature, traffic turning out from the minor street needs to feel comfortable in clearing traffic coming from both directions on Honoapi‘ilani Highway—a much more difficult task. Still, while delays result in LOS E or LOS F for these minor-street approaches, the movements involve a relatively small numbers of vehicles.

Intersections such as the Luawai Street, Ehehene Street, and Pōhaku ‘Aeko Street provide median refuge lanes and, therefore, operate at LOS D or better during both peak periods. And overall, traffic movements on mainline Honoapi‘ilani Highway operate well with very little delay.

TABLE II-**2**. **Existing Year 2023 Intersection Level of Service**

			AM PEAK HOUR			PM PEAK HOUR		
INTERSECTION	TRAFFIC CONTROL	MOVEMENT	LOS	DELAY	V/C	LOS	DELAY	V/C
Honoapi'ilani Highway/ Olowalu Recycling and Refuse Convenience Center	TWSC	Highest Delay Minor-Street Movement	**E**	**40**	**0.22**	**F**	**75**	**0.17**
Honoapi'ilani Highway/ Olowalu General Store North	TWSC	Highest Delay Minor-Street Movement	D	34	0.16	**E**	**45**	**0.30**
Honoapi'ilani Highway/ Olowalu General Store North-Mid	TWSC	Highest Delay Minor-Street Movement	D	33	0.06	D	31	0.21
Honoapi'ilani Highway/ Olowalu General Store Middle	TWSC	Highest Delay Minor-Street Movement	**F**	**151**	**0.63**	**F**	**254**	**0.83**
Honoapi'ilani Highway/ Olowalu General Store South	TWSC	Highest Delay Minor-Street Movement	C	18	0.05	C	24	0.14
Honoapi'ilani Highway/ Luawai Street	TWSC	Highest Delay Minor-Street Movement	C	20	0.05	D	26	0.14
Honoapi'ilani Highway/ Olowalu Village Middle	TWSC	Highest Delay Minor-Street Movement	**E**	**48**	**0.11**	**F**	**77**	**0.18**
Honoapi'ilani Highway/ Olowalu Village South	TWSC	Highest Delay Minor-Street Movement	**E**	**48**	**0.11**	**F**	**77**	**0.18**
Honoapi'ilani Highway/ Ehehene Street	TWSC	Highest Delay Minor-Street Movement	C	19	0.02	C	24	0.03
Honoapi'ilani Highway/ Pōhaku 'Aeko Street	TWSC	Highest Delay Minor-Street Movement	C	18	0.02	C	23	0.03
Honoapi'ilani Highway/ Ukumehame Firing Range	TWSC	Highest Delay Minor-Street Movement	**E**	**46**	**0.11**	**F**	**79**	**0.18**

Note: Delay shown in seconds per vehicle
TWSC = Two-Way STOP-Controlled

H. EXISTING CRASH DATA

The Traffic Branch of HDOT's Highways Division provided traffic crash data from 2020, 2021, and 2022.

	SECOND ACTION											
	Overturn/Rollover off Roadway	Ran off Roadway	Cross Median	Collision with Guardrail	Collision with Tree	Collision with Other	Head On	Rear End	Angle (Opposite Direction)	Sideswipe (Opposite Direction)	None	TOTAL
											2	**2**
Ran off Roadway	1				1							**2**
Fell/Jumped from Motor Vehicle						1					2	**3**
Cross Centerline				1	1		4		2	3		**11**
Collision with Guardrail					1						1	**2**
Collision with Tree	1											**1**
Ped Darting Out											1	**1**
Rear End			1					5			12	**18**
Angle (Same Direction)											1	**1**
Broadside		1									1	**2**
Collision with Parked Motor Vehicle											1	**1**
Total	**2**	**1**	**1**	**1**	**3**	**1**	**4**	**5**	**2**	**3**	**21**	**44**

shows the first and second actions of the crashes identified in the project area. In addition, a traffic crash inventory within the project area (milepost 11 to milepost 17) for the three most recent years of data available in a memorandum dated August 17, 2023. This data is included in Appendix D of this report.

TABLE II-**3**. **Existing Crash Data First and Second Actions (2020, 2021, 2022)**

		SECOND ACTION											
		Overturn/Rollover off Roadway	Ran off Roadway	Cross Median	Collision with Guardrail	Collision with Tree	Collision with Other	Head On	Rear End	Angle (Opposite Direction)	Sideswipe (Opposite Direction)	None	TOTAL
												2	**2**
	Ran off Roadway	1				1							**2**
	Fell/Jumped from Motor Vehicle						1					2	**3**
	Cross Centerline				1	1		4		2	3		**11**
	Collision with Guardrail					1						1	**2**
	Collision with Tree	1											**1**
	Ped Darting Out											1	**1**
	Rear End			1					5			12	**18**
	Angle (Same Direction)											1	**1**
	Broadside		1									1	**2**
	Collision with Parked Motor Vehicle											1	**1**
	Total	**2**	**1**	**1**	**1**	**3**	**1**	**4**	**5**	**2**	**3**	**21**	**44**

Of these 44 major traffic crashes reported, five were motorcycle crashes, one involved a pedestrian, and there were no bicycle crashes. There were 18 lane departure crashes, of which nine crashes involved speeding. There were two fatalities and 13 serious injuries.

As shown in

	SECOND ACTION											
	Overturn/Rollover off Roadway	Ran off Roadway	Cross Median	Collision with Guardrail	Collision with Tree	Collision with Other	Head On	Rear End	Angle (Opposite Direction)	Sideswipe (Opposite Direction)	None	TOTAL
											2	**2**
Ran off Roadway	1				1							**2**
Fell/Jumped from Motor Vehicle						1					2	**3**
Cross Centerline				1	1		4		2	3		**11**
Collision with Guardrail					1						1	**2**
Collision with Tree	1											**1**
Ped Darting Out											1	**1**
Rear End			1					5			12	**18**
Angle (Same Direction)											1	**1**
Broadside		1									1	**2**
Collision with Parked Motor Vehicle											1	**1**
Total	**2**	**1**	**1**	**1**	**3**	**1**	**4**	**5**	**2**	**3**	**21**	**44**

, the two most prominent categories of crashes were rear end, with 18 occurrences, and crossing of the centerline, with 11 occurrences. Both reflect the characteristics of the existing Honoapi'ilani Highway as an undivided, two-lane roadway with low management of access and limited intersections with turning movement lanes.

Rear-end crashes had the highest occurrence—18 of the 44 reported incidents. Three of these 18 accidents were attributed to speeding and seven were attributed to distracted driving. Rear-end accidents could potentially be reduced by providing turning movement turn lanes at intersections and providing more management of access. There were 11 occurrences of vehicles crossing the centerline. Of these, four resulted in head-on collisions—potentially the most severe type of motor vehicle accident. Finally, fourteen of the 44 major traffic crashes reported occurred at night. The existing highway is in a rural area and does not provide street lighting.

III. Projected Year 2045 Conditions

The purpose and need for this project is to increase the resiliency of Honoapi'ilani Highway between Ukumehame and Launiuipoko. The primary way to increase the resiliency of the highway segment is to relocate Honoapi'ilani Highway mauka out of the project sea-level rise areas. This relocated highway segment is proposed as a two-lane divided highway. However, to assure future reliability for handling unanticipated increases in traffic volumes, right-of-way is proposed to be acquired that would allow expansion to a four-lane highway facility if travel demand and funding is available to do so.

This section discusses the data inputs and analyses used to evaluate the No Build and Build Alternatives for the Future Year 2045. For this analysis year, future traffic volumes used in the evaluation are established, and the No Build Alternative and the Build Alternatives are described, evaluated, documented, and summarized.

This section analyzes conditions with these future traffic volumes for the No Build Alternative (retaining the existing highway in its current configuration) as well as four build alternatives in Olowalu and three build alternatives in Ukumehame, which were grouped together as the four Build Alternatives for the Project. FIGURE III-5 illustrates the No Build Alternative and the Build Alternatives.

All of the evaluated roadway alternatives are approximately 6 miles long and extend from Ukumehame near the Pali to Launiupoko, where it joins the existing Lāhainā Bypass. The Build Alternatives would be constructed as principal arterials with paved shoulders—8-foot outside and 6-foot inside. The posted speed limit for the Build Alternatives would be 45 miles per hourto maintain consistency with the existing Lahaina Bypass that has a posted speed limit of 45 miles per hour.

FUTURE YEAR 2045 TRAVEL DEMAND

Year 2045 was used as the future analysis time frame within the project area to be consistent with the Maui MPO's current updated travel demand model forecast which is a component of the Hele Mai Maui 2040 Long Range Transportation Plan.

The Maui MPO travel demand forecasts were developed prior to the Lāhainā wildfire. Based on coordination with the MPO and given the extended period of reconstruction and rebound in economic activity, these projections are considered to be appropriate over the long-term but are likely conservatively high for the Future Year 2045. In turn, the results of the Project's future traffic analyses are considered conservative in assessing potential operational effects.

The Maui MPO maintains the Maui Travel Demand Model, the purpose of which is to provide travel information that aids in planning for regional transportation improvements. The model was updated in 2021 and includes 2019 baseline and projected 2045 travel demand. The Maui MPO Travel Demand Model provided the basis for future traffic volume projections within the project corridor.

This forecast includes assumptions of future land use that have been adopted for use in the model.

The model breaks the island of Maui into traffic analysis zones (TAZs). **Figure III-1** illustrates the TAZ's for the West Maui area. The project study area falls into TAZ 170. **Table III-1** summarizes the households and employment inputs to the travel demand model.

FIGURE III-**1**. **West Maui TAZs**

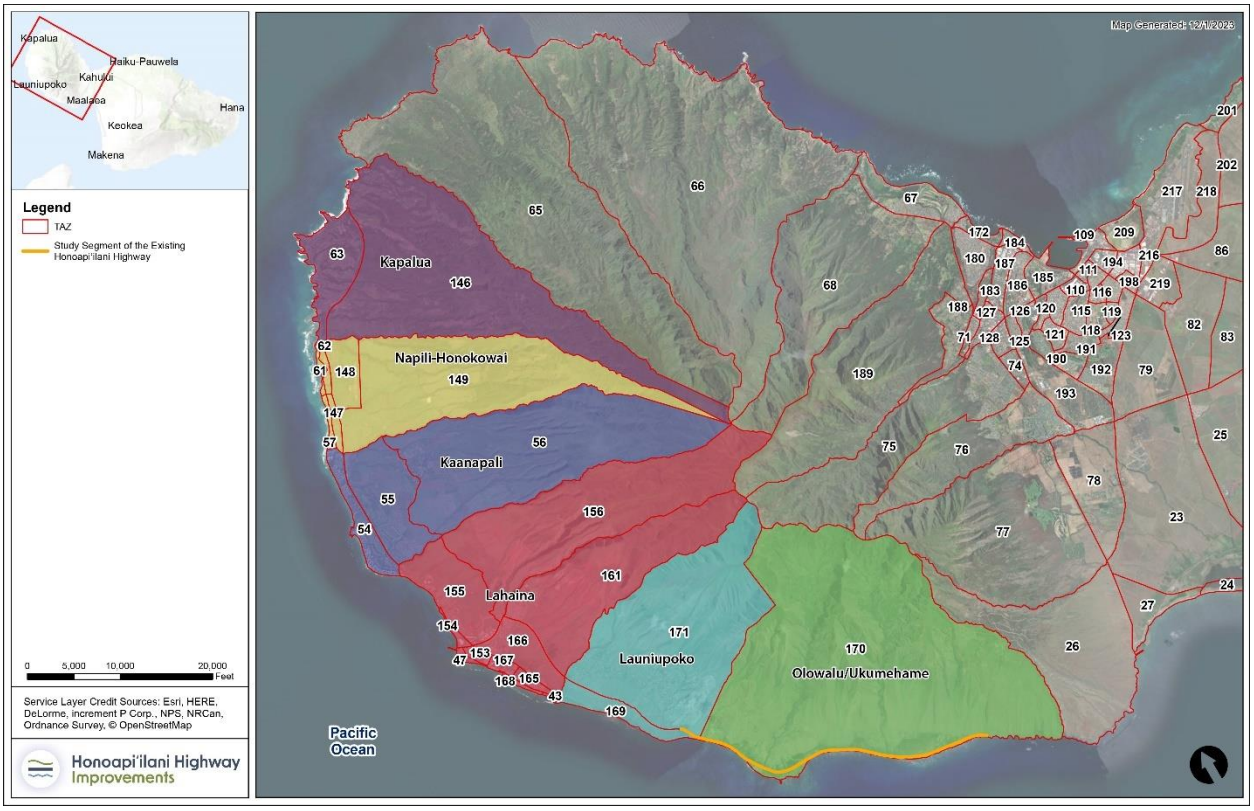


TABLE III-**1**. **Households/Employment within Project Area (TAZ 170)**

YEAR	HOUSEHOLDS	EMPLOYMENT
2019	55	10
2030	61	11
2045	67	12

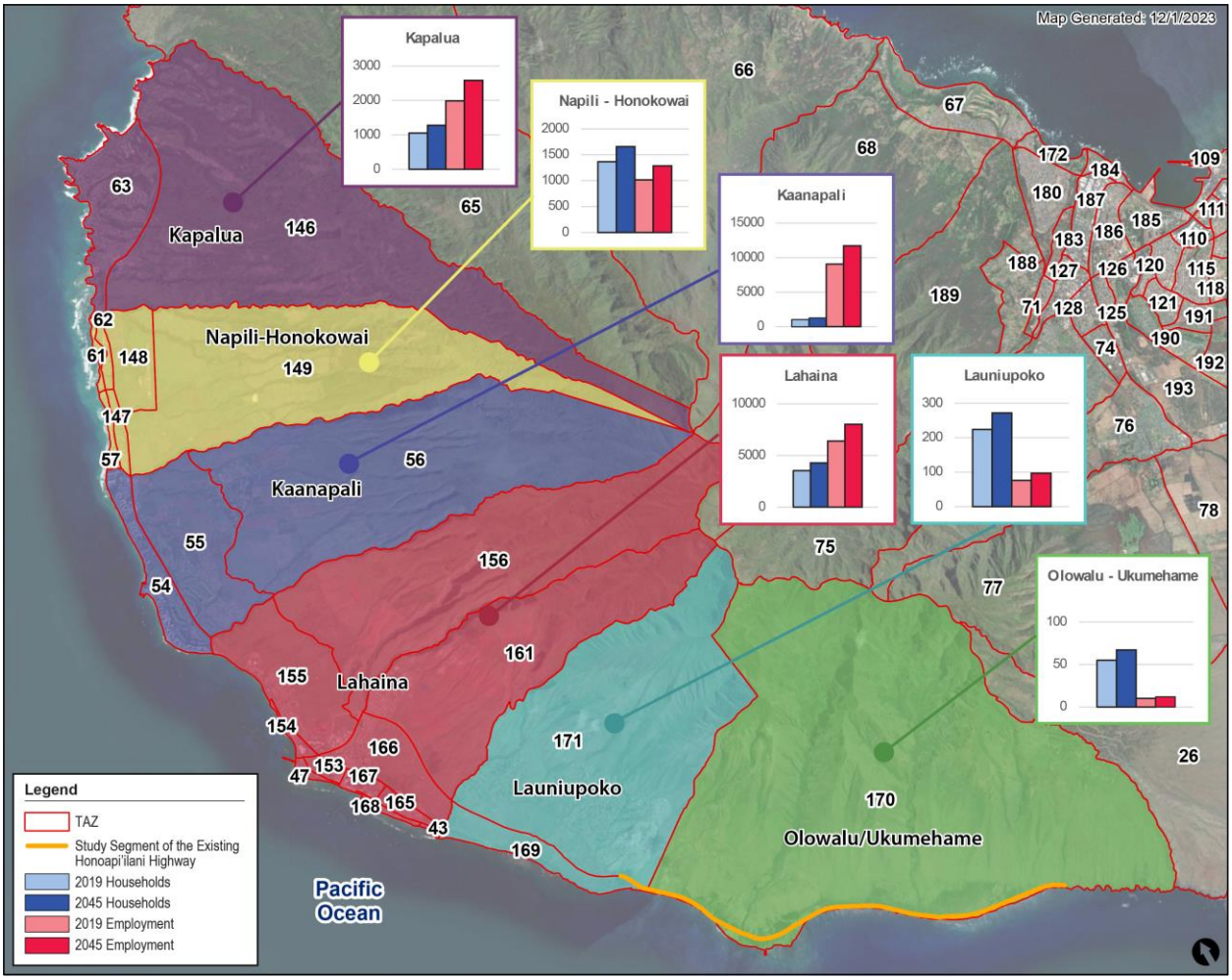
As shown, only modest growth in households and employment are assumed in the travel demand model input.

TABLE III-2 shows the number of households and employment for West Maui TAZs, which includes Lāhainā, Kaanapali, Nāpili-Honokōwai, and Kapalua. As shown, household counts are projected to increase by approximately 0.8% annually while employment is projected to increase by 1.1% between the base year and 2045. FIGURE III-2 illustrates the differences in household and employment between the Base Year 2019 and Projected Year 2045.

TABLE III-2. **Projected West Maui Households/Employment by Traffic Analysis Zone**

LOCATION	TRAFFIC ANALYSIS ZONE	HOUSEHOLDS			EMPLOYMENT		
		2019	2030	2045	2019	2030	2045
Kapalua	63	885	978	1,074	1,637	1,864	2,124
	146	168	186	204	352	401	457
Napili-Honokowai	57	98	109	119	88	98	110
	61	102	113	124	74	84	94
	62	243	269	295	231	262	299
	147	243	269	295	256	285	316
	148	678	749	823	306	347	392
	149	0	0	0	60	68	76
Kaanapali	54	262	290	318	8,967	10,203	11,600
	55	698	771	847	88	100	112
	56	79	87	96	0	0	0
Lahaina	43	13	14	16	4	5	5
	47	336	371	408	15	17	19
	153	228	252	277	663	746	836
	154	29	32	35	167	189	214
	155	796	880	966	1,429	1,588	1,751
	156	0	0	0	0	0	0
	161	470	519	570	26	29	31
	165	224	248	272	95	105	116
	166	976	1,079	1,184	985	1,111	1,247
	167	315	348	382	1,981	2,218	2,472
	168	137	151	166	1,028	1,163	1,314
Launiupoko	169	13	14	16	19	21	25
	171	211	233	256	57	64	72
Olowalu /Ukumehame	170	55	61	67	10	11	12
	Total	**7,259**	**8,023**	**8,810**	**18,538**	**20,979**	**23,694**

FIGURE III-2. **Projected West Maui Model Parameters**

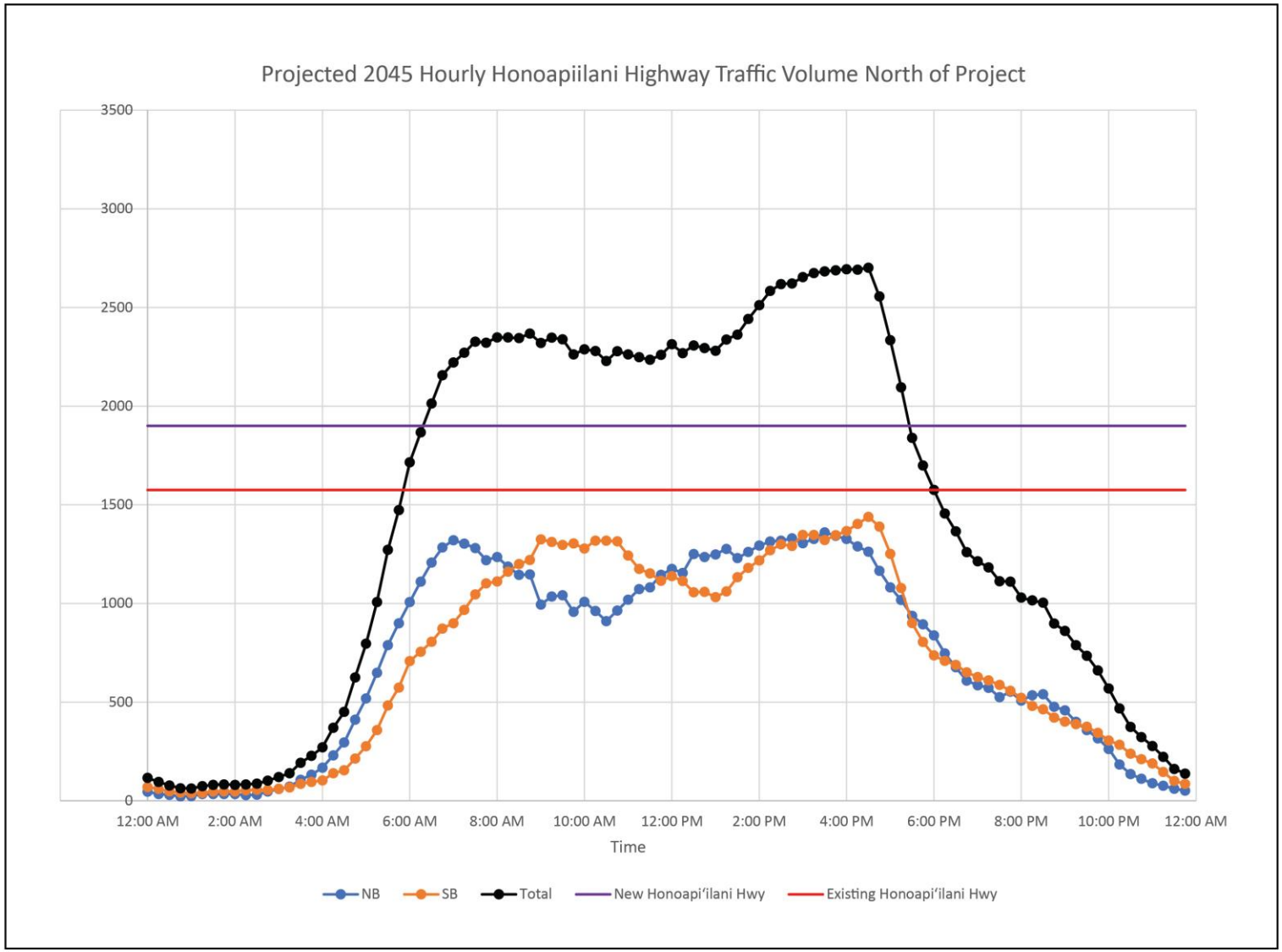


PROJECTED YEAR 2045 TRAFFIC VOLUMES

FIGURE III-3 and FIGURE III-4 illustrate the projected Year 2045 traffic volumes at Olowalu RRCC and Ukumehame Firing Range Driveways, respectively. These figures illustrate the distribution of hourly traffic volumes over a 24-hour period by direction as well as for the two-way total. And reference lines indicate the maximum directional operational volumes for both the existing Honoapi'ilani Highway—based on its current level of access management and roadway geometrics—and for the new Honoapi'ilani Highway, with improved access management and roadway geometrics. Because through traffic on Honoapi'ilani Highway is largely unconstrained by intersecting street traffic, these maximum directional operational volumes were assumed to be a measure of through capacity. Signalized intersections, if implemented, would be timed to prioritize movement and maintain capacity for this though traffic on the new Honoapi'ilani Highway.

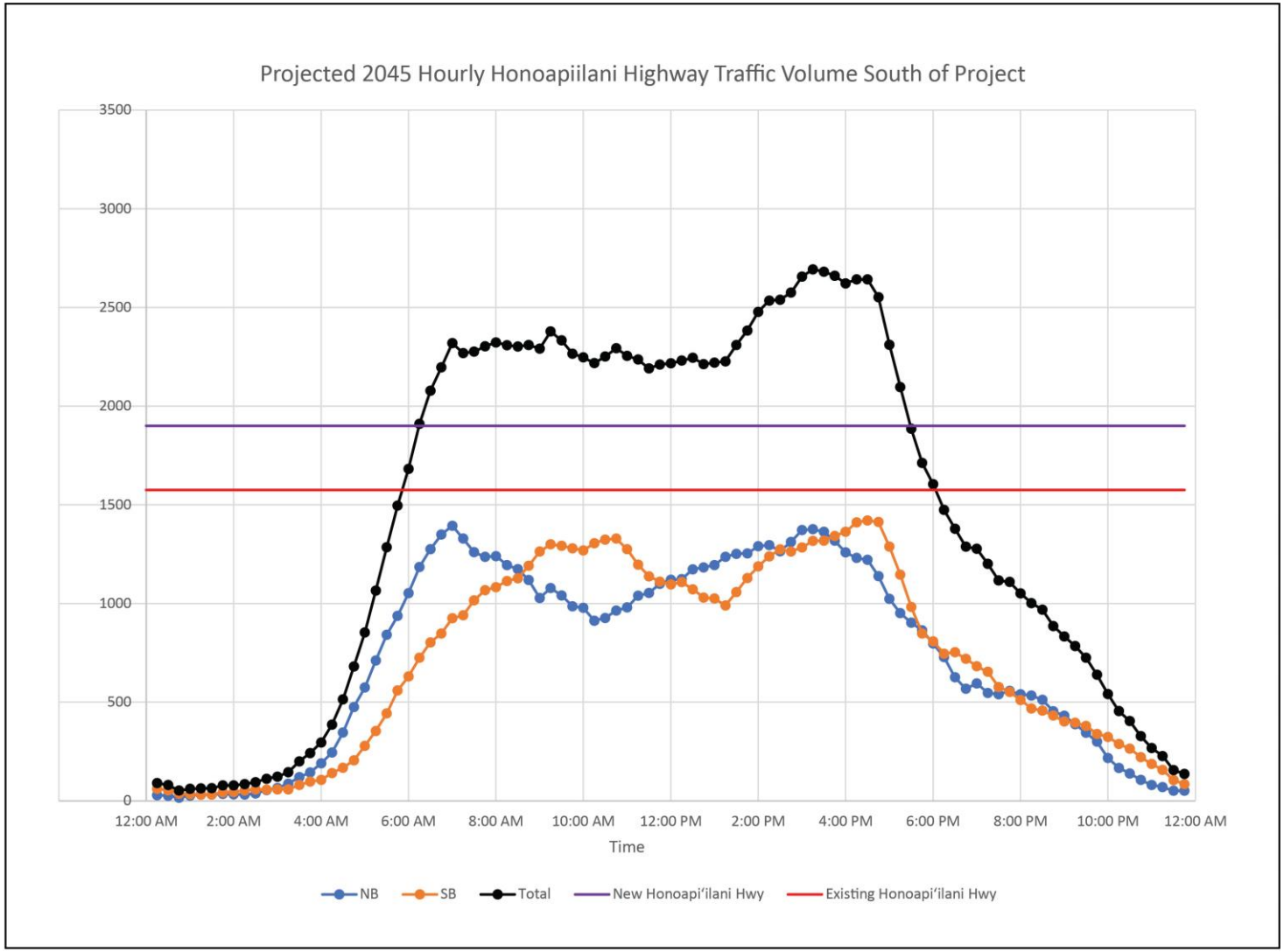
As shown, with the regional growth in traffic projected for Honoapi'ilani Highway, there are time periods in which traffic volumes approach the interrupted lane capacity of Honoapi'ilani Highway. This implies that queuing would occur on the main line at any intersection with projected interrupted traffic flow on

FIGURE III-3. **Future Year 2045 Honoapi‘ilani Highway Traffic Volumes at Launiupoko in the Vicinity of Milepost 16.5**



Projected 2045 Hourly Honoapiilani Highway Traffic Volume North of Project

FIGURE III-4. **Future Year 2045 Honoapi'ilani Highway Traffic Volumes at Ukumehame in the Vicinity of Milepost 11.5**



Projected 2045 Hourly Honoapiilani Highway Traffic Volume South of Project

Honoapi‘ilani Highway (a traffic signal would be an example of an interruption). In addition, it is expected that stop-controlled side streets would experience LOS F delays due to the demand on Honoapi‘ilani Highway. However, Honoapi‘ilani Highway is projected to be able to handle the demand and operate under capacity overall.

DESCRIPTION OF THE NO BUILD ALTERNATIVE AND THE BUILD ALTERNATIVES

Because of similar access configurations across the alternatives in Olowalu and Ukumehame, it would be feasible to combine an alternative in the Olowalu area with another one in the Ukumehame area to produce a composite Preferred Alternative. Therefore, to summarize the evaluation, four alternatives in Olowalu and three alternatives in Ukumehame were grouped as the Project’s Build Alternatives. These five alternative roadway configurations, the No Build Alternative and the Build Alternatives, are illustrated in FIGURE III-5 and described in the following sections.

No Build Alternative

The No Build Alternative reflects future conditions if the Project were not constructed. In this alternative, Honoapi‘ilani Highway would remain in its current alignment and configuration, and existing intersections and traffic control would remain unchanged.

Build Alternatives

Future Roadway Network and Access Assumptions Common to All Alternatives

The Build Alternatives differ primarily in roadway alignment, but are similar in terms of design parameters and access. All the alternatives would construct a new, divided, two-lane highway with grading, drainage, and roadway structures designed for future expansion to four lanes—if conditions are appropriate and funding is available. All intersections would include street lighting.

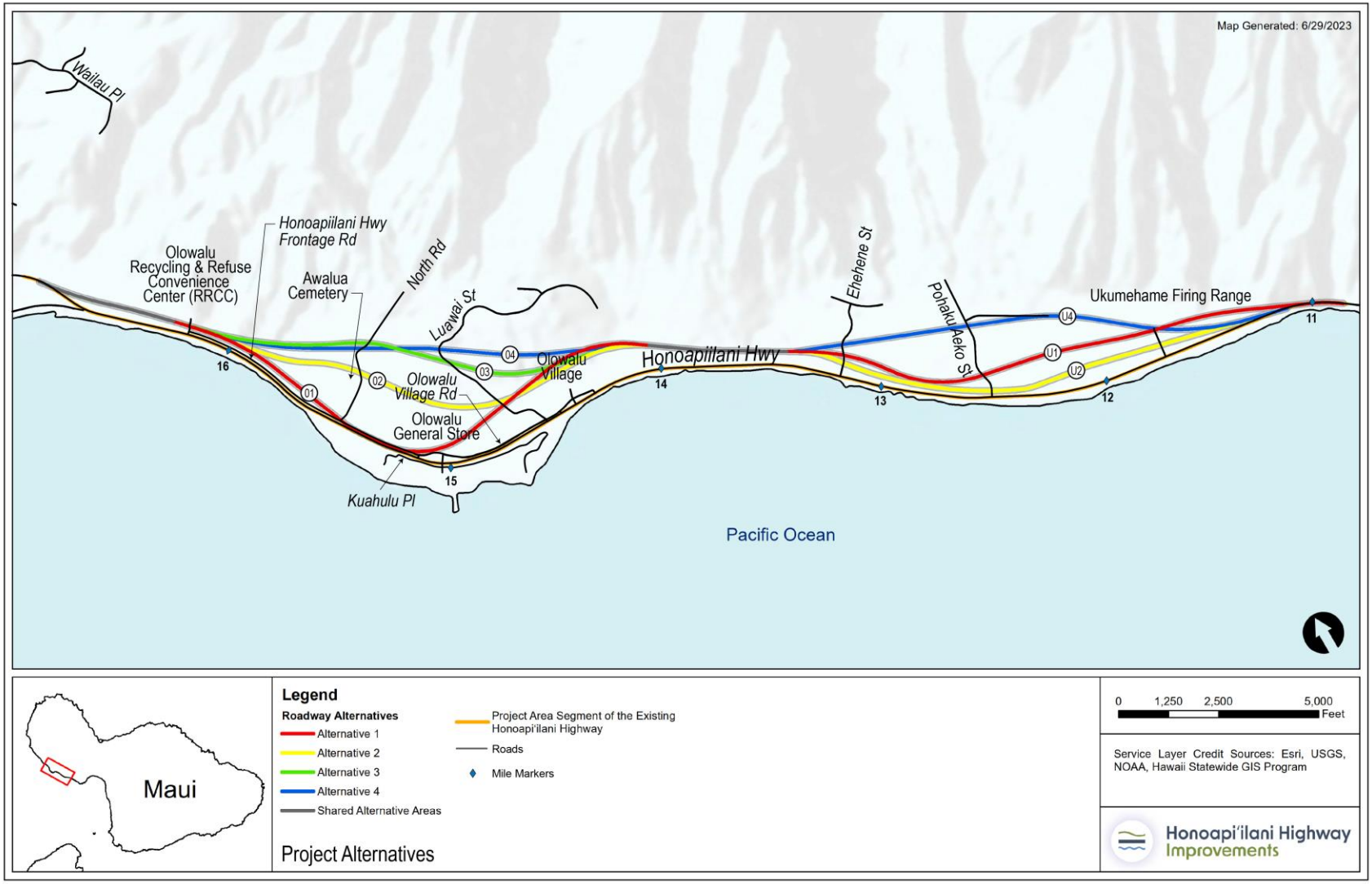
The Build Alternatives would be access-managed roadway facilities with access only allowed at designated intersections. The existing Honoapi‘ilani Highway would remain in place and be accessible from the new highway via cross streets that intersect the Build Alternatives. The existing highway would continue to provide access to adjacent properties and the beaches. All the Build Alternatives would intersect existing cross streets at Olowalu Recycling and Refuse Convenience Center, Luawai Street, Ehehene Street, and Pōhaku ‘Aeko Street.

The following are differences among the Build Alternatives:

- In Olowalu, Build Alternatives 2, 3, and 4 would intersect the new North Road, a subdivision roadway that is currently under construction north of the Olowalu General Store area. Build Alternative 1 would not intersect North Road.
- In Olowalu, to take advantage of the proximity of Build Alternative 1 to the Olowalu General Store area, there would be a four-legged intersection at a new roadway aligned to intersect the existing Honoapi‘ilani Highway near the existing main driveway to the store. To maintain intersection spacing, Build Alternative 1 would not have an intersection at the new North Road. So, Build Alternative 1 has the same number of intersections as the other Build Alternatives.

- While Build Alternatives 2 and 3 intersect the Ukumehame Firing Range driveway, Build Alternatives 1 and 4 do not. This is due to elevation differences between the viaducts in Build Alternatives 1 and 4 and the Ukumehame Firing Range access that make a direct connection difficult. As a result, Build Alternatives 1 and 4 would utilize the intersection at Pōhaku ‘Aeko Street to access the existing Honoapi‘ilani Highway, which would then allow access to the existing Ukumehame Firing Range Driveway.

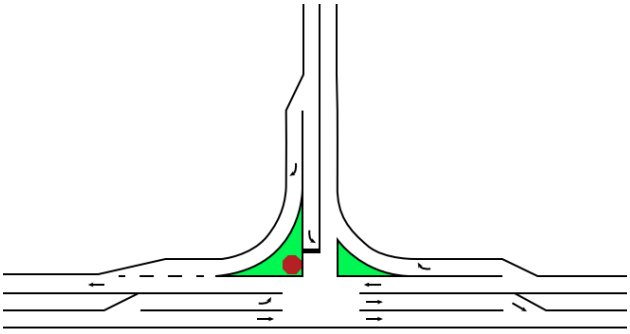
FIGURE III-5. **The No Build Alternative and the Build Alternatives**



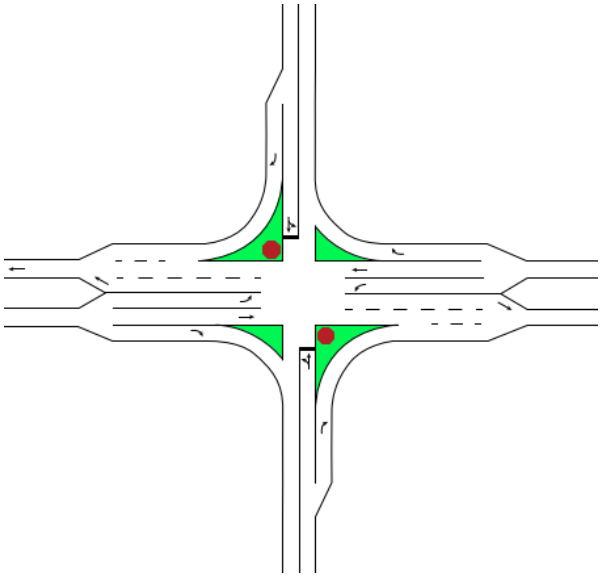
Intersections of the Build Alternatives

All intersections in the Build Alternatives would provide channelized minor-street approaches with separate left- and right-turn lanes. Exclusive right- and left-turn lanes would be part of the new Honoapi'ilani Highway, as would median left-turn refuge lanes at all unsignalized intersections. Typical layouts for three-legged (that is, T-intersections) and four-legged intersections are shown in FIGURE III-6.

FIGURE III-6. **Build Alternatives – Typical Unsignalized Intersection Configuration**



Typical T-Intersection



Typical Four-Legged Intersection

It is projected that one signalized intersection would be warranted for each of the Build Alternatives. The warrant analysis is documented in the Transportation Analysis Report in the Appendix. For Build Alternative 1, this would be at the intersection with the proposed new road in the Olowalu General Store area. For Build Alternatives 2, 3, and 4, the signalized intersection would be at Luawai Street. The signalized intersections would help to accommodate the projected traffic that would be consolidated on the Luawai Street connection between the new highway and the existing highway.

FIGURE III-7 through FIGURE III-10 show the locations of the access intersections for each Build Alternative.

FIGURE III-11 through FIGURE III-21 illustrate the access intersections in more detail for each Build Alternative along with the detailed study area limits.

FIGURE III-7. **Build Alternative 1: Access from Launiupoko to Ukumehame**.

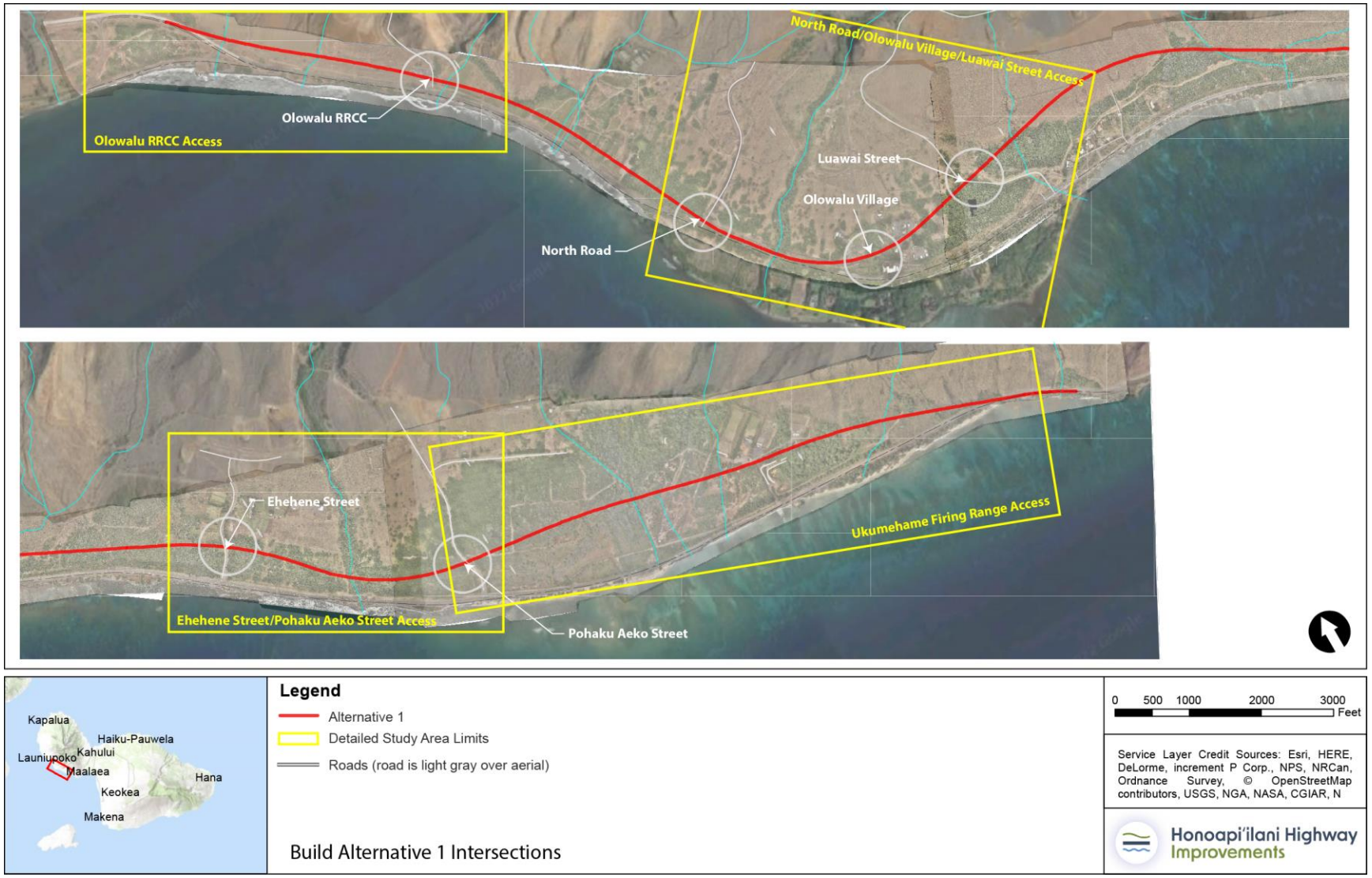


FIGURE III-8. **Build Alternative 2: Access from Launiupoko to Ukumehame**.

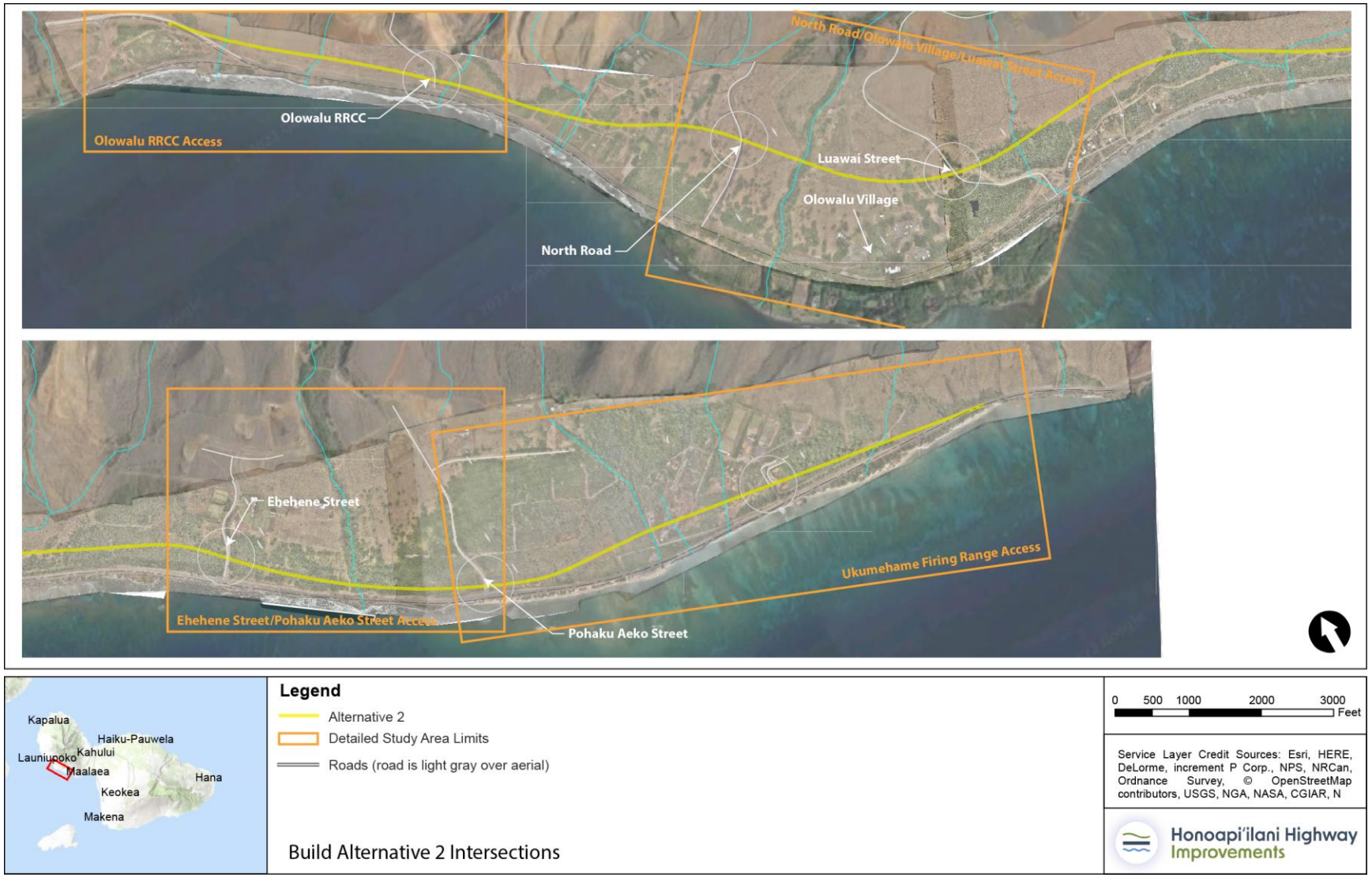


FIGURE III-9. **Build Alternative 3: Access from Launiupoko to Ukumehame**.

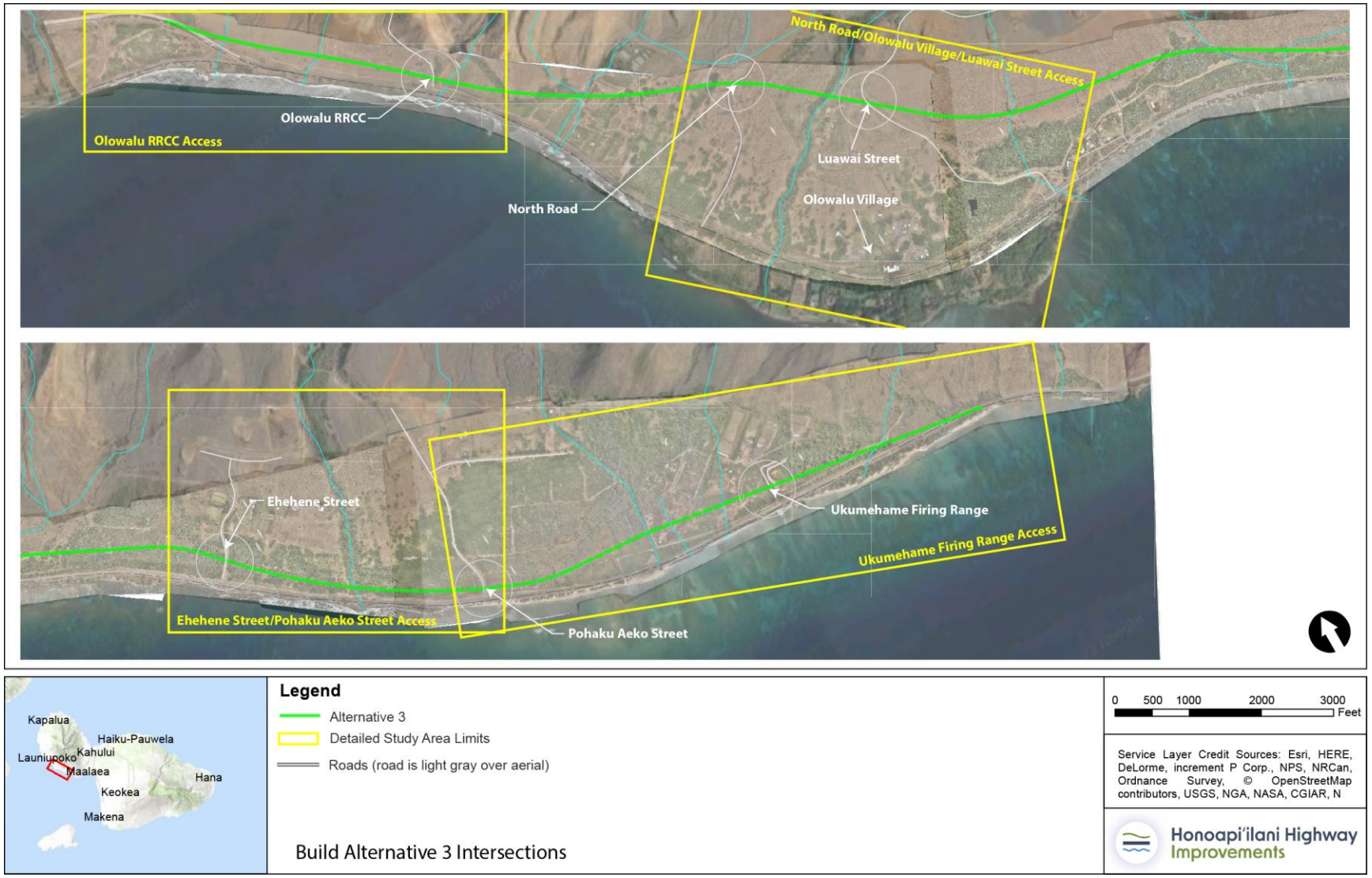


FIGURE III-10. **Build Alternative 4: Access from Launiupoko to Ukumehame**.

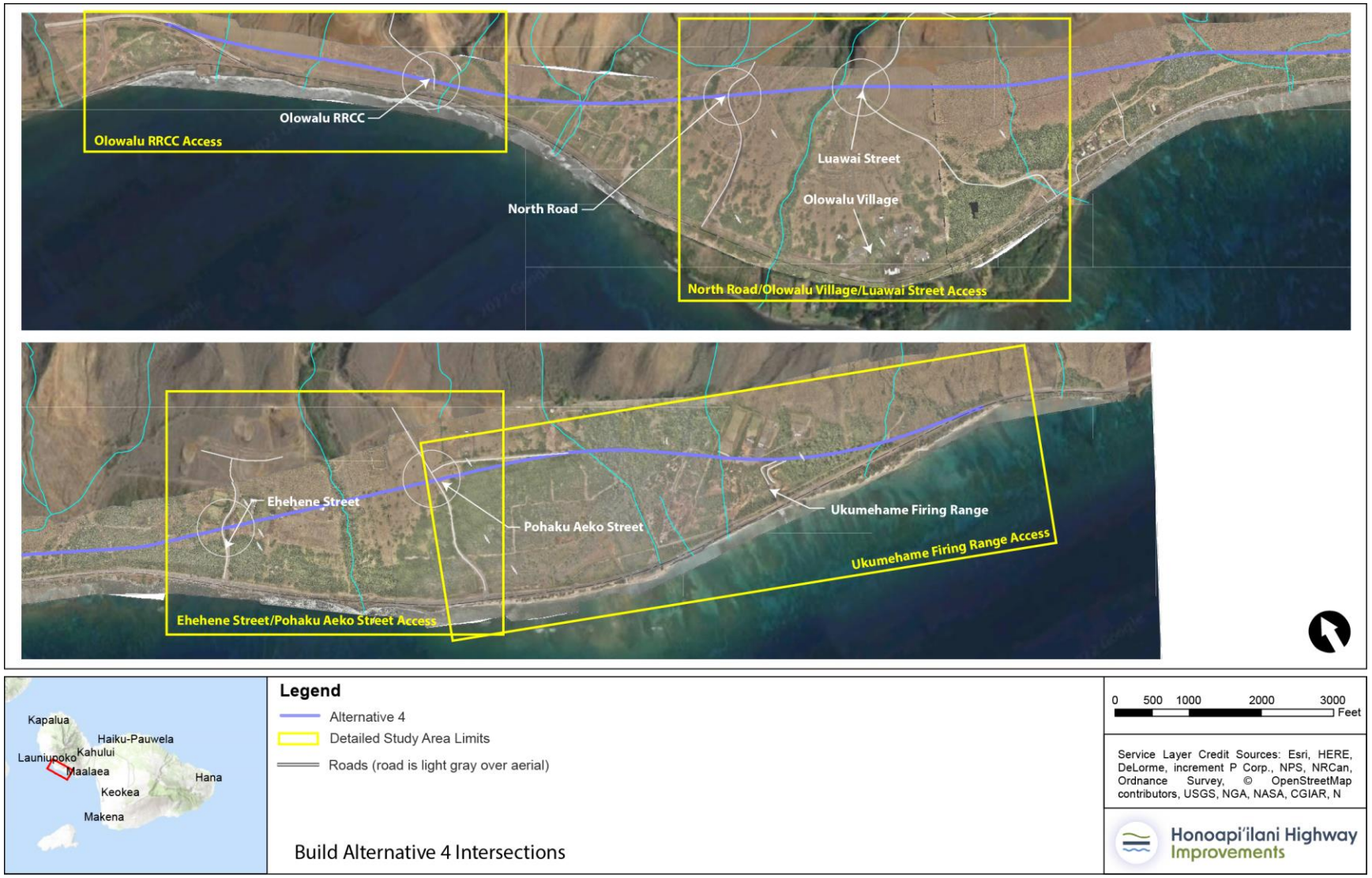


FIGURE III-11. **Olowalu – Build Alternatives 1 through 4: Olowalu Recycling and Refuse Convenience Center Access**.



FIGURE III-12. **Olowalu – Build Alternative 1: Access between North Road and Luawai Street Intersections**.



FIGURE III-13. **Olowalu – Build Alternative 2: Access between North Road and Luawai Street Intersections**.



FIGURE III-14. **Olowalu – Build Alternative 3: Access between North Road and Luawai Street Intersections**.



FIGURE III-15. **Olowalu – Build Alternative 4: Access between North Road and Luawai Street Intersections**



FIGURE III-16. **Ukumehame – Build Alternative 1: Access between Ehehene Street and Pōhaku 'Aeko Street Intersections**.

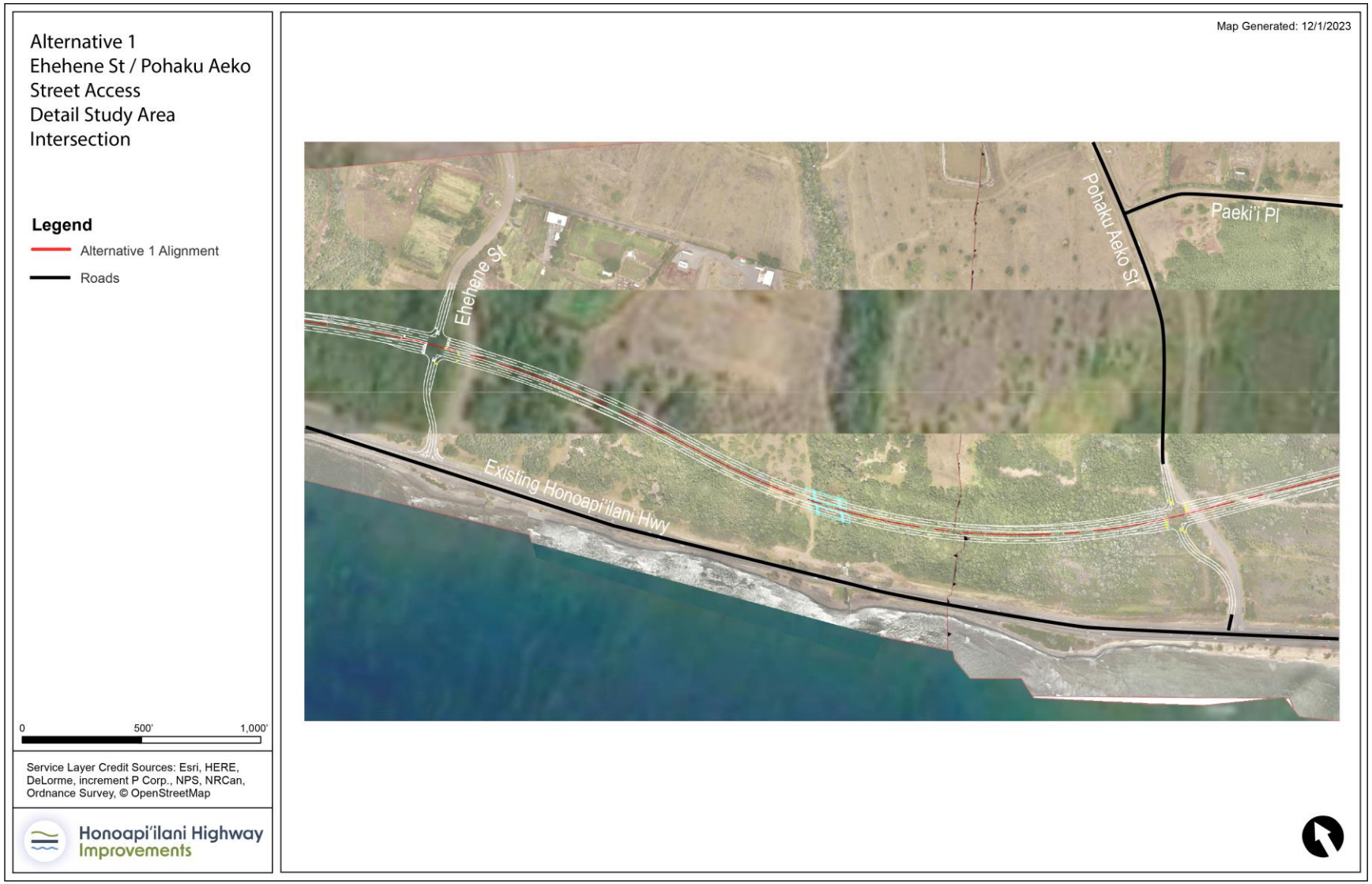


FIGURE III-17. **Ukumehame – Build Alternatives 2 and 3: Access between Ehehene Street and Pōhaku 'Aeko Street Intersections**.



FIGURE III-18. **Ukumehame – Build Alternative 4: Access between Ehehene Street and Pōhaku 'Aeko Street Intersections**.



FIGURE III-19. **Ukumehame – Build Alternative 1: Ukumehame Firing Range Access**.



Alternative 1 Pohaku Aeko St / Ukumehame Firing Range Access Detail Study Area Intersection

Legend
- Alternative 1
- Roads
- Viaduct

0 500 1000 Feet

Service Layer Credit Sources: Esri, HERE, DeLorme, increment P Corp., NPS, NRCan, Ordnance Survey, © OpenStreetMap contributors, USGS, NGA, NASA, CGIAR, N

Honoapi'ilani Highway Improvements

FIGURE III-20. **Ukumehame – Build Alternatives 2 and 3: Ukumehame Firing Range Access**.



Alternatives 2/3 Pohaku Aeko St / Ukumehame Firing Range Access Detail Study Area Intersection

Legend

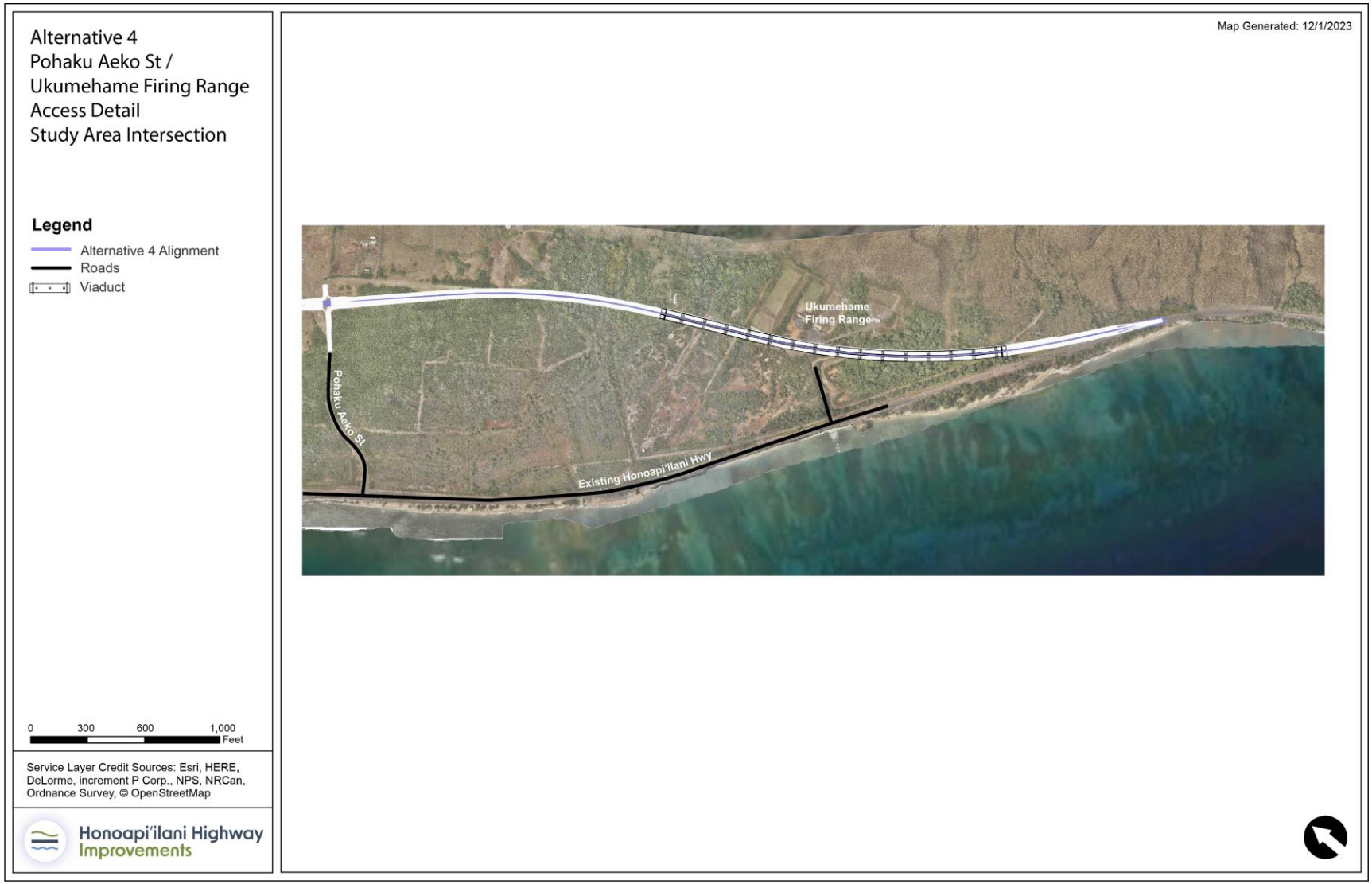
- Alternatives 2/3
- Roads
- Viaduct

0 500 1000 Feet

Service Layer Credit Sources: Esri, HERE, DeLorme, increment P Corp., NPS, NRCan, Ordnance Survey, © OpenStreetMap contributors, USGS, NGA, NASA, CGIAR, N

Honoapi'ilani Highway Improvements

FIGURE III-21. **Ukumehame – Build Alternative 4: Ukumehame Firing Range Access**.



TRANSIT SERVICE

No significant changes to transit service are anticipated within the project area.

BICYCLE/PEDESTRIAN FACILITIES

While the Project does not include formal bicycle facilities along the Build Alternatives, the new roadways would have paved shoulders that could be utilized by bicycles and pedestrians. Additionally, the Build Alternatives are projected to reallocate regional traffic from the existing Honoapi'ilani Highway to the new Honoapi'ilani Highway, thereby substantially reducing traffic on the existing highway and making it more conducive to biking.

Further, the *West Maui Greenway Plan* currently being developed by the Maui County Department of Parks and Recreation includes concepts of a greenway trail roughly paralleling the existing Honoapi'ilani Highway. Although formal plans have not been developed, the proposed greenway could provide opportunities for new bicycle and pedestrian facilities.

PROJECTED SEGMENT OPERATIONS

Projected Future Year 2045 roadway segment and intersection turning-movement volumes for the AM and PM peak-hour periods were used to evaluate highway and intersection operations on both the existing and future Honoapi'ilani Highway.

Project Area Evaluation

As shown in FIGURE III-3 and FIGURE III-4, both AM and PM peak-hour Future Year 2045 volumes on Honoapi'ilani Highway are projected to be less than the maximum directional operational volume for both the existing and new Honoapi'ilani Highway. The maximum directional operational volume is estimated at 1,575 vehicles per hour (vph) for the existing Honoapi'ilani Highway and 1,900 vph for the new Honoapi'ilani Highway. This higher maximum directional operational volume for the new Honoapi'ilani Highway is projected because of better management of the number of accesses and improved roadway segment and intersection configurations. These design elements are recommened to ensure that future volumes and associated LOS are maintained by managing the number of future accesses along the new highway to minimize traffic friction. This will assist in maintaining the integrity of the highway's functional classification.

The ratio of this demand volume to the maximum directional operational volume is analogous to a volume/capacity (V/C) ratio. Using the projected Future Year 2045 traffic volumes, the maximum directional operational volume for existing Honoapi'ilani Highway at 1,440 vph, and the maximum directional operational volume for the new Honoapi'ilani Highway at 1,900 vph, the V/C for the alternatives would be as follows:

- No Build Alternative: V/C = 0.91 LOS E
- All Build Alternatives: V/C = 0.76 LOS C

This indicates that while the existing Honoapi‘ilani Highway could accommodate projected Future Year 2045 traffic volumes, compared to any of the Build Alternatives, it will experience higher delays and be more vulnerable to any traffic event that interferes with the flow of through traffic.

PROJECTED FUTURE YEAR 2045 INTERSECTION TRAFFIC OPERATIONS

FIGURE III-22 through FIGURE III-26 show the intersection numbering used for each alternative to evaluate intersections in the operational summary. The intersections were analyzed using Synchro Studio 11 software and methodologies for signalized and unsignalized intersections outlined in the *Highway Capacity Manual (Sixth Edition)*. The Synchro worksheets for projected Year 2045 conidtions are included in Appendix D of this report.

FIGURE III-27 though FIGURE III-31 summarize the projected Year 2045 AM and PM peak hour intersection turning movements at these intersections for the No Build and Build Alternatives.

TABLE III-3 and TABLE III-4 compare the projected Future Year 2045 peak-hour LOS for each intersection by alternative for the AM and PM peak hours, respectively. For the Build Alternatives, both proposed and existing Honoapi‘ilani intersections are evaluated, with the greatest difference in operations projected to occur at the intersections on the existing Honoapi‘ilani Highway. For the unsignalized intersections, the LOS shown relate to the left-turn movements out of the minor streets onto Honoapi‘ilani Highway. This is usually the most difficult movement to execute at an unsignalized intersection, especially when there is substantial traffic volume on the main roadway, as is the case with both existing and future Honoapi‘ilani Highway. More detailed tables that include all of the evaluated traffic movements are included in the Transportation Anaysis Report in the Appendix.

Future through traffic is projected to primarily utilize the alignments of the Build Alternative, thereby substantially reducing the traffic volume on the existing Honoapi‘ilani Highway. This reduced traffic volume on the existing highway would in turn reduce side-street delays for vehicles accessing the highway from locations like beaches and the Olowalu General Store.

In the No Build Alternative, through traffic would remain on the existing Honoapi‘ilani Highway, which would result in increased delays on side-street approaches of intersections and increased LOS E and F operations for minor-street traffic movements.

For the Build Alternatives, all intersections on the new Honoapi‘ilani Highway are projected to operate during the peak-hour periods at LOS D or better, which are typically considered acceptable intersection operational levels for peak-hour conditions. This includes the overall LOS D for the one proposed signalized intersection at the Olowalu General Store intersection for Build Alternative 1 and the Luawai Street intersection for Build Alternatives 2, 3, and 4. Traffic signal warrant analysis per the Manual of Uniform Traffic Control Devices (MUTCD) is included I Appendix E of this report.

FIGURE III-22. **Future Year 2045 No Build Alternative Intersection Locations**.

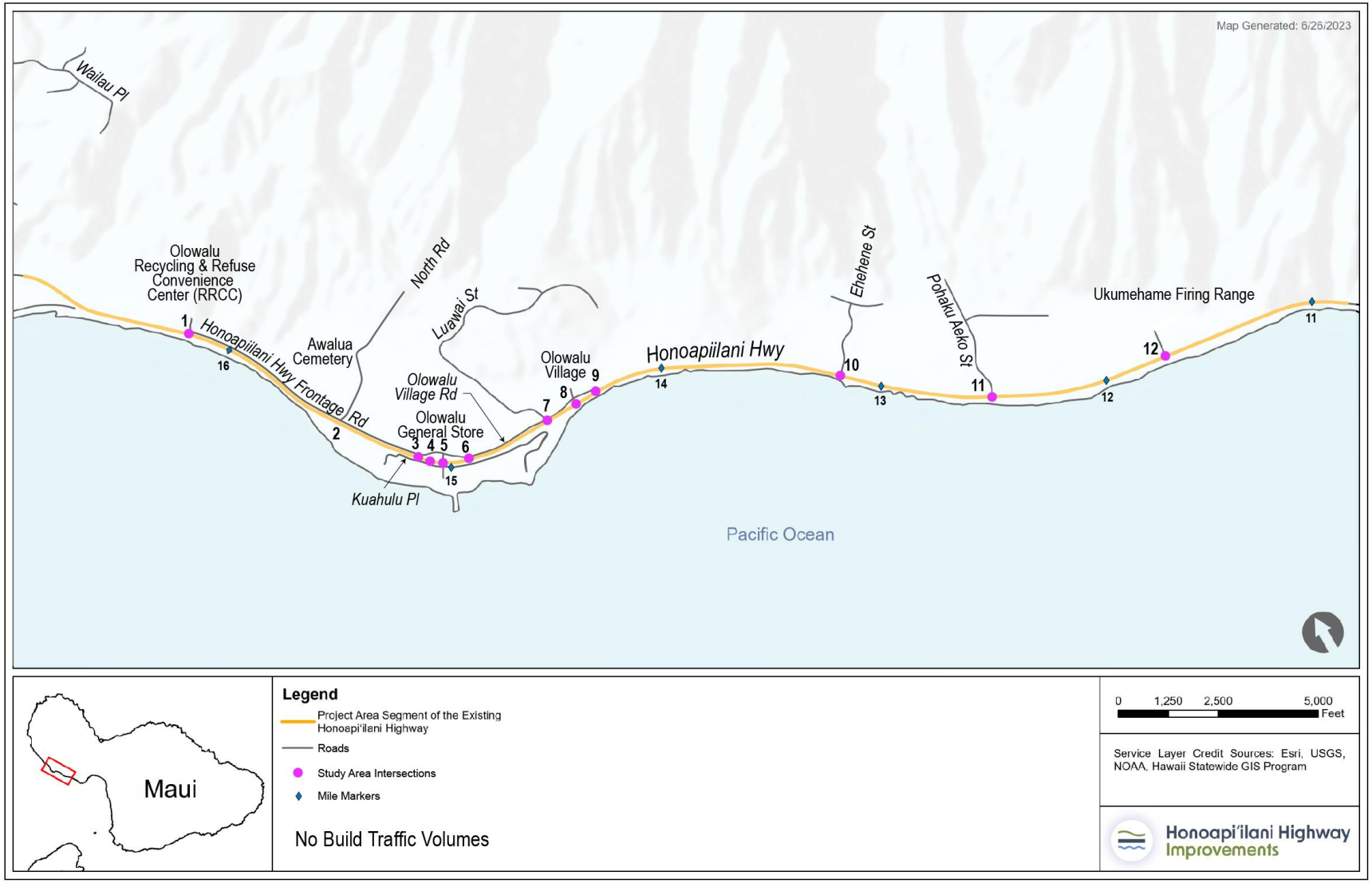


FIGURE III-23. **Future Year 2045 Build Alternative 1 Intersection Locations**.

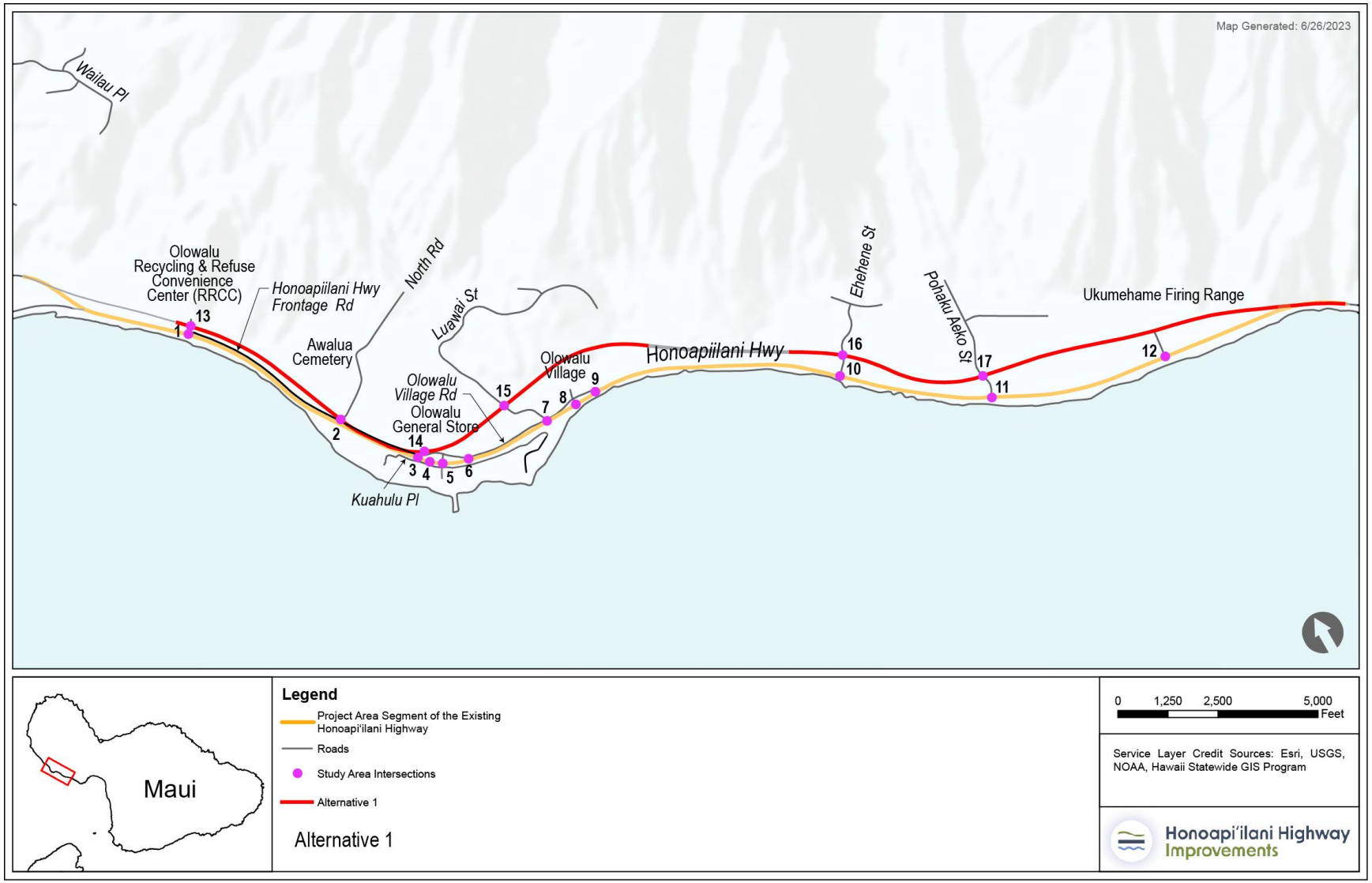


FIGURE III-24. **Future Year 2045 Build Alternative 2 Intersection Locations**.

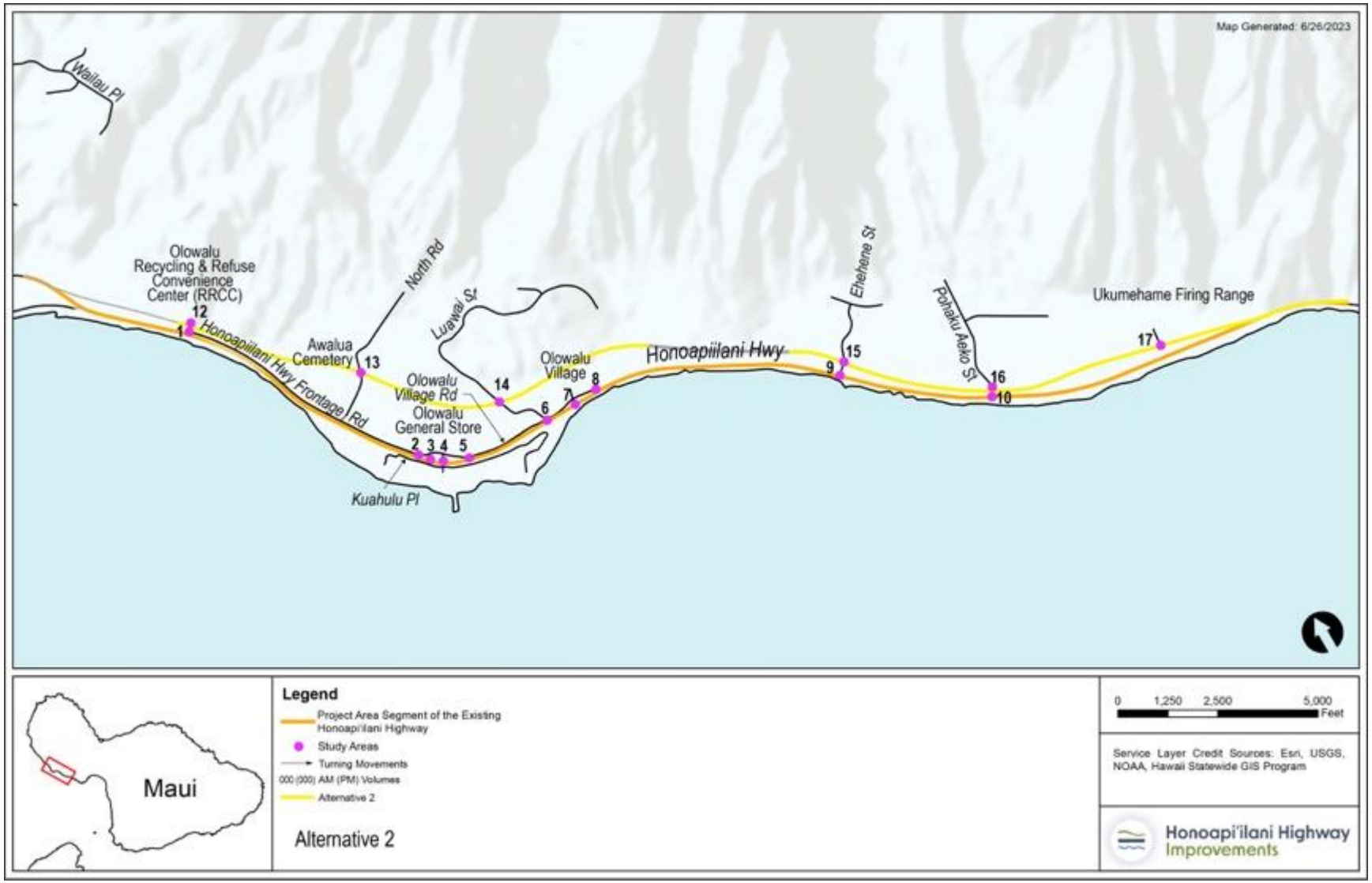


FIGURE III-25. **Future Year 2045 Build Alternative 3 Intersection Locations**.

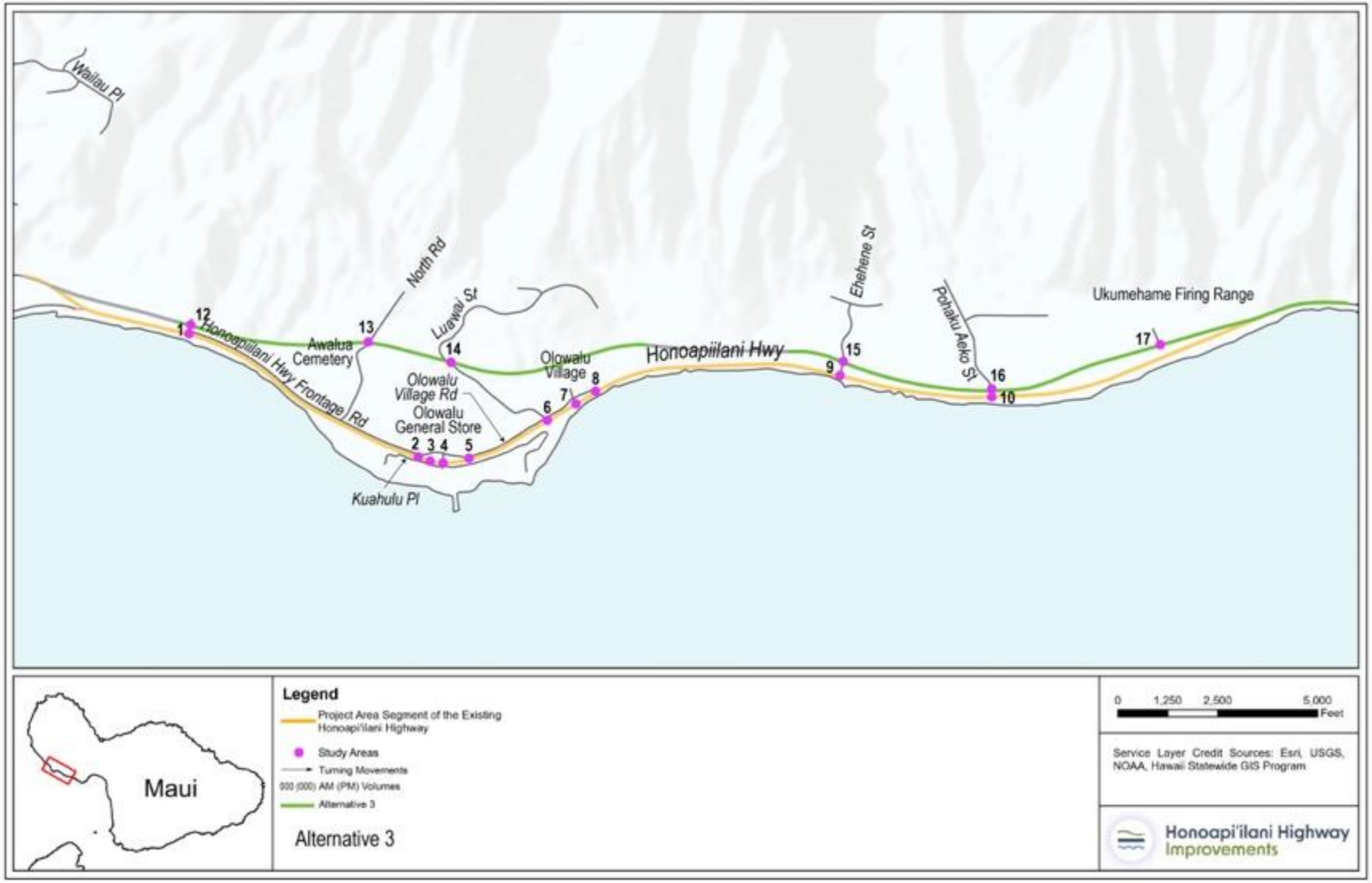


FIGURE III-26. **Future Year 2045 Build Alternative 4 Intersection Locations**.

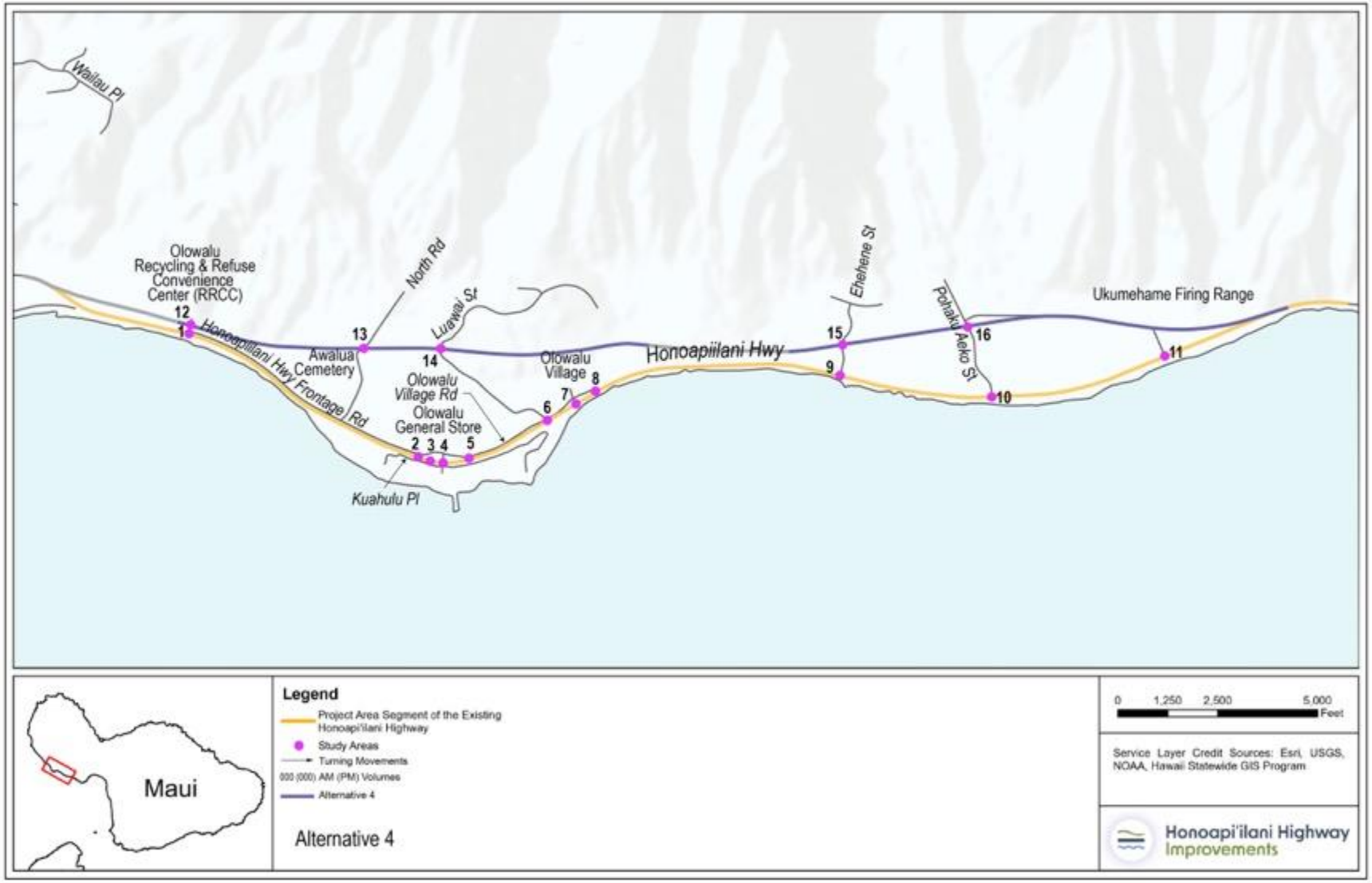


FIGURE III-27. **Projected Year 2045 No Build Peak Hour Traffic Volumes**

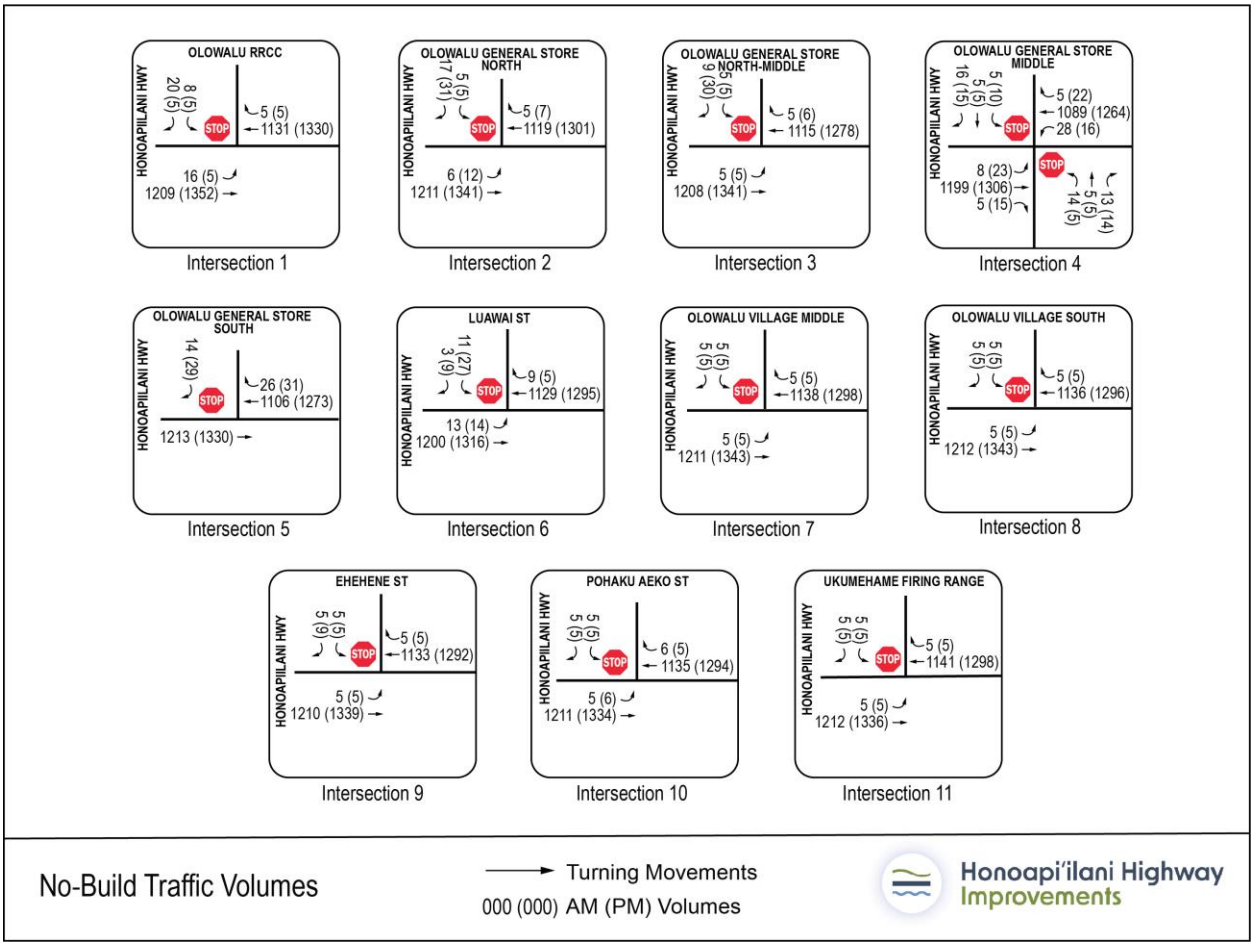


FIGURE III-28. **Projected Year 2045 Alternative 1 Peak Hour Traffic Volumes**

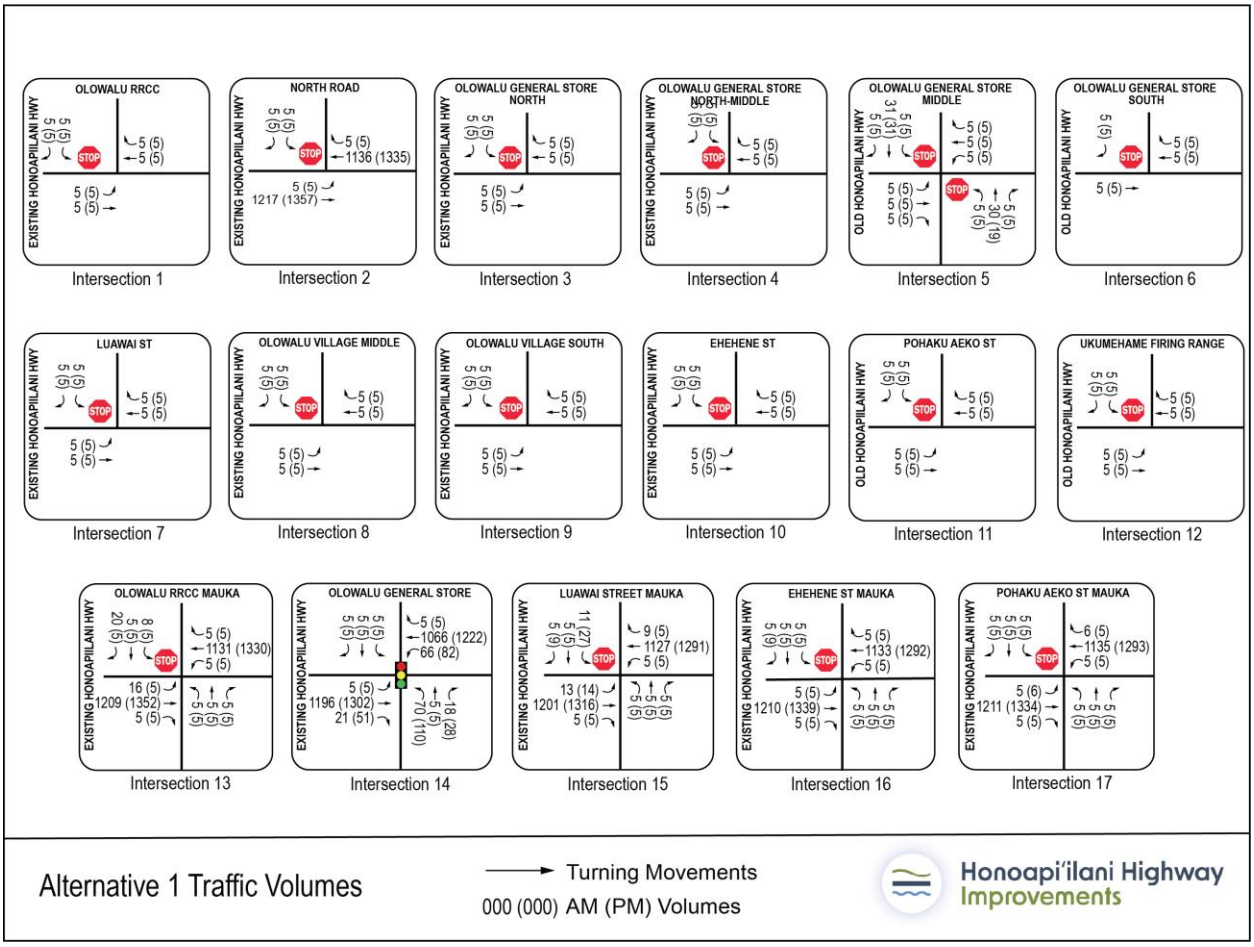


FIGURE III-29. **Projected Year 2045 Alternative 2 Peak Hour Traffic Volumes**

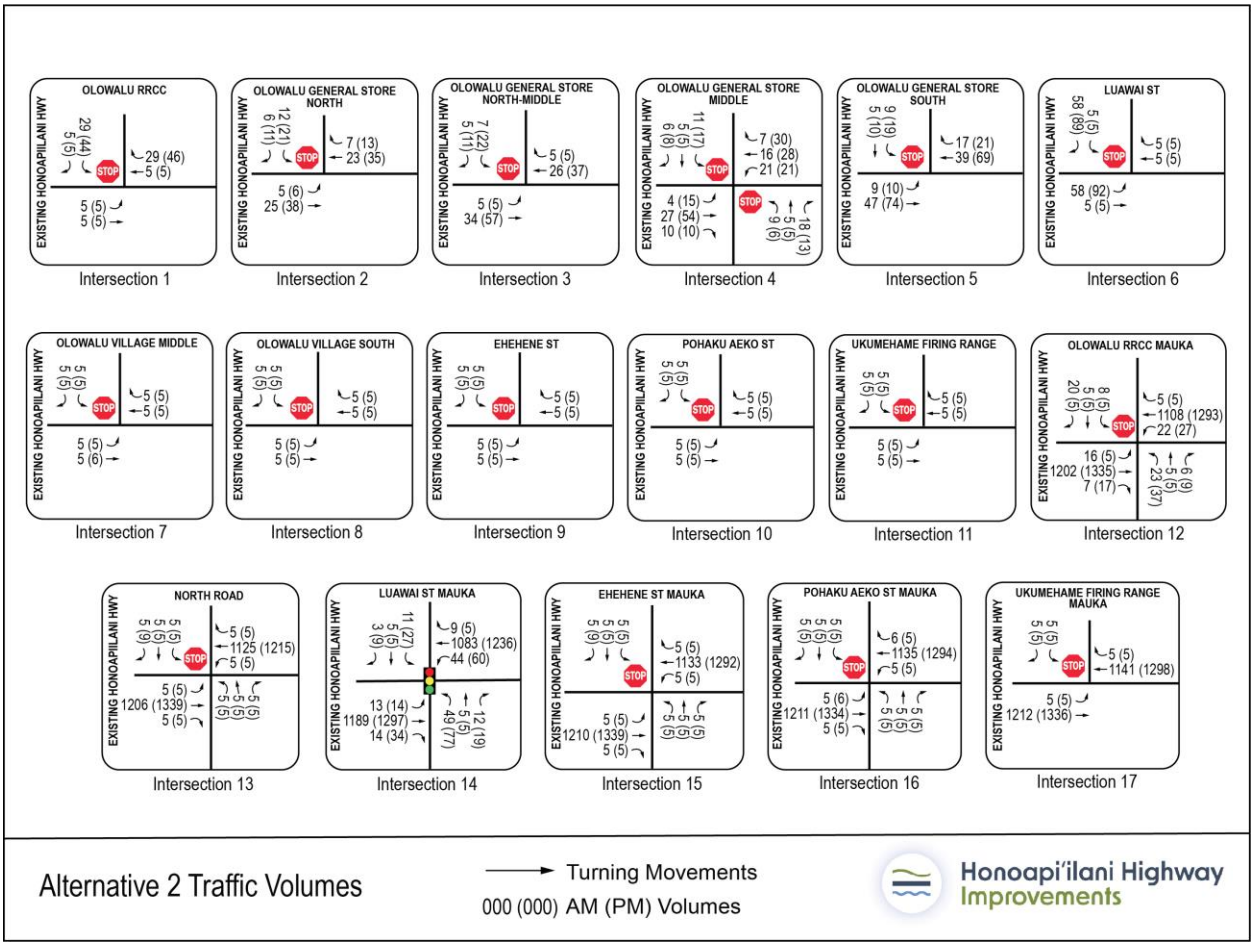


FIGURE III-30. **Projected Year 2045 Alternative 3 Peak Hour Traffic Volumes**

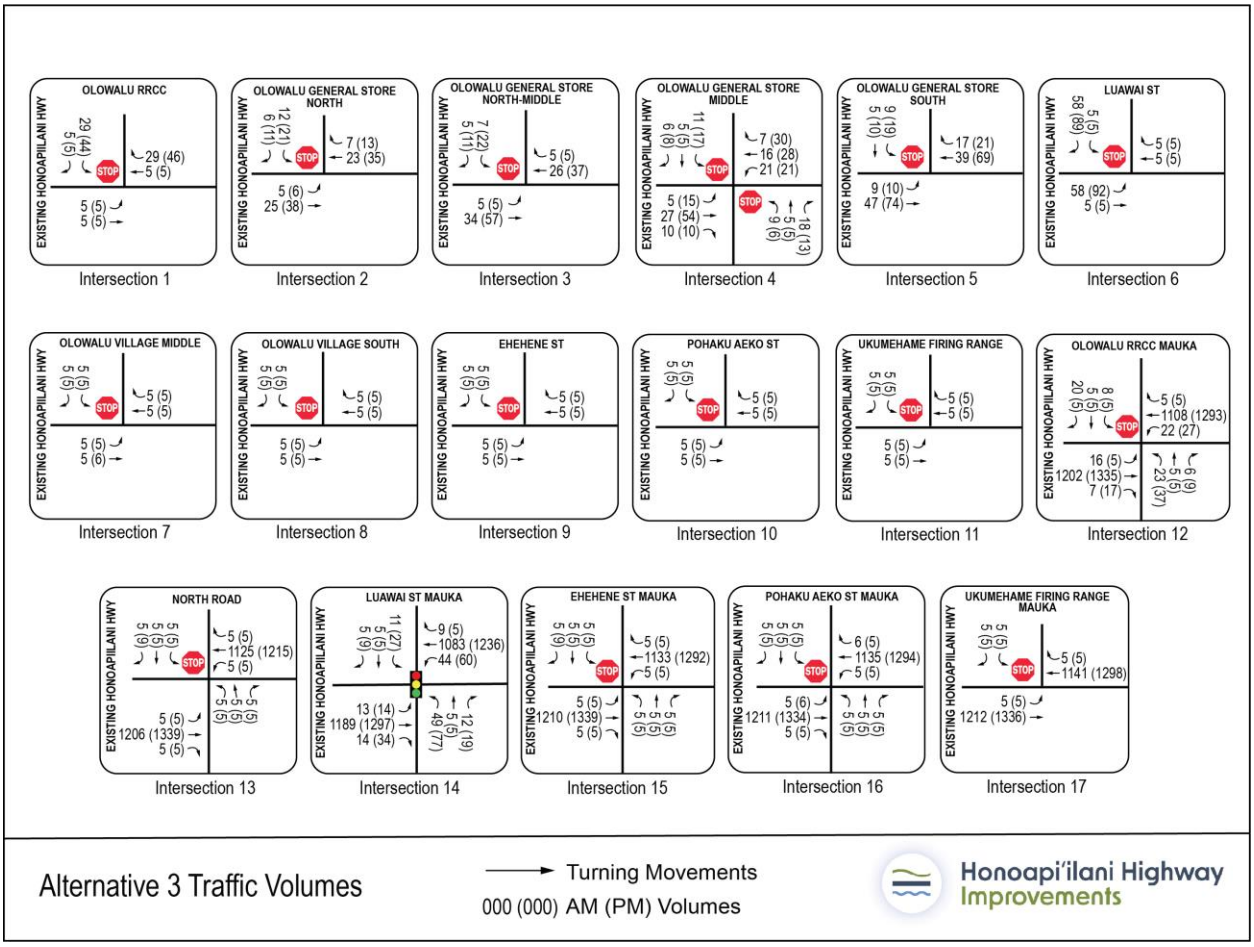


FIGURE III-31. **Projected Year 2045 Alternative 4 Peak Hour Traffic Volumes**

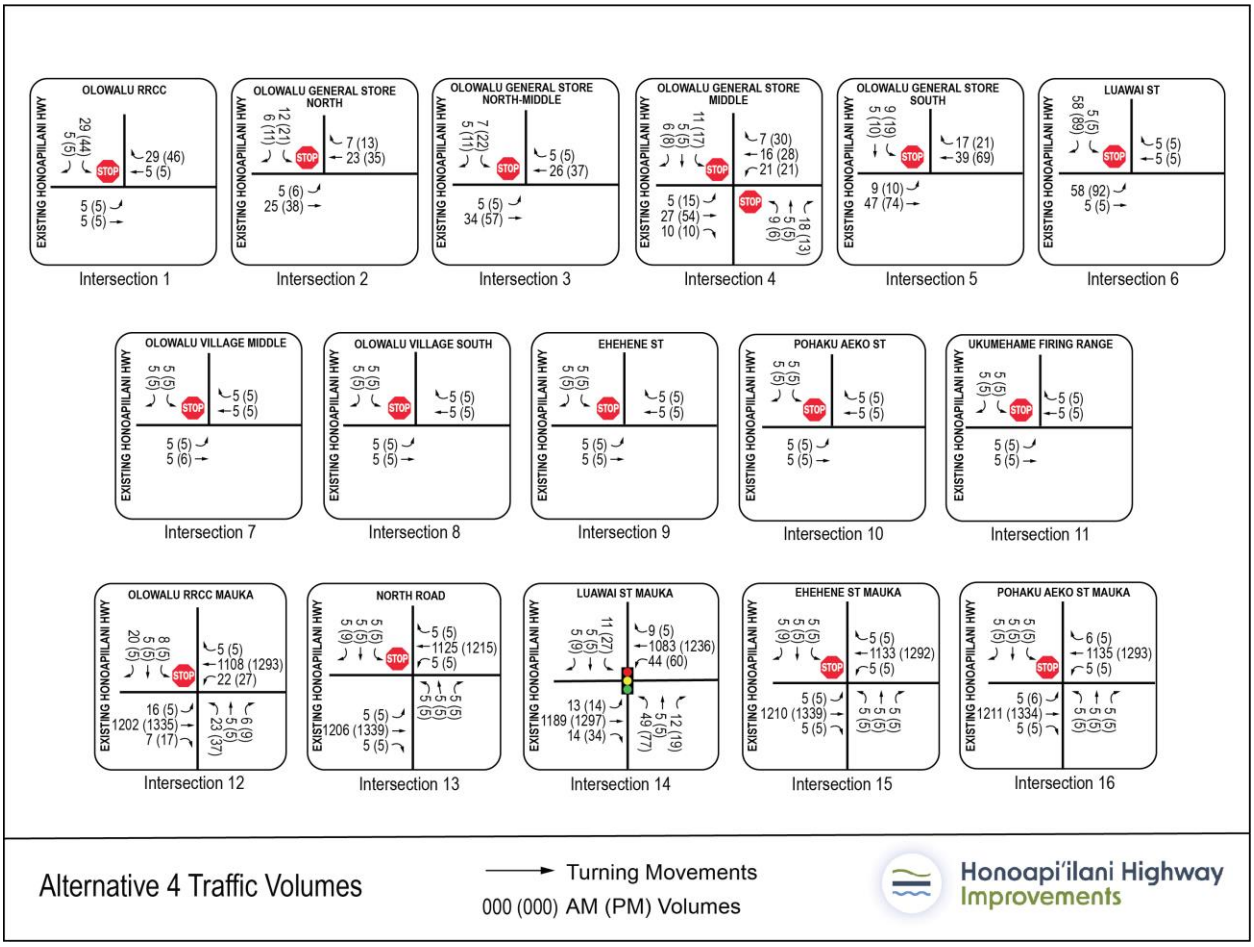


TABLE III-3. **Year 2045 No Build Alternative and Build Alternatives AM Peak-Hour LOS Comparison**

INTERSECTION	TRAFFIC CONTROL	MOVEMENT	NO BUILD	ALT 1	ALT 2	ALT 3	ALT 4
Honoapi'ilani Highway/Olowalu Recycling and Refuse Convenience Center	TWSC	Highest Delay Minor Street	F	C	C	C	C
Honoapi'ilani Highway/North Road	TWSC	Highest Delay Minor Street	N/A	N/A	C	C	C
Honoapi'ilani Highway/Olowalu General Store	Traffic Signal*	Overall*	N/A	B*	N/A	N/A	N/A
Honoapi'ilani Highway/Luawai Street	TWSC/ Traffic Signal*	Highest Delay Minor Street/ Overall*	C	C	B*	B*	B*
Honoapi'ilani Highway/Ehehene Street	TWSC	Highest Delay Minor Street	C	C	C	C	C
Honoapi'ilani Highway/Pōhaku ʻAeko Street	TWSC	Highest Delay Minor Street	C	C	C	C	C
Honoapi'ilani Highway/Ukumehame Firing Range	TWSC	Highest Delay Minor Street	F	N/A	C	C	N/A
Old Honoapi'ilani Highway/Olowalu Recycling and Refuse Convenience Center	TWSC	Highest Delay Minor Street	F	A	A	A	A
Old Honoapi'ilani Highway/Olowalu General Store North	TWSC	Highest Delay Minor Street	F	A	A	A	A
Old Honoapi'ilani Highway/Olowalu General Store North-Mid	TWSC/Alt 1 Traffic Signal	Highest Delay Minor Street	E	B*	A	A	A
Old Honoapi'ilani Highway/Olowalu General Store Middle	TWSC	Highest Delay Minor Street	F	A	A	A	A
Old Honoapi'ilani Highway/Olowalu General Store South	TWSC	Highest Delay Minor Street	C	A	A	A	A
Old Honoapi'ilani Highway/Luawai Street	TWSC	Highest Delay Minor Street	C	A	A	A	A
Old Honoapi'ilani Highway/Olowalu Village Middle	TWSC	Highest Delay Minor Street	F	A	A	A	A
Old Honoapi'ilani Highway/Olowalu Village South	TWSC	Highest Delay Minor Street	F	A	A	A	A
Old Honoapi'ilani Highway/Ehehene Street	TWSC	Highest Delay Minor Street	C	A	A	A	A
Old Honoapi'ilani Highway/Pōhaku ʻAeko Street	TWSC	Highest Delay Minor Street	C	A	A	A	A
Old Honoapi'ilani Highway/Ukumehame Firing Range	TWSC	Highest Delay Minor Street	F	A	N/A	N/A	A

Note: TWSC = Two-Way STOP-Controlled, NB = Northbound, SB = Southbound, EB = Eastbound, WB = Westbound, * = signalized intersection, N/A=not applicable

TABLE III-4. **No Build Alternative and Build Alternatives PM Peak-Hour LOS Comparison.**

NTERSECTION	TRAFFIC CONTROL	MOVEMENT	NO BUILD	ALT 1	ALT 2	ALT 3	ALT 4
Honoapi'ilani Hwy/Olowalu Recycling and Refuse Convenience Center	TWSC	Highest Delay Minor Street	F	D	D	D	D
Honoapi'ilani Hwy/North Road	TWSC	Highest Delay Minor Street	N/A	N/A	D	D	D
Honoapi'ilani Hwy/Olowalu General	Traffic Signal*	Overall*	N/A	C*	N/A	N/A	N/A
Honoapi'ilani Hwy/Luawai Street	TWSC/ Traffic Signal*	Highest Delay Minor Street/ Overall*	D	D	C*	C*	C*
Honoapi'ilani Hwy/Ehehene Street	TWSC	Highest Delay Minor Street	D	D	D	D	D
Honoapi'ilani Hwy/Pōhaku 'Aeko Street	TWSC	Highest Delay Minor Street	D	D	D	D	D
Honoapi'ilani Hwy/Ukumehame Firing Range	TWSC	Highest Delay Minor Street	F	N/A	D	D	N/A
Old Honoapi'ilani Hwy/ Olowalu Recycling and Refuse Convenience Center	TWSC	Highest Delay Minor Street	F	A	A	A	A
Old Honoapi'ilani Hwy/Olowalu General Store North	TWSC	Highest Delay Minor Street	F	A	A	A	A
Old Honoapi'ilani Hwy/Olowalu General Store North-Mid	TWSC	Highest Delay Minor Street	E	A	A	A	A
Old Honoapi'ilani Hwy/Olowalu General Store Middle	TWSC	TWSC/Alt 1 Traffic Signal	F	C*	A	A	A
Old Honoapi'ilani Hwy/Olowalu General Store South	TWSC	Highest Delay Minor Street	D	A	A	A	A
Old Honoapi'ilani Hwy/Luawai Street	TWSC	Highest Delay Minor Street	D	A	A	A	A
Old Honoapi'ilani Hwy/Olowalu Village Middle	TWSC	Highest Delay Minor Street	F	A	A	A	A
Old Honoapi'ilani Hwy/Olowalu Village South	TWSC	Highest Delay Minor Street	F	A	A	A	A
Old Honoapi'ilani Hwy/Ehehene Street	TWSC	Highest Delay Minor Street	D	A	A	A	A
Old Honoapi'ilani Hwy/Pōhaku 'Aeko Street	TWSC	Highest Delay Minor Street	D	A	A	A	A
Old Honoapi'ilani Hwy/ Ukumehame Firing Range	TWSC	Highest Delay Minor Street	F	A	N/A	N/A	A

Note: TWSC = Two-Way Stop-Controlled, NB = Northbound, SB = Southbound, EB = Eastbound, WB = Westbound, * = signalized intersection, NJ/A=not applicable

CRASH DATA DISCUSSION

A safety analysis was performed on the Honoapi‘ilani Highway corridor using the AASHTO *Highway Safety Manual* predicted crash frequency methodology. This analysis was focused on the existing Honoapi‘ilani Highway as this is where the difference between the No Build Alternative and the Build Alternatives can be best evaluated.

The predicted average crash frequency represents the number of crashes a similar intersection or roadway segment is anticipated to experience on average. It is calculated with safety performance functions, which are equations derived from empirical data based on a facility’s characteristics such as geometry, lighting, traffic control, and traffic volumes.

The expected average crash frequency is defined as the estimated number of crashes a facility is likely to experience, accounting for both the predicted crash frequency and the observed crash history. The number of predicted/expected crashes are reported in decimal form because it represents a calculation over time—for example, a 0.2 crash frequency could be defined as one crash occurring every five years, on average.

The safety analysis was conducted using existing and projected Future Year 2045 traffic volumes applied to the No Build and Build Alternatives. Build Alternative 1 was evaluated separately from the other Build Alternatives, because it has a unique access plan for the Olowalu General Store area. Build Alternatives 2, 3, and 4 are combined into a single set of values due to their similarity. Table III-5 shows these results.

TABLE III-5. **Predicted Crash Frequency**

	PREDICTED AVERAGE CRASH FREQUENCY (CRASHES/YEAR)			EXPECTED AVERAGE CRASH FREQUENCY, $N_{expected}$
Existing Conditions	56.4	19.1	37.2	31.8
Future Year 2045 No Build Alternative	66.7	22.7	44.0	Not Applicable
Build Alternative 1	0.7	0.3	0.5	Not Applicable
Build Alternatives 2, 3, 4	1.8	0.7	1.1	Not Applicable

FI: Fatalities/Injuries; PDO: Property Damage Only

While the No Build Alternative shows an increase in predicted crashes from existing conditions, the Build Alternatives show a clear reduction—with Build Alternative 1 predicted to show the greatest reduction. The reduction in crashes for the Build Alternatives is due to the projected reduction in through traffic volumes on the existing Honoapi‘ilani Highway. Even under existing conditions, the number of expected crashes is lower than the number of predicted crashes, which indicates that the highway’s safety performance is better than that of similar facilities. Note that expected crash frequencies were determined based on the reported and available crash data.

While all of the Build Alternatives would shift traffic volume from the existing highway to the new highway, this is not equivalent to shifting expected crashes to the new highway—because the new

highway will be constructed in ways that are known to improve safety. (One way of independently estimating the safety implications of the alternatives would be to use sources such as the Oregon DOT *Crash Reduction Factor Manual* to estimate overall crash reduction.) While the existing Honoapi‘ilani Highway is undivided, the new highway will be divided with opposite directions of travel separated by a median, which has the potential to reduce crashes by 30% (based on the applicable crash reduction factor).

CONSTRUCTION EFFECTS

The Project is in a section of Honoapiilani Highway designated as rural principal arterial that has limited multimodal infrastructure and transit accessibility. During the construction of the Project, the existing Highway would remain open and operational since the Build Alternatives are not on the existing alignment with the exception of the Build Alternative 1 in the Olowalu area.

Build Alternative 1 differs from the other Build Alternatives in that its alignment would overlap a segment of the existing Honoapi‘ilani Highway north of Olowalu. Approximately 2.5 miles of Build Alternative 1 will be constructed in sub-phases with lane closures traffic congestion along the highway corridor. This Alternative requires lane closures due to its use of the existing Honoapiilani Highway and the crossing of it.

Additionally, all Build Alternatives will have lane closures and construction phasing when construction occurs at intersections and where at the north and south ends of the project area, where the new roadway would connect to the existing roadway.

Construction of intersections, bridges and viaducts (where proposed) would cause temporary disruption of traffic on the cross streets. Best practices for maintenance of traffic would be employed during construction.

While construction-related vehicles (including for commuting) would temporarily increase traffic on the existing Honoapi‘ilani Highway, there will be measures in place to optimally focus these increases during non-peak-hour periods.

During the construction of the Project a traffic management plan is expected to be developed by the design-builder. Its purpose would be to minimize traffic congestion and maintain the efficiency of the study corridor.

ANTICIPATED BENEFICIAL EFFECTS

The Build Alternatives are designed to optimize traffic operations and safety, including the following:

- All intersections on the new Honoapi‘ilani Highway would have exclusive turn lanes and channelized minor-street approaches that separate right-turn movements from left-turn and through movements. The intersections would also incorporate improved geometric features such as median left-turn refuges at unsignalized intersections, which would mitigate the delays that are currently experienced at some of the intersections.

- To maintain operational delays and improve safety for minor-street vehicles, traffic signals are projected to be warranted on the realigned Honoapiʻilani Highway at its intersection with Luawai Street for Build Alternatives 2, 3, and 4, and at its intersection with the Olowalu General Store Driveway for Build Alternative 1.
- Regional through traffic on the existing highway would be reallocated to a new, divided, access-managed Honoapiʻilani Highway, which would improve intersection operations on the existing highway and in turn substantially reduce vehicle delays on the minor-street approaches for the Build Alternatives.
- The volume of traffic would be greatly reduced on the existing Honoapiʻilani Highway—which would remain as a local road—improving operations and increasing safety with a substantial reduction in predicted traffic crashes.
- The Build Alternatives would construct a new divided highway with opposite directions of travel separated by a median, which has the potential to reduce crashes by 30% (based on the applicable crash reduction factor).
- Most of the beneficial indirect effects on traffic from the Build Alternatives would be attributed to a reduction in through traffic volume on the existing Honoapiʻilani Highway. Qualitative indirect effects could include enhanced experiences for visitors to the beach parks that are adjacent to the existing highway. And while destinations such as the Olowalu General Store could see a reduction in drive-by business, reduced traffic volumes in the area would improve the store's visitor experience.

As a result, and as evaluated in this Draft EIS, there are no adverse effects anticipated with any of the Build Alternatives and no additional mitigation is required.

SUMMARY OF ALTERNATIVES EVALUATION

The evaluation of alternatives indicates that all the Build Alternatives are projected to perform better than the No Build Alternative based on roadway operations, intersection operations, and traffic safety.

Roadway operations, intersection operations, and traffic safety are comparable across the Build Alternatives. Alternatives 2, 3, and 4 appear to be less disruptive during construction because their alignments interact less with the existing Honoapiʻilani Highway. On the other hand, Build Alternative 1 would require substantial coordination during construction to maintain regional traffic flow because part of its alignment is shared with the existing Honoapiʻilani Highway, between Olowalu and Launiupoko.

Both the No Build Alternative and the Build Alternatives would be able to accommodate the projected Future Year 2045 peak-hour traffic volumes within the project area. The Build Alternatives are projected to operate at LOS C—compared to LOS E for the No Build Alternative on a segment capacity basis—indicating that the No Build Alternative would be more susceptible to disruption to regional traffic flow from events within the corridor.

The Build Alternatives are projected to reallocate regional traffic from the existing Honoapiʻilani Highway to the new Honoapiʻilani Highway. This would result in a substantial reduction in future traffic volume on the existing Honoapiʻilani Highway, directly benefitting its intersections operations. For the No Build Alternative, regional traffic would only increase from current levels, resulting in increased delays for minor-street vehicles.

Reduced future traffic volumes on the existing Honoapiʻilani Highway also reduces the number predicted traffic crashes for the Build Alternatives, while the No Build Alternative is projected to experience a slight increase from current levels. In summary, the change in configuration from an undivided roadway in the No Build Alternative to a divided roadway in the Build Alternatives results in lower predicted crashes within the project area.

All Build Alternatives are projected to be similar from a traffic operational perspective. As noted in Section 3.14.5, Build Alternative 1 has greater construction impacts than the other Build Alternatives. A discussion that results in a recommendation for a preferred Build Alternative is included in Chapter 5 of the Draft Environmental Impact Statement (DEIS).

Appendix A

Traffic Turning Movement Data

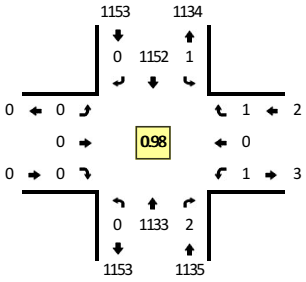
Type of peak hour being reported: System-wide Peak | Method for determining peak hour: Total Entering Volume

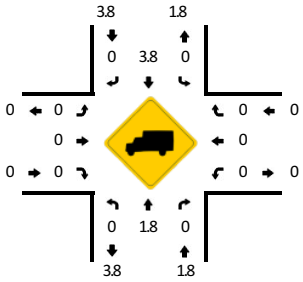
LOCATION: Honoapiilani Highway -- Olowalu Recycling/Refuse Convenience Center | **QC JOB #:** 16179901

CITY/STATE: Olowalu, HI | **DATE:** Wed, May 3 2023

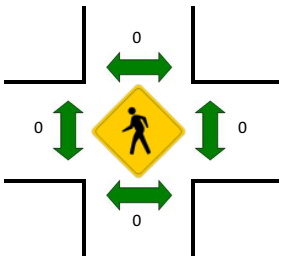
Peak-Hour: 3:15 PM -- 4:15 PM

Peak 15-Min: 3:45 PM -- 4:00 PM

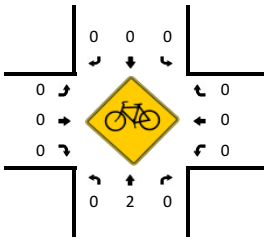


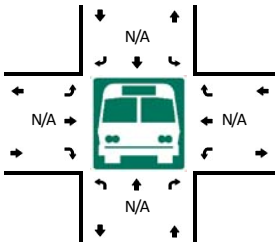


Quality Counts
DATA THAT DRIVES COMMUNITIES

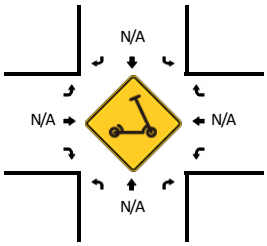












15-Min Count Period Beginning At	Honoapiilani Highway (Northbound)				Honoapiilani Highway (Southbound)				Olowalu Recycling/Refuse Convenience Center (Eastbound)				Olowalu Recycling/Refuse Convenience Center (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
12:00 AM	0	11	0	0	0	17	0	0	0	0	0	0	0	0	0	0	28	
12:15 AM	0	10	0	0	0	15	0	0	0	0	0	0	0	0	0	0	25	
12:30 AM	0	12	0	0	0	16	0	0	0	0	0	0	0	0	0	0	28	
12:45 AM	0	6	0	0	0	11	0	0	0	0	0	0	0	0	0	0	17	98
1:00 AM	0	2	1	0	0	9	0	0	0	0	0	0	0	0	0	0	12	82
1:15 AM	0	6	0	0	0	4	0	0	0	0	0	0	0	0	0	0	10	67
1:30 AM	0	5	0	0	0	10	0	0	0	0	0	0	0	0	1	0	16	55
1:45 AM	0	7	0	0	0	9	0	0	0	0	0	0	0	0	0	0	16	54
2:00 AM	0	9	0	0	0	10	0	0	0	0	0	0	0	0	1	0	20	62
2:15 AM	0	6	0	0	0	10	0	0	0	0	0	0	0	0	0	0	16	68
2:30 AM	0	6	0	0	0	12	0	0	0	0	0	0	0	0	0	0	18	70
2:45 AM	0	7	0	0	0	8	0	0	0	0	0	0	0	0	0	0	15	69
3:00 AM	0	6	0	0	0	16	0	0	0	0	0	0	0	0	0	0	22	71
3:15 AM	0	8	0	0	0	12	0	0	0	0	0	0	0	0	0	0	20	75
3:30 AM	0	20	0	0	0	11	0	0	0	0	0	0	0	0	0	0	31	88
3:45 AM	0	18	1	0	0	13	0	0	0	0	0	0	0	0	0	0	32	105
4:00 AM	0	16	0	0	0	22	0	0	0	0	0	0	0	0	0	0	38	121
4:15 AM	0	38	0	0	0	27	0	0	0	0	0	0	0	0	0	0	65	166
4:30 AM	0	41	0	0	0	20	0	0	0	0	0	0	0	0	0	0	61	196
4:45 AM	0	49	0	0	0	19	0	0	0	0	0	0	0	0	0	0	68	232
5:00 AM	0	69	0	0	0	54	0	0	0	0	0	0	0	0	0	0	123	317
5:15 AM	0	94	0	0	0	40	0	0	0	0	0	0	0	0	0	0	134	386
5:30 AM	0	139	0	0	0	70	0	0	0	0	0	0	0	0	0	0	209	534
5:45 AM	0	141	0	0	0	73	0	0	0	0	0	0	0	0	0	0	214	680
6:00 AM	0	180	0	0	0	123	0	0	0	0	0	0	0	0	0	0	303	860
6:15 AM	0	213	2	0	0	147	0	0	0	0	0	0	0	0	1	0	363	1089
6:30 AM	0	234	0	0	0	148	0	0	0	0	0	0	0	0	0	0	382	1262
6:45 AM	0	233	0	0	0	187	0	0	0	0	0	0	0	0	0	0	420	1468
7:00 AM	0	268	0	0	1	163	0	0	0	0	0	0	0	0	0	0	432	1597
7:15 AM	0	296	0	0	0	190	0	0	0	0	0	0	0	0	1	0	487	1721
7:30 AM	0	299	0	0	1	204	0	0	0	0	0	0	0	0	0	0	504	1843
7:45 AM	0	262	1	0	6	204	0	0	0	0	0	0	0	0	3	0	476	1899
8:00 AM	0	249	1	1	5	217	0	0	0	0	0	0	3	0	4	0	480	1947
8:15 AM	0	272	2	1	3	253	0	0	0	0	0	0	1	0	6	0	538	1998
8:30 AM	0	244	2	1	4	249	0	0	0	0	0	0	2	0	3	0	505	1999
8:45 AM	0	277	0	0	2	217	0	0	0	0	0	0	2	0	2	0	500	2023
9:00 AM	0	205	2	1	10	254	0	0	0	0	0	0	2	0	6	0	480	2023

15-Min Count Period Beginning At	Honoapiilani Highway (Northbound)				Honoapiilani Highway (Southbound)				Olowalu Recycling/Refuse Convenience Center (Eastbound)				Olowalu Recycling/Refuse Convenience Center (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
9:15 AM	0	232	2	0	2	288	0	0	0	0	0	0	1	0	10	0	535	2020
9:30 AM	0	247	1	0	2	269	0	0	0	0	0	0	3	0	2	0	524	2039
9:45 AM	0	146	2	0	5	303	0	0	0	0	0	0	0	0	3	0	459	1998
10:00 AM	0	241	2	0	5	248	0	0	0	0	0	0	3	0	4	0	503	2021
10:15 AM	0	238	0	0	4	273	0	0	0	0	0	0	1	0	10	0	526	2012
10:30 AM	0	174	1	0	6	271	0	0	0	0	0	0	0	0	3	0	455	1943
10:45 AM	0	185	2	0	5	281	0	0	0	0	0	0	2	0	7	0	482	1966
11:00 AM	0	199	3	1	7	279	0	1	0	0	0	0	0	0	6	0	496	1959
11:15 AM	0	200	2	0	4	273	0	0	0	0	0	0	2	0	4	0	485	1918
11:30 AM	0	214	2	1	7	267	0	0	0	0	0	0	0	0	8	0	499	1962
11:45 AM	0	231	3	0	3	222	0	0	0	0	0	0	1	0	8	0	468	1948
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12:30 PM	0	272	3	0	4	238	0	0	0	0	0	0	0	0	4	0	521	1941
12:45 PM	0	256	0	0	11	234	0	0	0	0	0	0	0	0	9	0	510	1983
1:00 PM	0	228	4	0	3	204	0	0	0	0	0	0	4	0	6	0	449	1951
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1:30 PM	0	259	1	1	7	237	0	0	0	0	0	0	2	0	4	0	511	1978
1:45 PM	0	271	1	0	7	215	0	0	0	0	0	0	5	0	5	0	504	1972
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2:15 PM	0	249	2	0	4	267	0	0	0	0	0	0	2	0	5	0	529	2035
2:30 PM	0	287	3	0	1	284	0	0	0	0	0	0	2	0	3	0	580	2104
2:45 PM	0	303	0	0	0	254	0	0	0	0	0	0	0	0	1	0	558	2158
3:00 PM	0	273	0	0	3	273	0	0	0	0	0	0	0	0	2	0	551	2218
3:15 PM	0	258	1	0	1	296	0	0	0	0	0	0	0	0	0	0	556	2245
3:30 PM	0	298	0	0	0	278	0	0	0	0	0	0	0	0	1	0	577	2242
3:45 PM	0	284	0	0	0	302	0	0	0	0	0	0	0	0	0	0	586	2270
4:00 PM	0	293	1	0	0	276	0	0	0	0	0	0	1	0	0	0	571	2290
4:15 PM	0	287	0	0	0	274	0	0	0	0	0	0	0	0	0	0	561	2295
4:30 PM	0	284	0	0	0	298	0	0	0	0	0	0	0	0	0	0	582	2300
4:45 PM	0	270	1	0	0	320	0	0	0	0	0	0	1	0	0	0	592	2306
5:00 PM	0	261	0	0	0	307	0	1	0	0	0	0	0	0	0	0	569	2304
5:15 PM	0	264	1	0	1	304	0	0	0	0	0	0	2	0	1	0	573	2316
5:30 PM	0	201	0	0	0	256	0	0	0	0	0	0	0	0	0	0	457	2191
5:45 PM	0	198	1	0	1	201	0	0	0	0	0	0	1	0	0	0	402	2001
6:00 PM	0	206	0	0	0	158	0	0	0	0	0	0	0	0	0	0	364	1796
6:15 PM	0	197	0	0	0	154	0	0	0	0	0	0	0	0	0	0	351	1574
6:30 PM	0	164	0	1	0	174	0	0	0	0	0	0	0	0	0	0	339	1456
6:45 PM	0	149	0	0	0	144	0	0	0	0	0	0	0	0	1	0	294	1348
7:00 PM	0	127	0	0	0	134	0	0	0	0	0	0	0	0	0	0	261	1245
7:15 PM	0	135	1	0	0	137	0	0	0	0	0	0	0	0	2	0	275	1169
7:30 PM	0	106	0	0	0	142	0	0	0	0	0	0	0	0	0	0	248	1078
7:45 PM	0	131	0	0	2	122	0	0	0	0	0	0	0	0	0	0	255	1039
8:00 PM	0	116	0	0	0	119	0	0	0	0	0	0	0	0	0	0	235	1013
8:15 PM	0	96	0	0	0	118	0	0	0	0	0	0	0	0	0	0	214	952
8:30 PM	0	130	0	0	0	116	0	0	0	0	0	0	0	0	0	0	246	950
8:45 PM	0	92	0	0	0	93	0	0	0	0	0	0	0	0	0	0	185	880
9:00 PM	0	139	0	0	0	84	0	0	0	0	0	0	0	0	0	0	223	868
9:15 PM	0	100	0	0	0	103	0	0	0	0	0	0	0	0	0	0	203	857
9:30 PM	0	76	0	0	0	80	0	0	0	0	0	0	0	0	0	0	156	767
9:45 PM	0	77	1	0	0	76	0	0	0	0	0	0	0	0	0	0	154	736
10:00 PM	0	89	0	0	0	73	0	0	0	0	0	0	0	0	0	0	162	675
10:15 PM	0	64	0	0	1	91	0	0	0	0	0	0	0	0	1	0	157	629
10:30 PM	0	40	0	0	0	53	0	0	0	0	0	0	0	0	0	0	93	566
10:45 PM	0	31	0	0	0	44	0	1	0	0	0	0	0	0	0	0	76	488
11:00 PM	0	21	0	0	0	54	0	0	0	0	0	0	0	0	0	0	75	401
11:15 PM	0	24	0	0	0	54	0	0	0	0	0	0	0	0	0	0	78	322
11:30 PM	0	20	0	0	0	29	0	0	0	0	0	0	0	0	0	0	49	278
11:45 PM	0	11	0	0	0	25	0	0	0	0	0	0	0	0	0	0	36	238

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	1136	0	0	0	1208	0	0	0	0	0	0	0	0	0	0	2344
Heavy Trucks	0	24	0		0	40	0		0	0	0		0	0	0		64
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 6/23/2023 8:30 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

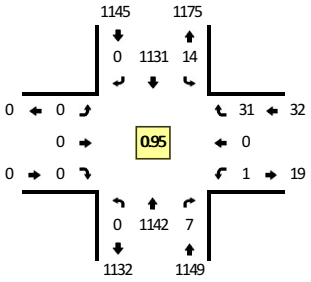
Type of peak hour being reported: System-wide Peak | Method for determining peak hour: Total Entering Volume

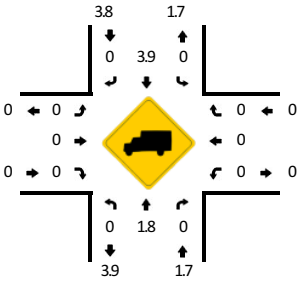
LOCATION: Honoapiilani Highway -- Olowalu General Store-North Driveway | **QC JOB #:** 16179902

CITY/STATE: Olowalu, HI | **DATE:** Wed, May 3 2023

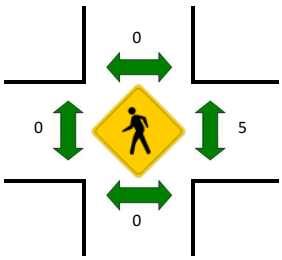
Peak-Hour: 3:15 PM -- 4:15 PM

Peak 15-Min: 3:45 PM -- 4:00 PM

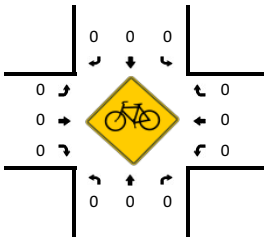


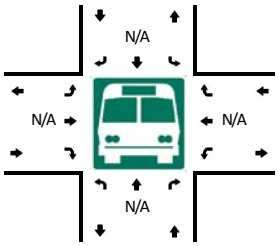


Quality Counts
DATA THAT DRIVES COMMUNITIES

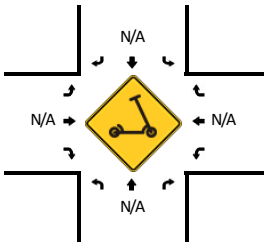












15-Min Count Period Beginning At	Honoapiilani Highway (Northbound)				Honoapiilani Highway (Southbound)				Olowalu General Store-North Driveway (Eastbound)				Olowalu General Store-North Driveway (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
12:00 AM	0	10	0	0	0	17	0	0	0	0	0	0	0	0	0	0	27	
12:15 AM	0	11	0	0	0	16	0	0	0	0	0	0	0	0	0	0	27	
12:30 AM	0	13	0	0	0	15	0	0	0	0	0	0	0	0	0	0	28	
12:45 AM	0	6	0	0	0	12	0	0	0	0	0	0	0	0	0	0	18	100
1:00 AM	0	2	0	0	0	9	0	0	0	0	0	0	0	0	0	0	11	84
1:15 AM	0	6	0	0	0	4	0	0	0	0	0	0	0	0	0	0	10	67
1:30 AM	0	4	0	0	0	8	0	0	0	0	0	0	0	0	0	0	12	51
1:45 AM	0	10	0	0	0	10	0	0	0	0	0	0	0	0	0	0	20	53
2:00 AM	0	8	0	0	0	10	0	0	0	0	0	0	0	0	0	0	18	60
2:15 AM	0	7	0	0	0	10	0	0	0	0	0	0	0	0	0	0	17	67
2:30 AM	0	4	0	0	0	11	0	0	0	0	0	0	0	0	0	0	15	70
2:45 AM	0	8	0	0	0	8	0	0	0	0	0	0	0	0	0	0	16	66
3:00 AM	0	5	0	0	0	13	0	0	0	0	0	0	0	0	0	0	18	66
3:15 AM	0	8	0	0	0	12	0	0	0	0	0	0	0	0	0	0	20	69
3:30 AM	0	21	0	0	0	13	0	0	0	0	0	0	0	0	0	0	34	88
3:45 AM	0	22	0	0	0	13	0	0	0	0	0	0	0	0	0	0	35	107
4:00 AM	0	14	0	0	0	22	0	0	0	0	0	0	0	0	0	0	36	125
4:15 AM	0	41	0	0	0	28	0	0	0	0	0	0	0	0	0	0	69	174
4:30 AM	0	36	0	0	0	20	0	0	0	0	0	0	0	0	0	0	56	196
4:45 AM	0	51	0	0	0	22	0	0	0	0	0	0	0	0	0	0	73	234
5:00 AM	0	68	0	0	0	49	0	0	0	0	0	0	0	0	0	0	117	315
5:15 AM	0	97	0	0	0	45	0	0	0	0	0	0	0	0	0	0	142	388
5:30 AM	0	156	0	0	0	68	0	0	0	0	0	0	0	0	1	0	225	557
5:45 AM	0	142	0	0	0	75	0	0	0	0	0	0	0	0	2	0	219	703
6:00 AM	0	172	0	0	0	125	0	0	0	0	0	0	0	0	1	0	298	884
6:15 AM	0	228	0	0	0	150	0	0	0	0	0	0	0	0	1	0	379	1121
6:30 AM	0	224	0	0	0	144	0	0	0	0	0	0	0	0	2	0	370	1266
6:45 AM	0	215	0	0	0	157	0	0	0	0	0	0	0	0	1	0	373	1420
7:00 AM	0	292	0	0	0	185	0	0	0	0	0	0	0	0	2	0	479	1601
7:15 AM	0	293	0	0	0	188	0	0	0	0	0	0	0	0	6	0	487	1709
7:30 AM	0	297	0	0	0	206	0	0	0	0	0	0	0	0	3	0	506	1845
7:45 AM	0	251	0	0	0	212	0	0	0	0	0	0	0	0	2	0	465	1937
8:00 AM	0	253	0	0	0	223	0	0	0	0	0	0	1	0	2	0	479	1937
8:15 AM	0	273	0	0	0	250	0	0	0	0	0	0	0	0	3	0	526	1976
8:30 AM	0	261	2	0	0	243	0	0	0	0	0	0	4	0	1	0	511	1981
8:45 AM	0	256	2	0	1	237	0	3	0	0	0	0	0	0	4	0	503	2019
9:00 AM	0	218	1	0	2	248	0	0	0	0	0	0	0	0	1	0	470	2010

15-Min Count Period Beginning At	Honoapiilani Highway (Northbound)				Honoapiilani Highway (Southbound)				Olowalu General Store-North Driveway (Eastbound)				Olowalu General Store-North Driveway (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
9:15 AM	0	239	2	0	1	271	0	0	0	0	0	0	1	0	9	0	523	2007
9:30 AM	0	229	0	0	2	286	0	1	0	0	0	0	0	0	3	0	521	2017
9:45 AM	0	144	0	0	2	295	0	0	0	0	0	0	0	0	6	0	447	1961
10:00 AM	0	258	1	0	2	251	0	1	0	0	0	0	0	0	5	0	518	2009
10:15 AM	0	220	1	0	1	272	0	1	0	0	0	0	0	0	5	0	500	1986
10:30 AM	0	175	3	1	3	277	0	0	0	0	0	0	1	0	7	0	467	1932
10:45 AM	0	185	2	0	1	283	0	0	0	0	0	0	1	0	6	0	478	1963
11:00 AM	0	211	0	0	1	282	0	2	0	0	0	0	0	0	6	0	502	1947
11:15 AM	0	193	0	0	7	271	0	0	0	0	0	0	3	0	2	0	476	1923
11:30 AM	0	201	3	0	5	276	0	1	0	0	0	0	3	0	10	0	499	1955
11:45 AM	0	217	2	0	7	208	0	1	0	0	0	0	3	0	16	0	454	1931
12:00 PM	0	228	5	0	4	229	0	0	0	0	0	0	4	0	9	0	479	1908
12:15 PM	0	195	2	0	3	228	0	0	0	0	0	0	9	0	7	0	444	1876
12:30 PM	0	290	3	0	2	258	0	1	0	0	0	0	4	0	6	0	564	1941
12:45 PM	0	234	3	0	5	225	0	0	0	0	0	0	0	0	13	0	480	1967
1:00 PM	0	232	0	0	5	202	0	0	0	0	0	0	1	0	11	0	451	1939
1:15 PM	0	272	1	0	5	217	0	0	0	0	0	0	4	0	7	0	506	2001
1:30 PM	0	257	1	0	2	234	0	0	0	0	0	0	2	0	10	0	506	1943
1:45 PM	0	255	2	0	0	207	0	0	0	0	0	0	3	0	13	0	480	1943
2:00 PM	0	245	9	0	5	242	0	0	0	0	0	0	2	0	9	0	512	2004
2:15 PM	0	244	4	0	1	259	0	0	0	0	0	0	3	0	5	0	516	2014
2:30 PM	0	281	4	0	3	283	0	1	0	0	0	0	3	0	13	0	588	2096
2:45 PM	0	260	3	0	2	260	0	2	0	0	0	0	1	0	15	0	543	2159
3:00 PM	0	274	0	0	1	274	0	1	0	0	0	0	1	0	15	0	566	2213
3:15 PM	0	277	0	0	3	273	0	0	0	0	0	0	0	0	11	0	564	2261
3:30 PM	0	276	1	0	2	284	0	1	0	0	0	0	0	0	9	0	573	2246
3:45 PM	0	305	2	0	3	296	0	0	0	0	0	0	1	0	4	0	611	2314
4:00 PM	0	284	4	0	4	278	0	1	0	0	0	0	0	0	7	0	578	2326
4:15 PM	0	277	1	0	1	279	0	1	0	0	0	0	2	0	10	0	571	2333
4:30 PM	0	250	4	0	3	294	0	0	0	0	0	0	2	0	9	0	562	2322
4:45 PM	0	259	3	1	3	327	0	0	0	0	0	0	0	0	8	0	601	2312
5:00 PM	0	265	1	2	0	315	0	0	0	0	0	0	2	0	7	0	592	2326
5:15 PM	0	238	2	0	3	296	0	0	0	0	0	0	1	0	7	0	547	2302
5:30 PM	0	203	0	0	1	261	0	0	0	0	0	0	5	0	5	0	475	2215
5:45 PM	0	192	1	0	1	195	0	0	0	0	0	0	4	0	4	0	397	2011
6:00 PM	0	205	0	0	0	152	0	0	0	0	0	0	5	0	4	0	366	1785
6:15 PM	0	188	0	0	0	149	0	0	0	0	0	0	0	0	1	0	338	1576
6:30 PM	0	170	0	0	0	175	0	0	0	0	0	0	0	0	1	0	346	1447
6:45 PM	0	129	0	0	0	144	0	0	0	0	0	0	0	0	2	0	275	1325
7:00 PM	0	128	0	0	0	151	0	0	0	0	0	0	0	0	0	0	279	1238
7:15 PM	0	132	0	0	0	132	0	0	0	0	0	0	0	0	0	0	264	1164
7:30 PM	0	94	0	0	0	152	0	0	0	0	0	0	0	0	0	0	246	1064
7:45 PM	0	136	0	0	0	117	0	0	0	0	0	0	0	0	0	0	253	1042
8:00 PM	0	121	0	0	0	119	0	0	0	0	0	0	0	0	0	0	240	1003
8:15 PM	0	100	0	0	0	111	0	0	0	0	0	0	0	0	0	0	211	950
8:30 PM	0	110	0	0	0	123	0	0	0	0	0	0	0	0	0	0	233	937
8:45 PM	0	99	0	0	0	87	0	0	0	0	0	0	0	0	0	0	186	870
9:00 PM	0	124	0	0	0	91	0	0	0	0	0	0	0	0	0	0	215	845
9:15 PM	0	91	0	0	0	101	0	0	0	0	0	0	0	0	0	0	192	826
9:30 PM	0	86	0	0	0	81	0	0	0	0	0	0	0	0	0	0	167	760
9:45 PM	0	80	0	0	0	77	0	0	0	0	0	0	0	0	0	0	157	731
10:00 PM	0	81	0	0	0	75	0	0	0	0	0	0	0	0	0	0	156	672
10:15 PM	0	55	0	0	0	81	0	0	0	0	0	0	0	0	0	0	136	616
10:30 PM	0	43	0	0	0	65	0	0	0	0	0	0	0	0	0	0	108	557
10:45 PM	0	27	0	0	0	46	0	0	0	0	0	0	0	0	0	0	73	473
11:00 PM	0	20	0	0	0	54	0	0	0	0	0	0	0	0	0	0	74	391
11:15 PM	0	33	0	0	0	52	0	0	0	0	0	0	0	0	0	0	85	340
11:30 PM	0	13	0	0	0	29	0	0	0	0	0	0	0	0	0	0	42	274
11:45 PM	0	11	0	0	0	24	0	0	0	0	0	0	0	0	0	0	35	236

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	1220	8	0	12	1184	0	0	0	0	0	0	4	0	16	0	2444
Heavy Trucks	0	20	0		0	36	0		0	0	0		0	0	0		56
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 6/23/2023 8:30 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

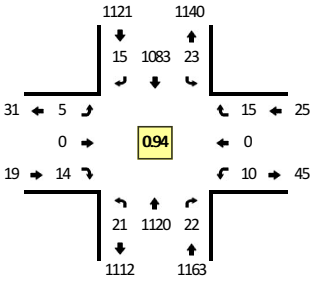
Type of peak hour being reported: System-wide Peak | Method for determining peak hour: Total Entering Volume

LOCATION: Honoapiilani Highway -- Olowalu General Store-Middle Driveway | **QC JOB #:** 16179903

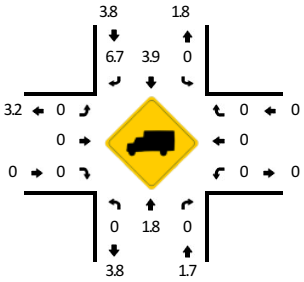
CITY/STATE: Olowalu, HI | **DATE:** Wed, May 3 2023

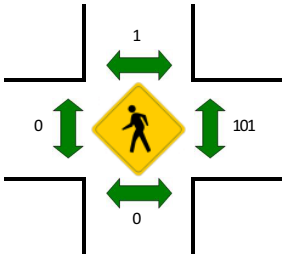
Peak-Hour: 3:15 PM -- 4:15 PM

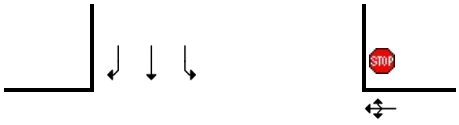
Peak 15-Min: 3:45 PM -- 4:00 PM

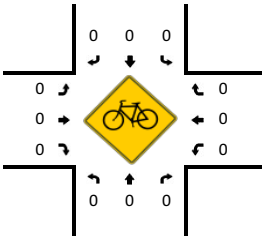


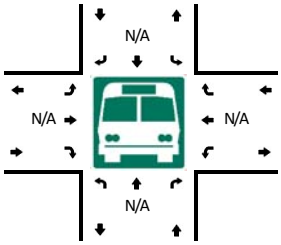




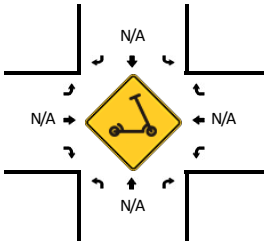












15-Min Count Period Beginning At	Honoapiilani Highway (Northbound)				Honoapiilani Highway (Southbound)				Olowalu General Store-Middle Driveway (Eastbound)				Olowalu General Store-Middle Driveway (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
12:00 AM	0	11	0	0	0	17	1	0	0	0	1	0	0	0	0	0	30	
12:15 AM	0	10	0	0	0	16	0	0	0	0	0	0	0	0	1	0	27	
12:30 AM	0	13	0	0	0	15	0	0	0	0	0	0	0	0	0	0	28	
12:45 AM	0	5	0	0	0	12	0	0	0	0	0	0	0	0	0	0	17	102
1:00 AM	0	2	0	0	0	9	0	0	0	0	0	0	0	0	0	0	11	83
1:15 AM	0	6	0	0	0	4	0	0	0	0	0	0	0	0	0	0	10	66
1:30 AM	0	4	0	0	0	8	0	0	0	0	0	0	0	0	0	0	12	50
1:45 AM	0	10	0	0	0	9	1	0	0	0	0	0	0	0	0	0	20	53
2:00 AM	0	8	0	0	0	10	0	0	0	0	0	0	0	0	0	0	18	60
2:15 AM	0	7	0	0	1	9	0	0	0	0	0	0	0	0	0	0	17	67
2:30 AM	0	4	0	0	0	11	0	0	0	0	0	0	0	0	0	0	15	70
2:45 AM	0	8	0	0	0	8	0	0	0	0	0	0	0	0	0	0	16	66
3:00 AM	0	5	0	0	0	13	0	0	0	0	1	0	0	0	0	0	19	67
3:15 AM	0	8	0	0	0	12	0	0	0	0	0	0	0	0	0	0	20	70
3:30 AM	0	21	0	0	0	12	0	0	0	0	0	0	0	0	0	0	33	88
3:45 AM	0	22	0	0	0	14	0	0	0	0	0	0	0	0	0	0	36	108
4:00 AM	0	15	0	0	1	20	0	0	1	0	0	0	0	0	0	0	37	126
4:15 AM	0	41	0	0	0	27	0	0	0	0	1	0	0	0	0	0	69	175
4:30 AM	0	36	0	0	0	19	0	0	0	0	0	0	0	0	0	0	55	197
4:45 AM	0	51	1	0	0	22	0	0	0	0	1	0	0	0	0	0	75	236
5:00 AM	0	71	0	0	0	49	0	0	0	0	3	0	0	0	0	0	123	322
5:15 AM	0	94	0	0	0	44	0	0	0	0	3	0	0	0	2	0	143	396
5:30 AM	0	155	1	0	0	69	0	0	1	0	1	0	0	0	0	0	227	568
5:45 AM	0	137	0	0	0	74	0	0	1	0	3	0	0	0	3	0	218	711
6:00 AM	0	163	0	0	1	123	0	0	1	1	1	0	1	0	3	0	294	882
6:15 AM	0	223	0	0	1	150	0	0	1	0	1	0	0	0	2	0	378	1117
6:30 AM	2	216	0	0	4	137	1	0	3	0	0	0	0	0	3	0	366	1256
6:45 AM	3	211	0	0	2	152	0	0	0	0	2	0	0	0	4	0	374	1412
7:00 AM	2	293	0	0	1	181	0	0	1	0	2	0	0	0	0	0	480	1598
7:15 AM	2	293	1	0	0	185	1	0	1	0	1	0	0	0	1	0	485	1705
7:30 AM	2	291	2	1	0	205	0	0	2	0	4	1	0	0	3	0	511	1850
7:45 AM	0	254	0	0	3	207	0	0	3	1	3	0	0	0	4	0	475	1951
8:00 AM	3	253	0	0	1	220	3	0	1	1	3	0	0	0	3	0	488	1959
8:15 AM	5	268	2	0	2	241	0	0	2	0	3	0	0	0	2	0	525	1999
8:30 AM	5	258	3	0	3	237	4	0	4	0	5	0	1	0	0	0	520	2008
8:45 AM	13	260	0	0	6	226	3	0	4	0	3	0	0	0	3	0	518	2051
9:00 AM	6	205	1	0	1	244	0	0	6	0	3	0	1	0	8	0	475	2038

15-Min Count Period Beginning At	Honoapiilani Highway (Northbound)				Honoapiilani Highway (Southbound)				Olowalu General Store-Middle Driveway (Eastbound)				Olowalu General Store-Middle Driveway (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
9:15 AM	3	235	2	0	0	266	0	0	1	2	4	0	0	0	1	0	514	2027
9:30 AM	6	224	0	0	1	286	0	0	3	1	3	0	0	0	4	0	528	2035
9:45 AM	3	140	0	0	0	283	1	0	1	0	3	0	2	0	0	0	433	1950
10:00 AM	2	256	2	0	1	242	3	0	3	0	7	0	1	0	3	0	520	1995
10:15 AM	3	208	1	0	1	260	0	0	8	2	4	0	1	0	3	0	491	1972
10:30 AM	0	179	2	0	5	270	3	0	3	1	5	0	1	0	3	0	472	1916
10:45 AM	2	181	2	1	3	278	2	0	1	0	5	0	4	1	1	0	481	1964
11:00 AM	4	207	1	0	5	272	3	0	4	1	4	0	2	0	2	0	505	1949
11:15 AM	1	191	3	0	9	262	4	0	0	1	3	0	1	0	0	0	475	1933
11:30 AM	3	207	6	0	8	264	3	0	1	1	4	0	1	0	4	0	502	1963
11:45 AM	4	208	8	0	6	198	2	0	5	0	2	0	3	0	3	0	439	1921
12:00 PM	5	226	5	1	10	218	2	0	3	0	5	0	6	0	2	0	483	1899
12:15 PM	2	197	5	1	8	222	3	0	1	0	2	0	2	0	0	0	443	1867
12:30 PM	2	285	8	0	7	251	2	0	0	0	0	0	1	0	6	0	562	1927
12:45 PM	1	231	6	1	5	221	1	0	0	0	1	0	2	0	4	0	473	1961
1:00 PM	2	224	2	0	5	192	2	0	1	1	3	0	2	0	8	0	442	1920
1:15 PM	5	270	2	1	6	215	2	0	0	0	6	0	2	0	2	0	511	1988
1:30 PM	1	249	6	0	15	213	5	0	1	0	5	0	2	0	3	0	500	1926
1:45 PM	3	247	5	2	10	203	1	0	2	0	2	0	1	0	6	0	482	1935
2:00 PM	1	236	2	2	5	234	2	0	0	0	1	0	4	0	6	0	493	1986
2:15 PM	0	240	3	1	5	256	2	0	0	0	0	0	0	0	8	0	515	1990
2:30 PM	2	295	6	2	6	274	2	0	1	0	2	0	2	0	7	0	599	2089
2:45 PM	1	248	7	1	7	247	7	0	1	0	3	0	4	0	6	0	532	2139
3:00 PM	1	273	2	0	4	267	3	0	0	2	3	0	3	1	1	0	560	2206
3:15 PM	0	262	7	2	7	259	6	0	1	0	0	0	0	0	4	0	548	2239
3:30 PM	6	271	5	2	6	272	3	0	2	0	5	0	4	0	4	0	580	2220
3:45 PM	8	302	6	0	7	283	4	0	0	0	4	0	3	0	2	0	619	2307
4:00 PM	2	285	4	1	3	269	2	0	2	0	5	0	3	0	5	0	581	2328
4:15 PM	4	268	1	0	4	272	4	1	1	1	5	0	3	0	5	0	569	2349
4:30 PM	1	245	4	0	2	289	3	0	1	0	2	0	0	0	1	0	548	2317
4:45 PM	1	259	2	0	2	321	1	0	1	0	3	0	4	0	4	0	598	2296
5:00 PM	1	270	2	0	1	308	2	0	0	1	1	0	1	0	3	0	590	2305
5:15 PM	0	228	5	0	4	289	0	0	0	1	0	0	0	0	4	0	531	2267
5:30 PM	5	204	1	0	4	261	1	0	0	1	1	0	3	1	3	0	485	2204
5:45 PM	4	187	2	0	3	188	3	0	2	1	2	0	0	1	3	0	396	2002
6:00 PM	0	200	0	0	2	155	4	0	3	1	3	0	3	0	0	0	371	1783
6:15 PM	2	188	1	0	1	148	0	0	1	0	0	0	0	0	1	0	342	1594
6:30 PM	1	165	1	1	0	173	1	0	2	0	3	0	0	0	1	0	348	1457
6:45 PM	1	125	0	0	0	145	2	0	0	0	1	0	0	0	2	0	276	1337
7:00 PM	1	128	0	0	0	148	2	0	2	0	2	0	0	0	1	0	284	1250
7:15 PM	4	128	0	0	0	130	2	0	2	0	1	0	0	0	0	0	267	1175
7:30 PM	2	93	0	0	1	149	2	0	1	0	2	0	0	0	0	0	250	1077
7:45 PM	2	134	0	0	0	116	1	0	1	0	2	0	0	0	0	0	256	1057
8:00 PM	4	123	0	0	0	117	3	0	0	0	0	0	0	0	0	0	247	1020
8:15 PM	0	92	0	0	0	109	3	0	7	0	0	0	0	0	0	0	211	964
8:30 PM	1	129	0	0	0	119	3	0	2	0	0	0	0	0	0	0	254	968
8:45 PM	3	109	0	0	0	88	0	0	0	0	1	0	0	0	0	0	201	913
9:00 PM	1	125	0	0	0	89	3	0	0	1	0	0	0	0	0	0	219	885
9:15 PM	2	88	0	0	1	100	0	0	0	0	2	0	0	0	2	0	195	869
9:30 PM	2	84	0	0	0	81	0	0	0	0	0	0	0	0	1	0	168	783
9:45 PM	1	81	0	1	0	75	2	0	0	0	1	0	1	0	0	0	162	744
10:00 PM	0	76	0	0	0	74	1	0	4	0	3	0	0	0	0	0	158	683
10:15 PM	2	48	0	1	0	79	2	0	9	0	3	0	0	0	0	0	144	632
10:30 PM	2	43	0	0	0	64	1	0	0	0	0	0	0	0	0	0	110	574
10:45 PM	2	26	0	0	0	46	0	0	0	0	3	0	0	1	0	0	78	490
11:00 PM	0	20	0	0	0	55	0	0	0	0	0	0	0	0	0	0	75	407
11:15 PM	0	32	0	0	0	52	0	0	0	0	0	0	0	0	0	0	84	347
11:30 PM	1	13	0	0	1	27	0	0	0	0	0	0	0	0	0	0	42	279
11:45 PM	0	12	0	0	0	22	0	0	0	0	0	0	0	0	0	0	34	235

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	32	1208	24	0	28	1132	16	0	0	0	16	0	12	0	8	0	2476
Heavy Trucks	0	24	0		0	32	4		0	0	0		0	0	0		60
Buses																	
Pedestrians		0				0				0				96			96
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 6/23/2023 8:30 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

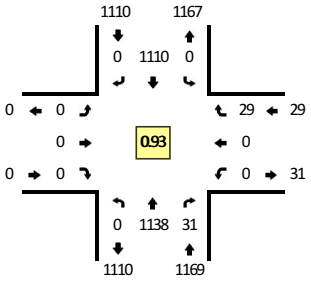
Type of peak hour being reported: System-wide Peak | Method for determining peak hour: Total Entering Volume

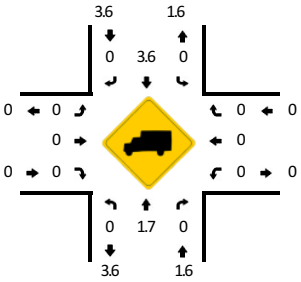
LOCATION: Honoapiilani Highway -- Olowalu General Store-South Driveway | **QC JOB #:** 16179904

CITY/STATE: Olowalu, HI | **DATE:** Wed, May 3 2023

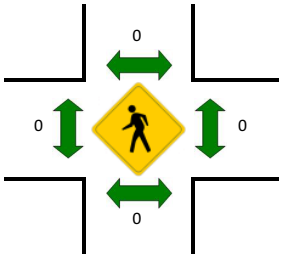
Peak-Hour: 3:15 PM -- 4:15 PM

Peak 15-Min: 3:45 PM -- 4:00 PM

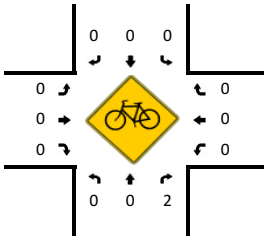


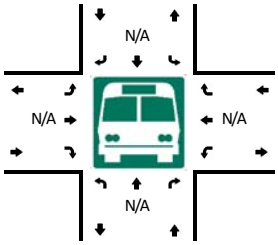


Quality Counts
DATA THAT DRIVES COMMUNITIES

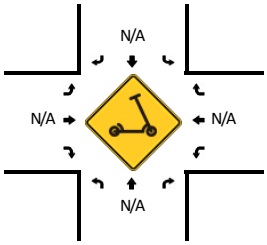












15-Min Count Period Beginning At	Honoapiilani Highway (Northbound)				Honoapiilani Highway (Southbound)				Olowalu General Store-South Driveway (Eastbound)				Olowalu General Store-South Driveway (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
12:00 AM	0	9	1	0	0	18	0	0	0	0	0	0	0	0	0	0	28	
12:15 AM	0	10	0	0	0	16	0	0	0	0	0	0	0	0	0	0	26	
12:30 AM	0	13	0	0	0	15	0	0	0	0	0	0	0	0	0	0	28	
12:45 AM	0	5	0	0	0	12	0	0	0	0	0	0	0	0	0	0	17	99
1:00 AM	0	2	0	0	0	9	0	0	0	0	0	0	0	0	0	0	11	82
1:15 AM	0	6	0	0	0	4	0	0	0	0	0	0	0	0	0	0	10	66
1:30 AM	0	4	0	0	0	8	0	0	0	0	0	0	0	0	0	0	12	50
1:45 AM	0	10	0	0	0	9	0	0	0	0	0	0	0	0	0	0	19	52
2:00 AM	0	8	0	0	0	10	0	0	0	0	0	0	0	0	0	0	18	59
2:15 AM	0	7	0	0	0	8	0	0	0	0	0	0	0	0	0	0	15	64
2:30 AM	0	4	0	0	0	12	0	0	0	0	0	0	0	0	0	0	16	68
2:45 AM	0	8	0	0	0	8	0	0	0	0	0	0	0	0	0	0	16	65
3:00 AM	0	5	0	0	0	14	0	0	0	0	0	0	0	0	0	0	19	66
3:15 AM	0	8	0	0	0	12	0	0	0	0	0	0	0	0	0	0	20	71
3:30 AM	0	21	0	0	0	11	0	0	0	0	0	0	0	0	0	0	32	87
3:45 AM	0	22	0	0	0	14	0	0	0	0	0	0	0	0	0	0	36	107
4:00 AM	0	14	0	0	0	20	0	0	0	0	0	0	0	0	0	0	34	122
4:15 AM	0	41	0	0	0	29	0	0	0	0	0	0	0	0	0	0	70	172
4:30 AM	0	36	0	0	0	20	0	0	0	0	0	0	0	0	0	0	56	196
4:45 AM	0	52	0	0	0	24	0	0	0	0	0	0	0	0	0	0	76	236
5:00 AM	0	70	2	0	0	52	0	0	0	0	0	0	0	0	0	0	124	326
5:15 AM	0	96	0	0	0	48	0	0	0	0	0	0	0	0	0	0	144	400
5:30 AM	0	157	2	0	0	69	0	0	0	0	0	0	0	0	1	0	229	573
5:45 AM	0	137	4	0	0	79	0	0	0	0	0	0	0	0	0	0	220	717
6:00 AM	0	165	6	0	0	124	0	0	0	0	0	0	0	0	1	0	296	889
6:15 AM	0	226	7	0	0	151	0	0	0	0	0	0	0	0	1	0	385	1130
6:30 AM	0	218	4	0	0	138	0	0	0	0	0	0	0	0	0	0	360	1261
6:45 AM	0	213	6	0	0	150	0	0	0	0	0	0	0	0	1	0	370	1411
7:00 AM	0	295	4	0	0	186	0	0	0	0	0	0	0	0	0	0	485	1600
7:15 AM	0	294	9	0	0	186	0	0	0	0	0	0	0	0	2	0	491	1706
7:30 AM	0	291	6	0	0	209	0	0	0	0	0	0	0	0	3	0	509	1855
7:45 AM	0	250	7	0	0	209	0	0	0	0	0	0	0	0	0	0	466	1951
8:00 AM	0	254	8	0	0	224	0	0	0	0	0	0	0	0	2	0	488	1954
8:15 AM	0	268	2	0	0	241	0	0	0	0	0	0	0	0	3	0	514	1977
8:30 AM	0	263	4	0	0	245	0	0	0	0	0	0	0	0	3	0	515	1983
8:45 AM	0	264	5	0	0	227	0	0	0	0	0	0	0	0	7	0	503	2020
9:00 AM	0	212	10	0	0	246	0	0	0	0	0	0	0	0	0	0	468	2000

15-Min Count Period Beginning At	Honoapiilani Highway (Northbound)				Honoapiilani Highway (Southbound)				Olowalu General Store-South Driveway (Eastbound)				Olowalu General Store-South Driveway (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
9:15 AM	0	237	5	0	0	270	0	0	0	0	0	0	0	0	3	0	515	2001
9:30 AM	0	227	6	0	0	288	0	0	0	0	0	0	0	0	4	0	525	2011
9:45 AM	0	140	2	0	1	287	0	0	0	0	0	0	0	0	1	0	431	1939
10:00 AM	0	259	9	0	0	249	0	0	0	0	0	0	0	0	0	0	517	1988
10:15 AM	0	207	7	0	0	263	0	0	0	0	0	0	0	0	3	0	480	1953
10:30 AM	0	176	9	0	0	278	0	0	0	0	0	0	0	0	7	0	470	1898
10:45 AM	0	173	5	0	0	288	0	0	0	0	0	0	0	0	11	0	477	1944
11:00 AM	0	211	16	0	0	277	0	0	0	0	0	0	0	0	3	0	507	1934
11:15 AM	0	189	6	0	0	267	0	0	0	0	0	0	0	0	5	0	467	1921
11:30 AM	0	207	12	0	0	271	0	0	0	0	0	0	0	0	10	0	500	1951
11:45 AM	0	212	12	0	0	207	0	0	0	0	0	0	0	0	8	0	439	1913
12:00 PM	0	223	7	0	0	229	0	0	0	0	0	0	0	0	15	0	474	1880
12:15 PM	0	199	9	0	0	226	0	0	0	0	0	0	0	0	5	0	439	1852
12:30 PM	0	287	7	0	0	253	0	0	0	0	0	0	0	0	6	0	553	1905
12:45 PM	0	229	7	0	0	226	0	0	0	0	0	0	0	0	10	0	472	1938
1:00 PM	0	222	8	0	0	196	0	0	0	0	0	0	0	0	5	0	431	1895
1:15 PM	0	273	11	0	0	226	0	0	0	0	0	0	0	0	7	0	517	1973
1:30 PM	0	251	10	0	0	218	0	0	0	0	0	0	0	0	5	0	484	1904
1:45 PM	0	249	17	0	0	209	0	0	0	0	0	0	0	0	7	0	482	1914
2:00 PM	0	236	15	0	0	241	0	0	0	0	0	0	0	0	9	0	501	1984
2:15 PM	0	237	18	0	0	257	0	0	0	0	0	0	0	0	7	0	519	1986
2:30 PM	0	302	20	0	0	278	0	0	0	0	0	0	0	0	5	0	605	2107
2:45 PM	0	248	10	0	0	256	0	0	0	0	0	0	0	0	8	0	522	2147
3:00 PM	0	268	10	0	0	271	0	0	0	0	0	0	0	0	9	0	558	2204
3:15 PM	0	264	8	0	0	260	0	0	0	0	0	0	0	0	6	0	538	2223
3:30 PM	0	276	4	0	0	282	0	0	0	0	0	0	0	0	10	0	572	2190
3:45 PM	0	314	12	0	0	290	0	0	0	0	0	0	0	0	4	0	620	2288
4:00 PM	0	284	7	0	0	278	0	0	0	0	0	0	0	0	9	0	578	2308
4:15 PM	0	270	10	0	0	281	0	0	0	0	0	0	0	0	10	0	571	2341
4:30 PM	0	249	6	0	0	292	0	0	0	0	0	0	0	0	7	0	554	2323
4:45 PM	0	257	4	0	0	323	0	0	0	0	0	0	0	0	2	0	586	2289
5:00 PM	0	267	8	0	0	313	0	0	0	0	0	0	0	0	4	0	592	2303
5:15 PM	0	232	7	0	0	291	0	0	0	0	0	0	0	0	4	0	534	2266
5:30 PM	0	202	5	0	0	268	0	0	0	0	0	0	0	0	6	0	481	2193
5:45 PM	0	185	6	0	0	189	0	0	0	0	0	0	0	0	7	0	387	1994
6:00 PM	0	197	6	0	0	164	0	0	0	0	0	0	0	0	5	0	372	1774
6:15 PM	0	189	1	0	0	149	0	0	0	0	0	0	0	0	2	0	341	1581
6:30 PM	0	169	2	0	0	177	0	0	0	0	0	0	0	0	0	0	348	1448
6:45 PM	0	125	3	0	0	143	0	0	0	0	0	0	0	0	0	0	271	1332
7:00 PM	0	129	0	0	1	148	0	0	0	0	0	0	0	0	1	0	279	1239
7:15 PM	0	131	0	0	0	134	0	0	0	0	0	0	0	0	0	0	265	1163
7:30 PM	0	95	0	0	0	151	0	0	0	0	0	0	0	0	0	0	246	1061
7:45 PM	0	136	0	0	0	116	0	0	0	0	0	0	0	0	1	0	253	1043
8:00 PM	0	127	0	0	0	119	0	0	0	0	0	0	0	0	0	0	246	1010
8:15 PM	0	92	0	0	0	108	0	0	0	0	0	0	0	0	0	0	200	945
8:30 PM	0	130	0	0	0	120	0	0	0	0	0	0	0	0	0	0	250	949
8:45 PM	0	110	0	0	0	90	0	0	0	0	0	0	0	0	0	0	200	896
9:00 PM	0	127	0	0	0	89	0	0	0	0	0	0	0	0	1	0	217	867
9:15 PM	0	90	0	0	0	100	0	0	0	0	0	0	0	0	0	0	190	857
9:30 PM	0	85	0	0	0	84	0	0	0	0	0	0	0	0	0	0	169	776
9:45 PM	0	82	1	0	0	77	0	0	0	0	0	0	0	0	0	0	160	736
10:00 PM	0	76	0	0	0	77	0	0	0	0	0	0	0	0	0	0	153	672
10:15 PM	0	52	0	0	0	82	0	0	0	0	0	0	0	0	0	0	134	616
10:30 PM	0	43	0	0	0	64	0	0	0	0	0	0	0	0	0	0	107	554
10:45 PM	0	29	0	0	0	50	0	0	0	0	0	0	0	0	0	0	79	473
11:00 PM	0	21	0	0	0	55	0	0	0	0	0	0	0	0	0	0	76	396
11:15 PM	0	31	0	0	0	52	0	0	0	0	0	0	0	0	0	0	83	345
11:30 PM	0	14	0	0	0	27	0	0	0	0	0	0	0	0	0	0	41	279
11:45 PM	0	12	0	0	0	20	0	0	0	0	0	0	0	0	0	0	32	232

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	1256	48	0	0	1160	0	0	0	0	0	0	0	0	16	0	2480
Heavy Trucks	0	24	0		0	32	0		0	0	0		0	0	0		56
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

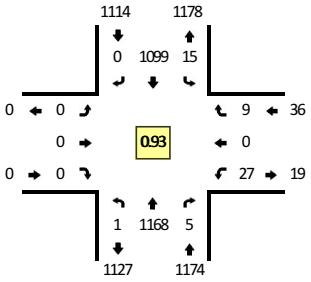
Report generated on 6/23/2023 8:30 AM

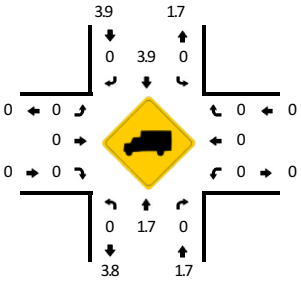
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

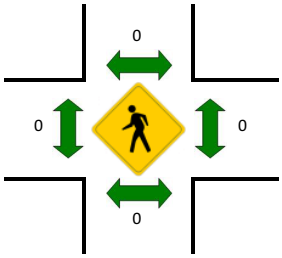
Type of peak hour being reported: System-wide Peak | Method for determining peak hour: Total Entering Volume

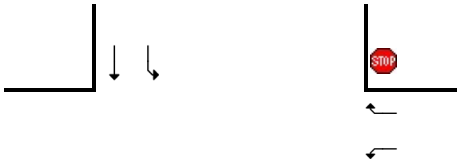
LOCATION: Honoapiilani Highway -- Luawai Street | **QC JOB #:** 16179905
CITY/STATE: Olowalu, HI | **DATE:** Wed, May 3 2023

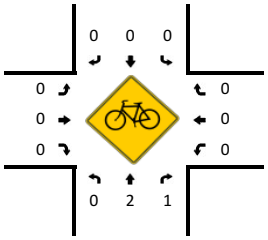
Peak-Hour: 3:15 PM -- 4:15 PM
Peak 15-Min: 3:45 PM -- 4:00 PM

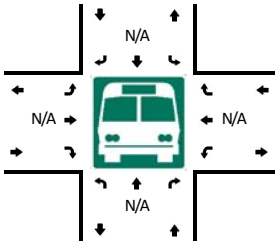




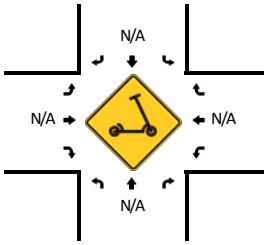












15-Min Count Period Beginning At	Honoapiilani Highway (Northbound)				Honoapiilani Highway (Southbound)				Luawai Street (Eastbound)				Luawai Street (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
12:00 AM	0	11	0	0	0	19	0	0	0	0	0	0	0	0	0	0	30	
12:15 AM	0	10	0	0	0	15	0	0	0	0	0	0	0	0	0	0	25	
12:30 AM	0	14	0	0	1	14	0	0	0	0	0	0	0	0	0	0	29	
12:45 AM	0	4	0	0	0	12	0	0	0	0	0	0	0	0	0	0	16	100
1:00 AM	0	2	0	0	1	9	0	0	0	0	0	0	0	0	0	0	12	82
1:15 AM	0	6	0	0	0	4	0	0	0	0	0	0	0	0	0	0	10	67
1:30 AM	0	4	0	0	1	7	0	0	0	0	0	0	0	0	0	0	12	50
1:45 AM	0	11	0	0	1	8	0	0	0	0	0	0	0	0	0	0	20	54
2:00 AM	0	8	0	0	0	10	0	0	0	0	0	0	0	0	0	0	18	60
2:15 AM	0	6	0	0	0	9	0	0	0	0	0	0	0	0	0	0	15	65
2:30 AM	0	4	1	0	0	11	0	0	0	0	0	0	0	0	0	0	16	69
2:45 AM	0	8	0	0	0	9	0	0	0	0	0	0	0	0	0	0	17	66
3:00 AM	0	5	0	0	0	14	0	0	0	0	0	0	0	0	0	0	19	67
3:15 AM	0	8	0	0	0	12	0	0	0	0	0	0	0	0	0	0	20	72
3:30 AM	0	21	0	0	0	12	0	0	0	0	0	0	0	0	0	0	33	89
3:45 AM	0	22	0	0	0	13	0	0	0	0	0	0	0	0	0	0	35	107
4:00 AM	0	22	0	0	0	20	0	0	0	0	0	0	0	0	0	0	42	130
4:15 AM	0	37	0	0	0	26	0	0	0	0	0	0	0	0	0	0	63	173
4:30 AM	0	37	0	0	0	22	0	0	0	0	0	0	0	0	0	0	59	199
4:45 AM	0	52	2	0	0	24	0	0	0	0	0	0	0	0	1	0	79	243
5:00 AM	0	71	0	0	0	54	0	0	0	0	0	0	0	0	1	0	126	327
5:15 AM	0	99	0	0	0	49	0	0	0	0	0	0	0	0	0	0	148	412
5:30 AM	0	197	0	0	0	67	0	0	0	0	0	0	0	0	1	0	265	618
5:45 AM	0	134	0	0	0	76	0	0	0	0	0	0	0	0	1	0	211	750
6:00 AM	0	174	0	0	0	120	0	0	0	0	0	0	1	0	1	0	296	920
6:15 AM	0	223	0	0	1	150	0	0	0	0	0	0	2	0	3	0	379	1151
6:30 AM	0	207	5	0	2	140	0	0	0	0	0	0	1	0	2	0	357	1243
6:45 AM	0	232	6	0	0	151	0	0	0	0	0	0	1	0	2	0	392	1424
7:00 AM	0	300	4	0	0	176	0	0	0	0	0	0	3	0	3	0	486	1614
7:15 AM	0	290	3	1	0	189	0	1	0	0	0	0	5	0	4	0	493	1728
7:30 AM	0	294	1	0	1	191	0	0	0	0	0	0	4	0	4	0	495	1866
7:45 AM	0	250	4	0	1	212	0	0	0	0	0	0	4	0	3	0	474	1948
8:00 AM	0	268	2	1	5	225	0	0	0	0	0	0	1	0	3	0	505	1967
8:15 AM	0	254	2	0	0	242	0	1	0	0	0	0	1	0	1	0	501	1975
8:30 AM	0	260	4	0	4	238	0	2	0	0	0	0	0	0	4	0	512	1992
8:45 AM	0	286	2	0	1	236	0	0	0	0	0	0	2	0	0	0	527	2045
9:00 AM	0	215	3	0	3	240	0	1	0	0	0	0	3	0	0	0	465	2005
9:15 AM	0	230	2	0	6	264	0	1	0	0	0	0	1	0	1	0	505	2009
9:30 AM	0	242	2	0	3	274	0	1	0	0	0	0	5	0	2	0	529	2026

15-Min Count Period Beginning At	Honoapiilani Highway (Northbound)				Honoapiilani Highway (Southbound)				Luawai Street (Eastbound)				Luawai Street (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
9:45 AM	0	140	2	0	0	286	0	1	0	0	0	0	2	0	2	0	433	1932
10:00 AM	0	265	2	0	2	253	0	1	0	0	0	0	4	0	1	0	528	1995
10:15 AM	0	211	0	0	1	263	0	0	0	0	0	0	5	0	3	0	483	1973
10:30 AM	0	172	1	1	1	270	0	0	0	0	0	0	1	0	2	0	448	1892
10:45 AM	0	179	3	0	4	287	0	1	0	0	0	0	2	0	0	0	476	1935
11:00 AM	0	227	0	0	3	269	0	4	0	0	0	0	0	0	3	0	506	1913
11:15 AM	0	181	1	0	3	261	0	1	0	0	0	0	2	0	1	0	450	1880
11:30 AM	0	224	2	0	1	270	0	0	0	0	0	0	2	0	4	0	503	1935
11:45 AM	0	216	1	0	6	205	0	1	0	0	0	0	6	0	3	0	438	1897
12:00 PM	0	222	3	0	3	215	0	2	0	0	0	0	3	0	6	0	454	1845
12:15 PM	0	212	2	0	1	230	0	0	0	0	0	0	6	0	5	0	456	1851
12:30 PM	0	291	1	0	2	252	0	2	0	0	0	0	1	0	3	0	552	1900
12:45 PM	0	233	0	0	5	209	0	2	0	0	0	0	7	0	1	0	457	1919
1:00 PM	0	220	0	0	1	200	0	0	0	0	0	0	6	0	2	0	429	1894
1:15 PM	0	281	1	0	2	215	0	1	0	0	0	0	6	0	4	0	510	1948
1:30 PM	0	265	1	0	3	224	0	1	0	0	0	0	4	0	4	0	502	1898
1:45 PM	0	245	5	0	8	205	0	0	0	0	0	0	2	0	4	0	469	1910
2:00 PM	0	258	6	0	5	230	0	2	0	0	0	0	3	0	2	0	506	1987
2:15 PM	0	248	3	0	6	214	0	1	0	0	0	0	5	0	6	0	483	1960
2:30 PM	0	316	2	0	2	279	0	1	0	0	0	0	5	0	8	0	613	2071
2:45 PM	0	247	1	0	4	248	0	0	0	0	0	0	5	0	4	0	509	2111
3:00 PM	0	282	1	1	4	263	0	0	0	0	0	0	6	0	2	0	559	2164
3:15 PM	0	260	1	1	5	258	0	0	0	0	0	0	11	0	5	0	541	2222
3:30 PM	0	281	0	0	4	282	0	1	0	0	0	0	6	0	1	0	575	2184
3:45 PM	0	325	3	0	4	284	0	0	0	0	0	0	4	0	2	0	622	2297
4:00 PM	0	302	1	0	1	275	0	0	0	0	0	0	6	0	1	0	586	2324
4:15 PM	0	260	2	1	3	268	0	0	0	0	0	0	10	0	0	0	544	2327
4:30 PM	0	244	1	0	3	299	0	2	0	0	0	0	3	0	4	0	556	2308
4:45 PM	0	253	2	1	3	317	0	0	0	0	0	0	4	0	3	0	583	2269
5:00 PM	0	287	1	0	2	305	0	1	0	0	0	0	2	0	1	0	599	2282
5:15 PM	0	226	1	0	3	294	0	0	0	0	0	0	4	0	3	0	531	2269
5:30 PM	0	213	2	0	3	268	0	1	0	0	0	0	4	0	0	0	491	2204
5:45 PM	0	186	1	0	5	178	0	0	0	0	0	0	4	0	0	0	374	1995
6:00 PM	0	186	0	0	2	166	0	0	0	0	0	0	5	0	2	0	361	1757
6:15 PM	0	198	1	0	1	158	0	0	0	0	0	0	1	0	1	0	360	1586
6:30 PM	0	166	1	0	1	170	0	0	0	0	0	0	3	0	3	0	344	1439
6:45 PM	0	125	1	0	1	139	0	0	0	0	0	0	5	0	0	0	271	1336
7:00 PM	0	137	0	0	0	156	0	0	0	0	0	0	1	0	1	0	295	1270
7:15 PM	0	122	1	0	0	134	0	0	0	0	0	0	0	0	1	0	258	1168
7:30 PM	0	93	1	0	0	152	0	0	0	0	0	0	0	0	0	0	246	1070
7:45 PM	0	133	3	0	3	111	0	0	0	0	0	0	1	0	0	0	251	1050
8:00 PM	0	124	2	0	1	120	0	0	0	0	0	0	0	0	1	0	248	1003
8:15 PM	0	99	0	0	2	103	0	0	0	0	0	0	0	0	0	0	204	949
8:30 PM	0	130	0	0	1	123	0	0	0	0	0	0	0	0	0	0	254	957
8:45 PM	0	101	1	0	1	91	0	0	0	0	0	0	0	0	1	0	195	901
9:00 PM	0	126	0	0	0	85	0	0	0	0	0	0	0	0	1	0	212	865
9:15 PM	0	89	0	0	0	102	0	0	0	0	0	0	0	0	0	0	191	852
9:30 PM	0	84	1	0	0	87	0	0	0	0	0	0	0	0	0	0	172	770
9:45 PM	0	85	0	0	1	73	0	0	0	0	0	0	0	0	0	0	159	734
10:00 PM	0	71	0	0	0	78	0	0	0	0	0	0	0	0	0	0	149	671
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10:30 PM	0	45	0	0	2	66	0	0	0	0	0	0	0	0	0	0	113	553
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11:00 PM	0	27	0	0	0	55	0	0	0	0	0	0	0	0	0	0	82	399
11:15 PM	0	26	0	0	0	52	0	0	0	0	0	0	0	0	0	0	78	345
11:30 PM	0	13	1	0	1	27	0	0	0	0	0	0	2	0	0	0	44	276
11:45 PM	0	9	1	0	0	20	0	0	0	0	0	0	0	0	1	0	31	235

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	1300	12	0	16	1136	0	0	0	0	0	0	16	0	8	0	2488
Heavy Trucks	0	20	0		0	44	0		0	0	0		0	0	0		64
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 6/23/2023 8:30 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: System-wide Peak

Method for determining peak hour: Total Entering Volume

LOCATION: Honoapiilani Highway -- Olowalu Village Middle

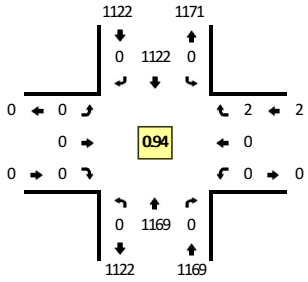
CITY/STATE: Olowalu, HI

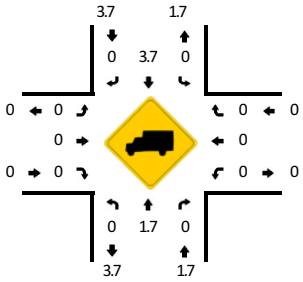
QC JOB #: 16179906

DATE: Wed, May 3 2023

Peak-Hour: 3:15 PM -- 4:15 PM

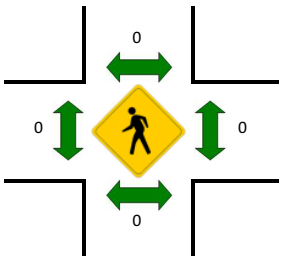
Peak 15-Min: 3:45 PM -- 4:00 PM



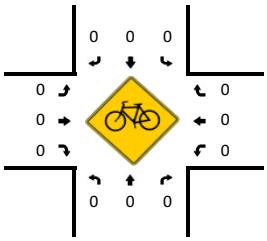


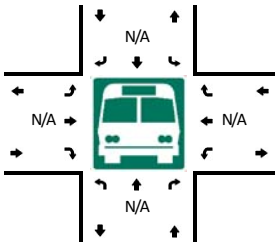
Quality Counts

DATA THAT DRIVES COMMUNITIES

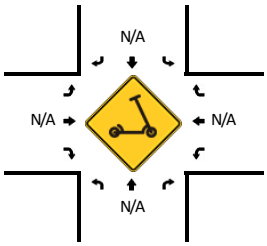












15-Min Count Period Beginning At	Honoapiilani Highway (Northbound)				Honoapiilani Highway (Southbound)				Olowalu Village Middle (Eastbound)				Olowalu Village Middle (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
12:00 AM	0	11	0	0	0	19	0	0	0	0	0	0	0	0	0	0	30	
12:15 AM	0	10	0	0	0	15	0	0	0	0	0	0	0	0	0	0	25	
12:30 AM	0	13	0	0	0	14	0	0	0	0	0	0	0	0	0	0	27	
12:45 AM	0	3	0	0	0	12	0	0	0	0	0	0	0	0	0	0	15	97
1:00 AM	0	2	0	0	0	9	0	0	0	0	0	0	0	0	0	0	11	78
1:15 AM	0	6	0	0	0	4	0	0	0	0	0	0	0	0	0	0	10	63
1:30 AM	0	4	0	0	0	6	0	0	0	0	0	0	0	0	0	0	10	46
1:45 AM	0	11	0	0	0	9	0	0	0	0	0	0	0	0	0	0	20	51
2:00 AM	0	8	0	0	0	10	0	0	0	0	0	0	0	0	0	0	18	58
2:15 AM	0	6	0	0	0	8	0	0	0	0	0	0	0	0	0	0	14	62
2:30 AM	0	5	0	0	0	12	0	0	0	0	0	0	0	0	0	0	17	69
2:45 AM	0	8	1	0	0	9	0	0	0	0	0	0	0	0	0	0	18	67
3:00 AM	0	5	0	0	0	14	0	0	0	0	0	0	0	0	0	0	19	68
3:15 AM	0	9	0	0	0	12	0	0	0	0	0	0	0	0	0	0	21	75
3:30 AM	0	23	0	0	0	12	0	0	0	0	0	0	0	0	0	0	35	93
3:45 AM	0	19	0	0	0	13	0	0	0	0	0	0	0	0	0	0	32	107
4:00 AM	0	22	0	0	0	20	0	0	0	0	0	0	0	0	0	0	42	130
4:15 AM	0	39	0	0	0	26	0	0	0	0	0	0	0	0	0	0	65	174
4:30 AM	0	35	0	0	0	21	0	0	0	0	0	0	0	0	0	0	56	195
4:45 AM	0	54	0	0	0	24	0	0	0	0	0	0	0	0	0	0	78	241
5:00 AM	0	72	0	0	0	52	0	0	0	0	0	0	0	0	0	0	124	323
5:15 AM	0	99	0	0	0	52	0	0	0	0	0	0	0	0	0	0	151	409
5:30 AM	0	197	0	0	1	63	0	0	0	0	0	0	0	0	0	0	261	614
5:45 AM	0	140	0	0	0	79	0	0	0	0	0	0	0	0	0	0	219	755
6:00 AM	0	170	0	0	0	121	0	0	0	0	0	0	1	0	0	0	292	923
6:15 AM	0	227	1	0	0	147	0	0	0	0	0	0	0	0	0	0	375	1147
6:30 AM	0	210	0	0	0	142	0	0	0	0	0	0	0	0	0	0	352	1238
6:45 AM	0	240	0	0	0	156	0	0	0	0	0	0	0	0	0	0	396	1415
7:00 AM	0	303	0	0	0	175	0	0	0	0	0	0	1	0	0	0	479	1602
7:15 AM	0	294	0	0	0	193	0	0	0	0	0	0	0	0	1	0	488	1715
7:30 AM	0	292	0	0	0	197	0	0	0	0	0	0	0	0	2	0	491	1854
7:45 AM	0	257	0	0	0	220	0	0	0	0	0	0	0	0	0	0	477	1935
8:00 AM	0	269	0	0	0	227	0	0	0	0	0	0	0	0	0	0	496	1952
8:15 AM	0	252	1	0	0	241	0	0	0	0	0	0	1	0	1	0	496	1960
8:30 AM	0	263	0	0	0	236	0	0	0	0	0	0	0	0	1	0	500	1969
8:45 AM	0	290	0	0	0	239	0	0	0	0	0	0	1	0	0	0	530	2022
9:00 AM	0	215	0	0	0	238	0	0	0	0	0	0	0	0	0	0	453	1979
9:15 AM	0	229	0	0	0	273	0	0	0	0	0	0	0	0	0	0	502	1985
9:30 AM	0	243	0	0	0	277	0	0	0	0	0	0	0	0	0	0	520	2005

15-Min Count Period Beginning At	Honoapiilani Highway (Northbound)				Honoapiilani Highway (Southbound)				Olowalu Village Middle (Eastbound)				Olowalu Village Middle (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
9:45 AM	0	143	0	0	0	290	0	0	0	0	0	0	0	0	0	0	433	1908
10:00 AM	0	266	0	0	0	254	0	0	0	0	0	0	0	0	0	0	520	1975
10:15 AM	0	212	0	0	0	274	0	0	0	0	0	0	0	0	0	0	486	1959
10:30 AM	0	169	0	0	0	271	0	0	0	0	0	0	0	0	0	0	440	1879
10:45 AM	0	185	0	0	0	292	0	0	0	0	0	0	0	0	0	0	477	1923
11:00 AM	0	223	0	0	0	271	0	0	0	0	0	0	0	0	0	0	494	1897
11:15 AM	0	178	0	0	0	263	0	0	0	0	0	0	0	0	0	0	441	1852
11:30 AM	0	223	0	0	0	272	0	0	0	0	0	0	0	0	0	0	495	1907
11:45 AM	0	219	0	0	0	209	0	0	0	0	0	0	0	0	0	0	428	1858
12:00 PM	0	220	0	0	0	222	0	0	0	0	0	0	0	0	0	0	442	1806
12:15 PM	0	218	1	0	0	232	0	0	0	0	0	0	0	0	0	0	451	1816
12:30 PM	0	287	0	0	0	257	0	0	0	0	0	0	0	0	1	0	545	1866
12:45 PM	0	235	2	0	1	213	0	0	0	0	0	0	0	0	0	0	451	1889
1:00 PM	0	220	0	0	1	211	0	0	0	0	0	0	0	0	1	0	433	1880
1:15 PM	0	279	0	0	0	216	0	0	0	0	0	0	0	0	0	0	495	1924
1:30 PM	0	264	0	0	0	227	0	0	0	0	0	0	0	0	0	0	491	1870
1:45 PM	0	248	0	0	0	213	0	0	0	0	0	0	0	0	1	0	462	1881
2:00 PM	0	268	0	0	0	231	0	0	0	0	0	0	1	0	0	0	500	1948
2:15 PM	0	252	0	0	1	224	0	0	0	0	0	0	0	0	0	0	477	1930
2:30 PM	0	314	0	0	0	280	0	0	0	0	0	0	0	0	0	0	594	2033
2:45 PM	0	252	0	0	0	254	0	0	0	0	0	0	1	0	0	0	507	2078
3:00 PM	0	285	0	0	0	268	0	0	0	0	0	0	0	0	0	0	553	2131
3:15 PM	0	254	0	0	0	272	0	0	0	0	0	0	0	0	1	0	527	2181
3:30 PM	0	287	0	0	0	283	0	0	0	0	0	0	0	0	0	0	570	2157
3:45 PM	0	326	0	0	0	285	0	0	0	0	0	0	0	0	0	0	611	2261
4:00 PM	0	302	0	0	0	282	0	0	0	0	0	0	0	0	1	0	585	2293
4:15 PM	0	258	0	0	0	275	0	0	0	0	0	0	0	0	0	0	533	2299
4:30 PM	0	248	0	0	0	300	0	0	0	0	0	0	0	0	0	0	548	2277
4:45 PM	0	250	0	0	0	323	0	0	0	0	0	0	0	0	1	0	574	2240
5:00 PM	0	292	0	0	0	308	0	0	0	0	0	0	0	0	0	0	600	2255
5:15 PM	0	225	0	0	0	301	0	0	0	0	0	0	0	0	0	0	526	2248
5:30 PM	0	210	1	0	0	269	0	0	0	0	0	0	0	0	0	0	480	2180
5:45 PM	0	187	0	0	0	181	0	0	0	0	0	0	0	0	0	0	368	1974
6:00 PM	0	182	0	0	0	174	0	0	0	0	0	0	0	0	0	0	356	1730
6:15 PM	0	200	0	0	0	159	0	0	0	0	0	0	0	0	0	0	359	1563
6:30 PM	0	167	0	0	0	170	0	0	0	0	0	0	0	0	0	0	337	1420
6:45 PM	0	129	1	0	0	144	0	0	0	0	0	0	0	0	0	0	274	1326
7:00 PM	0	137	0	0	0	155	0	0	0	0	0	0	0	0	0	0	292	1262
7:15 PM	0	119	0	0	0	134	0	0	0	0	0	0	0	0	0	0	253	1156
7:30 PM	0	96	0	0	0	152	0	0	0	0	0	0	0	0	0	0	248	1067
7:45 PM	0	135	0	0	0	110	0	0	0	0	0	0	0	0	0	0	245	1038
8:00 PM	0	126	0	0	0	119	0	0	0	0	0	0	0	0	0	0	245	991
8:15 PM	0	101	0	0	0	115	0	0	0	0	0	0	0	0	0	0	216	954
8:30 PM	0	129	0	0	0	126	0	0	0	0	0	0	0	0	0	0	255	961
8:45 PM	0	104	0	0	0	90	0	0	0	0	0	0	0	0	0	0	194	910
9:00 PM	0	124	0	0	0	83	0	0	0	0	0	0	0	0	0	0	207	872
9:15 PM	0	94	0	0	0	100	0	0	0	0	0	0	0	0	0	0	194	850
9:30 PM	0	85	2	0	0	88	0	0	0	0	0	0	0	0	0	0	175	770
9:45 PM	0	86	1	0	0	72	0	0	0	0	0	0	0	0	0	0	159	735
10:00 PM	0	76	2	0	0	79	0	0	0	0	0	0	0	0	1	0	158	686
10:15 PM	0	48	0	0	0	79	0	0	0	0	0	0	0	0	0	0	127	619
10:30 PM	0	46	0	0	0	66	0	0	0	0	0	0	0	0	1	0	113	557
10:45 PM	0	24	0	0	0	46	0	0	0	0	0	0	0	0	0	0	70	468
11:00 PM	0	27	0	0	0	55	0	0	0	0	0	0	0	0	0	0	82	392
11:15 PM	0	26	0	0	0	52	0	0	0	0	0	0	0	0	0	0	78	343
11:30 PM	0	15	0	0	0	32	0	0	0	0	0	0	0	0	0	0	47	277
11:45 PM	0	11	0	0	0	20	0	0	0	0	0	0	0	0	0	0	31	238

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	1304	0	0	0	1140	0	0	0	0	0	0	0	0	0	0	2444
Heavy Trucks	0	20	0		0	44	0		0	0	0		0	0	0		64
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 6/23/2023 8:30 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: System-wide Peak

Method for determining peak hour: Total Entering Volume

LOCATION: Honoapiilani Highway -- Olowalu Village South/East

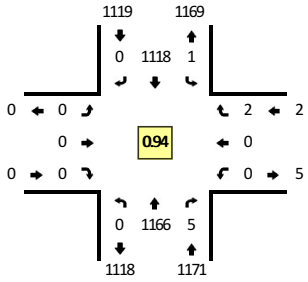
QC JOB #: 16179907

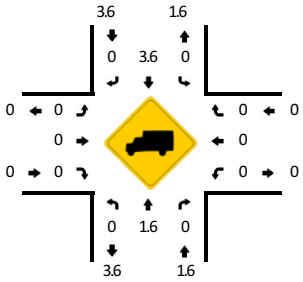
CITY/STATE: Olowalu, HI

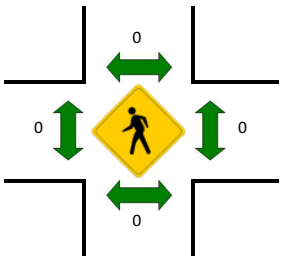
DATE: Wed, May 3 2023

Peak-Hour: 3:15 PM -- 4:15 PM

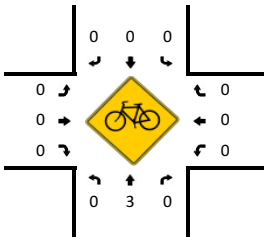
Peak 15-Min: 3:45 PM -- 4:00 PM

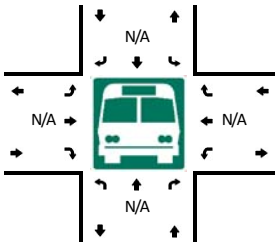




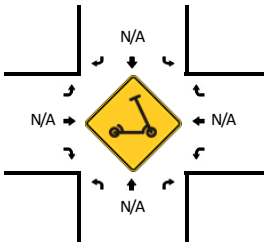












15-Min Count Period Beginning At	Honoapiilani Highway (Northbound)				Honoapiilani Highway (Southbound)				Olowalu Village South/East (Eastbound)				Olowalu Village South/East (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
12:00 AM	0	11	0	0	0	19	0	0	0	0	0	0	0	0	0	0	30	
12:15 AM	0	10	0	0	0	15	0	0	0	0	0	0	0	0	0	0	25	
12:30 AM	0	13	0	0	0	14	0	0	0	0	0	0	0	0	0	0	27	
12:45 AM	0	3	0	0	0	12	0	0	0	0	0	0	0	0	0	0	15	97
1:00 AM	0	2	0	0	0	9	0	0	0	0	0	0	0	0	0	0	11	78
1:15 AM	0	5	0	0	0	4	0	0	0	0	0	0	0	0	0	0	9	62
1:30 AM	0	4	0	0	0	6	0	0	0	0	0	0	0	0	0	0	10	45
1:45 AM	0	12	0	0	0	9	0	0	0	0	0	0	0	0	0	0	21	51
2:00 AM	0	7	0	0	0	10	0	0	0	0	0	0	0	0	1	0	18	58
2:15 AM	0	6	0	0	0	7	0	0	0	0	0	0	0	0	0	0	13	62
2:30 AM	0	6	0	0	0	13	0	0	0	0	0	0	0	0	0	0	19	71
2:45 AM	0	8	0	0	0	9	0	0	0	0	0	0	0	0	0	0	17	67
3:00 AM	0	5	0	0	0	14	0	0	0	0	0	0	0	0	0	0	19	68
3:15 AM	0	10	0	0	0	12	0	0	0	0	0	0	0	0	0	0	22	77
3:30 AM	0	21	0	0	0	11	0	0	0	0	0	0	0	0	0	0	32	90
3:45 AM	0	19	0	0	0	14	0	0	0	0	0	0	0	0	0	0	33	106
4:00 AM	0	22	0	0	0	19	0	0	0	0	0	0	0	0	0	0	41	128
4:15 AM	0	39	0	0	0	27	0	0	0	0	0	0	0	0	0	0	66	172
4:30 AM	0	35	0	0	0	22	0	0	0	0	0	0	0	0	0	0	57	197
4:45 AM	0	55	0	0	0	21	0	0	0	0	0	0	0	0	0	0	76	240
5:00 AM	0	70	0	0	0	52	0	0	0	0	0	0	0	0	0	0	122	321
5:15 AM	0	100	0	0	0	53	0	0	0	0	0	0	0	0	0	0	153	408
5:30 AM	0	189	0	0	0	62	0	0	0	0	0	0	0	0	0	0	251	602
5:45 AM	0	142	0	0	0	79	0	0	0	0	0	0	0	0	0	0	221	747
6:00 AM	0	168	0	0	0	122	0	0	0	0	0	0	0	0	0	0	290	915
6:15 AM	0	229	0	0	0	141	0	0	0	0	0	0	0	0	0	0	370	1132
6:30 AM	0	209	0	0	0	144	0	0	0	0	0	0	0	0	0	0	353	1234
6:45 AM	0	242	0	0	0	157	0	0	0	0	0	0	0	0	0	0	399	1412
7:00 AM	0	301	0	0	0	175	0	0	0	0	0	0	1	0	0	0	477	1599
7:15 AM	0	297	1	0	0	192	0	0	0	0	0	0	0	0	0	0	490	1719
7:30 AM	0	291	2	0	0	194	0	0	0	0	0	0	0	0	0	0	487	1853
7:45 AM	0	259	0	0	0	224	0	0	0	0	0	0	0	0	1	0	484	1938
8:00 AM	0	269	0	0	0	227	0	0	0	0	0	0	1	0	0	0	497	1958
8:15 AM	0	249	0	0	0	243	0	0	0	0	0	0	0	0	0	0	492	1960
8:30 AM	0	263	0	0	0	236	0	0	0	0	0	0	0	0	0	0	499	1972
8:45 AM	0	288	0	0	0	237	0	0	0	0	0	0	0	0	1	0	526	2014
9:00 AM	0	215	0	0	0	236	0	0	0	0	0	0	0	0	1	0	452	1969
9:15 AM	0	226	0	0	0	276	0	0	0	0	0	0	0	0	0	0	502	1979
9:30 AM	0	250	0	0	0	276	0	0	0	0	0	0	0	0	0	0	526	2006

15-Min Count Period Beginning At	Honoapiilani Highway (Northbound)				Honoapiilani Highway (Southbound)				Olowalu Village South/East (Eastbound)				Olowalu Village South/East (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
9:45 AM	0	149	0	0	0	288	0	0	0	0	0	0	0	0	0	0	437	1917
10:00 AM	0	265	0	0	1	253	0	0	0	0	0	0	0	0	1	0	520	1985
10:15 AM	0	210	0	0	0	274	0	0	0	0	0	0	0	0	1	0	485	1968
10:30 AM	0	170	0	0	0	274	0	0	0	0	0	0	0	0	0	0	444	1886
10:45 AM	0	184	1	0	0	290	0	0	0	0	0	0	0	0	0	0	475	1924
11:00 AM	0	228	0	0	0	270	0	0	0	0	0	0	0	0	0	0	498	1902
11:15 AM	0	181	0	0	0	262	0	0	0	0	0	0	0	0	0	0	443	1860
11:30 AM	0	227	2	0	0	270	0	0	0	0	0	0	0	0	0	0	499	1915
11:45 AM	0	215	0	0	0	210	0	0	0	0	0	0	0	0	0	0	425	1865
12:00 PM	0	219	0	0	0	224	0	0	0	0	0	0	0	0	0	0	443	1810
12:15 PM	0	221	0	0	0	233	0	0	0	0	0	0	0	0	0	0	454	1821
12:30 PM	0	286	0	0	0	259	0	0	0	0	0	0	0	0	0	0	545	1867
12:45 PM	0	239	0	0	0	211	0	0	0	0	0	0	1	0	0	0	451	1893
1:00 PM	0	220	0	0	0	216	0	0	0	0	0	0	0	0	0	0	436	1886
1:15 PM	0	276	0	0	0	216	0	0	0	0	0	0	0	0	0	0	492	1924
1:30 PM	0	263	1	0	0	224	0	0	0	0	0	0	0	0	0	0	488	1867
1:45 PM	0	250	0	0	0	217	0	0	0	0	0	0	0	0	0	0	467	1883
2:00 PM	0	272	0	0	0	233	0	0	0	0	0	0	0	0	0	0	505	1952
2:15 PM	0	256	0	0	0	226	0	0	0	0	0	0	0	0	0	0	482	1942
2:30 PM	0	313	0	0	0	277	0	0	0	0	0	0	0	0	0	0	590	2044
2:45 PM	0	253	0	0	0	258	0	0	0	0	0	0	0	0	0	0	511	2088
3:00 PM	0	284	0	0	0	269	0	0	0	0	0	0	1	0	1	0	555	2138
3:15 PM	0	252	2	0	0	271	0	0	0	0	0	0	0	0	0	0	525	2181
3:30 PM	0	289	1	0	0	280	0	1	0	0	0	0	0	0	0	0	571	2162
3:45 PM	0	323	0	0	0	287	0	0	0	0	0	0	0	0	1	0	611	2262
4:00 PM	0	302	2	0	0	280	0	0	0	0	0	0	0	0	1	0	585	2292
4:15 PM	0	259	0	0	0	277	0	0	0	0	0	0	0	0	0	0	536	2303
4:30 PM	0	248	0	0	0	301	0	0	0	0	0	0	0	0	0	0	549	2281
4:45 PM	0	251	0	0	0	322	0	0	0	0	0	0	0	0	0	0	573	2243
5:00 PM	0	292	0	0	0	309	0	0	0	0	0	0	0	0	0	0	601	2259
5:15 PM	0	219	2	0	0	301	0	0	0	0	0	0	1	0	0	0	523	2246
5:30 PM	0	213	1	0	0	266	0	0	0	0	0	0	0	0	1	0	481	2178
5:45 PM	0	189	0	0	0	186	0	0	0	0	0	0	0	0	0	0	375	1980
6:00 PM	0	178	0	0	0	171	0	0	0	0	0	0	0	0	0	0	349	1728
6:15 PM	0	200	0	0	0	162	0	0	0	0	0	0	0	0	0	0	362	1567
6:30 PM	0	169	0	1	0	171	0	0	0	0	0	0	0	0	0	0	341	1427
6:45 PM	0	128	0	0	0	146	0	0	0	0	0	0	0	0	0	0	274	1326
7:00 PM	0	137	0	0	0	154	0	0	0	0	0	0	0	0	0	0	291	1268
7:15 PM	0	119	0	0	0	134	0	0	0	0	0	0	0	0	0	0	253	1159
7:30 PM	0	99	1	0	0	152	0	0	0	0	0	0	1	0	0	0	253	1071
7:45 PM	0	132	1	0	0	109	0	0	0	0	0	0	1	0	0	0	243	1040
8:00 PM	0	126	0	0	0	119	0	0	0	0	0	0	0	0	0	0	245	994
8:15 PM	0	101	1	0	0	114	0	0	0	0	0	0	0	0	0	0	216	957
8:30 PM	0	130	0	0	0	123	0	0	0	0	0	0	0	0	0	0	253	957
8:45 PM	0	105	0	0	0	87	0	0	0	0	0	0	0	0	0	0	192	906
9:00 PM	0	122	0	0	0	83	0	0	0	0	0	0	0	0	0	0	205	866
9:15 PM	0	88	1	0	0	102	0	0	0	0	0	0	0	0	0	0	191	841
9:30 PM	0	89	0	0	0	87	0	0	0	0	0	0	0	0	0	0	176	764
9:45 PM	0	85	0	0	0	73	0	0	0	0	0	0	0	0	0	0	158	730
10:00 PM	0	78	0	0	0	79	0	0	0	0	0	0	0	0	0	0	157	682
10:15 PM	0	48	0	0	0	80	0	0	0	0	0	0	0	0	0	0	128	619
10:30 PM	0	47	1	0	0	63	0	0	0	0	0	0	0	0	0	0	111	554
10:45 PM	0	23	0	0	0	48	0	0	0	0	0	0	0	0	0	0	71	467
11:00 PM	0	27	0	0	0	55	0	0	0	0	0	0	0	0	0	0	82	392
11:15 PM	0	26	0	0	0	53	0	0	0	0	0	0	0	0	0	0	79	343
11:30 PM	0	15	0	0	0	32	0	0	0	0	0	0	0	0	0	0	47	279
11:45 PM	0	11	0	0	0	21	0	0	0	0	0	0	0	0	0	0	32	240

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	1292	0	0	0	1148	0	0	0	0	0	0	0	0	4	0	2444
Heavy Trucks	0	20	0		0	44	0		0	0	0		0	0	0		64
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 6/23/2023 8:30 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

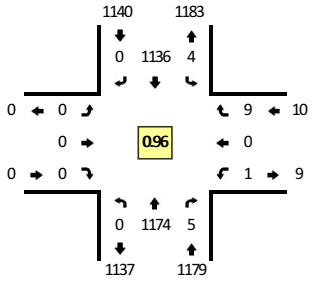
Type of peak hour being reported: System-wide Peak | Method for determining peak hour: Total Entering Volume

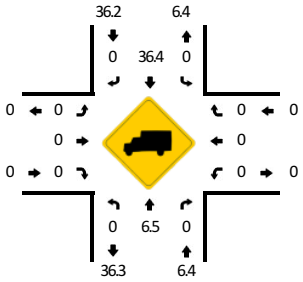
LOCATION: Honoapiilani Highway -- Ehehene Street | **QC JOB #:** 16179908

CITY/STATE: Olowalu, HI | **DATE:** Wed, May 3 2023

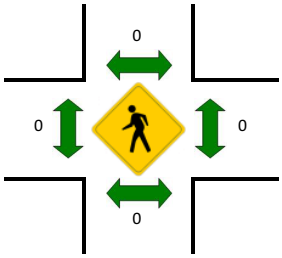
Peak-Hour: 3:15 PM -- 4:15 PM

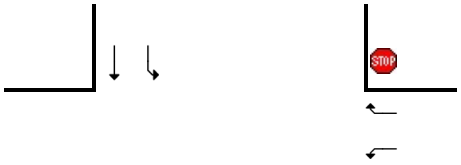
Peak 15-Min: 3:45 PM -- 4:00 PM

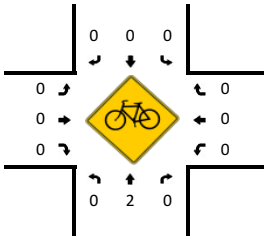


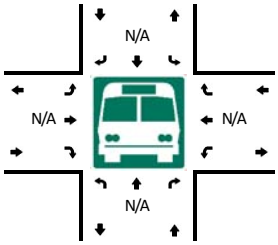


Quality Counts
DATA THAT DRIVES COMMUNITIES

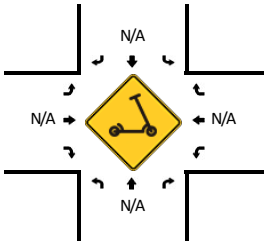












15-Min Count Period Beginning At	Honoapiilani Highway (Northbound)				Honoapiilani Highway (Southbound)				Ehehene Street (Eastbound)				Ehehene Street (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
12:00 AM	0	3	0	0	0	13	0	0	0	0	0	0	0	0	0	0	16	
12:15 AM	0	6	0	0	0	14	0	0	0	0	0	0	0	0	0	0	20	
12:30 AM	0	7	0	0	0	15	0	0	0	0	0	0	0	0	0	0	22	
12:45 AM	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	10	68
1:00 AM	0	2	0	0	0	11	0	0	0	0	0	0	0	0	0	0	13	65
1:15 AM	0	2	0	0	0	5	0	0	0	0	0	0	0	0	0	0	7	52
1:30 AM	0	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	8	38
1:45 AM	0	10	0	0	0	9	0	0	0	0	0	0	0	0	0	0	19	47
2:00 AM	0	5	0	0	0	10	0	0	0	0	0	0	0	0	0	0	15	49
2:15 AM	0	6	0	0	0	6	0	0	0	0	0	0	0	0	0	0	12	54
2:30 AM	0	5	0	0	0	13	0	0	0	0	0	0	0	0	0	0	18	64
2:45 AM	0	7	0	0	0	11	0	0	0	0	0	0	0	0	0	0	18	63
3:00 AM	0	3	0	0	0	16	0	0	0	0	0	0	0	0	0	0	19	67
3:15 AM	0	6	0	0	0	12	0	0	0	0	0	0	0	0	0	0	18	73
3:30 AM	0	14	0	0	0	11	0	0	0	0	0	0	0	0	0	0	25	80
3:45 AM	0	11	0	0	0	13	0	0	0	0	0	0	0	0	0	0	24	86
4:00 AM	0	17	0	0	0	17	0	0	0	0	0	0	0	0	0	0	34	101
4:15 AM	0	30	0	0	0	26	0	0	0	0	0	0	0	0	0	0	56	139
4:30 AM	0	22	0	0	0	22	0	0	0	0	0	0	0	0	0	0	44	158
4:45 AM	0	50	0	0	0	23	0	0	0	0	0	0	0	0	0	0	73	207
5:00 AM	0	51	0	0	0	55	0	0	0	0	0	0	0	0	1	0	107	280
5:15 AM	0	94	0	0	0	48	0	0	0	0	0	0	0	0	0	0	142	366
5:30 AM	0	92	0	0	0	33	0	0	0	0	0	0	0	0	0	0	125	447
5:45 AM	0	142	0	0	0	79	0	0	0	0	0	0	1	0	2	0	224	598
6:00 AM	0	172	0	0	0	120	0	0	0	0	0	0	0	0	0	0	292	783
6:15 AM	0	226	0	0	0	140	0	0	0	0	0	0	0	0	0	0	366	1007
6:30 AM	0	222	0	0	0	145	0	0	0	0	0	0	0	0	0	0	367	1249
6:45 AM	0	237	1	0	0	139	0	0	0	0	0	0	1	0	0	0	378	1403
7:00 AM	0	310	0	0	1	194	0	0	0	0	0	0	1	0	0	0	506	1617
7:15 AM	0	330	6	0	0	188	0	0	0	0	0	0	2	0	0	0	526	1777
7:30 AM	0	300	1	0	1	184	0	0	0	0	0	0	1	0	2	0	489	1899
7:45 AM	0	255	0	0	1	222	0	0	0	0	0	0	0	0	1	0	479	2000
8:00 AM	0	259	0	0	0	200	0	0	0	0	0	0	1	0	0	0	460	1954
8:15 AM	0	244	0	0	1	262	0	0	0	0	0	0	0	0	2	0	509	1937
8:30 AM	0	281	1	0	0	224	0	0	0	0	0	0	0	0	1	0	507	1955
8:45 AM	0	266	1	0	0	240	0	0	0	0	0	0	0	0	1	0	508	1984
9:00 AM	0	217	1	0	0	226	0	0	0	0	0	0	0	0	0	0	444	1968
9:15 AM	0	239	2	0	1	286	0	0	0	0	0	0	2	0	2	0	532	1991
9:30 AM	0	233	0	0	1	268	0	0	0	0	0	0	0	0	0	0	502	1986

15-Min Count Period Beginning At	Honoapiilani Highway (Northbound)				Honoapiilani Highway (Southbound)				Ehehene Street (Eastbound)				Ehehene Street (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
9:45 AM	0	162	0	0	0	291	0	0	0	0	0	0	0	0	1	0	454	1932
10:00 AM	0	257	1	0	1	264	0	0	0	0	0	0	0	0	0	0	523	2011
10:15 AM	0	203	1	0	1	266	0	0	0	0	0	0	2	0	1	0	474	1953
10:30 AM	0	173	1	0	2	263	0	0	0	0	0	0	0	0	0	0	439	1890
10:45 AM	0	191	1	0	0	284	0	0	0	0	0	0	1	0	2	0	479	1915
11:00 AM	0	206	0	0	1	284	0	0	0	0	0	0	0	0	1	0	492	1884
11:15 AM	0	195	0	0	2	263	0	0	0	0	0	0	1	0	0	0	461	1871
11:30 AM	0	225	3	0	3	274	0	0	0	0	0	0	1	0	3	0	509	1941
11:45 AM	0	216	3	0	0	204	0	0	0	0	0	0	1	0	0	0	424	1886
12:00 PM	0	215	0	0	0	228	0	0	0	0	0	0	0	0	2	0	445	1839
12:15 PM	0	227	2	0	2	229	0	0	0	0	0	0	0	0	2	0	462	1840
12:30 PM	0	267	2	0	0	264	0	0	0	0	0	0	0	0	3	0	536	1867
12:45 PM	0	229	2	0	0	218	0	0	0	0	0	0	1	0	2	0	452	1895
1:00 PM	0	240	0	0	2	218	0	0	0	0	0	0	2	0	1	0	463	1913
1:15 PM	0	255	1	0	0	211	0	0	0	0	0	0	0	0	1	0	468	1919
1:30 PM	0	283	0	0	0	216	0	0	0	0	0	0	0	0	1	0	500	1883
1:45 PM	0	231	0	0	0	224	0	0	0	0	0	0	0	0	0	0	455	1886
2:00 PM	0	279	0	0	0	210	0	0	0	0	0	0	0	0	0	0	489	1912
2:15 PM	0	283	0	0	1	259	0	0	0	0	0	0	0	0	0	0	543	1987
2:30 PM	0	280	0	0	3	283	0	0	0	0	0	0	0	0	2	0	568	2055
2:45 PM	0	254	1	0	0	253	0	0	0	0	0	0	1	0	1	0	510	2110
3:00 PM	0	271	0	0	1	257	0	0	0	0	0	0	0	0	0	0	529	2150
3:15 PM	0	277	1	0	0	279	0	0	0	0	0	0	1	0	1	0	559	2166
3:30 PM	0	286	1	0	2	294	0	0	0	0	0	0	0	0	3	0	586	2184
3:45 PM	0	319	2	0	0	284	0	0	0	0	0	0	0	0	1	0	606	2280
4:00 PM	0	292	1	0	2	279	0	0	0	0	0	0	0	0	4	0	578	2329
4:15 PM	0	237	2	0	0	279	0	0	0	0	0	0	2	0	0	0	520	2290
4:30 PM	0	261	1	0	0	293	0	0	0	0	0	0	0	0	1	0	556	2260
4:45 PM	0	240	1	0	2	298	0	0	0	0	0	0	0	0	0	0	541	2195
5:00 PM	0	265	2	0	2	307	0	0	0	0	0	0	2	0	1	0	579	2196
5:15 PM	0	186	0	0	0	276	0	0	0	0	0	0	0	0	0	0	462	2138
5:30 PM	0	214	2	0	0	145	0	0	0	0	0	0	0	0	2	0	363	1945
5:45 PM	0	164	0	0	0	126	0	0	0	0	0	0	0	0	0	0	290	1694
6:00 PM	0	176	0	0	0	90	0	0	0	0	0	0	1	0	0	0	267	1382
6:15 PM	0	154	3	0	0	149	0	0	0	0	0	0	0	0	0	0	306	1226
6:30 PM	0	129	8	0	0	196	0	0	0	0	0	0	1	0	0	0	334	1197
6:45 PM	0	128	0	0	0	87	0	0	0	0	0	0	2	0	1	0	218	1125
7:00 PM	0	108	1	0	1	77	0	0	0	0	0	0	1	0	1	0	189	1047
7:15 PM	0	74	0	0	1	123	0	0	0	0	0	0	0	0	1	0	199	940
7:30 PM	0	86	0	0	0	132	0	0	0	0	0	0	0	0	0	0	218	824
7:45 PM	0	114	0	0	0	119	0	0	0	0	0	0	0	0	0	0	233	839
8:00 PM	0	86	1	0	0	96	0	0	0	0	0	0	1	0	1	0	185	835
8:15 PM	0	77	1	0	0	102	0	0	0	0	0	0	0	0	0	0	180	816
8:30 PM	0	98	0	0	0	107	0	0	0	0	0	0	0	0	0	0	205	803
8:45 PM	0	108	1	0	0	85	0	0	0	0	0	0	1	0	1	0	196	766
9:00 PM	0	81	0	0	0	71	0	0	0	0	0	0	0	0	0	0	152	733
9:15 PM	0	71	0	0	0	92	0	0	0	0	0	0	0	0	0	0	163	716
9:30 PM	0	66	0	0	0	90	0	0	0	0	0	0	1	0	0	0	157	668
9:45 PM	0	76	0	0	0	64	0	0	0	0	0	0	0	0	0	0	140	612
10:00 PM	0	53	0	0	0	69	0	0	0	0	0	0	0	0	0	0	122	582
10:15 PM	0	37	0	0	0	61	0	0	0	0	0	0	0	0	0	0	98	517
10:30 PM	0	37	0	0	0	73	0	0	0	0	0	0	0	0	0	0	110	470
10:45 PM	0	19	0	0	0	50	0	0	0	0	0	0	0	0	0	0	69	399
11:00 PM	0	20	0	0	0	46	0	0	0	0	0	0	0	0	0	0	66	343
11:15 PM	0	22	0	0	0	51	0	0	0	0	0	0	0	0	0	0	73	318
11:30 PM	0	11	0	0	0	31	0	0	0	0	0	0	0	0	0	0	42	250
11:45 PM	0	12	0	0	0	19	0	0	0	0	0	0	0	0	0	0	31	212

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	1276	8	0	0	1136	0	0	0	0	0	0	0	0	4	0	2424
Heavy Trucks	0	104	0		0	412	0		0	0	0		0	0	0		516
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

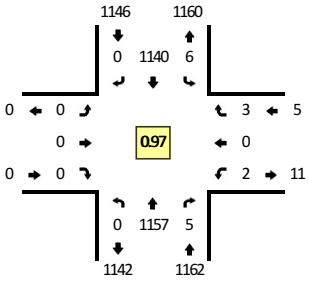
Report generated on 6/23/2023 8:30 AM

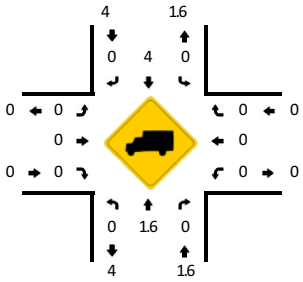
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: System-wide Peak | Method for determining peak hour: Total Entering Volume

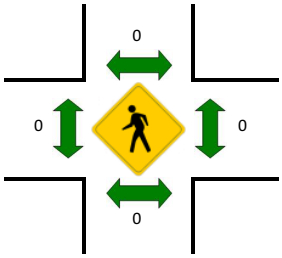
LOCATION: Honoapiilani Highway -- Pohaku Aeko Street | **QC JOB #:** 16179909
CITY/STATE: Olowalu, HI | **DATE:** Wed, May 3 2023

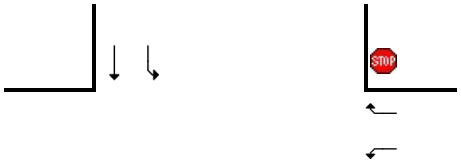
Peak-Hour: 3:15 PM -- 4:15 PM
Peak 15-Min: 3:45 PM -- 4:00 PM

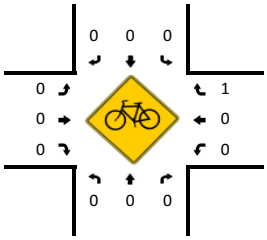


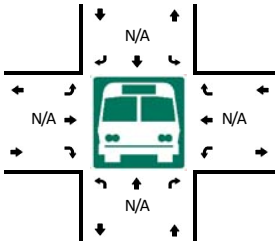


Quality Counts
DATA THAT DRIVES COMMUNITIES

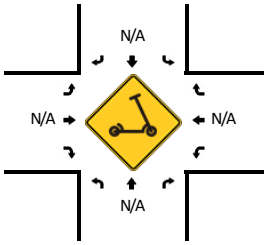












15-Min Count Period Beginning At	Honoapiilani Highway (Northbound)				Honoapiilani Highway (Southbound)				Pohaku Aeko Street (Eastbound)				Pohaku Aeko Street (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
12:00 AM	0	15	0	0	0	15	0	0	0	0	0	0	0	0	0	0	30	
12:15 AM	0	9	0	0	0	12	0	0	0	0	0	0	0	0	0	0	21	
12:30 AM	0	12	1	0	0	10	0	0	0	0	0	0	0	0	0	0	23	
12:45 AM	0	3	2	0	0	8	0	0	0	0	0	0	0	0	0	0	13	87
1:00 AM	0	3	0	0	0	11	0	0	0	0	0	0	0	0	0	0	14	71
1:15 AM	0	5	0	0	1	1	0	0	0	0	0	0	1	0	0	0	8	58
1:30 AM	0	4	0	0	0	5	0	0	0	0	0	0	0	0	0	0	9	44
1:45 AM	0	12	0	0	0	6	0	0	0	0	0	0	0	0	0	0	18	49
2:00 AM	0	6	0	0	0	8	0	0	0	0	0	0	0	0	0	0	14	49
2:15 AM	0	6	0	0	0	7	0	0	0	0	0	0	0	0	0	0	13	54
2:30 AM	0	7	0	0	0	12	0	0	0	0	0	0	0	0	0	0	19	64
2:45 AM	0	11	0	0	0	9	0	0	0	0	0	0	0	0	0	0	20	66
3:00 AM	0	4	0	0	0	7	0	0	0	0	0	0	0	0	0	0	11	63
3:15 AM	0	10	0	0	0	11	0	0	0	0	0	0	0	0	0	0	21	71
3:30 AM	0	24	0	0	1	9	0	0	0	0	0	0	0	0	0	0	34	86
3:45 AM	0	19	0	0	0	12	0	0	0	0	0	0	0	0	0	0	31	97
4:00 AM	0	26	0	0	0	12	0	0	0	0	0	0	1	0	0	0	39	125
4:15 AM	0	39	0	0	0	23	0	0	0	0	0	0	0	0	0	0	62	166
4:30 AM	0	44	0	0	0	21	0	0	0	0	0	0	0	0	0	0	65	197
4:45 AM	0	59	0	0	1	18	0	0	0	0	0	0	0	0	0	0	78	244
5:00 AM	0	73	0	0	0	39	0	0	0	0	0	0	0	0	0	0	112	317
5:15 AM	0	127	0	0	0	40	0	0	0	0	0	0	0	0	0	0	167	422
5:30 AM	0	153	0	0	0	30	0	0	0	0	0	0	0	0	0	0	183	540
5:45 AM	0	135	1	0	0	84	0	0	0	0	0	0	0	0	0	0	220	682
6:00 AM	0	167	0	0	1	111	0	0	0	0	0	0	1	0	1	0	281	851
6:15 AM	0	233	0	0	1	141	0	0	0	0	0	0	0	0	1	0	376	1060
6:30 AM	0	219	0	0	0	155	0	0	0	0	0	0	0	0	0	0	374	1251
6:45 AM	0	217	0	0	0	138	0	0	0	0	0	0	0	0	2	0	357	1388
7:00 AM	0	274	0	0	0	175	0	0	0	0	0	0	0	0	1	0	450	1557
7:15 AM	0	289	0	0	1	165	0	0	0	0	0	0	0	0	3	0	458	1639
7:30 AM	0	287	2	0	1	178	0	0	0	0	0	0	0	0	2	0	470	1735
7:45 AM	0	231	0	0	0	212	0	0	0	0	0	0	1	0	1	0	445	1823
8:00 AM	0	236	0	0	0	188	0	0	0	0	0	0	0	0	0	0	424	1797
8:15 AM	0	224	0	0	1	257	0	0	0	0	0	0	0	0	1	0	483	1822
8:30 AM	0	270	0	0	2	223	0	0	0	0	0	0	0	0	0	0	495	1847
8:45 AM	0	252	2	0	0	226	0	0	0	0	0	0	0	0	1	0	481	1883
9:00 AM	0	201	0	0	0	224	0	0	0	0	0	0	0	0	0	0	425	1884
9:15 AM	0	224	2	0	1	288	0	0	0	0	0	0	0	0	1	0	516	1917
9:30 AM	0	227	2	0	0	288	0	0	0	0	0	0	1	0	0	0	518	1940

15-Min Count Period Beginning At	Honoapiilani Highway (Northbound)				Honoapiilani Highway (Southbound)				Pohaku Aeko Street (Eastbound)				Pohaku Aeko Street (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
9:45 AM	0	170	2	0	1	284	0	0	0	0	0	0	2	0	0	0	459	1918
10:00 AM	0	261	2	0	2	277	0	0	0	0	0	0	0	0	1	0	543	2036
10:15 AM	0	199	2	0	3	257	0	0	0	0	0	0	1	0	1	0	463	1983
10:30 AM	0	174	2	0	2	275	0	0	0	0	0	0	2	0	3	0	458	1923
10:45 AM	0	187	1	0	0	285	0	0	0	0	0	0	2	0	1	0	476	1940
11:00 AM	0	201	1	0	4	290	0	0	0	0	0	0	1	0	1	0	498	1895
11:15 AM	0	208	0	0	1	273	0	0	0	0	0	0	0	0	0	0	482	1914
11:30 AM	0	211	2	0	1	285	0	0	0	0	0	0	1	0	2	0	502	1958
11:45 AM	0	223	2	0	3	215	0	0	0	0	0	0	0	0	0	0	443	1925
12:00 PM	0	224	3	0	1	224	0	0	0	0	0	0	2	0	3	0	457	1884
12:15 PM	0	232	1	0	2	237	0	0	0	0	0	0	0	0	3	0	475	1877
12:30 PM	0	257	1	0	2	267	0	0	0	0	0	0	0	0	2	0	529	1904
12:45 PM	0	220	1	0	6	218	0	0	0	0	0	0	0	0	2	0	447	1908
1:00 PM	0	253	1	0	4	228	0	0	0	0	0	0	0	0	0	0	486	1937
1:15 PM	0	258	1	0	2	197	0	0	0	0	0	0	0	0	2	0	460	1922
1:30 PM	0	266	1	0	3	230	0	0	0	0	0	0	0	0	1	0	501	1894
1:45 PM	0	236	0	0	2	215	0	0	0	0	0	0	0	0	2	0	455	1902
2:00 PM	0	275	2	0	3	217	0	0	0	0	0	0	2	0	1	0	500	1916
2:15 PM	0	280	2	0	4	258	0	0	0	0	0	0	1	0	0	0	545	2001
2:30 PM	0	280	0	0	0	289	0	0	0	0	0	0	0	0	1	0	570	2070
2:45 PM	0	258	0	0	0	256	0	0	0	0	0	0	0	0	0	0	514	2129
3:00 PM	0	278	0	0	1	258	0	0	0	0	0	0	2	0	0	0	539	2168
3:15 PM	0	266	1	0	1	300	0	0	0	0	0	0	0	0	1	0	569	2192
3:30 PM	0	286	2	0	1	286	0	0	0	0	0	0	1	0	1	0	577	2199
3:45 PM	0	315	2	0	2	276	0	0	0	0	0	0	1	0	1	0	597	2282
4:00 PM	0	290	0	0	2	278	0	0	0	0	0	0	0	0	0	0	570	2313
4:15 PM	0	233	0	0	0	285	0	0	0	0	0	0	0	0	0	0	518	2262
4:30 PM	0	273	1	0	3	296	0	0	0	0	0	0	1	0	1	0	575	2260
4:45 PM	0	256	3	0	1	303	0	0	0	0	0	0	1	0	0	0	564	2227
5:00 PM	0	274	1	0	0	324	0	0	0	0	0	0	0	0	1	0	600	2257
5:15 PM	0	219	0	0	1	299	0	0	0	0	0	0	0	0	0	0	519	2258
5:30 PM	0	209	1	0	2	274	0	0	0	0	0	0	1	0	0	0	487	2170
5:45 PM	0	174	1	0	1	194	0	0	0	0	0	0	0	0	2	0	372	1978
6:00 PM	0	201	1	0	3	176	0	0	0	0	0	0	0	0	1	0	382	1760
6:15 PM	0	199	0	0	4	163	0	0	0	0	0	0	1	0	0	0	367	1608
6:30 PM	0	148	0	0	4	178	0	0	0	0	0	0	1	0	1	0	332	1453
6:45 PM	0	128	0	0	5	148	0	0	0	0	0	0	0	0	0	0	281	1362
7:00 PM	0	131	0	0	0	88	0	0	0	0	0	0	1	0	0	0	220	1200
7:15 PM	0	116	2	0	0	118	0	0	0	0	0	0	0	0	1	0	237	1070
7:30 PM	0	120	0	0	2	125	0	0	0	0	0	0	0	0	0	0	247	985
7:45 PM	0	162	1	0	2	103	0	0	0	0	0	0	0	0	2	0	270	974
8:00 PM	0	109	1	0	0	90	0	0	0	0	0	0	1	0	0	0	201	955
8:15 PM	0	109	0	0	0	88	0	0	0	0	0	0	0	0	0	0	197	915
8:30 PM	0	140	2	0	1	102	0	0	0	0	0	0	1	0	2	0	248	916
8:45 PM	0	135	1	0	0	65	0	0	0	0	0	0	0	0	1	0	202	848
9:00 PM	0	105	0	0	0	62	0	0	0	0	0	0	1	0	0	0	168	815
9:15 PM	0	86	0	0	1	84	0	0	0	0	0	0	0	0	0	0	171	789
9:30 PM	0	83	0	0	1	69	0	0	0	0	0	0	1	0	0	0	154	695
9:45 PM	0	106	1	0	0	47	0	0	0	0	0	0	0	0	0	0	154	647
10:00 PM	0	64	1	0	1	61	0	0	0	0	0	0	0	0	2	0	129	608
10:15 PM	0	49	1	0	0	53	0	0	0	0	0	0	1	0	0	0	104	541
10:30 PM	0	56	0	0	0	69	0	0	0	0	0	0	1	0	0	0	126	513
10:45 PM	0	29	0	0	0	40	0	0	0	0	0	0	1	0	0	0	70	429
11:00 PM	0	23	0	0	1	35	0	0	0	0	0	0	0	0	1	0	60	360
11:15 PM	0	28	0	0	0	38	0	0	0	0	0	0	0	0	0	0	66	322
11:30 PM	0	15	0	0	0	27	0	0	0	0	0	0	0	0	0	0	42	238
11:45 PM	0	12	0	0	0	17	0	0	0	0	0	0	0	0	0	0	29	197

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	1260	8	0	8	1104	0	0	0	0	0	0	4	0	4	0	2388
Heavy Trucks	0	32	0		0	32	0		0	0	0		0	0	0		64
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 6/23/2023 8:30 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

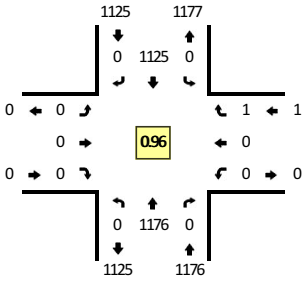
Type of peak hour being reported: System-wide Peak | Method for determining peak hour: Total Entering Volume

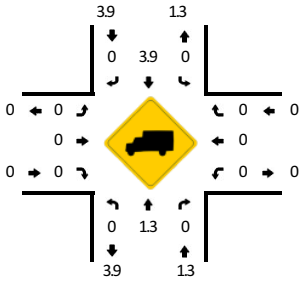
LOCATION: Honoapiilani Highway -- Ukumehame Firing Range | **QC JOB #:** 16179910

CITY/STATE: Olowalu, HI | **DATE:** Wed, May 3 2023

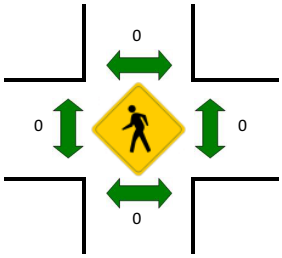
Peak-Hour: 3:15 PM -- 4:15 PM

Peak 15-Min: 3:45 PM -- 4:00 PM

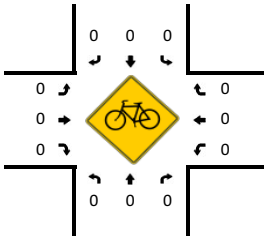


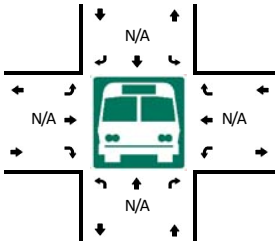


Quality Counts
DATA THAT DRIVES COMMUNITIES

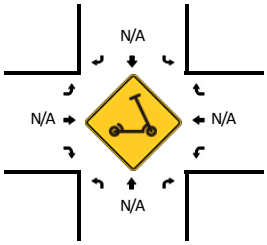












15-Min Count Period Beginning At	Honoapiilani Highway (Northbound)				Honoapiilani Highway (Southbound)				Ukumehame Firing Range (Eastbound)				Ukumehame Firing Range (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
12:00 AM	0	13	0	0	0	20	0	0	0	0	0	0	0	0	0	0	33	
12:15 AM	0	8	0	0	0	12	0	0	0	0	0	0	0	0	0	0	20	
12:30 AM	0	14	0	0	0	19	0	0	0	0	0	0	0	0	0	0	33	
12:45 AM	0	2	0	0	0	12	0	0	0	0	0	0	0	0	0	0	14	100
1:00 AM	0	2	0	0	0	9	0	0	0	0	0	0	0	0	0	0	11	78
1:15 AM	0	5	0	0	0	6	0	0	0	0	0	0	0	0	0	0	11	69
1:30 AM	0	5	0	0	0	3	0	0	0	0	0	0	0	0	0	0	8	44
1:45 AM	0	11	0	0	0	10	0	0	0	0	0	0	0	0	0	0	21	51
2:00 AM	0	6	0	0	0	7	0	0	0	0	0	0	0	0	0	0	13	53
2:15 AM	0	5	0	0	0	7	0	0	0	0	0	0	0	0	0	0	12	54
2:30 AM	0	8	0	0	0	13	0	0	0	0	0	0	0	0	0	0	21	67
2:45 AM	0	9	0	0	0	12	0	0	0	0	0	0	0	0	0	0	21	67
3:00 AM	0	5	0	0	0	14	0	0	0	0	0	0	0	0	0	0	19	73
3:15 AM	0	9	0	0	0	11	0	0	0	0	0	0	0	0	0	0	20	81
3:30 AM	0	23	0	0	0	12	0	0	0	0	0	0	0	0	0	0	35	95
3:45 AM	0	18	0	0	0	13	0	0	0	0	0	0	0	0	0	0	31	105
4:00 AM	0	24	0	0	0	14	0	0	0	0	0	0	0	0	0	0	38	124
4:15 AM	0	38	0	0	0	30	0	0	0	0	0	0	0	0	0	0	68	172
4:30 AM	0	44	0	0	0	27	0	0	0	0	0	0	0	0	0	0	71	208
4:45 AM	0	57	0	0	0	20	0	0	0	0	0	0	0	0	0	0	77	254
5:00 AM	0	71	0	0	0	44	0	0	0	0	0	0	0	0	0	0	115	331
5:15 AM	0	124	0	0	0	53	0	0	0	0	0	0	0	0	0	0	177	440
5:30 AM	0	155	0	0	0	59	0	0	0	0	0	0	0	0	0	0	214	583
5:45 AM	0	141	0	0	0	83	0	0	0	0	0	0	0	0	0	0	224	730
6:00 AM	0	188	0	0	1	108	0	0	0	0	0	0	0	0	0	0	297	912
6:15 AM	0	236	0	0	0	129	0	0	0	0	0	0	0	0	0	0	365	1100
6:30 AM	0	236	0	0	0	158	0	0	0	0	0	0	0	0	0	0	394	1280
6:45 AM	0	239	0	0	0	144	0	0	0	0	0	0	0	0	0	0	383	1439
7:00 AM	0	302	0	0	0	189	0	0	0	0	0	0	0	0	0	0	491	1633
7:15 AM	0	313	0	0	0	196	0	0	0	0	0	0	0	0	0	0	509	1777
7:30 AM	0	299	0	0	0	197	0	0	0	0	0	0	0	0	0	0	496	1879
7:45 AM	0	278	0	0	0	209	0	0	0	0	0	0	0	0	0	0	487	1983
8:00 AM	0	246	0	0	0	202	0	0	0	0	0	0	0	0	0	0	448	1940
8:15 AM	0	252	2	0	0	261	0	0	0	0	0	0	0	0	0	0	515	1946
8:30 AM	0	279	0	0	0	240	0	0	0	0	0	0	0	0	1	0	520	1970
8:45 AM	0	279	2	0	0	223	0	0	0	0	0	0	0	0	0	0	504	1987
9:00 AM	0	208	0	0	0	228	0	0	0	0	0	0	0	0	0	0	436	1975
9:15 AM	0	236	0	0	0	273	0	0	0	0	0	0	0	0	0	0	509	1969
9:30 AM	0	232	0	0	0	294	0	0	0	0	0	0	0	0	0	0	526	1975

15-Min Count Period Beginning At	Honoapiilani Highway (Northbound)				Honoapiilani Highway (Southbound)				Ukumehame Firing Range (Eastbound)				Ukumehame Firing Range (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
9:45 AM	0	203	0	0	0	284	0	0	0	0	0	0	1	0	0	0	488	1959
10:00 AM	0	250	0	0	0	260	0	0	0	0	0	0	0	0	0	0	510	2033
10:15 AM	0	204	0	0	0	266	0	0	0	0	0	0	0	0	0	0	470	1994
10:30 AM	0	184	1	0	0	284	0	0	0	0	0	0	0	0	0	0	469	1937
10:45 AM	0	196	1	0	0	274	0	0	0	0	0	0	1	0	1	0	473	1922
11:00 AM	0	195	0	0	0	291	0	0	0	0	0	0	0	0	0	0	486	1898
11:15 AM	0	216	0	0	0	282	0	0	0	0	0	0	0	0	0	0	498	1926
11:30 AM	0	216	0	0	0	288	0	0	0	0	0	0	0	0	0	0	504	1961
11:45 AM	0	209	1	0	0	229	0	0	0	0	0	0	0	0	1	0	440	1928
12:00 PM	0	245	0	0	0	224	0	0	0	0	0	0	0	0	0	0	469	1911
12:15 PM	0	228	0	0	0	232	0	0	0	0	0	0	0	0	0	0	460	1873
12:30 PM	0	256	0	0	0	265	0	0	0	0	0	0	0	0	0	0	521	1890
12:45 PM	0	227	0	0	0	217	0	0	0	0	0	0	0	0	0	0	444	1894
1:00 PM	0	247	1	0	0	232	0	0	0	0	0	0	1	0	0	0	481	1906
1:15 PM	0	271	0	0	1	200	0	0	0	0	0	0	1	0	0	0	473	1919
1:30 PM	0	265	0	0	0	229	0	0	0	0	0	0	0	0	0	0	494	1892
1:45 PM	0	238	0	0	0	213	0	0	0	0	0	0	0	0	0	0	451	1899
2:00 PM	0	284	0	0	0	203	0	0	0	0	0	0	0	0	0	0	487	1905
2:15 PM	0	284	0	0	0	259	0	0	0	0	0	0	0	0	0	0	543	1975
2:30 PM	0	267	0	0	0	290	0	0	0	0	0	0	0	0	0	0	557	2038
2:45 PM	0	268	0	0	0	262	0	0	0	0	0	0	1	0	0	0	531	2118
3:00 PM	0	289	0	0	0	247	0	0	0	0	0	0	0	0	0	0	536	2167
3:15 PM	0	257	0	0	0	289	0	0	0	0	0	0	0	0	1	0	547	2171
3:30 PM	0	307	0	0	0	280	0	0	0	0	0	0	0	0	0	0	587	2201
3:45 PM	0	320	0	0	0	281	0	0	0	0	0	0	0	0	0	0	601	2271
4:00 PM	0	292	0	0	0	275	0	0	0	0	0	0	0	0	0	0	567	2302
4:15 PM	0	246	0	0	0	290	0	0	0	0	0	0	0	0	0	0	536	2291
4:30 PM	0	268	0	0	0	301	0	0	0	0	0	0	0	0	0	0	569	2273
4:45 PM	0	268	1	0	0	299	0	0	0	0	0	0	0	0	1	0	569	2241
5:00 PM	0	268	0	0	0	316	0	0	0	0	0	0	0	0	0	0	584	2258
5:15 PM	0	238	0	0	0	298	0	0	0	0	0	0	0	0	0	0	536	2258
5:30 PM	0	198	0	0	0	294	0	0	0	0	0	0	0	0	0	0	492	2181
5:45 PM	0	170	0	0	0	192	0	0	0	0	0	0	0	0	0	0	362	1974
6:00 PM	0	207	0	0	0	195	0	0	0	0	0	0	0	0	0	0	402	1792
6:15 PM	0	197	0	0	0	159	0	0	0	0	0	0	0	0	0	0	356	1612
6:30 PM	0	165	0	0	0	179	0	0	0	0	0	0	0	0	0	0	344	1464
6:45 PM	0	113	0	0	0	158	0	0	0	0	0	0	0	0	0	0	271	1373
7:00 PM	0	148	0	0	0	142	0	0	0	0	0	0	0	0	0	0	290	1261
7:15 PM	0	109	0	0	0	165	0	0	0	0	0	0	0	0	0	0	274	1179
7:30 PM	0	115	0	0	0	150	0	0	0	0	0	0	0	0	0	0	265	1100
7:45 PM	0	136	0	0	0	126	0	0	0	0	0	0	0	0	0	0	262	1091
8:00 PM	0	107	0	0	0	118	0	0	0	0	0	0	0	0	0	0	225	1026
8:15 PM	0	102	1	0	0	98	0	0	0	0	0	0	1	0	0	0	202	954
8:30 PM	0	130	0	0	0	129	0	0	0	0	0	0	0	0	0	0	259	948
8:45 PM	0	121	0	0	0	91	0	0	0	0	0	0	0	0	0	0	212	898
9:00 PM	0	102	0	0	0	81	0	0	0	0	0	0	0	0	0	0	183	856
9:15 PM	0	85	0	0	0	90	0	0	0	0	0	0	0	0	0	0	175	829
9:30 PM	0	80	0	0	0	108	0	0	0	0	0	0	0	0	0	0	188	758
9:45 PM	0	102	0	0	0	65	0	0	0	0	0	0	0	0	0	0	167	713
10:00 PM	0	65	0	0	0	76	0	0	0	0	0	0	0	0	0	0	141	671
10:15 PM	0	48	0	0	0	76	0	0	0	0	0	0	0	0	0	0	124	620
10:30 PM	0	42	0	0	0	73	0	0	0	0	0	0	0	0	0	0	115	547
10:45 PM	0	31	0	0	0	52	0	0	0	0	0	0	0	0	0	0	83	463
11:00 PM	0	22	0	0	0	45	0	0	0	0	0	0	0	0	0	0	67	389
11:15 PM	0	24	0	0	0	56	0	0	0	0	0	0	0	0	0	0	80	345
11:30 PM	0	14	0	0	0	36	0	0	0	0	0	0	0	0	0	0	50	280
11:45 PM	0	9	0	0	0	22	0	0	0	0	0	0	0	0	0	0	31	228

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	1280	0	0	0	1124	0	0	0	0	0	0	0	0	0	0	2404
Heavy Trucks	0	20	0		0	44	0		0	0	0		0	0	0		64
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 6/23/2023 8:30 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

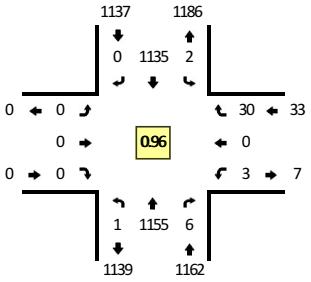
Type of peak hour being reported: System-wide Peak | Method for determining peak hour: Total Entering Volume

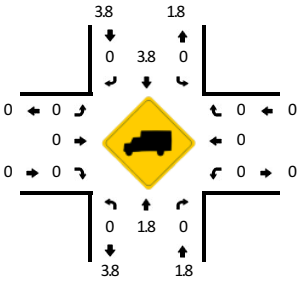
LOCATION: Honoapiilani Highway -- General Store N Dwy | **QC JOB #:** 16179911

CITY/STATE: Olowalu, HI | **DATE:** Wed, May 3 2023

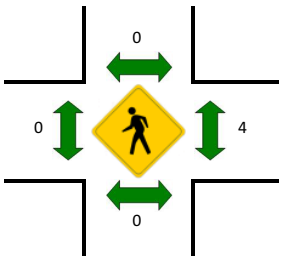
Peak-Hour: 3:15 PM -- 4:15 PM

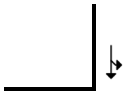
Peak 15-Min: 3:45 PM -- 4:00 PM

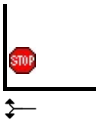


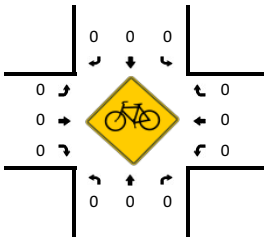


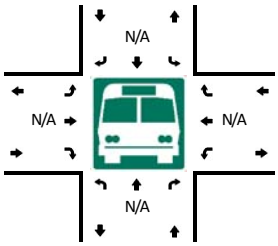
Quality Counts
DATA THAT DRIVES COMMUNITIES



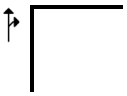


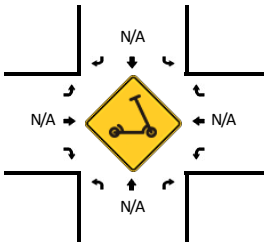












15-Min Count Period Beginning At	Honoapiilani Highway (Northbound)				Honoapiilani Highway (Southbound)				General Store N Dwy (Eastbound)				General Store N Dwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
12:00 AM	0	10	0	0	0	17	0	0	0	0	0	0	0	0	0	0	27	
12:15 AM	0	11	0	0	0	16	0	0	0	0	0	0	0	0	0	0	27	
12:30 AM	0	13	0	0	0	15	0	0	0	0	0	0	0	0	0	0	28	
12:45 AM	0	5	0	0	0	12	0	0	0	0	0	0	0	0	0	0	17	99
1:00 AM	0	2	0	0	0	9	0	0	0	0	0	0	0	0	0	0	11	83
1:15 AM	0	6	0	0	0	4	0	0	0	0	0	0	0	0	0	0	10	66
1:30 AM	0	4	0	0	0	8	0	0	0	0	0	0	0	0	0	0	12	50
1:45 AM	0	10	0	0	0	10	0	0	0	0	0	0	0	0	0	0	20	53
2:00 AM	0	8	0	0	0	10	0	0	0	0	0	0	0	0	0	0	18	60
2:15 AM	0	7	0	0	0	10	0	0	0	0	0	0	0	0	0	0	17	67
2:30 AM	0	4	0	0	0	11	0	0	0	0	0	0	0	0	0	0	15	70
2:45 AM	0	8	0	0	0	8	0	0	0	0	0	0	0	0	0	0	16	66
3:00 AM	0	5	0	0	0	13	0	0	0	0	0	0	0	0	0	0	18	66
3:15 AM	0	8	0	0	0	12	0	0	0	0	0	0	0	0	0	0	20	69
3:30 AM	0	21	0	0	0	13	0	0	0	0	0	0	0	0	0	0	34	88
3:45 AM	0	22	0	0	0	13	0	0	0	0	0	0	0	0	0	0	35	107
4:00 AM	0	16	0	0	0	21	0	0	0	0	0	0	0	0	0	0	37	126
4:15 AM	0	41	0	0	0	28	0	0	0	0	0	0	0	0	0	0	69	175
4:30 AM	0	36	0	0	0	20	0	0	0	0	0	0	0	0	0	0	56	197
4:45 AM	0	50	1	0	0	22	0	0	0	0	0	0	0	0	1	0	74	236
5:00 AM	0	69	0	0	0	49	0	0	0	0	0	0	0	0	0	0	118	317
5:15 AM	0	97	0	0	0	45	0	0	0	0	0	0	0	0	0	0	142	390
5:30 AM	0	157	0	0	0	68	0	0	0	0	0	0	0	0	0	0	225	559
5:45 AM	0	145	0	0	0	75	0	0	0	0	0	0	0	0	0	0	220	705
6:00 AM	0	171	0	0	0	124	0	0	0	0	0	0	0	0	1	0	296	883
6:15 AM	0	227	0	0	0	149	0	0	0	0	0	0	0	0	1	0	377	1118
6:30 AM	0	228	0	0	0	141	0	0	0	0	0	0	0	0	0	0	369	1262
6:45 AM	0	216	0	0	1	157	0	0	0	0	0	0	0	0	3	0	377	1419
7:00 AM	0	298	0	0	0	184	0	0	0	0	0	0	0	0	0	0	482	1605
7:15 AM	0	300	1	0	0	187	0	0	0	0	0	0	0	0	1	0	489	1717
7:30 AM	0	301	0	0	1	209	0	0	0	0	0	0	0	0	3	0	514	1862
7:45 AM	0	260	0	0	1	211	0	0	0	0	0	0	1	0	0	0	473	1958
8:00 AM	0	254	0	1	0	223	0	0	0	0	0	0	1	0	3	2	484	1960
8:15 AM	0	277	0	0	0	252	0	0	0	0	0	0	0	0	3	0	532	2003
8:30 AM	0	263	0	1	1	241	0	0	0	0	0	0	2	0	1	0	509	1998
8:45 AM	0	259	2	0	0	238	0	2	0	0	0	0	2	0	3	0	506	2031
9:00 AM	0	220	1	0	0	249	0	0	0	0	0	0	0	0	2	0	472	2019
9:15 AM	0	246	1	1	2	271	0	0	0	0	0	0	0	0	0	0	521	2008
9:30 AM	0	233	0	1	2	285	0	1	0	0	0	0	0	0	4	0	526	2025

15-Min Count Period Beginning At	Honoapiilani Highway (Northbound)				Honoapiilani Highway (Southbound)				General Store N Dwy (Eastbound)				General Store N Dwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
9:45 AM	0	148	0	0	0	296	0	0	0	0	0	0	1	0	3	0	448	1967
10:00 AM	0	262	1	2	1	252	0	0	0	0	0	0	1	0	1	0	520	2015
10:15 AM	0	221	4	2	0	271	0	2	0	0	0	0	0	0	1	0	501	1995
10:30 AM	0	179	1	1	1	278	0	0	0	0	0	0	0	0	2	0	462	1931
10:45 AM	0	186	5	1	0	285	0	0	0	0	0	0	0	0	3	0	480	1963
11:00 AM	0	216	0	2	1	281	0	1	0	0	0	0	0	0	2	0	503	1946
11:15 AM	0	194	1	0	4	272	0	0	0	0	0	0	1	0	3	0	475	1920
11:30 AM	0	208	1	1	1	280	0	1	0	0	0	0	0	0	3	0	495	1953
11:45 AM	0	228	0	1	2	213	0	1	0	0	0	0	2	0	5	0	452	1925
12:00 PM	0	232	2	2	5	231	0	0	0	0	0	0	0	0	0	0	472	1894
12:15 PM	0	200	0	1	1	231	0	0	0	0	0	0	0	0	5	0	438	1857
12:30 PM	0	286	7	0	0	259	0	1	0	0	0	0	0	0	2	0	555	1917
12:45 PM	0	242	3	0	1	227	0	0	0	0	0	0	1	0	6	0	480	1945
1:00 PM	0	239	0	1	1	205	0	0	0	0	0	0	3	0	8	0	457	1930
1:15 PM	0	279	2	0	1	221	0	0	0	0	0	0	0	0	8	0	511	2003
1:30 PM	0	259	2	0	0	236	0	0	0	0	0	0	3	0	12	0	512	1960
1:45 PM	0	261	2	1	0	208	0	1	0	0	0	0	1	0	2	0	476	1956
2:00 PM	0	252	0	0	0	246	0	0	0	0	0	0	1	0	4	0	503	2002
2:15 PM	0	249	2	1	1	259	0	0	0	0	0	0	1	0	2	0	515	2006
2:30 PM	0	293	1	1	0	287	0	1	0	0	0	0	2	0	5	0	590	2084
2:45 PM	0	270	0	0	2	262	0	1	0	0	0	0	1	0	1	0	537	2145
3:00 PM	0	282	8	0	0	273	0	0	0	0	0	0	2	0	6	0	571	2213
3:15 PM	0	279	2	0	0	278	0	0	0	0	0	0	1	0	13	0	573	2271
3:30 PM	0	284	3	0	1	282	0	0	0	0	0	0	1	0	4	0	575	2256
3:45 PM	0	304	0	0	0	298	0	0	0	0	0	0	0	0	5	0	607	2326
4:00 PM	0	288	1	1	0	277	0	1	0	0	0	0	1	0	8	0	577	2332
4:15 PM	0	274	0	1	0	283	0	1	0	0	0	0	0	0	2	0	561	2320
4:30 PM	0	255	1	1	1	295	0	1	0	0	0	0	1	0	3	0	558	2303
4:45 PM	0	254	1	2	0	328	0	0	0	0	0	0	2	0	5	0	592	2288
5:00 PM	0	269	0	1	1	314	0	0	0	0	0	0	1	0	1	0	587	2298
5:15 PM	0	241	1	0	0	296	0	0	0	0	0	0	1	0	0	0	539	2276
5:30 PM	0	208	0	1	0	262	0	0	0	0	0	0	0	0	0	0	471	2189
5:45 PM	0	194	1	3	0	198	0	1	0	0	0	0	0	0	2	0	399	1996
6:00 PM	0	208	0	0	0	152	0	0	0	0	0	0	2	0	0	0	362	1771
6:15 PM	0	187	0	0	0	149	0	0	0	0	0	0	0	0	2	0	338	1570
6:30 PM	0	173	0	0	0	175	0	1	0	0	0	0	0	0	0	0	349	1448
6:45 PM	0	131	0	0	0	145	0	0	0	0	0	0	0	0	0	0	276	1325
7:00 PM	0	129	0	0	0	148	0	0	0	0	0	0	0	0	0	0	277	1240
7:15 PM	0	132	0	0	0	133	0	0	0	0	0	0	0	0	0	0	265	1167
7:30 PM	0	93	0	0	0	152	0	1	0	0	0	0	0	0	0	0	246	1064
7:45 PM	0	136	0	0	0	118	0	0	0	0	0	0	0	0	0	0	254	1042
8:00 PM	0	121	0	0	0	119	0	0	0	0	0	0	0	0	0	0	240	1005
8:15 PM	0	100	0	0	0	111	0	0	0	0	0	0	0	0	1	0	212	952
8:30 PM	0	110	0	0	0	124	0	0	0	0	0	0	0	0	0	0	234	940
8:45 PM	0	98	0	0	0	86	0	0	0	0	0	0	0	0	0	0	184	870
9:00 PM	0	124	0	0	0	91	0	0	0	0	0	0	0	0	0	0	215	845
9:15 PM	0	90	0	0	0	101	0	0	0	0	0	0	0	0	0	0	191	824
9:30 PM	0	86	0	0	0	81	0	0	0	0	0	0	0	0	0	0	167	757
9:45 PM	0	81	0	0	0	76	0	0	0	0	0	0	0	0	0	0	157	730
10:00 PM	0	80	0	0	0	75	0	0	0	0	0	0	0	0	0	0	155	670
10:15 PM	0	58	0	0	0	81	0	0	0	0	0	0	0	0	0	0	139	618
10:30 PM	0	44	0	0	0	65	0	0	0	0	0	0	0	0	0	0	109	560
10:45 PM	0	27	0	0	0	46	0	0	0	0	0	0	0	0	0	0	73	476
11:00 PM	0	20	0	0	0	56	0	0	0	0	0	0	0	0	0	0	76	397
11:15 PM	0	32	0	0	0	52	0	0	0	0	0	0	0	0	0	0	84	342
11:30 PM	0	13	0	0	0	28	0	0	0	0	0	0	0	0	0	0	41	274
11:45 PM	0	11	0	0	0	24	0	0	0	0	0	0	0	0	0	0	35	236

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	1216	0	0	0	1192	0	0	0	0	0	0	0	0	20	0	2428
Heavy Trucks	0	20	0		0	36	0		0	0	0		0	0	0		56
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 6/23/2023 8:30 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Appendix B

Existing Intersection Operations

Synchro Worksheets

Intersection	
Int Delay, s/veh	0.6

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	16	1028	961	5	8	20
Future Vol, veh/h	16	1028	961	5	8	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	190	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	13	3	7	0	0	5
Mvmt Flow	17	1071	1001	5	8	21

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1006	0	-	0	2109	1004
Stage 1	-	-	-	-	1004	-
Stage 2	-	-	-	-	1105	-
Critical Hdwy	4.23	-	-	-	6.4	6.25
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.317	-	-	-	3.5	3.345
Pot Cap-1 Maneuver	647	-	-	-	57	290
Stage 1	-	-	-	-	357	-
Stage 2	-	-	-	-	320	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	647	-	-	-	56	290
Mov Cap-2 Maneuver	-	-	-	-	56	-
Stage 1	-	-	-	-	348	-
Stage 2	-	-	-	-	320	-

Approach	SE	NW	SW
HCM Control Delay, s	0.2	0	39.8
HCM LOS			E

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	647	-	132
HCM Lane V/C Ratio	-	-	0.026	-	0.221
HCM Control Delay (s)	-	-	10.7	-	39.8
HCM Lane LOS	-	-	B	-	E
HCM 95th %tile Q(veh)	-	-	0.1	-	0.8

Intersection	
Int Delay, s/veh	0.4

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	6	1042	942	5	5	17
Future Vol, veh/h	6	1042	942	5	5	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	17	3	6	0	0	30
Mvmt Flow	6	1085	981	5	5	18

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	986	0	-	0	2081	984
Stage 1	-	-	-	-	984	-
Stage 2	-	-	-	-	1097	-
Critical Hdwy	4.27	-	-	-	6.4	6.5
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.353	-	-	-	3.5	3.57
Pot Cap-1 Maneuver	645	-	-	-	59	267
Stage 1	-	-	-	-	365	-
Stage 2	-	-	-	-	323	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	645	-	-	-	58	267
Mov Cap-2 Maneuver	-	-	-	-	58	-
Stage 1	-	-	-	-	357	-
Stage 2	-	-	-	-	323	-

Approach	SE	NW	SW
HCM Control Delay, s	0.1	0	34
HCM LOS			D

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	645	-	147
HCM Lane V/C Ratio	-	-	0.01	-	0.156
HCM Control Delay (s)	-	-	10.6	0	34
HCM Lane LOS	-	-	B	A	D
HCM 95th %tile Q(veh)	-	-	0	-	0.5

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	5	1043	958	5	5	9
Future Vol, veh/h	5	1043	958	5	5	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	175	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	7	25	50	11
Mvmt Flow	5	1086	998	5	5	9

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1003	0	-	0	1554	1001
Stage 1	-	-	-	-	1001	-
Stage 2	-	-	-	-	553	-
Critical Hdwy	4.1	-	-	-	7.35	6.365
Critical Hdwy Stg 1	-	-	-	-	6.15	-
Critical Hdwy Stg 2	-	-	-	-	6.55	-
Follow-up Hdwy	2.2	-	-	-	3.975	3.4045
Pot Cap-1 Maneuver	698	-	-	-	79	279
Stage 1	-	-	-	-	271	-
Stage 2	-	-	-	-	442	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	698	-	-	-	78	279
Mov Cap-2 Maneuver	-	-	-	-	78	-
Stage 1	-	-	-	-	266	-
Stage 2	-	-	-	-	442	-

Approach	EB	WB	SW
HCM Control Delay, s	0.1	0	32.6
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	698	-	-	-	145
HCM Lane V/C Ratio	0.007	-	-	-	0.101
HCM Control Delay (s)	10.2	0.1	-	-	32.6
HCM Lane LOS	B	A	-	-	D
HCM 95th %tile Q(veh)	0	-	-	-	0.3

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	1022	5	28	924	5	14	5	13	5	5	16
Future Vol, veh/h	8	1022	5	28	924	5	14	5	13	5	5	16
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	None
Storage Length	300	-	-	400	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	13	3	0	7	6	0	0	0	0	0	0	13
Mvmt Flow	8	1065	5	29	963	5	15	5	14	5	5	17

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	968	0	0	1065	0	0	2116	2107	1065	2115	2105	966
Stage 1	-	-	-	-	-	-	1081	1081	-	1024	1024	-
Stage 2	-	-	-	-	-	-	1035	1026	-	1091	1081	-
Critical Hdwy	4.23	-	-	4.17	-	-	7.1	6.5	6.2	7.1	6.5	6.33
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.317	-	-	2.263	-	-	3.5	4	3.3	3.5	4	3.417
Pot Cap-1 Maneuver	669	-	-	636	-	-	37	52	273	37	52	294
Stage 1	-	-	-	-	-	-	266	296	-	286	315	-
Stage 2	-	-	-	-	-	-	282	315	-	263	296	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	669	-	-	636	-	-	31	49	273	31	49	294
Mov Cap-2 Maneuver	-	-	-	-	-	-	31	49	-	31	49	-
Stage 1	-	-	-	-	-	-	263	292	-	283	301	-
Stage 2	-	-	-	-	-	-	249	301	-	243	292	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.3	151.3	69.2
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	53	669	-	-	636	-	-	82
HCM Lane V/C Ratio	0.629	0.012	-	-	0.046	-	-	0.33
HCM Control Delay (s)	151.3	10.4	-	-	10.9	-	-	69.2
HCM Lane LOS	F	B	-	-	B	-	-	F
HCM 95th %tile Q(veh)	2.5	0	-	-	0.1	-	-	1.3

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↱			↗
Traffic Vol, veh/h	0	1031	940	26	0	14
Future Vol, veh/h	0	1031	940	26	0	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	6	23	0	7
Mvmt Flow	0	1074	979	27	0	15

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	993
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.27
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.363
Pot Cap-1 Maneuver	0	-	-	-	0	291
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	291
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	18
HCM LOS			C

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	291
HCM Lane V/C Ratio	-	-	-	0.05
HCM Control Delay (s)	-	-	-	18
HCM Lane LOS	-	-	-	C
HCM 95th %tile Q(veh)	-	-	-	0.2

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	13	1014	973	9	11	5
Future Vol, veh/h	13	1014	973	9	11	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	275	-	-	225	0	65
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	7	0	9	0
Mvmt Flow	14	1056	1014	9	11	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1014	0	-	0	2098	1014
Stage 1	-	-	-	-	1014	-
Stage 2	-	-	-	-	1084	-
Critical Hdwy	4.1	-	-	-	6.49	6.2
Critical Hdwy Stg 1	-	-	-	-	5.49	-
Critical Hdwy Stg 2	-	-	-	-	5.49	-
Follow-up Hdwy	2.2	-	-	-	3.581	3.3
Pot Cap-1 Maneuver	692	-	-	-	55	292
Stage 1	-	-	-	-	340	-
Stage 2	-	-	-	-	315	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	692	-	-	-	54	292
Mov Cap-2 Maneuver	-	-	-	-	172	-
Stage 1	-	-	-	-	333	-
Stage 2	-	-	-	-	315	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	24.3
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	692	-	-	-	172	292
HCM Lane V/C Ratio	0.02	-	-	-	0.067	0.018
HCM Control Delay (s)	10.3	-	-	-	27.4	17.6
HCM Lane LOS	B	-	-	-	D	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2	0.1

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	1027	977	5	5	5
Future Vol, veh/h	5	1027	977	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	7	0	0	0
Mvmt Flow	5	1070	1018	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1023	0	-	0	2101	1021
Stage 1	-	-	-	-	1021	-
Stage 2	-	-	-	-	1080	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	686	-	-	-	58	289
Stage 1	-	-	-	-	351	-
Stage 2	-	-	-	-	329	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	686	-	-	-	57	289
Mov Cap-2 Maneuver	-	-	-	-	57	-
Stage 1	-	-	-	-	345	-
Stage 2	-	-	-	-	329	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	47.5
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	686	-	-	-	95
HCM Lane V/C Ratio	0.008	-	-	-	0.11
HCM Control Delay (s)	10.3	0	-	-	47.5
HCM Lane LOS	B	A	-	-	E
HCM 95th %tile Q(veh)	0	-	-	-	0.4

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	1025	979	5	5	5
Future Vol, veh/h	5	1025	979	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	7	0	0	0
Mvmt Flow	5	1068	1020	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1025	0	-	0	2101	1023
Stage 1	-	-	-	-	1023	-
Stage 2	-	-	-	-	1078	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	685	-	-	-	58	289
Stage 1	-	-	-	-	350	-
Stage 2	-	-	-	-	330	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	685	-	-	-	57	289
Mov Cap-2 Maneuver	-	-	-	-	57	-
Stage 1	-	-	-	-	344	-
Stage 2	-	-	-	-	330	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	47.5
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	685	-	-	-	95
HCM Lane V/C Ratio	0.008	-	-	-	0.11
HCM Control Delay (s)	10.3	0	-	-	47.5
HCM Lane LOS	B	A	-	-	E
HCM 95th %tile Q(veh)	0	-	-	-	0.4

Intersection	
Int Delay, s/veh	0.1

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	5	1020	955	5	5	5
Future Vol, veh/h	5	1020	955	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	425	-	-	350	0	75
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	5	8	25	50	0
Mvmt Flow	5	1063	995	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	995	0	-	0	2068	995
Stage 1	-	-	-	-	995	-
Stage 2	-	-	-	-	1073	-
Critical Hdwy	4.1	-	-	-	6.9	6.2
Critical Hdwy Stg 1	-	-	-	-	5.9	-
Critical Hdwy Stg 2	-	-	-	-	5.9	-
Follow-up Hdwy	2.2	-	-	-	3.95	3.3
Pot Cap-1 Maneuver	703	-	-	-	44	300
Stage 1	-	-	-	-	293	-
Stage 2	-	-	-	-	267	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	703	-	-	-	44	300
Mov Cap-2 Maneuver	-	-	-	-	147	-
Stage 1	-	-	-	-	291	-
Stage 2	-	-	-	-	267	-

Approach	SE	NW	SW
HCM Control Delay, s	0	0	23.8
HCM LOS			C

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1	SWLn2
Capacity (veh/h)	-	-	703	-	147	300
HCM Lane V/C Ratio	-	-	0.007	-	0.035	0.017
HCM Control Delay (s)	-	-	10.2	-	30.4	17.2
HCM Lane LOS	-	-	B	-	D	C
HCM 95th %tile Q(veh)	-	-	0	-	0.1	0.1

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	1026	904	6	5	5
Future Vol, veh/h	5	1026	904	6	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	425	-	-	350	0	75
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	0	7	0	0	0
Mvmt Flow	5	1069	942	6	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	942	0	-	0	2021	942
Stage 1	-	-	-	-	942	-
Stage 2	-	-	-	-	1079	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	736	-	-	-	65	322
Stage 1	-	-	-	-	382	-
Stage 2	-	-	-	-	329	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	736	-	-	-	65	322
Mov Cap-2 Maneuver	-	-	-	-	190	-
Stage 1	-	-	-	-	379	-
Stage 2	-	-	-	-	329	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	20.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	736	-	-	-	190	322
HCM Lane V/C Ratio	0.007	-	-	-	0.027	0.016
HCM Control Delay (s)	9.9	-	-	-	24.5	16.4
HCM Lane LOS	A	-	-	-	C	C
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	1018	955	5	5	5
Future Vol, veh/h	5	1018	955	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	0	0	0	0
Mvmt Flow	5	1060	995	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1000	0	-	0	2068	998
Stage 1	-	-	-	-	998	-
Stage 2	-	-	-	-	1070	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	700	-	-	-	60	299
Stage 1	-	-	-	-	360	-
Stage 2	-	-	-	-	332	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	700	-	-	-	59	299
Mov Cap-2 Maneuver	-	-	-	-	59	-
Stage 1	-	-	-	-	354	-
Stage 2	-	-	-	-	332	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	45.6
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	700	-	-	-	99
HCM Lane V/C Ratio	0.007	-	-	-	0.105
HCM Control Delay (s)	10.2	0	-	-	45.6
HCM Lane LOS	B	A	-	-	E
HCM 95th %tile Q(veh)	0	-	-	-	0.3

Intersection	
Int Delay, s/veh	0.3

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	5	1152	1133	5	5	5
Future Vol, veh/h	5	1152	1133	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	190	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	5	1213	1193	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1198	0	-	0	2419	1196
Stage 1	-	-	-	-	1196	-
Stage 2	-	-	-	-	1223	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	590	-	-	-	36	229
Stage 1	-	-	-	-	289	-
Stage 2	-	-	-	-	281	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	590	-	-	-	36	229
Mov Cap-2 Maneuver	-	-	-	-	36	-
Stage 1	-	-	-	-	287	-
Stage 2	-	-	-	-	281	-

Approach	SE	NW	SW
HCM Control Delay, s	0	0	74.6
HCM LOS			F

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	590	-	62
HCM Lane V/C Ratio	-	-	0.009	-	0.17
HCM Control Delay (s)	-	-	11.2	-	74.6
HCM Lane LOS	-	-	B	-	F
HCM 95th %tile Q(veh)	-	-	0	-	0.6

Intersection	
Int Delay, s/veh	0.7

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	12	1131	1142	7	5	31
Future Vol, veh/h	12	1131	1142	7	5	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	13	1191	1202	7	5	33

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1209	0	-	0	2423	1206
Stage 1	-	-	-	-	1206	-
Stage 2	-	-	-	-	1217	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	584	-	-	-	36	226
Stage 1	-	-	-	-	286	-
Stage 2	-	-	-	-	283	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	584	-	-	-	34	226
Mov Cap-2 Maneuver	-	-	-	-	34	-
Stage 1	-	-	-	-	267	-
Stage 2	-	-	-	-	283	-

Approach	SE	NW	SW
HCM Control Delay, s	0.1	0	45
HCM LOS			E

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	584	-	127
HCM Lane V/C Ratio	-	-	0.022	-	0.298
HCM Control Delay (s)	-	-	11.3	0	45
HCM Lane LOS	-	-	B	A	E
HCM 95th %tile Q(veh)	-	-	0.1	-	1.2

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	5	1135	1155	6	5	30
Future Vol, veh/h	5	1135	1155	6	5	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	175	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	5	1195	1216	6	5	32

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1222	0	-	0	1827	1219
Stage 1	-	-	-	-	1219	-
Stage 2	-	-	-	-	608	-
Critical Hdwy	4.1	-	-	-	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	578	-	-	-	77	222
Stage 1	-	-	-	-	282	-
Stage 2	-	-	-	-	512	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	578	-	-	-	75	222
Mov Cap-2 Maneuver	-	-	-	-	75	-
Stage 1	-	-	-	-	275	-
Stage 2	-	-	-	-	512	-

Approach	EB	WB	SW
HCM Control Delay, s	0.1	0	31.4
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	578	-	-	-	173
HCM Lane V/C Ratio	0.009	-	-	-	0.213
HCM Control Delay (s)	11.3	0.1	-	-	31.4
HCM Lane LOS	B	A	-	-	D
HCM 95th %tile Q(veh)	0	-	-	-	0.8

Intersection	
Int Delay, s/veh	4.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	23	1083	15	16	1120	22	5	5	14	10	5	15
Future Vol, veh/h	23	1083	15	16	1120	22	5	5	14	10	5	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	None
Storage Length	300	-	-	400	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	4	7	0	2	0	0	0	0	0	0	0
Mvmt Flow	24	1140	16	17	1179	23	5	5	15	11	5	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1202	0	0	1140	0	0	2423	2424	1140	2423	2413	1191
Stage 1	-	-	-	-	-	-	1188	1188	-	1225	1225	-
Stage 2	-	-	-	-	-	-	1235	1236	-	1198	1188	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	588	-	-	620	-	-	23	33	247	23	33	231
Stage 1	-	-	-	-	-	-	232	264	-	221	254	-
Stage 2	-	-	-	-	-	-	218	250	-	229	264	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	588	-	-	620	-	-	18	31	247	18	31	231
Mov Cap-2 Maneuver	-	-	-	-	-	-	18	31	-	18	31	-
Stage 1	-	-	-	-	-	-	222	253	-	212	247	-
Stage 2	-	-	-	-	-	-	193	243	-	202	253	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.2	144.1	253.7
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	48	588	-	-	620	-	-	38
HCM Lane V/C Ratio	0.526	0.041	-	-	0.027	-	-	0.831
HCM Control Delay (s)	144.1	11.4	-	-	11	-	-	253.7
HCM Lane LOS	F	B	-	-	B	-	-	F
HCM 95th %tile Q(veh)	2	0.1	-	-	0.1	-	-	3.1

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	1110	1138	31	0	29
Future Vol, veh/h	0	1110	1138	31	0	29
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	0	1168	1198	33	0	31

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	1215
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.3
Pot Cap-1 Maneuver	0	-	-	-	0	223
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	223
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	23.7
HCM LOS			C

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	223
HCM Lane V/C Ratio	-	-	-	0.137
HCM Control Delay (s)	-	-	-	23.7
HCM Lane LOS	-	-	-	C
HCM 95th %tile Q(veh)	-	-	-	0.5

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	14	1099	1168	5	27	9
Future Vol, veh/h	14	1099	1168	5	27	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	275	-	-	225	0	65
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	15	1157	1229	5	28	9

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1229	0	-	0	2416	1229
Stage 1	-	-	-	-	1229	-
Stage 2	-	-	-	-	1187	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	574	-	-	-	36	219
Stage 1	-	-	-	-	279	-
Stage 2	-	-	-	-	292	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	574	-	-	-	35	219
Mov Cap-2 Maneuver	-	-	-	-	144	-
Stage 1	-	-	-	-	272	-
Stage 2	-	-	-	-	292	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	32.6
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	574	-	-	-	144	219
HCM Lane V/C Ratio	0.026	-	-	-	0.197	0.043
HCM Control Delay (s)	11.4	-	-	-	36	22.2
HCM Lane LOS	B	-	-	-	E	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.7	0.1

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	1122	1169	5	5	5
Future Vol, veh/h	5	1122	1169	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	5	1181	1231	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1236	0	-	0	2425	1234
Stage 1	-	-	-	-	1234	-
Stage 2	-	-	-	-	1191	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	571	-	-	-	36	218
Stage 1	-	-	-	-	277	-
Stage 2	-	-	-	-	291	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	571	-	-	-	35	218
Mov Cap-2 Maneuver	-	-	-	-	35	-
Stage 1	-	-	-	-	270	-
Stage 2	-	-	-	-	291	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	77.4
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	571	-	-	-	60
HCM Lane V/C Ratio	0.009	-	-	-	0.175
HCM Control Delay (s)	11.4	0	-	-	77.4
HCM Lane LOS	B	A	-	-	F
HCM 95th %tile Q(veh)	0	-	-	-	0.6

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	1118	1166	5	5	5
Future Vol, veh/h	5	1118	1166	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	2
Mvmt Flow	5	1177	1227	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1232	0	-	0	2417	1230
Stage 1	-	-	-	-	1230	-
Stage 2	-	-	-	-	1187	-
Critical Hdwy	4.1	-	-	-	6.4	6.22
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.318
Pot Cap-1 Maneuver	573	-	-	-	36	217
Stage 1	-	-	-	-	279	-
Stage 2	-	-	-	-	292	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	573	-	-	-	35	217
Mov Cap-2 Maneuver	-	-	-	-	35	-
Stage 1	-	-	-	-	272	-
Stage 2	-	-	-	-	292	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	77.4
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	573	-	-	-	60
HCM Lane V/C Ratio	0.009	-	-	-	0.175
HCM Control Delay (s)	11.3	0	-	-	77.4
HCM Lane LOS	B	A	-	-	F
HCM 95th %tile Q(veh)	0	-	-	-	0.6

Intersection	
Int Delay, s/veh	0.2

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	5	1136	1174	5	5	9
Future Vol, veh/h	5	1136	1174	5	5	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	425	-	-	350	0	75
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	92
Heavy Vehicles, %	0	37	7	0	0	0
Mvmt Flow	5	1196	1236	5	5	10

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1236	0	-	0	2442	1236
Stage 1	-	-	-	-	1236	-
Stage 2	-	-	-	-	1206	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	571	-	-	-	35	217
Stage 1	-	-	-	-	277	-
Stage 2	-	-	-	-	286	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	571	-	-	-	35	217
Mov Cap-2 Maneuver	-	-	-	-	144	-
Stage 1	-	-	-	-	275	-
Stage 2	-	-	-	-	286	-

Approach	SE	NW	SW
HCM Control Delay, s	0	0	25.4
HCM LOS			D

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1	SWLn2
Capacity (veh/h)	-	-	571	-	144	217
HCM Lane V/C Ratio	-	-	0.009	-	0.037	0.045
HCM Control Delay (s)	-	-	11.4	-	30.9	22.4
HCM Lane LOS	-	-	B	-	D	C
HCM 95th %tile Q(veh)	-	-	0	-	0.1	0.1

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	6	1140	1157	5	5	5
Future Vol, veh/h	6	1140	1157	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	425	-	-	350	0	75
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	6	1200	1218	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1218	0	-	0	2430	1218
Stage 1	-	-	-	-	1218	-
Stage 2	-	-	-	-	1212	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	580	-	-	-	36	222
Stage 1	-	-	-	-	282	-
Stage 2	-	-	-	-	284	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	580	-	-	-	36	222
Mov Cap-2 Maneuver	-	-	-	-	145	-
Stage 1	-	-	-	-	279	-
Stage 2	-	-	-	-	284	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	26.2
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	580	-	-	-	145	222
HCM Lane V/C Ratio	0.011	-	-	-	0.036	0.024
HCM Control Delay (s)	11.3	-	-	-	30.8	21.6
HCM Lane LOS	B	-	-	-	D	C
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0.1

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	1125	1176	5	5	5
Future Vol, veh/h	5	1125	1176	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	2
Mvmt Flow	5	1184	1238	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1243	0	-	0	2435	1241
Stage 1	-	-	-	-	1241	-
Stage 2	-	-	-	-	1194	-
Critical Hdwy	4.1	-	-	-	6.4	6.22
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.318
Pot Cap-1 Maneuver	567	-	-	-	35	213
Stage 1	-	-	-	-	275	-
Stage 2	-	-	-	-	290	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	567	-	-	-	34	213
Mov Cap-2 Maneuver	-	-	-	-	34	-
Stage 1	-	-	-	-	268	-
Stage 2	-	-	-	-	290	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	78.8
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	567	-	-	-	59
HCM Lane V/C Ratio	0.009	-	-	-	0.178
HCM Control Delay (s)	11.4	0	-	-	78.8
HCM Lane LOS	B	A	-	-	F
HCM 95th %tile Q(veh)	0	-	-	-	0.6

Appendix C

Traffic Accident Data

Crash Data 1/2

C000 Report No	C002 County	C025 Prim City	C006 Occur Date	C006 Occur Day	C007 Occur Time	C009 MV Total Inv	C009 MC Total Inv	C009 MOP Total Inv	C009 BC Total Inv	C009 PED Total Inv	C027 Prim Route No	C028 Prim Milepost	C024 Prim St Hwy Name	C029 Refer Dist	C029 Refer Dist Unit	C029 Refer Direction	C030 Refer Name
20-023355	MAU	LAHAINA	3/7/2020	FR	14:48	2	0	0	0	0	30	11	HONOAPIILANI HWY	0.63	MI	NW	TUNNEL N PORT
21-043740	MAU	LAHAINA	13-12-2021	MO	18:42	0	0	1	0	0	30	11.004	HONOAPIILANI HWY	3744	FT	SE	UKUMEHAME RANGE ENT
20-017684	MAU	LAHAINA	19-05-2020	TU	5:08	2	0	0	0	0	30	11.2	HONOAPIILANI HWY	0.54	MI	E	UKUMEHAME RANGE ENT
19-046542	MAU	LAHAINA	12/11/2019	TU	18:27	1	0	0	0	0	30	11.2	HONOAPIILANI HWY	0.46	MI	S	UKUMEHAME RANGE ENT
21-019932	MAU	LAHAINA	7/6/2021	MO	13:16	2	0	0	0	0	30	11.21	HONOAPIILANI HWY	2655	FT	SE	UKUMEHAME RANGE ENT
20-023313	MAU	LAHAINA	3/7/2020	FR	6:19	1	0	0	0	0	30	11.3	HONOAPIILANI HWY	0.4	MI	SE	UKUMEHAME RANGE ENT
19-037413	MAU	LAHAINA	11/9/2019	WE	4:23	1	0	0	0	0	30	11.4	HONOAPIILANI HWY	0.25	MI	E	UKUMEHAME RANGE ENT
20-009910	MAU	LAHAINA	12/3/2020	TH	17:41	3	0	0	0	0	30	11.5	HONOAPIILANI HWY	0.24	MI	SE	UKUMEHAME RANGE ENT
20-024074	MAU	LAHAINA	9/7/2020	TH	6:07	1	0	0	0	0	30	11.6	HONOAPIILANI HWY	0.11	MI	SE	UKUMEHAME RANGE ENT
20-020064	MAU	LAHAINA	7/6/2020	SU	6:50	2	0	0	0	0	30	11.7	HONOAPIILANI HWY	174	FT	E	UKUMEHAME RANGE ENT
19-032658	MAU	LAHAINA	10/8/2019	SA	16:43	2	0	0	0	0	30	11.7	HONOAPIILANI HWY	82	FT	E	UKUMEHAME RANGE ENT
19-023843	MAU	LAHAINA	10/6/2019	MO	17:26	2	0	0	0	0	30	11.8	HONOAPIILANI HWY	294	FT	NW	UKUMEHAME RANGE ENT
20-029645	MAU	LAHAINA	21-08-2020	FR	18:28	2	0	0	0	0	30	12	HONOAPIILANI HWY	0.09	MI	SE	UKUMEHAME BCH PK ENT
19-012866	MAU	LAHAINA	29-03-2019	FR	23:32	2	0	0	0	0	30	12	HONOAPIILANI HWY	0.1	MI	S	UKUMEHAME BCH PK ENT
19-051801	MAU	LAHAINA	19-12-2019	TH	9:57	3	0	0	0	0	30	12.4	HONOAPIILANI HWY	247	FT	S	POHAKU AEKO ST
21-027371	MAU	LAHAINA	6/8/2021	FR	12:38	2	0	0	0	0	30	12.506	HONOAPIILANI HWY	5	FT	SE	POHAKU AEKO ST
19-029347	MAU	LAHAINA	18-07-2019	TH	17:07	2	0	0	0	0	30	12.6	HONOAPIILANI HWY	0.1	MI	N	POHAKU AEKO ST
20-022731	MAU	LAHAINA	28-06-2020	SU	10:32	0	1	0	0	0	30	12.8	HONOAPIILANI HWY	0.31	MI	NW	POHAKU AEKO ST
19-002403	MAU	LAHAINA	16-01-2019	WE	15:58	1	0	0	0	1	30	12.8	HONOAPIILANI HWY	0.37	MI	S	EHEHENE ST
20-017390	MAU	LAHAINA	16-05-2020	SA	12:51	3	0	0	0	0	30	13.5	HONOAPIILANI HWY	0.31	MI	NW	EHEHENE ST
21-034194	MAU	LAHAINA	29-09-2021	WE	15:23	2	0	0	0	0	30	13.522	HONOAPIILANI HWY	1779	FT	NW	EHEHENE ST
21-024137	MAU	LAHAINA	10/7/2021	SA	9:34	3	0	0	0	0	30	13.581	HONOAPIILANI HWY	2089	FT	NW	EHEHENE ST
19-044850	MAU	LAHAINA	1/11/2019	FR	1:54	2	0	0	0	0	30	13.9	HONOAPIILANI HWY	0.41	MI	SE	OLOWALU VILLAGE RD A
20-023360	MAU	LAHAINA	3/7/2020	FR	15:52	3	0	0	0	0	30	13.9	HONOAPIILANI HWY	0.41	MI	SE	OLOWALU VILLAGE RD A
21-019237	MAU	LAHAINA	2/6/2021	WE	3:56	1	0	0	0	0	30	13.994	HONOAPIILANI HWY	1608	FT	SE	OLOWALU VILLAGE RD A
21-020499	MAU	OLOWALU	11/6/2021	FR	22:46	2	0	0	0	0	30	14	HONOAPIILANI HWY	1577	FT	SE	OLOWALU VILLAGE RD A
19-032688	MAU	LAHAINA	10/8/2019	SA	21:55	3	0	0	0	0	30	14	HONOAPIILANI HWY	0.27	MI	SE	OLOWALU VILLAGE RD A
19-012980	MAU	LAHAINA	30-03-2019	SA	21:56	3	0	0	0	0	30	14	HONOAPIILANI HWY	0.32	MI	E	OLOWALU VILLAGE RD A
19-030713	MAU	LAHAINA	28-07-2019	SU	10:22	1	1	0	0	0	30	14.1	HONOAPIILANI HWY	0.21	MI	SE	OLOWALU VILLAGE RD A
19-021792	MAU	LAHAINA	27-05-2019	MO	10:22	2	0	0	0	0	30	14.2	HONOAPIILANI HWY	0.25	MI	S	LUAWAI ST
19-008087	MAU	LAHAINA	24-02-2019	SU	14:31	3	0	0	0	0	30	14.3	HONOAPIILANI HWY	100	FT	E	OLOWALU VILLAGE RD A
19-052811	MAU	LAHAINA	27-12-2019	FR	6:22	2	0	0	0	0	30	14.4	HONOAPIILANI HWY	51	FT	E	OLOWALU VILLAGE RD B
19-026404	MAU	LAHAINA	28-06-2019	FR	15:26	1	1	0	0	0	30	14.4	HONOAPIILANI HWY	0.1	MI	E	LUAWAI ST
20-007206	MAU	LAHAINA	22-02-2020	SA	0:13	2	0	0	0	0	30	15	HONOAPIILANI HWY	83	FT	N	OLOWALU STORE (E)
20-019587	MAU	LAHAINA	3/6/2020	WE	10:57	1	0	0	0	0	30	15.1	HONOAPIILANI HWY	76	FT	N	OLOWALU STORE (W)
19-024471	MAU	LAHAINA	14-06-2019	FR	17:23	1	0	0	0	0	30	15.5	HONOAPIILANI HWY	0.8	MI	S	OLOWALU DUMP RD
20-003398	MAU	LAHAINA	25-01-2020	SA	10:14	2	0	0	0	0	30	15.5	HONOAPIILANI HWY	0.79	MI	S	OLOWALU DUMP RD
20-031144	MAU	LAHAINA	2/9/2020	WE	2:43	2	0	0	0	0	30	15.6	HONOAPIILANI HWY	0.47	MI	NW	OLOWALU STORE (W)
19-020961	MAU	LAHAINA	21-05-2019	TU	17:18	1	1	0	0	0	30	15.6	HONOAPIILANI HWY	0.45	MI	NW	OLOWALU STORE (W)
19-052557	MAU	WAILUKU	24-12-2019	TU	21:47	3	0	0	0	0	30	16	HONOAPIILANI HWY	0.28	MI	SE	OLOWALU DUMP RD
20-021737	MAU	LAHAINA	20-06-2020	SA	10:56	2	0	0	0	0	30	16.1	HONOAPIILANI HWY	0.17	MI	SE	OLOWALU DUMP RD
19-020740	MAU	LAHAINA	20-05-2019	MO	9:15	2	0	0	0	0	30	16.7	HONOAPIILANI HWY	0.42	MI	NW	OLOWALU DUMP RD
19-007944	MAU	LAHAINA	23-02-2019	SA	14:05	4	0	0	0	0	30	16.7	HONOAPIILANI HWY	0.44	MI	NW	OLOWALU DUMP RD
19-024235	MAU	LAHAINA	13-06-2019	TH	10:30	0	1	0	0	0	30	16.9	HONOAPIILANI HWY	0.61	MI	NW	OLOWALU DUMP RD
							5	1	0	1							

The State of Hawaii, Department of Transportation, has provided this traffic crash information under the protection of 23 USC 407.

This information may not be used in any federal or State court proceeding in any action for damages arising from any occurrence at a location mentioned or addressed in the information provided.

Crash Data 2/2																										
C000 Prim Jurisdict	C031A Loc First Harm	CF027 Intersectionrelated	CF031B Crashactions	C023 GPS Latitude	C023 GPS Longitude	CF021 Runoffroad	CF024 Lanedeparture	CF022 Crosscenterlinefirst	CF023 Crosscenterlineany	CF136 Involvedguardrail	CF010 Involvedspeed	CF004 Involveddistraction	CF005 Involvedelectronicdistraction	CF020 Involveddisregardtraffic	CF007 Alcoholinvolved	CF009 Drugsinvolved	C019 Lighting	CF031 Timenight	C018 Weather Cond 1	C018 Weather Cond 2	CF134 Involvedwetroad	CF156 Numberkilled	CF158 Numberseriousinjuries	CF157 Numberinjured	DB Crash Year
S3R	14	N	39, 02, 102	20.79244	-156.5659	Y	Y	N	N	N	N	N	N	N	N	N	1	N	1	1	N	0	0	0	2020
S3R	23	N	8	20.79254	-156.565386	N	N	N	N	N	N	N	N	N	N	N	7	Y	1	-	N	0	0	1	2021
S3R	12	N	81	20.79316	-156.56785	N	N	N	N	N	Y	N	N	N	N	N	2	Y	1	1	N	0	1	1	2020
S3R	21	N	2	20.79325	-156.56923	Y	Y	N	N	N	N	N	N	N	N	N	7	Y	1	-	N	0	0	1	2019
S3R	12	N	81	20.793236	-156.56845	N	N	N	N	N	N	N	N	N	N	N	1	N	1	-	N	0	0	0	2021
S3R	10	N	06, 39	20.79348	-156.56999	Y	Y	N	N	N	Y	N	N	N	N	N	1	N	1	1	N	0	0	1	2020
S3R	12	N	06, 02	20.79372	-156.57222	Y	Y	N	N	N	Y	N	N	N	N	N	3	Y	1	-	N	0	0	0	2019
S3R	11	N	81, 81	20.79371	-156.57252	N	N	N	N	N	N	Y	N	N	N	N	1	N	1	-	N	0	0	0	2020
S3R	22	N	11, 39	20.7939	-156.5745	N	Y	Y	Y	N	Y	N	N	N	N	N	1	N	1	1	Y	0	0	1	2020
S3R	23	N	102	20.79403	-156.57565	N	N	N	N	N	Y	N	N	N	N	N	1	N	1	1	Y	0	0	1	2020
S3R	12	N	11, 83, 39, 02	20.79415	-156.57588	N	Y	Y	Y	N	N	N	N	N	N	N	1	N	1	-	N	1	0	0	2019
S3R	12	N	81	20.79432	-156.57707	N	N	N	N	N	N	Y	Y	N	N	N	1	N	1	1	N	0	0	2	2019
S3R	11	N	81	20.79474	-156.58058	N	N	N	N	N	N	N	N	N	N	N	3	Y	1	1	N	0	0	1	2020
S3R	12	N	81	20.79469	-156.58047	N	N	N	N	N	Y	N	N	N	N	N	7	Y	1	1	N	0	0	0	2019
S3R	12	N	81, 81	20.7971	-156.58708	N	N	N	N	N	N	Y	N	N	N	N	1	N	1	-	N	0	0	1	2019
S3R	1	Y	87, 06, 24, 34	20.797518	-156.587761	N	N	N	N	N	Y	N	N	N	N	N	1	N	1	-	N	0	0	4	2021
S3R	12	N	81	20.79816	-156.58924	N	N	N	N	N	N	N	N	N	N	N	1	N	1	1	N	0	0	1	2019
S3R	11	N	8	20.8	-156.59184	N	N	N	N	N	N	Y	N	N	N	N	1	N	1	1	N	0	0	1	2020
S3R	12	N	54	20.79989	-156.59176	N	N	N	N	N	N	N	N	N	N	N	1	N	1	99	N	0	0	1	2019
S3R	12	N	81, 11, 85	20.80634	-156.59969	N	N	N	Y	N	N	Y	N	N	N	N	1	N	1	1	N	0	0	5	2020
S3R	10	N	85	20.806563	-156.600106	N	Y	Y	Y	N	N	N	N	N	N	N	1	N	1	-	N	0	0	2	2021
S3R	12	N	81, 81	20.806942	-156.600919	N	N	N	N	N	N	Y	N	N	N	N	1	N	1	-	N	0	0	1	2021
S3R	12	N	81	20.80901	-156.60512	N	N	N	N	N	N	N	N	N	Y	N	7	Y	1	-	N	0	0	0	2019
S3R	11	N	81, 81	20.80899	-156.60507	N	N	N	N	N	Y	N	N	N	N	N	1	N	1	1	Y	0	0	2	2020
S3R	23	N	2	20.809735	-156.606527	Y	Y	N	N	N	N	N	N	N	N	N	7	Y	1	-	N	0	0	0	2021
S3R	12	N	87	20.809687	-156.606646	N	N	N	N	N	N	N	N	N	N	N	7	Y	1	-	N	0	0	1	2021
S3R	10	N	81, 81	20.80982	-156.60704	N	N	N	N	N	N	N	N	N	N	N	3	Y	1	1	N	0	0	6	2019
S3R	12	N	11, 80, 80	20.80946	-156.60602	N	Y	Y	Y	N	N	Y	Y	N	N	N	7	Y	1	99	N	0	0	2	2019
S3R	10	N	81	20.81009	-156.60786	N	N	N	N	N	N	N	N	N	N	N	1	N	1	-	N	0	0	1	2019
S3R	11	N	85	20.81038	-156.61085	N	Y	Y	Y	N	N	N	N	N	N	N	1	N	1	1	N	0	0	2	2019
S3R	12	N	11, 83, 80	20.8104	-156.61082	N	Y	Y	Y	N	N	Y	N	Y	N	N	1	N	1	1	N	0	9	5	2019
S3R	11	Y	81	20.8104	-156.61247	N	N	N	N	N	N	Y	N	N	N	N	1	N	1	-	N	0	0	1	2019
S3R	12	N	81	20.81035	-156.61318	N	N	N	N	N	N	N	N	N	N	N	1	N	1	1	N	0	0	1	2019
S3R	12	N	21, 39, 13	20.81122	-156.62216	Y	Y	N	N	Y	N	N	N	N	N	N	7	Y	1	-	N	0	0	0	2020
S3R	11	N	21	20.81154	-156.62269	Y	Y	N	N	Y	N	N	N	N	N	N	1	N	1	1	N	0	0	0	2020
S3R	20	N	11, 22	20.81654	-156.62715	N	Y	Y	Y	Y	N	N	N	N	N	N	1	N	1	99	N	0	0	0	2019
S3R	12	N	11, 83	20.81666	-156.62721	N	Y	Y	Y	N	N	N	N	N	N	N	1	N	1	-	N	0	0	2	2020
S3R	12	N	81	20.81667	-156.62722	N	N	N	N	N	N	N	N	N	N	N	5	Y	1	-	N	0	0	1	2020
S3R	12	N	84	20.81628	-156.62701	N	N	N	N	N	N	N	N	N	N	N	1	N	1	1	N	0	0	1	2019
S3R	12	N	11, 80, 11, 80	20.82338	-156.63066	N	Y	Y	Y	N	N	N	N	N	N	N	7	Y	1	-	N	0	1	2	2019
S3R	12	N	81	20.82471	-156.63152	N	N	N	N	N	N	Y	N	N	N	N	1	N	1	1	N	0	0	0	2020
S3R	12	N	11, 80	20.83084	-156.63809	N	Y	Y	Y	N	N	N	N	N	N	N	1	N	1	99	N	1	0	1	2019
S3R	12	N	11, 80, 83, 81	20.83103	-156.63828	N	Y	Y	Y	N	N	N	N	N	N	N	1	N	1	1	N	0	2	5	2019
S3R	12	N	08, 43	20.83258	-156.64028	N	N	N	N	N	Y	N	N	N	N	N	1	N	1	99	N	0	0	1	2019

Appendix D

Future Year 2045 Intersection Operations

Synchro Worksheets

Intersection	
Int Delay, s/veh	0.9

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	16	1209	1131	5	8	20
Future Vol, veh/h	16	1209	1131	5	8	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	190	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	13	3	7	0	0	5
Mvmt Flow	17	1259	1178	5	8	21

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1183	0	-	0	2474	1181
Stage 1	-	-	-	-	1181	-
Stage 2	-	-	-	-	1293	-
Critical Hdwy	4.23	-	-	-	6.4	6.25
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.317	-	-	-	3.5	3.345
Pot Cap-1 Maneuver	553	-	-	-	33	228
Stage 1	-	-	-	-	294	-
Stage 2	-	-	-	-	260	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	553	-	-	-	32	228
Mov Cap-2 Maneuver	-	-	-	-	32	-
Stage 1	-	-	-	-	285	-
Stage 2	-	-	-	-	260	-

Approach	SE	NW	SW
HCM Control Delay, s	0.2	0	70.2
HCM LOS			F

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	553	-	83
HCM Lane V/C Ratio	-	-	0.03	-	0.351
HCM Control Delay (s)	-	-	11.7	-	70.2
HCM Lane LOS	-	-	B	-	F
HCM 95th %tile Q(veh)	-	-	0.1	-	1.4

Intersection	
Int Delay, s/veh	0.6

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	6	1211	1119	5	5	17
Future Vol, veh/h	6	1211	1119	5	5	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	17	3	6	0	0	30
Mvmt Flow	6	1261	1166	5	5	18

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1171	0	-	0	2442	1169
Stage 1	-	-	-	-	1169	-
Stage 2	-	-	-	-	1273	-
Critical Hdwy	4.27	-	-	-	6.4	6.5
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.353	-	-	-	3.5	3.57
Pot Cap-1 Maneuver	546	-	-	-	35	206
Stage 1	-	-	-	-	298	-
Stage 2	-	-	-	-	266	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	546	-	-	-	34	206
Mov Cap-2 Maneuver	-	-	-	-	34	-
Stage 1	-	-	-	-	287	-
Stage 2	-	-	-	-	266	-

Approach	SE	NW	SW
HCM Control Delay, s	0.1	0	53.9
HCM LOS			F

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	546	-	96
HCM Lane V/C Ratio	-	-	0.011	-	0.239
HCM Control Delay (s)	-	-	11.7	0	53.9
HCM Lane LOS	-	-	B	A	F
HCM 95th %tile Q(veh)	-	-	0	-	0.9

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	5	1208	1115	5	5	9
Future Vol, veh/h	5	1208	1115	5	5	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	175	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	7	25	50	11
Mvmt Flow	5	1258	1161	5	5	9

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1166	0	-	0	1803	1164
Stage 1	-	-	-	-	1164	-
Stage 2	-	-	-	-	639	-
Critical Hdwy	4.1	-	-	-	7.35	6.365
Critical Hdwy Stg 1	-	-	-	-	6.15	-
Critical Hdwy Stg 2	-	-	-	-	6.55	-
Follow-up Hdwy	2.2	-	-	-	3.975	3.4045
Pot Cap-1 Maneuver	606	-	-	-	53	223
Stage 1	-	-	-	-	220	-
Stage 2	-	-	-	-	395	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	606	-	-	-	52	223
Mov Cap-2 Maneuver	-	-	-	-	52	-
Stage 1	-	-	-	-	214	-
Stage 2	-	-	-	-	395	-

Approach	EB	WB	SW
HCM Control Delay, s	0.1	0	45.6
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	606	-	-	-	103
HCM Lane V/C Ratio	0.009	-	-	-	0.142
HCM Control Delay (s)	11	0.1	-	-	45.6
HCM Lane LOS	B	A	-	-	E
HCM 95th %tile Q(veh)	0	-	-	-	0.5

Intersection	
Int Delay, s/veh	7.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	1199	5	28	1089	5	14	5	13	5	5	16
Future Vol, veh/h	8	1199	5	28	1089	5	14	5	13	5	5	16
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	None
Storage Length	300	-	-	400	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	13	3	0	7	6	0	0	0	0	0	0	13
Mvmt Flow	8	1249	5	29	1134	5	15	5	14	5	5	17

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1139	0	0	1249	0	0	2471	2462	1249	2470	2460	1137
Stage 1	-	-	-	-	-	-	1265	1265	-	1195	1195	-
Stage 2	-	-	-	-	-	-	1206	1197	-	1275	1265	-
Critical Hdwy	4.23	-	-	4.17	-	-	7.1	6.5	6.2	7.1	6.5	6.33
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.317	-	-	2.263	-	-	3.5	4	3.3	3.5	4	3.417
Pot Cap-1 Maneuver	575	-	-	540	-	-	21	31	213	21	31	233
Stage 1	-	-	-	-	-	-	210	243	-	230	262	-
Stage 2	-	-	-	-	-	-	226	261	-	207	243	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	575	-	-	540	-	-	16	29	213	16	29	233
Mov Cap-2 Maneuver	-	-	-	-	-	-	16	29	-	16	29	-
Stage 1	-	-	-	-	-	-	207	240	-	227	248	-
Stage 2	-	-	-	-	-	-	194	247	-	187	240	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.3	$ 418.4	156.4
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	29	575	-	-	540	-	-	47
HCM Lane V/C Ratio	1.149	0.014	-	-	0.054	-	-	0.576
HCM Control Delay (s)	$ 418.4	11.4	-	-	12	-	-	156.4
HCM Lane LOS	F	B	-	-	B	-	-	F
HCM 95th %tile Q(veh)	3.8	0	-	-	0.2	-	-	2.2

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	1213	1106	26	0	14
Future Vol, veh/h	0	1213	1106	26	0	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	6	23	0	7
Mvmt Flow	0	1264	1152	27	0	15

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	1166
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.27
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.363
Pot Cap-1 Maneuver	0	-	-	-	0	231
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	231
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	21.6
HCM LOS			C

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	231
HCM Lane V/C Ratio	-	-	-	0.063
HCM Control Delay (s)	-	-	-	21.6
HCM Lane LOS	-	-	-	C
HCM 95th %tile Q(veh)	-	-	-	0.2

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	13	1200	1129	9	11	5
Future Vol, veh/h	13	1200	1129	9	11	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	275	-	-	225	0	65
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	7	0	9	0
Mvmt Flow	14	1250	1176	9	11	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1176	0	-	0	2454	1176
Stage 1	-	-	-	-	1176	-
Stage 2	-	-	-	-	1278	-
Critical Hdwy	4.1	-	-	-	6.49	6.2
Critical Hdwy Stg 1	-	-	-	-	5.49	-
Critical Hdwy Stg 2	-	-	-	-	5.49	-
Follow-up Hdwy	2.2	-	-	-	3.581	3.3
Pot Cap-1 Maneuver	601	-	-	-	32	235
Stage 1	-	-	-	-	284	-
Stage 2	-	-	-	-	253	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	601	-	-	-	31	235
Mov Cap-2 Maneuver	-	-	-	-	135	-
Stage 1	-	-	-	-	277	-
Stage 2	-	-	-	-	253	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	29.9
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	601	-	-	-	135	235
HCM Lane V/C Ratio	0.023	-	-	-	0.085	0.022
HCM Control Delay (s)	11.1	-	-	-	34.1	20.7
HCM Lane LOS	B	-	-	-	D	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3	0.1

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	1211	1138	5	5	5
Future Vol, veh/h	5	1211	1138	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	7	0	0	0
Mvmt Flow	5	1261	1185	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1190	0	-	0	2459	1188
Stage 1	-	-	-	-	1188	-
Stage 2	-	-	-	-	1271	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	594	-	-	-	34	231
Stage 1	-	-	-	-	292	-
Stage 2	-	-	-	-	266	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	594	-	-	-	33	231
Mov Cap-2 Maneuver	-	-	-	-	33	-
Stage 1	-	-	-	-	284	-
Stage 2	-	-	-	-	266	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	80.2
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	594	-	-	-	58
HCM Lane V/C Ratio	0.009	-	-	-	0.18
HCM Control Delay (s)	11.1	0	-	-	80.2
HCM Lane LOS	B	A	-	-	F
HCM 95th %tile Q(veh)	0	-	-	-	0.6

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	1212	1136	5	5	5
Future Vol, veh/h	5	1212	1136	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	7	0	0	0
Mvmt Flow	5	1263	1183	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1188	0	-	0	2459	1186
Stage 1	-	-	-	-	1186	-
Stage 2	-	-	-	-	1273	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	595	-	-	-	34	232
Stage 1	-	-	-	-	293	-
Stage 2	-	-	-	-	266	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	595	-	-	-	33	232
Mov Cap-2 Maneuver	-	-	-	-	33	-
Stage 1	-	-	-	-	285	-
Stage 2	-	-	-	-	266	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	80.2
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	595	-	-	-	58
HCM Lane V/C Ratio	0.009	-	-	-	0.18
HCM Control Delay (s)	11.1	0	-	-	80.2
HCM Lane LOS	B	A	-	-	F
HCM 95th %tile Q(veh)	0	-	-	-	0.6

Intersection	
Int Delay, s/veh	0.1

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	5	1210	1133	5	5	5
Future Vol, veh/h	5	1210	1133	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	425	-	-	350	0	75
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	5	8	25	50	0
Mvmt Flow	5	1260	1180	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1180	0	-	0	2450	1180
Stage 1	-	-	-	-	1180	-
Stage 2	-	-	-	-	1270	-
Critical Hdwy	4.1	-	-	-	6.9	6.2
Critical Hdwy Stg 1	-	-	-	-	5.9	-
Critical Hdwy Stg 2	-	-	-	-	5.9	-
Follow-up Hdwy	2.2	-	-	-	3.95	3.3
Pot Cap-1 Maneuver	599	-	-	-	24	234
Stage 1	-	-	-	-	235	-
Stage 2	-	-	-	-	211	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	599	-	-	-	24	234
Mov Cap-2 Maneuver	-	-	-	-	112	-
Stage 1	-	-	-	-	233	-
Stage 2	-	-	-	-	211	-

Approach	SE	NW	SW
HCM Control Delay, s	0	0	29.7
HCM LOS			D

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1	SWLn2
Capacity (veh/h)	-	-	599	-	112	234
HCM Lane V/C Ratio	-	-	0.009	-	0.047	0.022
HCM Control Delay (s)	-	-	11.1	-	38.7	20.7
HCM Lane LOS	-	-	B	-	E	C
HCM 95th %tile Q(veh)	-	-	0	-	0.1	0.1

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	1211	1135	6	5	5
Future Vol, veh/h	5	1211	1135	6	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	425	-	-	350	0	75
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	0	7	0	0	0
Mvmt Flow	5	1261	1182	6	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1182	0	-	0	2453	1182
Stage 1	-	-	-	-	1182	-
Stage 2	-	-	-	-	1271	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	598	-	-	-	34	233
Stage 1	-	-	-	-	294	-
Stage 2	-	-	-	-	266	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	598	-	-	-	34	233
Mov Cap-2 Maneuver	-	-	-	-	143	-
Stage 1	-	-	-	-	292	-
Stage 2	-	-	-	-	266	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	25.9
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	598	-	-	-	143	233
HCM Lane V/C Ratio	0.009	-	-	-	0.036	0.022
HCM Control Delay (s)	11.1	-	-	-	31.1	20.8
HCM Lane LOS	B	-	-	-	D	C
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0.1

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	1212	1141	5	5	5
Future Vol, veh/h	5	1212	1141	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	0	0	0	0
Mvmt Flow	5	1263	1189	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1194	0	-	0	2465	1192
Stage 1	-	-	-	-	1192	-
Stage 2	-	-	-	-	1273	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	592	-	-	-	34	230
Stage 1	-	-	-	-	291	-
Stage 2	-	-	-	-	266	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	592	-	-	-	33	230
Mov Cap-2 Maneuver	-	-	-	-	33	-
Stage 1	-	-	-	-	283	-
Stage 2	-	-	-	-	266	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	80.2
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	592	-	-	-	58
HCM Lane V/C Ratio	0.009	-	-	-	0.18
HCM Control Delay (s)	11.1	0	-	-	80.2
HCM Lane LOS	B	A	-	-	F
HCM 95th %tile Q(veh)	0	-	-	-	0.6

Intersection	
Int Delay, s/veh	0.5

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	5	1352	1330	5	5	5
Future Vol, veh/h	5	1352	1330	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	190	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	5	1423	1400	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1405	0	-	0	2836	1403
Stage 1	-	-	-	-	1403	-
Stage 2	-	-	-	-	1433	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	492	-	-	-	20	173
Stage 1	-	-	-	-	230	-
Stage 2	-	-	-	-	222	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	492	-	-	-	20	173
Mov Cap-2 Maneuver	-	-	-	-	20	-
Stage 1	-	-	-	-	228	-
Stage 2	-	-	-	-	222	-

Approach	SE	NW	SW
HCM Control Delay, s	0	0	142
HCM LOS			F

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	492	-	36
HCM Lane V/C Ratio	-	-	0.011	-	0.292
HCM Control Delay (s)	-	-	12.4	-	142
HCM Lane LOS	-	-	B	-	F
HCM 95th %tile Q(veh)	-	-	0	-	1

Intersection	
Int Delay, s/veh	1.2

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	12	1341	1301	7	5	31
Future Vol, veh/h	12	1341	1301	7	5	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	13	1412	1369	7	5	33

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1376	0	-	0	2811	1373
Stage 1	-	-	-	-	1373	-
Stage 2	-	-	-	-	1438	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	505	-	-	-	20	180
Stage 1	-	-	-	-	238	-
Stage 2	-	-	-	-	221	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	505	-	-	-	18	180
Mov Cap-2 Maneuver	-	-	-	-	18	-
Stage 1	-	-	-	-	210	-
Stage 2	-	-	-	-	221	-

Approach	SE	NW	SW
HCM Control Delay, s	0.1	0	85.3
HCM LOS			F

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	505	-	80
HCM Lane V/C Ratio	-	-	0.025	-	0.474
HCM Control Delay (s)	-	-	12.3	0	85.3
HCM Lane LOS	-	-	B	A	F
HCM 95th %tile Q(veh)	-	-	0.1	-	2

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	5	1341	1278	6	5	30
Future Vol, veh/h	5	1341	1278	6	5	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	175	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	5	1412	1345	6	5	32

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1351	0	-	0	2064	1348
Stage 1	-	-	-	-	1348	-
Stage 2	-	-	-	-	716	-
Critical Hdwy	4.1	-	-	-	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	516	-	-	-	54	186
Stage 1	-	-	-	-	244	-
Stage 2	-	-	-	-	450	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	516	-	-	-	52	186
Mov Cap-2 Maneuver	-	-	-	-	52	-
Stage 1	-	-	-	-	233	-
Stage 2	-	-	-	-	450	-

Approach	EB	WB	SW
HCM Control Delay, s	0.3	0	41
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	516	-	-	-	136
HCM Lane V/C Ratio	0.01	-	-	-	0.271
HCM Control Delay (s)	12	0.3	-	-	41
HCM Lane LOS	B	A	-	-	E
HCM 95th %tile Q(veh)	0	-	-	-	1

Intersection	
Int Delay, s/veh	13

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	23	1306	15	16	1264	22	5	5	14	10	5	15
Future Vol, veh/h	23	1306	15	16	1264	22	5	5	14	10	5	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	None
Storage Length	300	-	-	400	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	4	7	0	2	0	0	0	0	0	0	0
Mvmt Flow	24	1375	16	17	1331	23	5	5	15	11	5	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1354	0	0	1375	0	0	2810	2811	1375	2810	2800	1343
Stage 1	-	-	-	-	-	-	1423	1423	-	1377	1377	-
Stage 2	-	-	-	-	-	-	1387	1388	-	1433	1423	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	515	-	-	505	-	-	12	18	180	12	19	188
Stage 1	-	-	-	-	-	-	170	204	-	181	214	-
Stage 2	-	-	-	-	-	-	179	212	-	168	204	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	515	-	-	505	-	-	8	17	180	~ 8	17	188
Mov Cap-2 Maneuver	-	-	-	-	-	-	8	17	-	~ 8	17	-
Stage 1	-	-	-	-	-	-	162	194	-	172	207	-
Stage 2	-	-	-	-	-	-	154	205	-	143	194	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.2	$ 433.7	$ 806.8
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	24	515	-	-	505	-	-	18
HCM Lane V/C Ratio	1.053	0.047	-	-	0.033	-	-	1.754
HCM Control Delay (s)	$ 433.7	12.3	-	-	12.4	-	-	$ 806.8
HCM Lane LOS	F	B	-	-	B	-	-	F
HCM 95th %tile Q(veh)	3.2	0.1	-	-	0.1	-	-	4.4

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑			↱
Traffic Vol, veh/h	0	1330	1273	31	0	29
Future Vol, veh/h	0	1330	1273	31	0	29
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	0	1400	1340	33	0	31

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	1357
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.3
Pot Cap-1 Maneuver	0	-	-	-	0	184
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	184
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	28.4
HCM LOS			D

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	184
HCM Lane V/C Ratio	-	-	-	0.166
HCM Control Delay (s)	-	-	-	28.4
HCM Lane LOS	-	-	-	D
HCM 95th %tile Q(veh)	-	-	-	0.6

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	14	1316	1295	5	27	9
Future Vol, veh/h	14	1316	1295	5	27	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	275	-	-	225	0	65
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	15	1385	1363	5	28	9

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1363	0	-	0	2778	1363
Stage 1	-	-	-	-	1363	-
Stage 2	-	-	-	-	1415	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	511	-	-	-	~ 21	183
Stage 1	-	-	-	-	240	-
Stage 2	-	-	-	-	227	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	511	-	-	-	~ 20	183
Mov Cap-2 Maneuver	-	-	-	-	114	-
Stage 1	-	-	-	-	233	-
Stage 2	-	-	-	-	227	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	41.5
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	511	-	-	-	114	183
HCM Lane V/C Ratio	0.029	-	-	-	0.249	0.052
HCM Control Delay (s)	12.3	-	-	-	46.8	25.7
HCM Lane LOS	B	-	-	-	E	D
HCM 95th %tile Q(veh)	0.1	-	-	-	0.9	0.2

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	1343	1298	5	5	5
Future Vol, veh/h	5	1343	1298	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	5	1414	1366	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1371	0	-	0	2793	1369
Stage 1	-	-	-	-	1369	-
Stage 2	-	-	-	-	1424	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	507	-	-	-	21	181
Stage 1	-	-	-	-	239	-
Stage 2	-	-	-	-	224	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	507	-	-	-	20	181
Mov Cap-2 Maneuver	-	-	-	-	20	-
Stage 1	-	-	-	-	228	-
Stage 2	-	-	-	-	224	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	142
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	507	-	-	-	36
HCM Lane V/C Ratio	0.01	-	-	-	0.292
HCM Control Delay (s)	12.2	0	-	-	142
HCM Lane LOS	B	A	-	-	F
HCM 95th %tile Q(veh)	0	-	-	-	1

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	1343	1296	5	5	5
Future Vol, veh/h	5	1343	1296	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	2
Mvmt Flow	5	1414	1364	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1369	0	-	0	2791	1367
Stage 1	-	-	-	-	1367	-
Stage 2	-	-	-	-	1424	-
Critical Hdwy	4.1	-	-	-	6.4	6.22
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.318
Pot Cap-1 Maneuver	508	-	-	-	21	180
Stage 1	-	-	-	-	239	-
Stage 2	-	-	-	-	224	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	508	-	-	-	20	180
Mov Cap-2 Maneuver	-	-	-	-	20	-
Stage 1	-	-	-	-	228	-
Stage 2	-	-	-	-	224	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	142
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	508	-	-	-	36
HCM Lane V/C Ratio	0.01	-	-	-	0.292
HCM Control Delay (s)	12.2	0	-	-	142
HCM Lane LOS	B	A	-	-	F
HCM 95th %tile Q(veh)	0	-	-	-	1

Intersection	
Int Delay, s/veh	0.2

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	5	1339	1292	5	5	9
Future Vol, veh/h	5	1339	1292	5	5	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	425	-	-	350	0	75
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	92
Heavy Vehicles, %	0	37	7	0	0	0
Mvmt Flow	5	1409	1360	5	5	10

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1360	0	-	0	2779	1360
Stage 1	-	-	-	-	1360	-
Stage 2	-	-	-	-	1419	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	512	-	-	-	21	183
Stage 1	-	-	-	-	241	-
Stage 2	-	-	-	-	226	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	512	-	-	-	21	183
Mov Cap-2 Maneuver	-	-	-	-	116	-
Stage 1	-	-	-	-	239	-
Stage 2	-	-	-	-	226	-

Approach	SE	NW	SW
HCM Control Delay, s	0	0	29.9
HCM LOS			D

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1	SWLn2
Capacity (veh/h)	-	-	512	-	116	183
HCM Lane V/C Ratio	-	-	0.01	-	0.045	0.053
HCM Control Delay (s)	-	-	12.1	-	37.5	25.8
HCM Lane LOS	-	-	B	-	E	D
HCM 95th %tile Q(veh)	-	-	0	-	0.1	0.2

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	6	1334	1294	5	5	5
Future Vol, veh/h	6	1334	1294	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	425	-	-	350	0	75
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	6	1404	1362	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1362	0	-	0	2778	1362
Stage 1	-	-	-	-	1362	-
Stage 2	-	-	-	-	1416	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	511	-	-	-	21	183
Stage 1	-	-	-	-	241	-
Stage 2	-	-	-	-	226	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	511	-	-	-	21	183
Mov Cap-2 Maneuver	-	-	-	-	115	-
Stage 1	-	-	-	-	238	-
Stage 2	-	-	-	-	226	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	31.6
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	511	-	-	-	115	183
HCM Lane V/C Ratio	0.012	-	-	-	0.046	0.029
HCM Control Delay (s)	12.1	-	-	-	37.8	25.3
HCM Lane LOS	B	-	-	-	E	D
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0.1

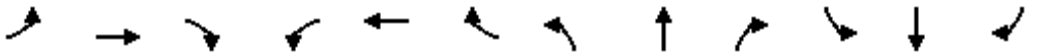
Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	1336	1298	5	5	5
Future Vol, veh/h	5	1336	1298	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	2
Mvmt Flow	5	1406	1366	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1371	0	-	0	2785	1369
Stage 1	-	-	-	-	1369	-
Stage 2	-	-	-	-	1416	-
Critical Hdwy	4.1	-	-	-	6.4	6.22
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.318
Pot Cap-1 Maneuver	507	-	-	-	21	179
Stage 1	-	-	-	-	239	-
Stage 2	-	-	-	-	226	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	507	-	-	-	20	179
Mov Cap-2 Maneuver	-	-	-	-	20	-
Stage 1	-	-	-	-	228	-
Stage 2	-	-	-	-	226	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	142
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	507	-	-	-	36
HCM Lane V/C Ratio	0.01	-	-	-	0.292
HCM Control Delay (s)	12.2	0	-	-	142
HCM Lane LOS	B	A	-	-	F
HCM 95th %tile Q(veh)	0	-	-	-	1



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	1196	21	66	1066	5	70	5	18	5	5	5
Future Volume (veh/h)	5	1196	21	66	1066	5	70	5	18	5	5	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	5	1246	0	69	1110	0	73	5	0	5	5	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	12	1372		89	1453		167	6		101	79	
Arrive On Green	0.01	0.73	0.00	0.05	0.78	0.00	0.07	0.07	0.00	0.07	0.07	0.00
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1366	94	1585	634	1153	1585
Grp Volume(v), veh/h	5	1246	0	69	1110	0	78	0	0	10	0	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1460	0	1585	1787	0	1585
Q Serve(g_s), s	0.3	50.1	0.0	3.6	30.7	0.0	4.5	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.3	50.1	0.0	3.6	30.7	0.0	4.9	0.0	0.0	0.5	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.94		1.00	0.50		1.00
Lane Grp Cap(c), veh/h	12	1372		89	1453		174	0		179	0	
V/C Ratio(X)	0.43	0.91		0.78	0.76		0.45	0.00		0.06	0.00	
Avail Cap(c_a), veh/h	94	2202		113	2222		365	0		394	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	46.7	10.0	0.0	44.3	5.8	0.0	43.2	0.0	0.0	41.1	0.0	0.0
Incr Delay (d2), s/veh	23.3	3.8	0.0	22.5	0.9	0.0	1.8	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	14.3	0.0	2.1	6.6	0.0	1.9	0.0	0.0	0.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	70.0	13.8	0.0	66.7	6.6	0.0	45.0	0.0	0.0	41.3	0.0	0.0
LnGrp LOS	E	B		E	A		D	A		D	A	
Approach Vol, veh/h		1251			1179			78			10	
Approach Delay, s/veh		14.1			10.2			45.0			41.3	
Approach LOS		B			B			D			D	

Timer - Assigned Phs	2	3	4	6	7	8
Phs Duration (G+Y+Rc), s	10.4	9.7	74.1	10.4	5.6	78.2
Change Period (Y+Rc), s	4.0	5.0	5.0	4.0	5.0	5.0
Max Green Setting (Gmax), s	19.0	6.0	111.0	19.0	5.0	112.0
Max Q Clear Time (g_c+I1), s	6.9	5.6	52.1	2.5	2.3	32.7
Green Ext Time (p_c), s	0.2	0.0	17.0	0.0	0.0	12.7

Intersection Summary	
HCM 6th Ctrl Delay	13.3
HCM 6th LOS	B

Notes

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	8	0	1131	5	0	16
Future Vol, veh/h	8	0	1131	5	0	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	0	1191	5	0	17

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1208	-	0	0	-	-
Stage 1	1191	-	-	-	-	-
Stage 2	17	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	202	0	-	-	0	-
Stage 1	288	0	-	-	0	-
Stage 2	1006	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	202	-	-	-	-	-
Mov Cap-2 Maneuver	202	-	-	-	-	-
Stage 1	288	-	-	-	-	-
Stage 2	1006	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	23.6	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	202	-
HCM Lane V/C Ratio	-	-	0.042	-
HCM Control Delay (s)	-	-	23.6	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1136	5	0	5
Future Vol, veh/h	5	0	1136	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1196	5	0	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1201	-	0	0	-	-
Stage 1	1196	-	-	-	-	-
Stage 2	5	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	204	0	-	-	0	-
Stage 1	287	0	-	-	0	-
Stage 2	1018	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	204	-	-	-	-	-
Mov Cap-2 Maneuver	204	-	-	-	-	-
Stage 1	287	-	-	-	-	-
Stage 2	1018	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	23.1	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	204	-
HCM Lane V/C Ratio	-	-	0.026	-
HCM Control Delay (s)	-	-	23.1	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	11	0	1127	9	0	13
Future Vol, veh/h	11	0	1127	9	0	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	12	0	1186	9	0	14

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1200	-	0	0	-	-
Stage 1	1186	-	-	-	-	-
Stage 2	14	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	204	0	-	-	0	-
Stage 1	290	0	-	-	0	-
Stage 2	1009	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	204	-	-	-	-	-
Mov Cap-2 Maneuver	204	-	-	-	-	-
Stage 1	290	-	-	-	-	-
Stage 2	1009	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	23.7	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	204	-
HCM Lane V/C Ratio	-	-	0.057	-
HCM Control Delay (s)	-	-	23.7	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0.2	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1133	5	0	5
Future Vol, veh/h	5	0	1133	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1193	5	0	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1198	-	0	0	-	-
Stage 1	1193	-	-	-	-	-
Stage 2	5	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	205	0	-	-	0	-
Stage 1	288	0	-	-	0	-
Stage 2	1018	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	205	-	-	-	-	-
Mov Cap-2 Maneuver	205	-	-	-	-	-
Stage 1	288	-	-	-	-	-
Stage 2	1018	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	23	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	205	-
HCM Lane V/C Ratio	-	-	0.026	-
HCM Control Delay (s)	-	-	23	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1135	6	0	5
Future Vol, veh/h	5	0	1135	6	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1195	6	0	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1200	-	0	0	-	-
Stage 1	1195	-	-	-	-	-
Stage 2	5	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	204	0	-	-	0	-
Stage 1	287	0	-	-	0	-
Stage 2	1018	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	204	-	-	-	-	-
Mov Cap-2 Maneuver	204	-	-	-	-	-
Stage 1	287	-	-	-	-	-
Stage 2	1018	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	23.1	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	204	-
HCM Lane V/C Ratio	-	-	0.026	-
HCM Control Delay (s)	-	-	23.1	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	4

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	10	0	-	0	23	8
Stage 1	-	-	-	-	8	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1610	-	-	-	993	1074
Stage 1	-	-	-	-	1015	-
Stage 2	-	-	-	-	1008	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1610	-	-	-	990	1074
Mov Cap-2 Maneuver	-	-	-	-	990	-
Stage 1	-	-	-	-	1012	-
Stage 2	-	-	-	-	1008	-

Approach	SE	NW	SW
HCM Control Delay, s	3.6	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	1610	-	1030
HCM Lane V/C Ratio	-	-	0.003	-	0.01
HCM Control Delay (s)	-	-	7.2	0	8.5
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	-	0

Intersection	
Int Delay, s/veh	4

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	10	0	-	0	23	8
Stage 1	-	-	-	-	8	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1623	-	-	-	998	1080
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1013	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1623	-	-	-	995	1080
Mov Cap-2 Maneuver	-	-	-	-	995	-
Stage 1	-	-	-	-	1017	-
Stage 2	-	-	-	-	1013	-

Approach	SE	NW	SW
HCM Control Delay, s	3.6	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	1623	-	1036
HCM Lane V/C Ratio	-	-	0.003	-	0.01
HCM Control Delay (s)	-	-	7.2	0	8.5
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	-	0

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	175	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	10	0	-	0	21	8
Stage 1	-	-	-	-	8	-
Stage 2	-	-	-	-	13	-
Critical Hdwy	4.1	-	-	-	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1623	-	-	-	1000	1080
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1014	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1623	-	-	-	997	1080
Mov Cap-2 Maneuver	-	-	-	-	997	-
Stage 1	-	-	-	-	1017	-
Stage 2	-	-	-	-	1014	-

Approach	EB	WB	SW
HCM Control Delay, s	3.6	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	1623	-	-	-	1037
HCM Lane V/C Ratio	0.003	-	-	-	0.01
HCM Control Delay (s)	7.2	0	-	-	8.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	7.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	5	5	5	5	5	5	30	5	5	31	5
Future Vol, veh/h	5	5	5	5	5	5	5	30	5	5	31	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	None
Storage Length	300	-	-	400	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	4	7	0	2	0	0	0	0	0	0	0
Mvmt Flow	5	5	5	5	5	5	5	31	5	5	32	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	10	0	0	5	0	0	51	35	5	51	33	8
Stage 1	-	-	-	-	-	-	15	15	-	18	18	-
Stage 2	-	-	-	-	-	-	36	20	-	33	15	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1623	-	-	1630	-	-	953	861	1084	953	864	1080
Stage 1	-	-	-	-	-	-	1010	887	-	1006	884	-
Stage 2	-	-	-	-	-	-	985	883	-	988	887	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1623	-	-	1630	-	-	917	856	1084	918	859	1080
Mov Cap-2 Maneuver	-	-	-	-	-	-	917	856	-	918	859	-
Stage 1	-	-	-	-	-	-	1007	884	-	1003	881	-
Stage 2	-	-	-	-	-	-	941	880	-	946	884	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.4	2.4	9.3	9.3
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	887	1623	-	-	1630	-	-	888
HCM Lane V/C Ratio	0.047	0.003	-	-	0.003	-	-	0.048
HCM Control Delay (s)	9.3	7.2	-	-	7.2	-	-	9.3
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	5	5	5	0	5
Future Vol, veh/h	0	5	5	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	0	5	5	5	0	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	8
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.3
Pot Cap-1 Maneuver	0	-	-	-	0	1080
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	1080
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	8.3
HCM LOS			A

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	1080
HCM Lane V/C Ratio	-	-	-	0.005
HCM Control Delay (s)	-	-	-	8.3
HCM Lane LOS	-	-	-	A
HCM 95th %tile Q(veh)	-	-	-	0

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	275	-	-	225	0	65
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	5	0	-	0	20	5
Stage 1	-	-	-	-	5	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1630	-	-	-	1002	1084
Stage 1	-	-	-	-	1023	-
Stage 2	-	-	-	-	1013	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1630	-	-	-	999	1084
Mov Cap-2 Maneuver	-	-	-	-	920	-
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1013	-

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	8.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1630	-	-	-	920	1084
HCM Lane V/C Ratio	0.003	-	-	-	0.006	0.005
HCM Control Delay (s)	7.2	-	-	-	8.9	8.3
HCM Lane LOS	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0	0

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	10	0	-	0	23	8
Stage 1	-	-	-	-	8	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1623	-	-	-	998	1080
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1013	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1623	-	-	-	995	1080
Mov Cap-2 Maneuver	-	-	-	-	995	-
Stage 1	-	-	-	-	1017	-
Stage 2	-	-	-	-	1013	-

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1623	-	-	-	1036
HCM Lane V/C Ratio	0.003	-	-	-	0.01
HCM Control Delay (s)	7.2	0	-	-	8.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	4	2	0	0	2
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	10	0	-	0	23	8
Stage 1	-	-	-	-	8	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.4	6.22
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.318
Pot Cap-1 Maneuver	1623	-	-	-	998	1074
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1013	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1623	-	-	-	995	1074
Mov Cap-2 Maneuver	-	-	-	-	995	-
Stage 1	-	-	-	-	1017	-
Stage 2	-	-	-	-	1013	-

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1623	-	-	-	1033
HCM Lane V/C Ratio	0.003	-	-	-	0.01
HCM Control Delay (s)	7.2	0	-	-	8.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	4.1

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	425	-	-	350	0	75
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	37	7	0	0	0
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	5	0	-	0	20	5
Stage 1	-	-	-	-	5	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1630	-	-	-	1002	1084
Stage 1	-	-	-	-	1023	-
Stage 2	-	-	-	-	1013	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1630	-	-	-	999	1084
Mov Cap-2 Maneuver	-	-	-	-	920	-
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1013	-

Approach	SE	NW	SW
HCM Control Delay, s	3.6	0	8.6
HCM LOS			A

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1	SWLn2
Capacity (veh/h)	-	-	1630	-	920	1084
HCM Lane V/C Ratio	-	-	0.003	-	0.006	0.005
HCM Control Delay (s)	-	-	7.2	-	8.9	8.3
HCM Lane LOS	-	-	A	-	A	A
HCM 95th %tile Q(veh)	-	-	0	-	0	0

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	425	-	-	350	0	75
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	5	0	-	0	20	5
Stage 1	-	-	-	-	5	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1630	-	-	-	1002	1084
Stage 1	-	-	-	-	1023	-
Stage 2	-	-	-	-	1013	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1630	-	-	-	999	1084
Mov Cap-2 Maneuver	-	-	-	-	920	-
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1013	-

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	8.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1630	-	-	-	920	1084
HCM Lane V/C Ratio	0.003	-	-	-	0.006	0.005
HCM Control Delay (s)	7.2	-	-	-	8.9	8.3
HCM Lane LOS	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0	0

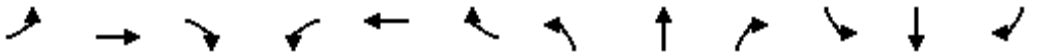
Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	4	2	0	0	2
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	10	0	-	0	23	8
Stage 1	-	-	-	-	8	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.4	6.22
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.318
Pot Cap-1 Maneuver	1623	-	-	-	998	1074
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1013	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1623	-	-	-	995	1074
Mov Cap-2 Maneuver	-	-	-	-	995	-
Stage 1	-	-	-	-	1017	-
Stage 2	-	-	-	-	1013	-

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1623	-	-	-	1033
HCM Lane V/C Ratio	0.003	-	-	-	0.01
HCM Control Delay (s)	7.2	0	-	-	8.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	1302	51	82	1222	5	110	5	28	5	5	5
Future Volume (veh/h)	5	1302	51	82	1222	5	110	5	28	5	5	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	5	1371	0	86	1286	0	116	5	0	5	5	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	11	1395		106	1494		184	6		112	100	
Arrive On Green	0.01	0.75	0.00	0.06	0.80	0.00	0.10	0.10	0.00	0.10	0.10	0.00
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1384	60	1585	766	1032	1585
Grp Volume(v), veh/h	5	1371	0	86	1286	0	121	0	0	10	0	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1444	0	1585	1798	0	1585
Q Serve(g_s), s	0.4	100.3	0.0	6.9	63.5	0.0	11.1	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.4	100.3	0.0	6.9	63.5	0.0	11.8	0.0	0.0	0.7	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.96		1.00	0.50		1.00
Lane Grp Cap(c), veh/h	11	1395		106	1494		190	0		213	0	
V/C Ratio(X)	0.45	0.98		0.81	0.86		0.64	0.00		0.05	0.00	
Avail Cap(c_a), veh/h	87	1407		112	1494		239	0		269	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	71.1	17.4	0.0	66.7	9.3	0.0	63.8	0.0	0.0	58.8	0.0	0.0
Incr Delay (d2), s/veh	25.3	19.9	0.0	33.2	5.4	0.0	3.7	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	45.1	0.0	4.1	23.4	0.0	4.6	0.0	0.0	0.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	96.4	37.3	0.0	99.9	14.6	0.0	67.5	0.0	0.0	58.9	0.0	0.0
LnGrp LOS	F	D		F	B		E	A		E	A	
Approach Vol, veh/h		1376			1372			121			10	
Approach Delay, s/veh		37.6			20.0			67.5			58.9	
Approach LOS		D			B			E			E	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		18.0	13.6	112.1		18.0	5.9	119.7				
Change Period (Y+Rc), s		4.0	5.0	5.0		4.0	5.0	5.0				
Max Green Setting (Gmax), s		19.0	9.0	108.0		19.0	7.0	110.0				
Max Q Clear Time (g_c+I1), s		13.8	8.9	102.3		2.7	2.4	65.5				
Green Ext Time (p_c), s		0.2	0.0	4.8		0.0	0.0	20.0				

Intersection Summary	
HCM 6th Ctrl Delay	30.5
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1330	5	0	5
Future Vol, veh/h	5	0	1330	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1385	5	0	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1390	-	0	0	-	-
Stage 1	1385	-	-	-	-	-
Stage 2	5	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	157	0	-	-	0	-
Stage 1	232	0	-	-	0	-
Stage 2	1018	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	157	-	-	-	-	-
Mov Cap-2 Maneuver	157	-	-	-	-	-
Stage 1	232	-	-	-	-	-
Stage 2	1018	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	28.7	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	157	-
HCM Lane V/C Ratio	-	-	0.033	-
HCM Control Delay (s)	-	-	28.7	-
HCM Lane LOS	-	-	D	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1335	5	0	5
Future Vol, veh/h	5	0	1335	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1391	5	0	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1396	-	0	0	-	-
Stage 1	1391	-	-	-	-	-
Stage 2	5	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	156	0	-	-	0	-
Stage 1	231	0	-	-	0	-
Stage 2	1018	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	156	-	-	-	-	-
Mov Cap-2 Maneuver	156	-	-	-	-	-
Stage 1	231	-	-	-	-	-
Stage 2	1018	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	28.9	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	156	-
HCM Lane V/C Ratio	-	-	0.033	-
HCM Control Delay (s)	-	-	28.9	-
HCM Lane LOS	-	-	D	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	27	0	1291	5	0	14
Future Vol, veh/h	27	0	1291	5	0	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	28	0	1345	5	0	15

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1360	-	0	0	-	-
Stage 1	1345	-	-	-	-	-
Stage 2	15	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	164	0	-	-	0	-
Stage 1	243	0	-	-	0	-
Stage 2	1008	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	164	-	-	-	-	-
Mov Cap-2 Maneuver	164	-	-	-	-	-
Stage 1	243	-	-	-	-	-
Stage 2	1008	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	31.4	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	164	-
HCM Lane V/C Ratio	-	-	0.171	-
HCM Control Delay (s)	-	-	31.4	-
HCM Lane LOS	-	-	D	-
HCM 95th %tile Q(veh)	-	-	0.6	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1292	5	0	5
Future Vol, veh/h	5	0	1292	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1346	5	0	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1351	-	0	0	-	-
Stage 1	1346	-	-	-	-	-
Stage 2	5	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	166	0	-	-	0	-
Stage 1	242	0	-	-	0	-
Stage 2	1018	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	166	-	-	-	-	-
Mov Cap-2 Maneuver	166	-	-	-	-	-
Stage 1	242	-	-	-	-	-
Stage 2	1018	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	27.4	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	166	-
HCM Lane V/C Ratio	-	-	0.031	-
HCM Control Delay (s)	-	-	27.4	-
HCM Lane LOS	-	-	D	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1293	5	0	6
Future Vol, veh/h	5	0	1293	5	0	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1347	5	0	6

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1353	-	0	0	-	-
Stage 1	1347	-	-	-	-	-
Stage 2	6	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	165	0	-	-	0	-
Stage 1	242	0	-	-	0	-
Stage 2	1017	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	165	-	-	-	-	-
Mov Cap-2 Maneuver	165	-	-	-	-	-
Stage 1	242	-	-	-	-	-
Stage 2	1017	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	27.5	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	165	-
HCM Lane V/C Ratio	-	-	0.032	-
HCM Control Delay (s)	-	-	27.5	-
HCM Lane LOS	-	-	D	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	4

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	10	0	-	0	23	8
Stage 1	-	-	-	-	8	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1610	-	-	-	993	1074
Stage 1	-	-	-	-	1015	-
Stage 2	-	-	-	-	1008	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1610	-	-	-	990	1074
Mov Cap-2 Maneuver	-	-	-	-	990	-
Stage 1	-	-	-	-	1012	-
Stage 2	-	-	-	-	1008	-

Approach	SE	NW	SW
HCM Control Delay, s	3.6	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	1610	-	1030
HCM Lane V/C Ratio	-	-	0.003	-	0.01
HCM Control Delay (s)	-	-	7.2	0	8.5
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	-	0

Intersection	
Int Delay, s/veh	4.1

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	17	3	6	0	0	30
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	10	0	-	0	23	8
Stage 1	-	-	-	-	8	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.27	-	-	-	6.4	6.5
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.353	-	-	-	3.5	3.57
Pot Cap-1 Maneuver	1517	-	-	-	998	998
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1013	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1517	-	-	-	995	998
Mov Cap-2 Maneuver	-	-	-	-	995	-
Stage 1	-	-	-	-	1017	-
Stage 2	-	-	-	-	1013	-

Approach	SE	NW	SW
HCM Control Delay, s	3.7	0	8.7
HCM LOS			A

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	1517	-	996
HCM Lane V/C Ratio	-	-	0.003	-	0.011
HCM Control Delay (s)	-	-	7.4	0	8.7
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	-	0

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	175	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	3	7	25	50	11
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	10	0	-	0	21	8
Stage 1	-	-	-	-	8	-
Stage 2	-	-	-	-	13	-
Critical Hdwy	4.1	-	-	-	7.35	6.365
Critical Hdwy Stg 1	-	-	-	-	6.15	-
Critical Hdwy Stg 2	-	-	-	-	6.55	-
Follow-up Hdwy	2.2	-	-	-	3.975	3.4045
Pot Cap-1 Maneuver	1623	-	-	-	878	1047
Stage 1	-	-	-	-	897	-
Stage 2	-	-	-	-	891	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1623	-	-	-	875	1047
Mov Cap-2 Maneuver	-	-	-	-	875	-
Stage 1	-	-	-	-	894	-
Stage 2	-	-	-	-	891	-

Approach	EB	WB	SW
HCM Control Delay, s	3.6	0	8.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	1623	-	-	-	953
HCM Lane V/C Ratio	0.003	-	-	-	0.011
HCM Control Delay (s)	7.2	0	-	-	8.8
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	7.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	5	5	5	5	5	5	19	5	5	31	5
Future Vol, veh/h	5	5	5	5	5	5	5	19	5	5	31	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	None
Storage Length	300	-	-	400	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	13	3	0	7	6	0	0	0	0	0	0	13
Mvmt Flow	5	5	5	5	5	5	5	20	5	5	33	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	10	0	0	5	0	0	52	35	5	46	33	8
Stage 1	-	-	-	-	-	-	15	15	-	18	18	-
Stage 2	-	-	-	-	-	-	37	20	-	28	15	-
Critical Hdwy	4.23	-	-	4.17	-	-	7.1	6.5	6.2	7.1	6.5	6.33
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.317	-	-	2.263	-	-	3.5	4	3.3	3.5	4	3.417
Pot Cap-1 Maneuver	1541	-	-	1584	-	-	952	861	1084	961	864	1043
Stage 1	-	-	-	-	-	-	1010	887	-	1006	884	-
Stage 2	-	-	-	-	-	-	984	883	-	994	887	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1541	-	-	1584	-	-	915	856	1084	935	859	1043
Mov Cap-2 Maneuver	-	-	-	-	-	-	915	856	-	935	859	-
Stage 1	-	-	-	-	-	-	1007	884	-	1003	881	-
Stage 2	-	-	-	-	-	-	940	880	-	964	884	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.4	2.4	9.1	9.3
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	899	1541	-	-	1584	-	-	887
HCM Lane V/C Ratio	0.034	0.003	-	-	0.003	-	-	0.049
HCM Control Delay (s)	9.1	7.3	-	-	7.3	-	-	9.3
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	5	5	5	0	5
Future Vol, veh/h	0	5	5	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	3	6	23	0	7
Mvmt Flow	0	5	5	5	0	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	8
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.27
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.363
Pot Cap-1 Maneuver	0	-	-	-	0	1060
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	1060
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	8.4
HCM LOS			A

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	1060
HCM Lane V/C Ratio	-	-	-	0.005
HCM Control Delay (s)	-	-	-	8.4
HCM Lane LOS	-	-	-	A
HCM 95th %tile Q(veh)	-	-	-	0

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	275	-	-	225	0	65
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	3	7	0	9	0
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	5	0	-	0	20	5
Stage 1	-	-	-	-	5	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.49	6.2
Critical Hdwy Stg 1	-	-	-	-	5.49	-
Critical Hdwy Stg 2	-	-	-	-	5.49	-
Follow-up Hdwy	2.2	-	-	-	3.581	3.3
Pot Cap-1 Maneuver	1630	-	-	-	979	1084
Stage 1	-	-	-	-	1000	-
Stage 2	-	-	-	-	990	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1630	-	-	-	976	1084
Mov Cap-2 Maneuver	-	-	-	-	899	-
Stage 1	-	-	-	-	997	-
Stage 2	-	-	-	-	990	-

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	8.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1630	-	-	-	899	1084
HCM Lane V/C Ratio	0.003	-	-	-	0.006	0.005
HCM Control Delay (s)	7.2	-	-	-	9	8.3
HCM Lane LOS	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0	0

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	3	7	0	0	0
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	10	0	-	0	23	8
Stage 1	-	-	-	-	8	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1623	-	-	-	998	1080
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1013	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1623	-	-	-	995	1080
Mov Cap-2 Maneuver	-	-	-	-	995	-
Stage 1	-	-	-	-	1017	-
Stage 2	-	-	-	-	1013	-

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1623	-	-	-	1036
HCM Lane V/C Ratio	0.003	-	-	-	0.01
HCM Control Delay (s)	7.2	0	-	-	8.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	3	7	0	0	0
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	10	0	-	0	23	8
Stage 1	-	-	-	-	8	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1623	-	-	-	998	1080
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1013	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1623	-	-	-	995	1080
Mov Cap-2 Maneuver	-	-	-	-	995	-
Stage 1	-	-	-	-	1017	-
Stage 2	-	-	-	-	1013	-

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1623	-	-	-	1036
HCM Lane V/C Ratio	0.003	-	-	-	0.01
HCM Control Delay (s)	7.2	0	-	-	8.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	4.2

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	425	-	-	350	0	75
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	5	8	25	50	0
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	5	0	-	0	20	5
Stage 1	-	-	-	-	5	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.9	6.2
Critical Hdwy Stg 1	-	-	-	-	5.9	-
Critical Hdwy Stg 2	-	-	-	-	5.9	-
Follow-up Hdwy	2.2	-	-	-	3.95	3.3
Pot Cap-1 Maneuver	1630	-	-	-	887	1084
Stage 1	-	-	-	-	906	-
Stage 2	-	-	-	-	897	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1630	-	-	-	884	1084
Mov Cap-2 Maneuver	-	-	-	-	814	-
Stage 1	-	-	-	-	903	-
Stage 2	-	-	-	-	897	-

Approach	SE	NW	SW
HCM Control Delay, s	3.6	0	8.9
HCM LOS			A

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1	SWLn2
Capacity (veh/h)	-	-	1630	-	814	1084
HCM Lane V/C Ratio	-	-	0.003	-	0.006	0.005
HCM Control Delay (s)	-	-	7.2	-	9.5	8.3
HCM Lane LOS	-	-	A	-	A	A
HCM 95th %tile Q(veh)	-	-	0	-	0	0

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	425	-	-	350	0	75
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	7	0	0	0
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	5	0	-	0	20	5
Stage 1	-	-	-	-	5	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1630	-	-	-	1002	1084
Stage 1	-	-	-	-	1023	-
Stage 2	-	-	-	-	1013	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1630	-	-	-	999	1084
Mov Cap-2 Maneuver	-	-	-	-	920	-
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1013	-

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	8.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1630	-	-	-	920	1084
HCM Lane V/C Ratio	0.003	-	-	-	0.006	0.005
HCM Control Delay (s)	7.2	-	-	-	8.9	8.3
HCM Lane LOS	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0	0

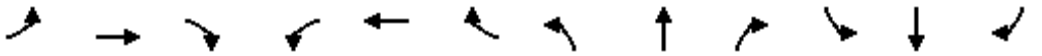
Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	3	0	0	0	0
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	10	0	-	0	23	8
Stage 1	-	-	-	-	8	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1623	-	-	-	998	1080
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1013	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1623	-	-	-	995	1080
Mov Cap-2 Maneuver	-	-	-	-	995	-
Stage 1	-	-	-	-	1017	-
Stage 2	-	-	-	-	1013	-

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1623	-	-	-	1036
HCM Lane V/C Ratio	0.003	-	-	-	0.01
HCM Control Delay (s)	7.2	0	-	-	8.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	1189	14	44	1083	9	49	5	12	11	5	9
Future Volume (veh/h)	13	1189	14	44	1083	9	49	5	12	11	5	9
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	14	1239	0	46	1128	0	51	5	0	11	5	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	30	1385		70	1428		152	7		121	40	
Arrive On Green	0.02	0.74	0.00	0.04	0.76	0.00	0.05	0.05	0.00	0.05	0.05	0.00
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1365	134	1585	942	800	1585
Grp Volume(v), veh/h	14	1239	0	46	1128	0	56	0	0	16	0	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1499	0	1585	1742	0	1585
Q Serve(g_s), s	0.6	42.0	0.0	2.1	29.7	0.0	2.3	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.6	42.0	0.0	2.1	29.7	0.0	3.0	0.0	0.0	0.7	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.91		1.00	0.69		1.00
Lane Grp Cap(c), veh/h	30	1385		70	1428		159	0		161	0	
V/C Ratio(X)	0.47	0.89		0.65	0.79		0.35	0.00		0.10	0.00	
Avail Cap(c_a), veh/h	108	2514		129	2537		418	0		436	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	40.2	8.2	0.0	39.1	5.8	0.0	38.6	0.0	0.0	37.5	0.0	0.0
Incr Delay (d2), s/veh	11.2	2.3	0.0	9.8	1.0	0.0	1.3	0.0	0.0	0.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	9.7	0.0	1.1	5.7	0.0	1.2	0.0	0.0	0.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	51.5	10.5	0.0	48.9	6.8	0.0	39.9	0.0	0.0	37.8	0.0	0.0
LnGrp LOS	D	B		D	A		D	A		D	A	
Approach Vol, veh/h		1253			1174			56			16	
Approach Delay, s/veh		11.0			8.5			39.9			37.8	
Approach LOS		B			A			D			D	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		8.2	8.3	66.1		8.2	6.4	68.0				
Change Period (Y+Rc), s		4.0	5.0	5.0		4.0	5.0	5.0				
Max Green Setting (Gmax), s		19.0	6.0	111.0		19.0	5.0	112.0				
Max Q Clear Time (g_c+I1), s		5.0	4.1	44.0		2.7	2.6	31.7				
Green Ext Time (p_c), s		0.2	0.0	17.1		0.0	0.0	13.3				

Intersection Summary	
HCM 6th Ctrl Delay	10.6
HCM 6th LOS	B

Notes

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	8	0	1108	5	0	16
Future Vol, veh/h	8	0	1108	5	0	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	0	1166	5	0	17

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1183	-	0	0	-	-
Stage 1	1166	-	-	-	-	-
Stage 2	17	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	209	0	-	-	0	-
Stage 1	296	0	-	-	0	-
Stage 2	1006	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	209	-	-	-	-	-
Mov Cap-2 Maneuver	209	-	-	-	-	-
Stage 1	296	-	-	-	-	-
Stage 2	1006	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	22.9	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	209	-
HCM Lane V/C Ratio	-	-	0.04	-
HCM Control Delay (s)	-	-	22.9	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1125	5	0	5
Future Vol, veh/h	5	0	1125	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1184	5	0	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1189	-	0	0	-	-
Stage 1	1184	-	-	-	-	-
Stage 2	5	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	208	0	-	-	0	-
Stage 1	290	0	-	-	0	-
Stage 2	1018	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	208	-	-	-	-	-
Mov Cap-2 Maneuver	208	-	-	-	-	-
Stage 1	290	-	-	-	-	-
Stage 2	1018	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	22.8	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	208	-
HCM Lane V/C Ratio	-	-	0.025	-
HCM Control Delay (s)	-	-	22.8	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1133	5	0	5
Future Vol, veh/h	5	0	1133	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1193	5	0	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1198	-	0	0	-	-
Stage 1	1193	-	-	-	-	-
Stage 2	5	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	205	0	-	-	0	-
Stage 1	288	0	-	-	0	-
Stage 2	1018	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	205	-	-	-	-	-
Mov Cap-2 Maneuver	205	-	-	-	-	-
Stage 1	288	-	-	-	-	-
Stage 2	1018	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	23	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	205	-
HCM Lane V/C Ratio	-	-	0.026	-
HCM Control Delay (s)	-	-	23	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1135	6	0	5
Future Vol, veh/h	5	0	1135	6	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1195	6	0	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1200	-	0	0	-	-
Stage 1	1195	-	-	-	-	-
Stage 2	5	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	204	0	-	-	0	-
Stage 1	287	0	-	-	0	-
Stage 2	1018	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	204	-	-	-	-	-
Mov Cap-2 Maneuver	204	-	-	-	-	-
Stage 1	287	-	-	-	-	-
Stage 2	1018	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	23.1	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	204	-
HCM Lane V/C Ratio	-	-	0.026	-
HCM Control Delay (s)	-	-	23.1	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1141	5	0	5
Future Vol, veh/h	5	0	1141	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1201	5	0	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1206	-	0	0	-	-
Stage 1	1201	-	-	-	-	-
Stage 2	5	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	203	0	-	-	0	-
Stage 1	285	0	-	-	0	-
Stage 2	1018	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	203	-	-	-	-	-
Mov Cap-2 Maneuver	203	-	-	-	-	-
Stage 1	285	-	-	-	-	-
Stage 2	1018	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	23.2	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	203	-
HCM Lane V/C Ratio	-	-	0.026	-
HCM Control Delay (s)	-	-	23.2	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	4.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	29	5	5	29	5	5
Future Vol, veh/h	29	5	5	29	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	190	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	5	7	0	13	3
Mvmt Flow	30	5	5	30	5	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	35	20	0	0	35	0
Stage 1	20	-	-	-	-	-
Stage 2	15	-	-	-	-	-
Critical Hdwy	6.4	6.25	-	-	4.23	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.345	-	-	2.317	-
Pot Cap-1 Maneuver	983	1049	-	-	1508	-
Stage 1	1008	-	-	-	-	-
Stage 2	1013	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	980	1049	-	-	1508	-
Mov Cap-2 Maneuver	980	-	-	-	-	-
Stage 1	1008	-	-	-	-	-
Stage 2	1010	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.8	0	3.7
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	990	1508	-
HCM Lane V/C Ratio	-	-	0.036	0.003	-
HCM Control Delay (s)	-	-	8.8	7.4	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	2.5

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	5	25	23	7	12	6
Future Vol, veh/h	5	25	23	7	12	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	17	3	6	0	0	30
Mvmt Flow	5	26	24	7	13	6

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	31	0	-	0	64	28
Stage 1	-	-	-	-	28	-
Stage 2	-	-	-	-	36	-
Critical Hdwy	4.27	-	-	-	6.4	6.5
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.353	-	-	-	3.5	3.57
Pot Cap-1 Maneuver	1490	-	-	-	947	972
Stage 1	-	-	-	-	1000	-
Stage 2	-	-	-	-	992	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1490	-	-	-	944	972
Mov Cap-2 Maneuver	-	-	-	-	944	-
Stage 1	-	-	-	-	997	-
Stage 2	-	-	-	-	992	-

Approach	SE	NW	SW
HCM Control Delay, s	1.2	0	8.9
HCM LOS			A

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	1490	-	953
HCM Lane V/C Ratio	-	-	0.003	-	0.02
HCM Control Delay (s)	-	-	7.4	0	8.9
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	-	0.1

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	5	34	26	5	7	5
Future Vol, veh/h	5	34	26	5	7	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	175	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	7	25	50	11
Mvmt Flow	5	35	27	5	7	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	32	0	-	0	58	30
Stage 1	-	-	-	-	30	-
Stage 2	-	-	-	-	28	-
Critical Hdwy	4.1	-	-	-	7.35	6.365
Critical Hdwy Stg 1	-	-	-	-	6.15	-
Critical Hdwy Stg 2	-	-	-	-	6.55	-
Follow-up Hdwy	2.2	-	-	-	3.975	3.4045
Pot Cap-1 Maneuver	1593	-	-	-	831	1017
Stage 1	-	-	-	-	875	-
Stage 2	-	-	-	-	874	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1593	-	-	-	829	1017
Mov Cap-2 Maneuver	-	-	-	-	829	-
Stage 1	-	-	-	-	872	-
Stage 2	-	-	-	-	874	-

Approach	EB	WB	SW
HCM Control Delay, s	0.9	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	1593	-	-	-	898
HCM Lane V/C Ratio	0.003	-	-	-	0.014
HCM Control Delay (s)	7.3	0	-	-	9.1
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	4.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	27	10	21	16	7	9	5	18	11	5	6
Future Vol, veh/h	5	27	10	21	16	7	9	5	18	11	5	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	None
Storage Length	300	-	-	400	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	13	3	0	7	6	0	0	0	0	0	0	13
Mvmt Flow	5	28	10	22	17	7	9	5	19	11	5	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	24	0	0	28	0	0	108	106	28	115	103	21
Stage 1	-	-	-	-	-	-	38	38	-	65	65	-
Stage 2	-	-	-	-	-	-	70	68	-	50	38	-
Critical Hdwy	4.23	-	-	4.17	-	-	7.1	6.5	6.2	7.1	6.5	6.33
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.317	-	-	2.263	-	-	3.5	4	3.3	3.5	4	3.417
Pot Cap-1 Maneuver	1522	-	-	1554	-	-	876	788	1053	867	791	1026
Stage 1	-	-	-	-	-	-	982	867	-	951	845	-
Stage 2	-	-	-	-	-	-	945	842	-	968	867	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1522	-	-	1554	-	-	855	775	1053	836	778	1026
Mov Cap-2 Maneuver	-	-	-	-	-	-	855	775	-	836	778	-
Stage 1	-	-	-	-	-	-	979	864	-	948	833	-
Stage 2	-	-	-	-	-	-	920	830	-	942	864	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.9	3.5	9	9.3
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	939	1522	-	-	1554	-	-	865
HCM Lane V/C Ratio	0.035	0.003	-	-	0.014	-	-	0.026
HCM Control Delay (s)	9	7.4	-	-	7.3	-	-	9.3
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	9	47	39	17	9	5
Future Vol, veh/h	9	47	39	17	9	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	6	23	0	7
Mvmt Flow	9	49	41	18	9	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	59	0	-	0	117	50
Stage 1	-	-	-	-	50	-
Stage 2	-	-	-	-	67	-
Critical Hdwy	4.1	-	-	-	6.4	6.27
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.363
Pot Cap-1 Maneuver	1558	-	-	-	884	1004
Stage 1	-	-	-	-	978	-
Stage 2	-	-	-	-	961	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1558	-	-	-	879	1004
Mov Cap-2 Maneuver	-	-	-	-	879	-
Stage 1	-	-	-	-	972	-
Stage 2	-	-	-	-	961	-

Approach	EB	WB	SB
HCM Control Delay, s	1.2	0	9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1558	-	-	-	920
HCM Lane V/C Ratio	0.006	-	-	-	0.016
HCM Control Delay (s)	7.3	0	-	-	9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	7.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	58	5	5	5	5	58
Future Vol, veh/h	58	5	5	5	5	58
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	275	-	-	225	0	65
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	7	0	9	0
Mvmt Flow	60	5	5	5	5	60

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	5	0	-	0	130	5
Stage 1	-	-	-	-	5	-
Stage 2	-	-	-	-	125	-
Critical Hdwy	4.1	-	-	-	6.49	6.2
Critical Hdwy Stg 1	-	-	-	-	5.49	-
Critical Hdwy Stg 2	-	-	-	-	5.49	-
Follow-up Hdwy	2.2	-	-	-	3.581	3.3
Pot Cap-1 Maneuver	1630	-	-	-	848	1084
Stage 1	-	-	-	-	1000	-
Stage 2	-	-	-	-	884	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1630	-	-	-	817	1084
Mov Cap-2 Maneuver	-	-	-	-	788	-
Stage 1	-	-	-	-	963	-
Stage 2	-	-	-	-	884	-

Approach	EB	WB	SB
HCM Control Delay, s	6.7	0	8.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1630	-	-	-	788	1084
HCM Lane V/C Ratio	0.037	-	-	-	0.007	0.056
HCM Control Delay (s)	7.3	-	-	-	9.6	8.5
HCM Lane LOS	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0	0.2

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	7	0	0	0
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	10	0	-	0	23	8
Stage 1	-	-	-	-	8	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1623	-	-	-	998	1080
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1013	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1623	-	-	-	995	1080
Mov Cap-2 Maneuver	-	-	-	-	995	-
Stage 1	-	-	-	-	1017	-
Stage 2	-	-	-	-	1013	-

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1623	-	-	-	1036
HCM Lane V/C Ratio	0.003	-	-	-	0.01
HCM Control Delay (s)	7.2	0	-	-	8.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	7	0	0	0
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	10	0	-	0	23	8
Stage 1	-	-	-	-	8	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1623	-	-	-	998	1080
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1013	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1623	-	-	-	995	1080
Mov Cap-2 Maneuver	-	-	-	-	995	-
Stage 1	-	-	-	-	1017	-
Stage 2	-	-	-	-	1013	-

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1623	-	-	-	1036
HCM Lane V/C Ratio	0.003	-	-	-	0.01
HCM Control Delay (s)	7.2	0	-	-	8.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	4.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	Yield	-	None
Storage Length	0	0	-	350	425	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	50	0	8	25	0	5
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	20	5	0	0	5	0
Stage 1	5	-	-	-	-	-
Stage 2	15	-	-	-	-	-
Critical Hdwy	6.9	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.9	-	-	-	-	-
Critical Hdwy Stg 2	5.9	-	-	-	-	-
Follow-up Hdwy	3.95	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	887	1084	-	-	1630	-
Stage 1	906	-	-	-	-	-
Stage 2	897	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	884	1084	-	-	1630	-
Mov Cap-2 Maneuver	813	-	-	-	-	-
Stage 1	906	-	-	-	-	-
Stage 2	894	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.9	0	3.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	813	1084	1630	-
HCM Lane V/C Ratio	-	-	0.006	0.005	0.003	-
HCM Control Delay (s)	-	-	9.5	8.3	7.2	-
HCM Lane LOS	-	-	A	A	A	-
HCM 95th %tile Q(veh)	-	-	0	0	0	-

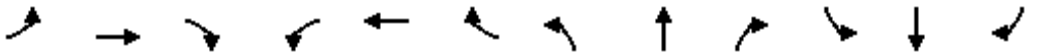
Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	None
Storage Length	425	-	-	350	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	0	7	0	0	0
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	5	0	-	0	20	5
Stage 1	-	-	-	-	5	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1630	-	-	-	1002	1084
Stage 1	-	-	-	-	1023	-
Stage 2	-	-	-	-	1013	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1630	-	-	-	999	1084
Mov Cap-2 Maneuver	-	-	-	-	920	-
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1013	-

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	8.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1630	-	-	-	920	1084
HCM Lane V/C Ratio	0.003	-	-	-	0.006	0.005
HCM Control Delay (s)	7.2	-	-	-	8.9	8.3
HCM Lane LOS	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0	0



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	1297	34	60	1236	5	77	5	19	27	5	5
Future Volume (veh/h)	14	1297	34	60	1236	5	77	5	19	27	5	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	15	1365	0	63	1301	0	81	5	0	28	5	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	29	1442		81	1496		158	6		153	23	
Arrive On Green	0.02	0.77	0.00	0.05	0.80	0.00	0.07	0.07	0.00	0.07	0.07	0.00
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1429	88	1585	1392	324	1585
Grp Volume(v), veh/h	15	1365	0	63	1301	0	86	0	0	33	0	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1518	0	1585	1715	0	1585
Q Serve(g_s), s	1.0	77.1	0.0	4.4	56.9	0.0	4.7	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	1.0	77.1	0.0	4.4	56.9	0.0	6.8	0.0	0.0	2.2	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.94		1.00	0.85		1.00
Lane Grp Cap(c), veh/h	29	1442		81	1496		165	0		176	0	
V/C Ratio(X)	0.52	0.95		0.78	0.87		0.52	0.00		0.19	0.00	
Avail Cap(c_a), veh/h	72	1653		115	1698		269	0		283	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	60.7	12.1	0.0	58.8	8.2	0.0	56.7	0.0	0.0	54.6	0.0	0.0
Incr Delay (d2), s/veh	13.6	11.1	0.0	19.4	4.7	0.0	2.6	0.0	0.0	0.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	26.5	0.0	2.4	16.4	0.0	2.8	0.0	0.0	1.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	74.3	23.2	0.0	78.2	12.9	0.0	59.2	0.0	0.0	55.2	0.0	0.0
LnGrp LOS	E	C		E	B		E	A		E	A	
Approach Vol, veh/h		1380			1364			86			33	
Approach Delay, s/veh		23.7			15.9			59.2			55.2	
Approach LOS		C			B			E			E	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		12.9	10.6	100.9		12.9	7.0	104.5				
Change Period (Y+Rc), s		4.0	5.0	5.0		4.0	5.0	5.0				
Max Green Setting (Gmax), s		18.0	8.0	110.0		18.0	5.0	113.0				
Max Q Clear Time (g_c+I1), s		8.8	6.4	79.1		4.2	3.0	58.9				
Green Ext Time (p_c), s		0.2	0.0	16.8		0.1	0.0	18.9				

Intersection Summary	
HCM 6th Ctrl Delay	21.4
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1293	5	0	5
Future Vol, veh/h	5	0	1293	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1347	5	0	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1352	-	0	0	-	-
Stage 1	1347	-	-	-	-	-
Stage 2	5	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	165	0	-	-	0	-
Stage 1	242	0	-	-	0	-
Stage 2	1018	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	165	-	-	-	-	-
Mov Cap-2 Maneuver	165	-	-	-	-	-
Stage 1	242	-	-	-	-	-
Stage 2	1018	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	27.5	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	165	-
HCM Lane V/C Ratio	-	-	0.032	-
HCM Control Delay (s)	-	-	27.5	-
HCM Lane LOS	-	-	D	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1215	5	0	5
Future Vol, veh/h	5	0	1215	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1266	5	0	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1271	-	0	0	-	-
Stage 1	1266	-	-	-	-	-
Stage 2	5	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	185	0	-	-	0	-
Stage 1	265	0	-	-	0	-
Stage 2	1018	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	185	-	-	-	-	-
Mov Cap-2 Maneuver	185	-	-	-	-	-
Stage 1	265	-	-	-	-	-
Stage 2	1018	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	25	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	185	-
HCM Lane V/C Ratio	-	-	0.028	-
HCM Control Delay (s)	-	-	25	-
HCM Lane LOS	-	-	D	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1292	5	0	5
Future Vol, veh/h	5	0	1292	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1346	5	0	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1351	-	0	0	-	-
Stage 1	1346	-	-	-	-	-
Stage 2	5	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	166	0	-	-	0	-
Stage 1	242	0	-	-	0	-
Stage 2	1018	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	166	-	-	-	-	-
Mov Cap-2 Maneuver	166	-	-	-	-	-
Stage 1	242	-	-	-	-	-
Stage 2	1018	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	27.4	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	166	-
HCM Lane V/C Ratio	-	-	0.031	-
HCM Control Delay (s)	-	-	27.4	-
HCM Lane LOS	-	-	D	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1294	5	0	6
Future Vol, veh/h	5	0	1294	5	0	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1348	5	0	6

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1354	-	0	0	-	-
Stage 1	1348	-	-	-	-	-
Stage 2	6	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	165	0	-	-	0	-
Stage 1	242	0	-	-	0	-
Stage 2	1017	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	165	-	-	-	-	-
Mov Cap-2 Maneuver	165	-	-	-	-	-
Stage 1	242	-	-	-	-	-
Stage 2	1017	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	27.5	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	165	-
HCM Lane V/C Ratio	-	-	0.032	-
HCM Control Delay (s)	-	-	27.5	-
HCM Lane LOS	-	-	D	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1298	5	0	5
Future Vol, veh/h	5	0	1298	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1352	5	0	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1357	-	0	0	-	-
Stage 1	1352	-	-	-	-	-
Stage 2	5	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	164	0	-	-	0	-
Stage 1	241	0	-	-	0	-
Stage 2	1018	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	164	-	-	-	-	-
Mov Cap-2 Maneuver	164	-	-	-	-	-
Stage 1	241	-	-	-	-	-
Stage 2	1018	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	27.7	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	164	-
HCM Lane V/C Ratio	-	-	0.032	-
HCM Control Delay (s)	-	-	27.7	-
HCM Lane LOS	-	-	D	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	4.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	44	5	5	46	5	5
Future Vol, veh/h	44	5	5	46	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	190	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	2	0	0	4
Mvmt Flow	46	5	5	48	5	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	44	29	0	0	53	0
Stage 1	29	-	-	-	-	-
Stage 2	15	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	972	1052	-	-	1566	-
Stage 1	999	-	-	-	-	-
Stage 2	1013	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	969	1052	-	-	1566	-
Mov Cap-2 Maneuver	969	-	-	-	-	-
Stage 1	999	-	-	-	-	-
Stage 2	1010	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.9	0	3.7
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	977	1566	-
HCM Lane V/C Ratio	-	-	0.053	0.003	-
HCM Control Delay (s)	-	-	8.9	7.3	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	0.2	0	-

Intersection	
Int Delay, s/veh	2.7

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	6	38	35	13	21	11
Future Vol, veh/h	6	38	35	13	21	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	6	40	37	14	22	12

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	51	0	-	0	96	44
Stage 1	-	-	-	-	44	-
Stage 2	-	-	-	-	52	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1568	-	-	-	908	1032
Stage 1	-	-	-	-	984	-
Stage 2	-	-	-	-	976	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1568	-	-	-	904	1032
Mov Cap-2 Maneuver	-	-	-	-	904	-
Stage 1	-	-	-	-	980	-
Stage 2	-	-	-	-	976	-

Approach	SE	NW	SW
HCM Control Delay, s	1	0	9
HCM LOS			A

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	1568	-	944
HCM Lane V/C Ratio	-	-	0.004	-	0.036
HCM Control Delay (s)	-	-	7.3	0	9
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	-	0.1

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	5	57	37	5	22	11
Future Vol, veh/h	5	57	37	5	22	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	175	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	5	60	39	5	23	12

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	44	0	-	0	82	42
Stage 1	-	-	-	-	42	-
Stage 2	-	-	-	-	40	-
Critical Hdwy	4.1	-	-	-	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1577	-	-	-	921	1034
Stage 1	-	-	-	-	986	-
Stage 2	-	-	-	-	983	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1577	-	-	-	918	1034
Mov Cap-2 Maneuver	-	-	-	-	918	-
Stage 1	-	-	-	-	983	-
Stage 2	-	-	-	-	983	-

Approach	EB	WB	SW
HCM Control Delay, s	0.6	0	8.9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	1577	-	-	-	954
HCM Lane V/C Ratio	0.003	-	-	-	0.036
HCM Control Delay (s)	7.3	0	-	-	8.9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	54	10	21	28	30	6	5	13	17	5	8
Future Vol, veh/h	15	54	10	21	28	30	6	5	13	17	5	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	None
Storage Length	300	-	-	400	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	4	7	0	2	0	0	0	0	0	0	0
Mvmt Flow	16	57	11	22	29	32	6	5	14	18	5	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	61	0	0	57	0	0	185	194	57	188	178	45
Stage 1	-	-	-	-	-	-	89	89	-	89	89	-
Stage 2	-	-	-	-	-	-	96	105	-	99	89	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1555	-	-	1560	-	-	780	705	1015	777	719	1031
Stage 1	-	-	-	-	-	-	923	825	-	923	825	-
Stage 2	-	-	-	-	-	-	916	812	-	912	825	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1555	-	-	1560	-	-	755	688	1015	748	702	1031
Mov Cap-2 Maneuver	-	-	-	-	-	-	755	688	-	748	702	-
Stage 1	-	-	-	-	-	-	914	817	-	914	813	-
Stage 2	-	-	-	-	-	-	890	801	-	885	817	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.4	2	9.3	9.7
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	856	1555	-	-	1560	-	-	798
HCM Lane V/C Ratio	0.03	0.01	-	-	0.014	-	-	0.04
HCM Control Delay (s)	9.3	7.3	-	-	7.3	-	-	9.7
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	74	69	21	19	10
Future Vol, veh/h	10	74	69	21	19	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	11	78	73	22	20	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	95	0	-	0	184	84
Stage 1	-	-	-	-	84	-
Stage 2	-	-	-	-	100	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1512	-	-	-	810	981
Stage 1	-	-	-	-	944	-
Stage 2	-	-	-	-	929	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1512	-	-	-	804	981
Mov Cap-2 Maneuver	-	-	-	-	804	-
Stage 1	-	-	-	-	936	-
Stage 2	-	-	-	-	929	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	9.4
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1512	-	-	-	857
HCM Lane V/C Ratio	0.007	-	-	-	0.036
HCM Control Delay (s)	7.4	0	-	-	9.4
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	7.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	92	5	5	5	5	89
Future Vol, veh/h	92	5	5	5	5	89
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	275	-	-	225	0	65
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	97	5	5	5	5	94

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	5	0	-	0	204	5
Stage 1	-	-	-	-	5	-
Stage 2	-	-	-	-	199	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1630	-	-	-	789	1084
Stage 1	-	-	-	-	1023	-
Stage 2	-	-	-	-	839	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1630	-	-	-	742	1084
Mov Cap-2 Maneuver	-	-	-	-	739	-
Stage 1	-	-	-	-	962	-
Stage 2	-	-	-	-	839	-

Approach	EB	WB	SB
HCM Control Delay, s	7	0	8.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1630	-	-	-	739	1084
HCM Lane V/C Ratio	0.059	-	-	-	0.007	0.086
HCM Control Delay (s)	7.3	-	-	-	9.9	8.6
HCM Lane LOS	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	-	0	0.3

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	6	5	5	5	5
Future Vol, veh/h	5	6	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	5	6	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	10	0	-	0	24	8
Stage 1	-	-	-	-	8	-
Stage 2	-	-	-	-	16	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1623	-	-	-	997	1080
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1012	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1623	-	-	-	994	1080
Mov Cap-2 Maneuver	-	-	-	-	994	-
Stage 1	-	-	-	-	1017	-
Stage 2	-	-	-	-	1012	-

Approach	EB	WB	SB
HCM Control Delay, s	3.3	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1623	-	-	-	1035
HCM Lane V/C Ratio	0.003	-	-	-	0.01
HCM Control Delay (s)	7.2	0	-	-	8.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	2
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	10	0	-	0	23	8
Stage 1	-	-	-	-	8	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.4	6.22
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.318
Pot Cap-1 Maneuver	1623	-	-	-	998	1074
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1013	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1623	-	-	-	995	1074
Mov Cap-2 Maneuver	-	-	-	-	995	-
Stage 1	-	-	-	-	1017	-
Stage 2	-	-	-	-	1013	-

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1623	-	-	-	1033
HCM Lane V/C Ratio	0.003	-	-	-	0.01
HCM Control Delay (s)	7.2	0	-	-	8.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	4.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	Yield	-	None
Storage Length	0	0	-	350	425	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	7	0	0	37
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	20	5	0	0	5	0
Stage 1	5	-	-	-	-	-
Stage 2	15	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	1002	1084	-	-	1630	-
Stage 1	1023	-	-	-	-	-
Stage 2	1013	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	999	1084	-	-	1630	-
Mov Cap-2 Maneuver	919	-	-	-	-	-
Stage 1	1023	-	-	-	-	-
Stage 2	1010	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.6	0	3.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	919	1084	1630	-
HCM Lane V/C Ratio	-	-	0.006	0.005	0.003	-
HCM Control Delay (s)	-	-	8.9	8.3	7.2	-
HCM Lane LOS	-	-	A	A	A	-
HCM 95th %tile Q(veh)	-	-	0	0	0	-

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	None
Storage Length	425	-	-	350	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	5	0	-	0	20	5
Stage 1	-	-	-	-	5	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1630	-	-	-	1002	1084
Stage 1	-	-	-	-	1023	-
Stage 2	-	-	-	-	1013	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1630	-	-	-	999	1084
Mov Cap-2 Maneuver	-	-	-	-	920	-
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1013	-

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	8.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1630	-	-	-	920	1084
HCM Lane V/C Ratio	0.003	-	-	-	0.006	0.005
HCM Control Delay (s)	7.2	-	-	-	8.9	8.3
HCM Lane LOS	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	13	1189	14	44	1083	9	49	5	12	11	5	5
Future Volume (veh/h)	13	1189	14	44	1083	9	49	5	12	11	5	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	14	1239	0	46	1128	0	51	5	0	11	5	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	30	1385		70	1428		152	7		121	40	
Arrive On Green	0.02	0.74	0.00	0.04	0.76	0.00	0.05	0.05	0.00	0.05	0.05	0.00
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1365	134	1585	942	800	1585
Grp Volume(v), veh/h	14	1239	0	46	1128	0	56	0	0	16	0	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1499	0	1585	1742	0	1585
Q Serve(g_s), s	0.6	42.0	0.0	2.1	29.7	0.0	2.3	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.6	42.0	0.0	2.1	29.7	0.0	3.0	0.0	0.0	0.7	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.91		1.00	0.69		1.00
Lane Grp Cap(c), veh/h	30	1385		70	1428		159	0		161	0	
V/C Ratio(X)	0.47	0.89		0.65	0.79		0.35	0.00		0.10	0.00	
Avail Cap(c_a), veh/h	108	2514		129	2537		418	0		436	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	40.2	8.2	0.0	39.1	5.8	0.0	38.6	0.0	0.0	37.5	0.0	0.0
Incr Delay (d2), s/veh	11.2	2.3	0.0	9.8	1.0	0.0	1.3	0.0	0.0	0.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	9.7	0.0	1.1	5.7	0.0	1.2	0.0	0.0	0.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	51.5	10.5	0.0	48.9	6.8	0.0	39.9	0.0	0.0	37.8	0.0	0.0
LnGrp LOS	D	B		D	A		D	A		D	A	
Approach Vol, veh/h		1253			1174			56			16	
Approach Delay, s/veh		11.0			8.5			39.9			37.8	
Approach LOS		B			A			D			D	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		8.2	8.3	66.1		8.2	6.4	68.0				
Change Period (Y+Rc), s		4.0	5.0	5.0		4.0	5.0	5.0				
Max Green Setting (Gmax), s		19.0	6.0	111.0		19.0	5.0	112.0				
Max Q Clear Time (g_c+I1), s		5.0	4.1	44.0		2.7	2.6	31.7				
Green Ext Time (p_c), s		0.2	0.0	17.1		0.0	0.0	13.3				

Intersection Summary	
HCM 6th Ctrl Delay	10.6
HCM 6th LOS	B

Notes

Unsignalized Delay for [NER, EBR, WBR, SWR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	8	0	1108	5	0	16
Future Vol, veh/h	8	0	1108	5	0	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	0	1166	5	0	17

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1183	-	0	0	-	-
Stage 1	1166	-	-	-	-	-
Stage 2	17	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	209	0	-	-	0	-
Stage 1	296	0	-	-	0	-
Stage 2	1006	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	209	-	-	-	-	-
Mov Cap-2 Maneuver	209	-	-	-	-	-
Stage 1	296	-	-	-	-	-
Stage 2	1006	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	22.9	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	209	-
HCM Lane V/C Ratio	-	-	0.04	-
HCM Control Delay (s)	-	-	22.9	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1125	5	0	5
Future Vol, veh/h	5	0	1125	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1184	5	0	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1189	-	0	0	-	-
Stage 1	1184	-	-	-	-	-
Stage 2	5	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	208	0	-	-	0	-
Stage 1	290	0	-	-	0	-
Stage 2	1018	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	208	-	-	-	-	-
Mov Cap-2 Maneuver	208	-	-	-	-	-
Stage 1	290	-	-	-	-	-
Stage 2	1018	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	22.8	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	208	-
HCM Lane V/C Ratio	-	-	0.025	-
HCM Control Delay (s)	-	-	22.8	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1133	5	0	5
Future Vol, veh/h	5	0	1133	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1193	5	0	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1198	-	0	0	-	-
Stage 1	1193	-	-	-	-	-
Stage 2	5	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	205	0	-	-	0	-
Stage 1	288	0	-	-	0	-
Stage 2	1018	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	205	-	-	-	-	-
Mov Cap-2 Maneuver	205	-	-	-	-	-
Stage 1	288	-	-	-	-	-
Stage 2	1018	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	23	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	205	-
HCM Lane V/C Ratio	-	-	0.026	-
HCM Control Delay (s)	-	-	23	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1135	6	0	5
Future Vol, veh/h	5	0	1135	6	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1195	6	0	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1200	-	0	0	-	-
Stage 1	1195	-	-	-	-	-
Stage 2	5	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	204	0	-	-	0	-
Stage 1	287	0	-	-	0	-
Stage 2	1018	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	204	-	-	-	-	-
Mov Cap-2 Maneuver	204	-	-	-	-	-
Stage 1	287	-	-	-	-	-
Stage 2	1018	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	23.1	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	204	-
HCM Lane V/C Ratio	-	-	0.026	-
HCM Control Delay (s)	-	-	23.1	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1141	5	0	5
Future Vol, veh/h	5	0	1141	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1201	5	0	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1206	-	0	0	-	-
Stage 1	1201	-	-	-	-	-
Stage 2	5	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	203	0	-	-	0	-
Stage 1	285	0	-	-	0	-
Stage 2	1018	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	203	-	-	-	-	-
Mov Cap-2 Maneuver	203	-	-	-	-	-
Stage 1	285	-	-	-	-	-
Stage 2	1018	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	23.2	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	203	-
HCM Lane V/C Ratio	-	-	0.026	-
HCM Control Delay (s)	-	-	23.2	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	4.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	29	5	5	29	5	5
Future Vol, veh/h	29	5	5	29	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	190	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	5	7	0	13	3
Mvmt Flow	30	5	5	30	5	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	35	20	0	0	35	0
Stage 1	20	-	-	-	-	-
Stage 2	15	-	-	-	-	-
Critical Hdwy	6.4	6.25	-	-	4.23	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.345	-	-	2.317	-
Pot Cap-1 Maneuver	983	1049	-	-	1508	-
Stage 1	1008	-	-	-	-	-
Stage 2	1013	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	980	1049	-	-	1508	-
Mov Cap-2 Maneuver	980	-	-	-	-	-
Stage 1	1008	-	-	-	-	-
Stage 2	1010	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.8	0	3.7
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	990	1508	-
HCM Lane V/C Ratio	-	-	0.036	0.003	-
HCM Control Delay (s)	-	-	8.8	7.4	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	2.5

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	5	25	23	7	12	6
Future Vol, veh/h	5	25	23	7	12	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	17	3	6	0	0	30
Mvmt Flow	5	26	24	7	13	6

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	31	0	-	0	64	28
Stage 1	-	-	-	-	28	-
Stage 2	-	-	-	-	36	-
Critical Hdwy	4.27	-	-	-	6.4	6.5
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.353	-	-	-	3.5	3.57
Pot Cap-1 Maneuver	1490	-	-	-	947	972
Stage 1	-	-	-	-	1000	-
Stage 2	-	-	-	-	992	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1490	-	-	-	944	972
Mov Cap-2 Maneuver	-	-	-	-	944	-
Stage 1	-	-	-	-	997	-
Stage 2	-	-	-	-	992	-

Approach	SE	NW	SW
HCM Control Delay, s	1.2	0	8.9
HCM LOS			A

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	1490	-	953
HCM Lane V/C Ratio	-	-	0.003	-	0.02
HCM Control Delay (s)	-	-	7.4	0	8.9
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	-	0.1

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	5	34	26	5	7	5
Future Vol, veh/h	5	34	26	5	7	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	175	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	7	25	50	11
Mvmt Flow	5	35	27	5	7	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	32	0	-	0	58	30
Stage 1	-	-	-	-	30	-
Stage 2	-	-	-	-	28	-
Critical Hdwy	4.1	-	-	-	7.35	6.365
Critical Hdwy Stg 1	-	-	-	-	6.15	-
Critical Hdwy Stg 2	-	-	-	-	6.55	-
Follow-up Hdwy	2.2	-	-	-	3.975	3.4045
Pot Cap-1 Maneuver	1593	-	-	-	831	1017
Stage 1	-	-	-	-	875	-
Stage 2	-	-	-	-	874	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1593	-	-	-	829	1017
Mov Cap-2 Maneuver	-	-	-	-	829	-
Stage 1	-	-	-	-	872	-
Stage 2	-	-	-	-	874	-

Approach	EB	WB	SW
HCM Control Delay, s	0.9	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	1593	-	-	-	898
HCM Lane V/C Ratio	0.003	-	-	-	0.014
HCM Control Delay (s)	7.3	0	-	-	9.1
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	4.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	27	10	21	16	7	9	5	18	11	5	6
Future Vol, veh/h	5	27	10	21	16	7	9	5	18	11	5	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	None
Storage Length	300	-	-	400	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	13	3	0	7	6	0	0	0	0	0	0	13
Mvmt Flow	5	28	10	22	17	7	9	5	19	11	5	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	24	0	0	28	0	0	108	106	28	115	103	21
Stage 1	-	-	-	-	-	-	38	38	-	65	65	-
Stage 2	-	-	-	-	-	-	70	68	-	50	38	-
Critical Hdwy	4.23	-	-	4.17	-	-	7.1	6.5	6.2	7.1	6.5	6.33
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.317	-	-	2.263	-	-	3.5	4	3.3	3.5	4	3.417
Pot Cap-1 Maneuver	1522	-	-	1554	-	-	876	788	1053	867	791	1026
Stage 1	-	-	-	-	-	-	982	867	-	951	845	-
Stage 2	-	-	-	-	-	-	945	842	-	968	867	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1522	-	-	1554	-	-	855	775	1053	836	778	1026
Mov Cap-2 Maneuver	-	-	-	-	-	-	855	775	-	836	778	-
Stage 1	-	-	-	-	-	-	979	864	-	948	833	-
Stage 2	-	-	-	-	-	-	920	830	-	942	864	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.9	3.5	9	9.3
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	939	1522	-	-	1554	-	-	865
HCM Lane V/C Ratio	0.035	0.003	-	-	0.014	-	-	0.026
HCM Control Delay (s)	9	7.4	-	-	7.3	-	-	9.3
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	9	47	39	17	9	5
Future Vol, veh/h	9	47	39	17	9	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	6	23	0	7
Mvmt Flow	9	49	41	18	9	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	59	0	-	0	117	50
Stage 1	-	-	-	-	50	-
Stage 2	-	-	-	-	67	-
Critical Hdwy	4.1	-	-	-	6.4	6.27
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.363
Pot Cap-1 Maneuver	1558	-	-	-	884	1004
Stage 1	-	-	-	-	978	-
Stage 2	-	-	-	-	961	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1558	-	-	-	879	1004
Mov Cap-2 Maneuver	-	-	-	-	879	-
Stage 1	-	-	-	-	972	-
Stage 2	-	-	-	-	961	-

Approach	EB	WB	SB
HCM Control Delay, s	1.2	0	9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1558	-	-	-	920
HCM Lane V/C Ratio	0.006	-	-	-	0.016
HCM Control Delay (s)	7.3	0	-	-	9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	7.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	58	5	5	5	5	58
Future Vol, veh/h	58	5	5	5	5	58
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	250	-	-	250	0	100
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	7	0	9	0
Mvmt Flow	60	5	5	5	5	60

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	5	0	-	0	130	5
Stage 1	-	-	-	-	5	-
Stage 2	-	-	-	-	125	-
Critical Hdwy	4.1	-	-	-	6.49	6.2
Critical Hdwy Stg 1	-	-	-	-	5.49	-
Critical Hdwy Stg 2	-	-	-	-	5.49	-
Follow-up Hdwy	2.2	-	-	-	3.581	3.3
Pot Cap-1 Maneuver	1630	-	-	-	848	1084
Stage 1	-	-	-	-	1000	-
Stage 2	-	-	-	-	884	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1630	-	-	-	817	1084
Mov Cap-2 Maneuver	-	-	-	-	788	-
Stage 1	-	-	-	-	963	-
Stage 2	-	-	-	-	884	-

Approach	EB	WB	SB
HCM Control Delay, s	6.7	0	8.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1630	-	-	-	788	1084
HCM Lane V/C Ratio	0.037	-	-	-	0.007	0.056
HCM Control Delay (s)	7.3	-	-	-	9.6	8.5
HCM Lane LOS	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0	0.2

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	7	0	0	0
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	10	0	-	0	23	8
Stage 1	-	-	-	-	8	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1623	-	-	-	998	1080
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1013	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1623	-	-	-	995	1080
Mov Cap-2 Maneuver	-	-	-	-	995	-
Stage 1	-	-	-	-	1017	-
Stage 2	-	-	-	-	1013	-

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1623	-	-	-	1036
HCM Lane V/C Ratio	0.003	-	-	-	0.01
HCM Control Delay (s)	7.2	0	-	-	8.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	7	0	0	0
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	10	0	-	0	23	8
Stage 1	-	-	-	-	8	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1623	-	-	-	998	1080
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1013	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1623	-	-	-	995	1080
Mov Cap-2 Maneuver	-	-	-	-	995	-
Stage 1	-	-	-	-	1017	-
Stage 2	-	-	-	-	1013	-

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1623	-	-	-	1036
HCM Lane V/C Ratio	0.003	-	-	-	0.01
HCM Control Delay (s)	7.2	0	-	-	8.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	4.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	Yield	-	None
Storage Length	0	75	-	350	425	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	50	0	8	25	0	5
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	20	5	0	0	5	0
Stage 1	5	-	-	-	-	-
Stage 2	15	-	-	-	-	-
Critical Hdwy	6.9	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.9	-	-	-	-	-
Critical Hdwy Stg 2	5.9	-	-	-	-	-
Follow-up Hdwy	3.95	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	887	1084	-	-	1630	-
Stage 1	906	-	-	-	-	-
Stage 2	897	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	884	1084	-	-	1630	-
Mov Cap-2 Maneuver	813	-	-	-	-	-
Stage 1	906	-	-	-	-	-
Stage 2	894	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.9	0	3.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	813	1084	1630	-
HCM Lane V/C Ratio	-	-	0.006	0.005	0.003	-
HCM Control Delay (s)	-	-	9.5	8.3	7.2	-
HCM Lane LOS	-	-	A	A	A	-
HCM 95th %tile Q(veh)	-	-	0	0	0	-

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	None
Storage Length	250	-	-	250	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	0	7	0	0	0
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	5	0	-	0	20	5
Stage 1	-	-	-	-	5	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1630	-	-	-	1002	1084
Stage 1	-	-	-	-	1023	-
Stage 2	-	-	-	-	1013	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1630	-	-	-	999	1084
Mov Cap-2 Maneuver	-	-	-	-	920	-
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1013	-

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	8.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1630	-	-	-	920	1084
HCM Lane V/C Ratio	0.003	-	-	-	0.006	0.005
HCM Control Delay (s)	7.2	-	-	-	8.9	8.3
HCM Lane LOS	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	14	1297	34	60	1236	5	77	5	19	27	5	9
Future Volume (veh/h)	14	1297	34	60	1236	5	77	5	19	27	5	9
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	15	1365	0	63	1301	0	81	5	0	28	5	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	29	1442		81	1496		158	6		153	23	
Arrive On Green	0.02	0.77	0.00	0.05	0.80	0.00	0.07	0.07	0.00	0.07	0.07	0.00
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1429	88	1585	1392	324	1585
Grp Volume(v), veh/h	15	1365	0	63	1301	0	86	0	0	33	0	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1518	0	1585	1715	0	1585
Q Serve(g_s), s	1.0	77.1	0.0	4.4	56.9	0.0	4.7	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	1.0	77.1	0.0	4.4	56.9	0.0	6.8	0.0	0.0	2.2	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.94		1.00	0.85		1.00
Lane Grp Cap(c), veh/h	29	1442		81	1496		165	0		176	0	
V/C Ratio(X)	0.52	0.95		0.78	0.87		0.52	0.00		0.19	0.00	
Avail Cap(c_a), veh/h	72	1653		115	1698		269	0		283	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	60.7	12.1	0.0	58.8	8.2	0.0	56.7	0.0	0.0	54.6	0.0	0.0
Incr Delay (d2), s/veh	13.6	11.1	0.0	19.4	4.7	0.0	2.6	0.0	0.0	0.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	26.5	0.0	2.4	16.4	0.0	2.8	0.0	0.0	1.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	74.3	23.2	0.0	78.2	12.9	0.0	59.2	0.0	0.0	55.2	0.0	0.0
LnGrp LOS	E	C		E	B		E	A		E	A	
Approach Vol, veh/h		1380			1364			86			33	
Approach Delay, s/veh		23.7			15.9			59.2			55.2	
Approach LOS		C			B			E			E	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		12.9	10.6	100.9		12.9	7.0	104.5				
Change Period (Y+Rc), s		4.0	5.0	5.0		4.0	5.0	5.0				
Max Green Setting (Gmax), s		18.0	8.0	110.0		18.0	5.0	113.0				
Max Q Clear Time (g_c+I1), s		8.8	6.4	79.1		4.2	3.0	58.9				
Green Ext Time (p_c), s		0.2	0.0	16.8		0.1	0.0	18.9				

Intersection Summary	
HCM 6th Ctrl Delay	21.4
HCM 6th LOS	C

Notes

Unsignalized Delay for [NER, EBR, WBR, SWR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1293	5	0	5
Future Vol, veh/h	5	0	1293	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1347	5	0	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1352	-	0	0	-	-
Stage 1	1347	-	-	-	-	-
Stage 2	5	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	165	0	-	-	0	-
Stage 1	242	0	-	-	0	-
Stage 2	1018	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	165	-	-	-	-	-
Mov Cap-2 Maneuver	165	-	-	-	-	-
Stage 1	242	-	-	-	-	-
Stage 2	1018	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	27.5	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	165	-
HCM Lane V/C Ratio	-	-	0.032	-
HCM Control Delay (s)	-	-	27.5	-
HCM Lane LOS	-	-	D	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1215	5	0	5
Future Vol, veh/h	5	0	1215	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1266	5	0	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1271	-	0	0	-	-
Stage 1	1266	-	-	-	-	-
Stage 2	5	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	185	0	-	-	0	-
Stage 1	265	0	-	-	0	-
Stage 2	1018	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	185	-	-	-	-	-
Mov Cap-2 Maneuver	185	-	-	-	-	-
Stage 1	265	-	-	-	-	-
Stage 2	1018	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	25	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	185	-
HCM Lane V/C Ratio	-	-	0.028	-
HCM Control Delay (s)	-	-	25	-
HCM Lane LOS	-	-	D	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1292	5	0	5
Future Vol, veh/h	5	0	1292	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1346	5	0	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1351	-	0	0	-	-
Stage 1	1346	-	-	-	-	-
Stage 2	5	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	166	0	-	-	0	-
Stage 1	242	0	-	-	0	-
Stage 2	1018	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	166	-	-	-	-	-
Mov Cap-2 Maneuver	166	-	-	-	-	-
Stage 1	242	-	-	-	-	-
Stage 2	1018	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	27.4	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	166	-
HCM Lane V/C Ratio	-	-	0.031	-
HCM Control Delay (s)	-	-	27.4	-
HCM Lane LOS	-	-	D	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1294	5	0	6
Future Vol, veh/h	5	0	1294	5	0	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1348	5	0	6

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1354	-	0	0	-	-
Stage 1	1348	-	-	-	-	-
Stage 2	6	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	165	0	-	-	0	-
Stage 1	242	0	-	-	0	-
Stage 2	1017	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	165	-	-	-	-	-
Mov Cap-2 Maneuver	165	-	-	-	-	-
Stage 1	242	-	-	-	-	-
Stage 2	1017	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	27.5	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	165	-
HCM Lane V/C Ratio	-	-	0.032	-
HCM Control Delay (s)	-	-	27.5	-
HCM Lane LOS	-	-	D	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1298	5	0	5
Future Vol, veh/h	5	0	1298	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1352	5	0	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1357	-	0	0	-	-
Stage 1	1352	-	-	-	-	-
Stage 2	5	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	164	0	-	-	0	-
Stage 1	241	0	-	-	0	-
Stage 2	1018	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	164	-	-	-	-	-
Mov Cap-2 Maneuver	164	-	-	-	-	-
Stage 1	241	-	-	-	-	-
Stage 2	1018	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	27.7	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	164	-
HCM Lane V/C Ratio	-	-	0.032	-
HCM Control Delay (s)	-	-	27.7	-
HCM Lane LOS	-	-	D	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	4.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	44	5	5	46	5	5
Future Vol, veh/h	44	5	5	46	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	190	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	2	0	0	4
Mvmt Flow	46	5	5	48	5	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	44	29	0	0	53	0
Stage 1	29	-	-	-	-	-
Stage 2	15	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	972	1052	-	-	1566	-
Stage 1	999	-	-	-	-	-
Stage 2	1013	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	969	1052	-	-	1566	-
Mov Cap-2 Maneuver	969	-	-	-	-	-
Stage 1	999	-	-	-	-	-
Stage 2	1010	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.9	0	3.7
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	977	1566	-
HCM Lane V/C Ratio	-	-	0.053	0.003	-
HCM Control Delay (s)	-	-	8.9	7.3	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	0.2	0	-

Intersection	
Int Delay, s/veh	2.7

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	6	38	35	13	21	11
Future Vol, veh/h	6	38	35	13	21	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	6	40	37	14	22	12

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	51	0	-	0	96	44
Stage 1	-	-	-	-	44	-
Stage 2	-	-	-	-	52	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1568	-	-	-	908	1032
Stage 1	-	-	-	-	984	-
Stage 2	-	-	-	-	976	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1568	-	-	-	904	1032
Mov Cap-2 Maneuver	-	-	-	-	904	-
Stage 1	-	-	-	-	980	-
Stage 2	-	-	-	-	976	-

Approach	SE	NW	SW
HCM Control Delay, s	1	0	9
HCM LOS			A

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	1568	-	944
HCM Lane V/C Ratio	-	-	0.004	-	0.036
HCM Control Delay (s)	-	-	7.3	0	9
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	-	0.1

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	5	57	37	5	22	11
Future Vol, veh/h	5	57	37	5	22	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	175	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	5	60	39	5	23	12

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	44	0	-	0	82	42
Stage 1	-	-	-	-	42	-
Stage 2	-	-	-	-	40	-
Critical Hdwy	4.1	-	-	-	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1577	-	-	-	921	1034
Stage 1	-	-	-	-	986	-
Stage 2	-	-	-	-	983	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1577	-	-	-	918	1034
Mov Cap-2 Maneuver	-	-	-	-	918	-
Stage 1	-	-	-	-	983	-
Stage 2	-	-	-	-	983	-

Approach	EB	WB	SW
HCM Control Delay, s	0.6	0	8.9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	1577	-	-	-	954
HCM Lane V/C Ratio	0.003	-	-	-	0.036
HCM Control Delay (s)	7.3	0	-	-	8.9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	54	10	21	28	30	6	5	13	17	5	8
Future Vol, veh/h	15	54	10	21	28	30	6	5	13	17	5	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	None
Storage Length	300	-	-	400	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	4	7	0	2	0	0	0	0	0	0	0
Mvmt Flow	16	57	11	22	29	32	6	5	14	18	5	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	61	0	0	57	0	0	185	194	57	188	178	45
Stage 1	-	-	-	-	-	-	89	89	-	89	89	-
Stage 2	-	-	-	-	-	-	96	105	-	99	89	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1555	-	-	1560	-	-	780	705	1015	777	719	1031
Stage 1	-	-	-	-	-	-	923	825	-	923	825	-
Stage 2	-	-	-	-	-	-	916	812	-	912	825	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1555	-	-	1560	-	-	755	688	1015	748	702	1031
Mov Cap-2 Maneuver	-	-	-	-	-	-	755	688	-	748	702	-
Stage 1	-	-	-	-	-	-	914	817	-	914	813	-
Stage 2	-	-	-	-	-	-	890	801	-	885	817	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.4	2	9.3	9.7
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	856	1555	-	-	1560	-	-	798
HCM Lane V/C Ratio	0.03	0.01	-	-	0.014	-	-	0.04
HCM Control Delay (s)	9.3	7.3	-	-	7.3	-	-	9.7
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	74	69	21	19	10
Future Vol, veh/h	10	74	69	21	19	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	11	78	73	22	20	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	95	0	-	0	184	84
Stage 1	-	-	-	-	84	-
Stage 2	-	-	-	-	100	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1512	-	-	-	810	981
Stage 1	-	-	-	-	944	-
Stage 2	-	-	-	-	929	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1512	-	-	-	804	981
Mov Cap-2 Maneuver	-	-	-	-	804	-
Stage 1	-	-	-	-	936	-
Stage 2	-	-	-	-	929	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	9.4
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1512	-	-	-	857
HCM Lane V/C Ratio	0.007	-	-	-	0.036
HCM Control Delay (s)	7.4	0	-	-	9.4
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	7.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	92	5	5	5	5	89
Future Vol, veh/h	92	5	5	5	5	89
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	250	-	-	250	0	100
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	97	5	5	5	5	94

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	5	0	-	0	204	5
Stage 1	-	-	-	-	5	-
Stage 2	-	-	-	-	199	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1630	-	-	-	789	1084
Stage 1	-	-	-	-	1023	-
Stage 2	-	-	-	-	839	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1630	-	-	-	742	1084
Mov Cap-2 Maneuver	-	-	-	-	739	-
Stage 1	-	-	-	-	962	-
Stage 2	-	-	-	-	839	-

Approach	EB	WB	SB
HCM Control Delay, s	7	0	8.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1630	-	-	-	739	1084
HCM Lane V/C Ratio	0.059	-	-	-	0.007	0.086
HCM Control Delay (s)	7.3	-	-	-	9.9	8.6
HCM Lane LOS	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	-	0	0.3

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	6	5	5	5	5
Future Vol, veh/h	5	6	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	5	6	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	10	0	-	0	24	8
Stage 1	-	-	-	-	8	-
Stage 2	-	-	-	-	16	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1623	-	-	-	997	1080
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1012	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1623	-	-	-	994	1080
Mov Cap-2 Maneuver	-	-	-	-	994	-
Stage 1	-	-	-	-	1017	-
Stage 2	-	-	-	-	1012	-

Approach	EB	WB	SB
HCM Control Delay, s	3.3	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1623	-	-	-	1035
HCM Lane V/C Ratio	0.003	-	-	-	0.01
HCM Control Delay (s)	7.2	0	-	-	8.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	2
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	10	0	-	0	23	8
Stage 1	-	-	-	-	8	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.4	6.22
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.318
Pot Cap-1 Maneuver	1623	-	-	-	998	1074
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1013	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1623	-	-	-	995	1074
Mov Cap-2 Maneuver	-	-	-	-	995	-
Stage 1	-	-	-	-	1017	-
Stage 2	-	-	-	-	1013	-

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1623	-	-	-	1033
HCM Lane V/C Ratio	0.003	-	-	-	0.01
HCM Control Delay (s)	7.2	0	-	-	8.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	4.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	Yield	-	None
Storage Length	0	75	-	350	425	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	7	0	0	37
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	20	5	0	0	5	0
Stage 1	5	-	-	-	-	-
Stage 2	15	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	1002	1084	-	-	1630	-
Stage 1	1023	-	-	-	-	-
Stage 2	1013	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	999	1084	-	-	1630	-
Mov Cap-2 Maneuver	919	-	-	-	-	-
Stage 1	1023	-	-	-	-	-
Stage 2	1010	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.6	0	3.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	919	1084	1630	-
HCM Lane V/C Ratio	-	-	0.006	0.005	0.003	-
HCM Control Delay (s)	-	-	8.9	8.3	7.2	-
HCM Lane LOS	-	-	A	A	A	-
HCM 95th %tile Q(veh)	-	-	0	0	0	-

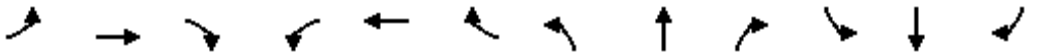
Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	None
Storage Length	250	-	-	250	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	5	0	-	0	20	5
Stage 1	-	-	-	-	5	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1630	-	-	-	1002	1084
Stage 1	-	-	-	-	1023	-
Stage 2	-	-	-	-	1013	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1630	-	-	-	999	1084
Mov Cap-2 Maneuver	-	-	-	-	920	-
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1013	-

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	8.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1630	-	-	-	920	1084
HCM Lane V/C Ratio	0.003	-	-	-	0.006	0.005
HCM Control Delay (s)	7.2	-	-	-	8.9	8.3
HCM Lane LOS	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0	0



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	1189	14	44	1083	9	49	5	12	11	5	5
Future Volume (veh/h)	13	1189	14	44	1083	9	49	5	12	11	5	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	14	1239	0	46	1128	0	51	5	0	11	5	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	29	1379		69	1420		163	8		129	45	
Arrive On Green	0.02	0.74	0.00	0.04	0.76	0.00	0.06	0.06	0.00	0.06	0.06	0.00
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1356	133	1585	958	745	1585
Grp Volume(v), veh/h	14	1239	0	46	1128	0	56	0	0	16	0	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1489	0	1585	1703	0	1585
Q Serve(g_s), s	0.7	44.3	0.0	2.2	31.4	0.0	2.4	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.7	44.3	0.0	2.2	31.4	0.0	3.1	0.0	0.0	0.7	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.91		1.00	0.69		1.00
Lane Grp Cap(c), veh/h	29	1379		69	1420		171	0		175	0	
V/C Ratio(X)	0.48	0.90		0.67	0.79		0.33	0.00		0.09	0.00	
Avail Cap(c_a), veh/h	104	2418		124	2440		402	0		420	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	41.9	8.8	0.0	40.7	6.3	0.0	39.2	0.0	0.0	38.2	0.0	0.0
Incr Delay (d2), s/veh	11.4	2.6	0.0	10.5	1.0	0.0	1.1	0.0	0.0	0.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	11.0	0.0	1.1	6.6	0.0	1.2	0.0	0.0	0.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.3	11.4	0.0	51.2	7.3	0.0	40.3	0.0	0.0	38.4	0.0	0.0
LnGrp LOS	D	B		D	A		D	A		D	A	
Approach Vol, veh/h		1253			1174			56			16	
Approach Delay, s/veh		11.8			9.0			40.3			38.4	
Approach LOS		B			A			D			D	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		9.2	8.3	68.3		9.2	6.4	70.2				
Change Period (Y+Rc), s		4.0	5.0	5.0		4.0	5.0	5.0				
Max Green Setting (Gmax), s		19.0	6.0	111.0		19.0	5.0	112.0				
Max Q Clear Time (g_c+I1), s		5.1	4.2	46.3		2.7	2.7	33.4				
Green Ext Time (p_c), s		0.2	0.0	17.0		0.0	0.0	13.3				

Intersection Summary												
HCM 6th Ctrl Delay			11.3									
HCM 6th LOS			B									

Notes

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	8	0	1108	5	0	16
Future Vol, veh/h	8	0	1108	5	0	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	0	1166	5	0	17

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1183	-	0	0	-	-
Stage 1	1166	-	-	-	-	-
Stage 2	17	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	209	0	-	-	0	-
Stage 1	296	0	-	-	0	-
Stage 2	1006	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	209	-	-	-	-	-
Mov Cap-2 Maneuver	209	-	-	-	-	-
Stage 1	296	-	-	-	-	-
Stage 2	1006	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	22.9	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	209	-
HCM Lane V/C Ratio	-	-	0.04	-
HCM Control Delay (s)	-	-	22.9	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1125	5	0	5
Future Vol, veh/h	5	0	1125	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1184	5	0	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1189	-	0	0	-	-
Stage 1	1184	-	-	-	-	-
Stage 2	5	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	208	0	-	-	0	-
Stage 1	290	0	-	-	0	-
Stage 2	1018	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	208	-	-	-	-	-
Mov Cap-2 Maneuver	208	-	-	-	-	-
Stage 1	290	-	-	-	-	-
Stage 2	1018	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	22.8	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	208	-
HCM Lane V/C Ratio	-	-	0.025	-
HCM Control Delay (s)	-	-	22.8	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1133	5	0	5
Future Vol, veh/h	5	0	1133	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1193	5	0	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1198	-	0	0	-	-
Stage 1	1193	-	-	-	-	-
Stage 2	5	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	205	0	-	-	0	-
Stage 1	288	0	-	-	0	-
Stage 2	1018	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	205	-	-	-	-	-
Mov Cap-2 Maneuver	205	-	-	-	-	-
Stage 1	288	-	-	-	-	-
Stage 2	1018	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	23	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	205	-
HCM Lane V/C Ratio	-	-	0.026	-
HCM Control Delay (s)	-	-	23	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1135	6	0	5
Future Vol, veh/h	5	0	1135	6	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1195	6	0	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1200	-	0	0	-	-
Stage 1	1195	-	-	-	-	-
Stage 2	5	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	204	0	-	-	0	-
Stage 1	287	0	-	-	0	-
Stage 2	1018	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	204	-	-	-	-	-
Mov Cap-2 Maneuver	204	-	-	-	-	-
Stage 1	287	-	-	-	-	-
Stage 2	1018	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	23.1	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	204	-
HCM Lane V/C Ratio	-	-	0.026	-
HCM Control Delay (s)	-	-	23.1	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	4.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	29	5	5	29	5	5
Future Vol, veh/h	29	5	5	29	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	190	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	5	7	0	13	3
Mvmt Flow	30	5	5	30	5	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	35	20	0	0	35	0
Stage 1	20	-	-	-	-	-
Stage 2	15	-	-	-	-	-
Critical Hdwy	6.4	6.25	-	-	4.23	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.345	-	-	2.317	-
Pot Cap-1 Maneuver	983	1049	-	-	1508	-
Stage 1	1008	-	-	-	-	-
Stage 2	1013	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	980	1049	-	-	1508	-
Mov Cap-2 Maneuver	980	-	-	-	-	-
Stage 1	1008	-	-	-	-	-
Stage 2	1010	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.8	0	3.7
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	990	1508	-
HCM Lane V/C Ratio	-	-	0.036	0.003	-
HCM Control Delay (s)	-	-	8.8	7.4	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	2.5

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	5	25	23	7	12	6
Future Vol, veh/h	5	25	23	7	12	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	17	3	6	0	0	30
Mvmt Flow	5	26	24	7	13	6

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	31	0	-	0	64	28
Stage 1	-	-	-	-	28	-
Stage 2	-	-	-	-	36	-
Critical Hdwy	4.27	-	-	-	6.4	6.5
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.353	-	-	-	3.5	3.57
Pot Cap-1 Maneuver	1490	-	-	-	947	972
Stage 1	-	-	-	-	1000	-
Stage 2	-	-	-	-	992	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1490	-	-	-	944	972
Mov Cap-2 Maneuver	-	-	-	-	944	-
Stage 1	-	-	-	-	997	-
Stage 2	-	-	-	-	992	-

Approach	SE	NW	SW
HCM Control Delay, s	1.2	0	8.9
HCM LOS			A

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	1490	-	953
HCM Lane V/C Ratio	-	-	0.003	-	0.02
HCM Control Delay (s)	-	-	7.4	0	8.9
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	-	0.1

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	5	34	26	5	7	5
Future Vol, veh/h	5	34	26	5	7	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	175	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	7	25	50	11
Mvmt Flow	5	35	27	5	7	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	32	0	-	0	58	30
Stage 1	-	-	-	-	30	-
Stage 2	-	-	-	-	28	-
Critical Hdwy	4.1	-	-	-	7.35	6.365
Critical Hdwy Stg 1	-	-	-	-	6.15	-
Critical Hdwy Stg 2	-	-	-	-	6.55	-
Follow-up Hdwy	2.2	-	-	-	3.975	3.4045
Pot Cap-1 Maneuver	1593	-	-	-	831	1017
Stage 1	-	-	-	-	875	-
Stage 2	-	-	-	-	874	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1593	-	-	-	829	1017
Mov Cap-2 Maneuver	-	-	-	-	829	-
Stage 1	-	-	-	-	872	-
Stage 2	-	-	-	-	874	-

Approach	EB	WB	SW
HCM Control Delay, s	0.9	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	1593	-	-	-	898
HCM Lane V/C Ratio	0.003	-	-	-	0.014
HCM Control Delay (s)	7.3	0	-	-	9.1
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	4.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	27	10	21	16	7	9	5	18	11	5	6
Future Vol, veh/h	5	27	10	21	16	7	9	5	18	11	5	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	None
Storage Length	300	-	-	400	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	13	3	0	7	6	0	0	0	0	0	0	13
Mvmt Flow	5	28	10	22	17	7	9	5	19	11	5	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	24	0	0	28	0	0	108	106	28	115	103	21
Stage 1	-	-	-	-	-	-	38	38	-	65	65	-
Stage 2	-	-	-	-	-	-	70	68	-	50	38	-
Critical Hdwy	4.23	-	-	4.17	-	-	7.1	6.5	6.2	7.1	6.5	6.33
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.317	-	-	2.263	-	-	3.5	4	3.3	3.5	4	3.417
Pot Cap-1 Maneuver	1522	-	-	1554	-	-	876	788	1053	867	791	1026
Stage 1	-	-	-	-	-	-	982	867	-	951	845	-
Stage 2	-	-	-	-	-	-	945	842	-	968	867	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1522	-	-	1554	-	-	855	775	1053	836	778	1026
Mov Cap-2 Maneuver	-	-	-	-	-	-	855	775	-	836	778	-
Stage 1	-	-	-	-	-	-	979	864	-	948	833	-
Stage 2	-	-	-	-	-	-	920	830	-	942	864	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.9	3.5	9	9.3
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	939	1522	-	-	1554	-	-	865
HCM Lane V/C Ratio	0.035	0.003	-	-	0.014	-	-	0.026
HCM Control Delay (s)	9	7.4	-	-	7.3	-	-	9.3
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	9	47	39	17	9	5
Future Vol, veh/h	9	47	39	17	9	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	6	23	0	7
Mvmt Flow	9	49	41	18	9	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	59	0	-	0	117	50
Stage 1	-	-	-	-	50	-
Stage 2	-	-	-	-	67	-
Critical Hdwy	4.1	-	-	-	6.4	6.27
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.363
Pot Cap-1 Maneuver	1558	-	-	-	884	1004
Stage 1	-	-	-	-	978	-
Stage 2	-	-	-	-	961	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1558	-	-	-	879	1004
Mov Cap-2 Maneuver	-	-	-	-	879	-
Stage 1	-	-	-	-	972	-
Stage 2	-	-	-	-	961	-

Approach	EB	WB	SB
HCM Control Delay, s	1.2	0	9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1558	-	-	-	920
HCM Lane V/C Ratio	0.006	-	-	-	0.016
HCM Control Delay (s)	7.3	0	-	-	9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	7.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	58	5	5	5	5	58
Future Vol, veh/h	58	5	5	5	5	58
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	275	-	-	225	0	65
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	7	0	9	0
Mvmt Flow	60	5	5	5	5	60

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	5	0	-	0	130	5
Stage 1	-	-	-	-	5	-
Stage 2	-	-	-	-	125	-
Critical Hdwy	4.1	-	-	-	6.49	6.2
Critical Hdwy Stg 1	-	-	-	-	5.49	-
Critical Hdwy Stg 2	-	-	-	-	5.49	-
Follow-up Hdwy	2.2	-	-	-	3.581	3.3
Pot Cap-1 Maneuver	1630	-	-	-	848	1084
Stage 1	-	-	-	-	1000	-
Stage 2	-	-	-	-	884	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1630	-	-	-	817	1084
Mov Cap-2 Maneuver	-	-	-	-	788	-
Stage 1	-	-	-	-	963	-
Stage 2	-	-	-	-	884	-

Approach	EB	WB	SB
HCM Control Delay, s	6.7	0	8.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1630	-	-	-	788	1084
HCM Lane V/C Ratio	0.037	-	-	-	0.007	0.056
HCM Control Delay (s)	7.3	-	-	-	9.6	8.5
HCM Lane LOS	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0	0.2

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	7	0	0	0
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	10	0	-	0	23	8
Stage 1	-	-	-	-	8	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1623	-	-	-	998	1080
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1013	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1623	-	-	-	995	1080
Mov Cap-2 Maneuver	-	-	-	-	995	-
Stage 1	-	-	-	-	1017	-
Stage 2	-	-	-	-	1013	-

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1623	-	-	-	1036
HCM Lane V/C Ratio	0.003	-	-	-	0.01
HCM Control Delay (s)	7.2	0	-	-	8.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	7	0	0	0
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	10	0	-	0	23	8
Stage 1	-	-	-	-	8	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1623	-	-	-	998	1080
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1013	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1623	-	-	-	995	1080
Mov Cap-2 Maneuver	-	-	-	-	995	-
Stage 1	-	-	-	-	1017	-
Stage 2	-	-	-	-	1013	-

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1623	-	-	-	1036
HCM Lane V/C Ratio	0.003	-	-	-	0.01
HCM Control Delay (s)	7.2	0	-	-	8.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	4.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	Yield	-	None
Storage Length	0	75	-	350	425	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	50	0	8	25	0	5
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	20	5	0	0	5	0
Stage 1	5	-	-	-	-	-
Stage 2	15	-	-	-	-	-
Critical Hdwy	6.9	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.9	-	-	-	-	-
Critical Hdwy Stg 2	5.9	-	-	-	-	-
Follow-up Hdwy	3.95	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	887	1084	-	-	1630	-
Stage 1	906	-	-	-	-	-
Stage 2	897	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	884	1084	-	-	1630	-
Mov Cap-2 Maneuver	813	-	-	-	-	-
Stage 1	906	-	-	-	-	-
Stage 2	894	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.9	0	3.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	813	1084	1630	-
HCM Lane V/C Ratio	-	-	0.006	0.005	0.003	-
HCM Control Delay (s)	-	-	9.5	8.3	7.2	-
HCM Lane LOS	-	-	A	A	A	-
HCM 95th %tile Q(veh)	-	-	0	0	0	-

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	425	-	-	350	0	35
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	0	7	0	0	0
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	5	0	-	0	20	5
Stage 1	-	-	-	-	5	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1630	-	-	-	1002	1084
Stage 1	-	-	-	-	1023	-
Stage 2	-	-	-	-	1013	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1630	-	-	-	999	1084
Mov Cap-2 Maneuver	-	-	-	-	920	-
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1013	-

Approach	EB	WB	SW
HCM Control Delay, s	3.6	0	8.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1	SWLn2
Capacity (veh/h)	1630	-	-	-	920	1084
HCM Lane V/C Ratio	0.003	-	-	-	0.006	0.005
HCM Control Delay (s)	7.2	-	-	-	8.9	8.3
HCM Lane LOS	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0	0

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	0	0	0	0
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	10	0	-	0	23	8
Stage 1	-	-	-	-	8	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1623	-	-	-	998	1080
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1013	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1623	-	-	-	995	1080
Mov Cap-2 Maneuver	-	-	-	-	995	-
Stage 1	-	-	-	-	1017	-
Stage 2	-	-	-	-	1013	-

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1623	-	-	-	1036
HCM Lane V/C Ratio	0.003	-	-	-	0.01
HCM Control Delay (s)	7.2	0	-	-	8.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	1297	34	60	1236	5	77	5	19	27	5	9
Future Volume (veh/h)	14	1297	34	60	1236	5	77	5	19	27	5	9
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	15	1365	0	63	1301	0	81	5	0	28	5	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	29	1442		81	1496		158	6		153	23	
Arrive On Green	0.02	0.77	0.00	0.05	0.80	0.00	0.07	0.07	0.00	0.07	0.07	0.00
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1430	88	1585	1392	324	1585
Grp Volume(v), veh/h	15	1365	0	63	1301	0	86	0	0	33	0	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1518	0	1585	1716	0	1585
Q Serve(g_s), s	1.0	77.0	0.0	4.4	56.9	0.0	4.7	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	1.0	77.0	0.0	4.4	56.9	0.0	6.8	0.0	0.0	2.2	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.94		1.00	0.85		1.00
Lane Grp Cap(c), veh/h	29	1442		81	1496		164	0		176	0	
V/C Ratio(X)	0.52	0.95		0.78	0.87		0.52	0.00		0.19	0.00	
Avail Cap(c_a), veh/h	72	1654		115	1699		269	0		283	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	60.7	12.1	0.0	58.8	8.2	0.0	56.6	0.0	0.0	54.6	0.0	0.0
Incr Delay (d2), s/veh	13.6	11.1	0.0	19.4	4.7	0.0	2.6	0.0	0.0	0.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	26.5	0.0	2.4	16.3	0.0	2.8	0.0	0.0	1.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	74.3	23.2	0.0	78.1	12.9	0.0	59.2	0.0	0.0	55.2	0.0	0.0
LnGrp LOS	E	C		E	B		E	A		E	A	
Approach Vol, veh/h		1380			1364			86			33	
Approach Delay, s/veh		23.7			15.9			59.2			55.2	
Approach LOS		C			B			E			E	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		12.9	10.6	100.9		12.9	7.0	104.5				
Change Period (Y+Rc), s		4.0	5.0	5.0		4.0	5.0	5.0				
Max Green Setting (Gmax), s		18.0	8.0	110.0		18.0	5.0	113.0				
Max Q Clear Time (g_c+I1), s		8.8	6.4	79.0		4.2	3.0	58.9				
Green Ext Time (p_c), s		0.2	0.0	16.9		0.1	0.0	18.9				

Intersection Summary	
HCM 6th Ctrl Delay	21.4
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1293	5	0	5
Future Vol, veh/h	5	0	1293	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1347	5	0	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1352	-	0	0	-	-
Stage 1	1347	-	-	-	-	-
Stage 2	5	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	165	0	-	-	0	-
Stage 1	242	0	-	-	0	-
Stage 2	1018	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	165	-	-	-	-	-
Mov Cap-2 Maneuver	165	-	-	-	-	-
Stage 1	242	-	-	-	-	-
Stage 2	1018	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	27.5	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	165	-
HCM Lane V/C Ratio	-	-	0.032	-
HCM Control Delay (s)	-	-	27.5	-
HCM Lane LOS	-	-	D	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1215	5	0	5
Future Vol, veh/h	5	0	1215	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1266	5	0	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1271	-	0	0	-	-
Stage 1	1266	-	-	-	-	-
Stage 2	5	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	185	0	-	-	0	-
Stage 1	265	0	-	-	0	-
Stage 2	1018	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	185	-	-	-	-	-
Mov Cap-2 Maneuver	185	-	-	-	-	-
Stage 1	265	-	-	-	-	-
Stage 2	1018	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	25	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	185	-
HCM Lane V/C Ratio	-	-	0.028	-
HCM Control Delay (s)	-	-	25	-
HCM Lane LOS	-	-	D	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1292	5	0	5
Future Vol, veh/h	5	0	1292	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1346	5	0	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1351	-	0	0	-	-
Stage 1	1346	-	-	-	-	-
Stage 2	5	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	166	0	-	-	0	-
Stage 1	242	0	-	-	0	-
Stage 2	1018	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	166	-	-	-	-	-
Mov Cap-2 Maneuver	166	-	-	-	-	-
Stage 1	242	-	-	-	-	-
Stage 2	1018	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	27.4	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	166	-
HCM Lane V/C Ratio	-	-	0.031	-
HCM Control Delay (s)	-	-	27.4	-
HCM Lane LOS	-	-	D	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	1293	5	0	6
Future Vol, veh/h	5	0	1293	5	0	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	1347	5	0	6

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1353	-	0	0	-	-
Stage 1	1347	-	-	-	-	-
Stage 2	6	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	165	0	-	-	0	-
Stage 1	242	0	-	-	0	-
Stage 2	1017	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	165	-	-	-	-	-
Mov Cap-2 Maneuver	165	-	-	-	-	-
Stage 1	242	-	-	-	-	-
Stage 2	1017	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	27.5	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	165	-
HCM Lane V/C Ratio	-	-	0.032	-
HCM Control Delay (s)	-	-	27.5	-
HCM Lane LOS	-	-	D	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	4.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	44	5	5	46	5	5
Future Vol, veh/h	44	5	5	46	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	190	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	2	0	0	4
Mvmt Flow	46	5	5	48	5	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	44	29	0	0	53	0
Stage 1	29	-	-	-	-	-
Stage 2	15	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	972	1052	-	-	1566	-
Stage 1	999	-	-	-	-	-
Stage 2	1013	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	969	1052	-	-	1566	-
Mov Cap-2 Maneuver	969	-	-	-	-	-
Stage 1	999	-	-	-	-	-
Stage 2	1010	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.9	0	3.7
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	977	1566	-
HCM Lane V/C Ratio	-	-	0.053	0.003	-
HCM Control Delay (s)	-	-	8.9	7.3	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	0.2	0	-

Intersection	
Int Delay, s/veh	2.7

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	6	38	35	13	21	11
Future Vol, veh/h	6	38	35	13	21	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	6	40	37	14	22	12

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	51	0	-	0	96	44
Stage 1	-	-	-	-	44	-
Stage 2	-	-	-	-	52	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1568	-	-	-	908	1032
Stage 1	-	-	-	-	984	-
Stage 2	-	-	-	-	976	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1568	-	-	-	904	1032
Mov Cap-2 Maneuver	-	-	-	-	904	-
Stage 1	-	-	-	-	980	-
Stage 2	-	-	-	-	976	-

Approach	SE	NW	SW
HCM Control Delay, s	1	0	9
HCM LOS			A

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	1568	-	944
HCM Lane V/C Ratio	-	-	0.004	-	0.036
HCM Control Delay (s)	-	-	7.3	0	9
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	-	0.1

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	5	57	37	5	22	11
Future Vol, veh/h	5	57	37	5	22	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	175	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	5	60	39	5	23	12

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	44	0	-	0	82	42
Stage 1	-	-	-	-	42	-
Stage 2	-	-	-	-	40	-
Critical Hdwy	4.1	-	-	-	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1577	-	-	-	921	1034
Stage 1	-	-	-	-	986	-
Stage 2	-	-	-	-	983	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1577	-	-	-	918	1034
Mov Cap-2 Maneuver	-	-	-	-	918	-
Stage 1	-	-	-	-	983	-
Stage 2	-	-	-	-	983	-

Approach	EB	WB	SW
HCM Control Delay, s	0.6	0	8.9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	1577	-	-	-	954
HCM Lane V/C Ratio	0.003	-	-	-	0.036
HCM Control Delay (s)	7.3	0	-	-	8.9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	54	10	21	28	30	6	5	13	17	5	8
Future Vol, veh/h	15	54	10	21	28	30	6	5	13	17	5	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	None
Storage Length	300	-	-	400	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	4	7	0	2	0	0	0	0	0	0	0
Mvmt Flow	16	57	11	22	29	32	6	5	14	18	5	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	61	0	0	57	0	0	185	194	57	188	178	45
Stage 1	-	-	-	-	-	-	89	89	-	89	89	-
Stage 2	-	-	-	-	-	-	96	105	-	99	89	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1555	-	-	1560	-	-	780	705	1015	777	719	1031
Stage 1	-	-	-	-	-	-	923	825	-	923	825	-
Stage 2	-	-	-	-	-	-	916	812	-	912	825	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1555	-	-	1560	-	-	755	688	1015	748	702	1031
Mov Cap-2 Maneuver	-	-	-	-	-	-	755	688	-	748	702	-
Stage 1	-	-	-	-	-	-	914	817	-	914	813	-
Stage 2	-	-	-	-	-	-	890	801	-	885	817	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.4	2	9.3	9.7
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	856	1555	-	-	1560	-	-	798
HCM Lane V/C Ratio	0.03	0.01	-	-	0.014	-	-	0.04
HCM Control Delay (s)	9.3	7.3	-	-	7.3	-	-	9.7
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	74	69	21	19	10
Future Vol, veh/h	10	74	69	21	19	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	11	78	73	22	20	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	95	0	-	0	184	84
Stage 1	-	-	-	-	84	-
Stage 2	-	-	-	-	100	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1512	-	-	-	810	981
Stage 1	-	-	-	-	944	-
Stage 2	-	-	-	-	929	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1512	-	-	-	804	981
Mov Cap-2 Maneuver	-	-	-	-	804	-
Stage 1	-	-	-	-	936	-
Stage 2	-	-	-	-	929	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	9.4
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1512	-	-	-	857
HCM Lane V/C Ratio	0.007	-	-	-	0.036
HCM Control Delay (s)	7.4	0	-	-	9.4
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	7.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	92	5	5	5	5	89
Future Vol, veh/h	92	5	5	5	5	89
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	275	-	-	225	0	65
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	97	5	5	5	5	94

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	5	0	-	0	204	5
Stage 1	-	-	-	-	5	-
Stage 2	-	-	-	-	199	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1630	-	-	-	789	1084
Stage 1	-	-	-	-	1023	-
Stage 2	-	-	-	-	839	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1630	-	-	-	742	1084
Mov Cap-2 Maneuver	-	-	-	-	739	-
Stage 1	-	-	-	-	962	-
Stage 2	-	-	-	-	839	-

Approach	EB	WB	SB
HCM Control Delay, s	7	0	8.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1630	-	-	-	739	1084
HCM Lane V/C Ratio	0.059	-	-	-	0.007	0.086
HCM Control Delay (s)	7.3	-	-	-	9.9	8.6
HCM Lane LOS	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	-	0	0.3

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	6	5	5	5	5
Future Vol, veh/h	5	6	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	5	6	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	10	0	-	0	24	8
Stage 1	-	-	-	-	8	-
Stage 2	-	-	-	-	16	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1623	-	-	-	997	1080
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1012	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1623	-	-	-	994	1080
Mov Cap-2 Maneuver	-	-	-	-	994	-
Stage 1	-	-	-	-	1017	-
Stage 2	-	-	-	-	1012	-

Approach	EB	WB	SB
HCM Control Delay, s	3.3	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1623	-	-	-	1035
HCM Lane V/C Ratio	0.003	-	-	-	0.01
HCM Control Delay (s)	7.2	0	-	-	8.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	2
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	10	0	-	0	23	8
Stage 1	-	-	-	-	8	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.4	6.22
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.318
Pot Cap-1 Maneuver	1623	-	-	-	998	1074
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1013	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1623	-	-	-	995	1074
Mov Cap-2 Maneuver	-	-	-	-	995	-
Stage 1	-	-	-	-	1017	-
Stage 2	-	-	-	-	1013	-

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1623	-	-	-	1033
HCM Lane V/C Ratio	0.003	-	-	-	0.01
HCM Control Delay (s)	7.2	0	-	-	8.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	4.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	Yield	-	None
Storage Length	0	75	-	350	425	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	7	0	0	37
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	20	5	0	0	5	0
Stage 1	5	-	-	-	-	-
Stage 2	15	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	1002	1084	-	-	1630	-
Stage 1	1023	-	-	-	-	-
Stage 2	1013	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	999	1084	-	-	1630	-
Mov Cap-2 Maneuver	919	-	-	-	-	-
Stage 1	1023	-	-	-	-	-
Stage 2	1010	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.6	0	3.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	919	1084	1630	-
HCM Lane V/C Ratio	-	-	0.006	0.005	0.003	-
HCM Control Delay (s)	-	-	8.9	8.3	7.2	-
HCM Lane LOS	-	-	A	A	A	-
HCM 95th %tile Q(veh)	-	-	0	0	0	-

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	425	-	-	350	0	35
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	0
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	5	0	-	0	20	5
Stage 1	-	-	-	-	5	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1630	-	-	-	1002	1084
Stage 1	-	-	-	-	1023	-
Stage 2	-	-	-	-	1013	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1630	-	-	-	999	1084
Mov Cap-2 Maneuver	-	-	-	-	920	-
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1013	-

Approach	EB	WB	SW
HCM Control Delay, s	3.6	0	8.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1	SWLn2
Capacity (veh/h)	1630	-	-	-	920	1084
HCM Lane V/C Ratio	0.003	-	-	-	0.006	0.005
HCM Control Delay (s)	7.2	-	-	-	8.9	8.3
HCM Lane LOS	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0	0

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	5	5	5
Future Vol, veh/h	5	5	5	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	2	0	0	2
Mvmt Flow	5	5	5	5	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	10	0	-	0	23	8
Stage 1	-	-	-	-	8	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	4.1	-	-	-	6.4	6.22
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.318
Pot Cap-1 Maneuver	1623	-	-	-	998	1074
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1013	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1623	-	-	-	995	1074
Mov Cap-2 Maneuver	-	-	-	-	995	-
Stage 1	-	-	-	-	1017	-
Stage 2	-	-	-	-	1013	-

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	8.5
HCM LOS			A

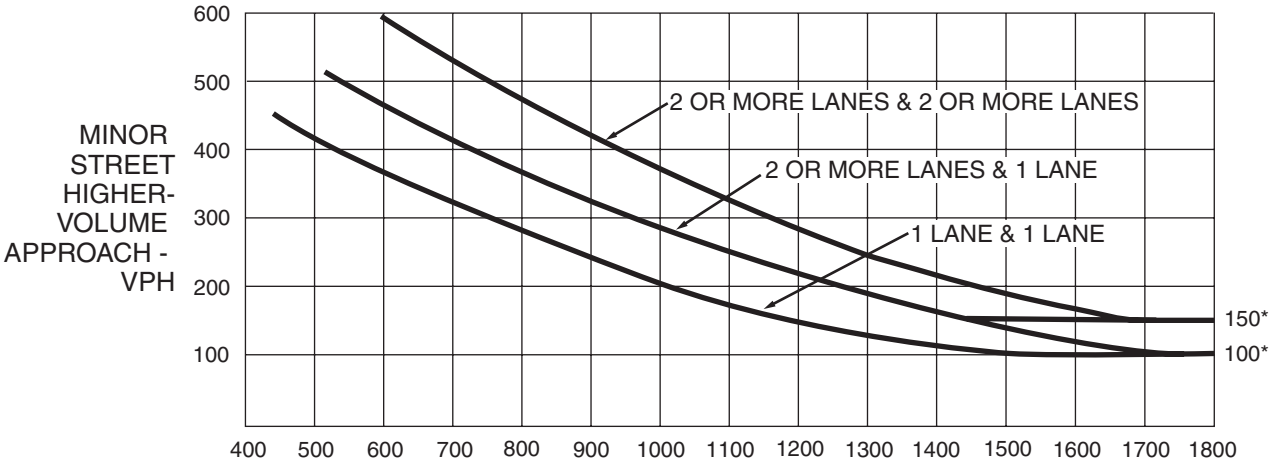
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1623	-	-	-	1033
HCM Lane V/C Ratio	0.003	-	-	-	0.01
HCM Control Delay (s)	7.2	0	-	-	8.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Appendix E

Traffic Signal Warrant Worksheets

Alternative 1
Honoapiilani Hwy/Olowalu General Store Intersection
PM Peak Hour

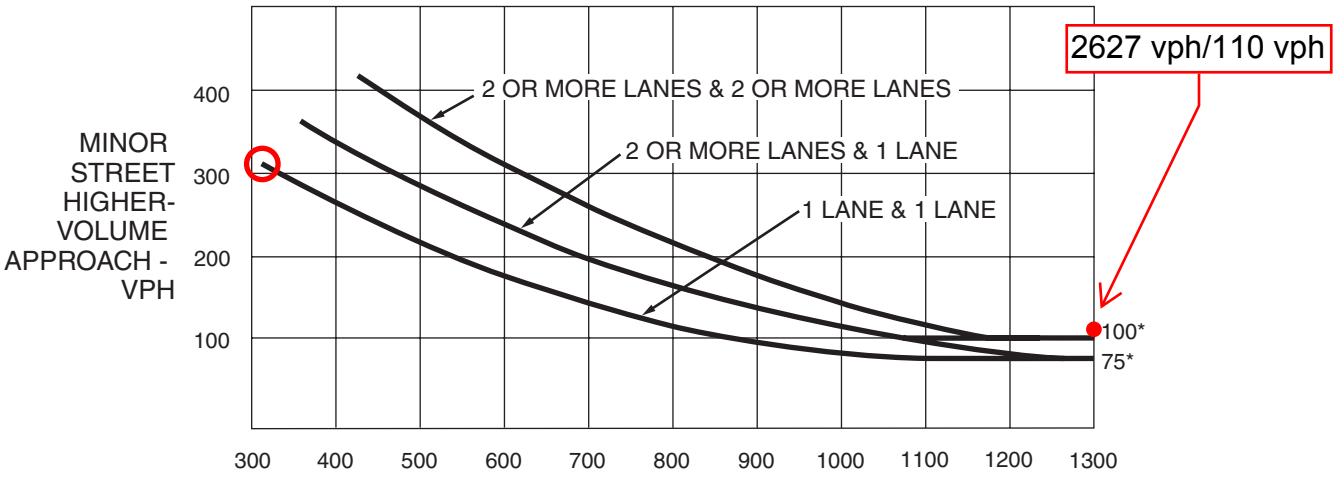
Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)

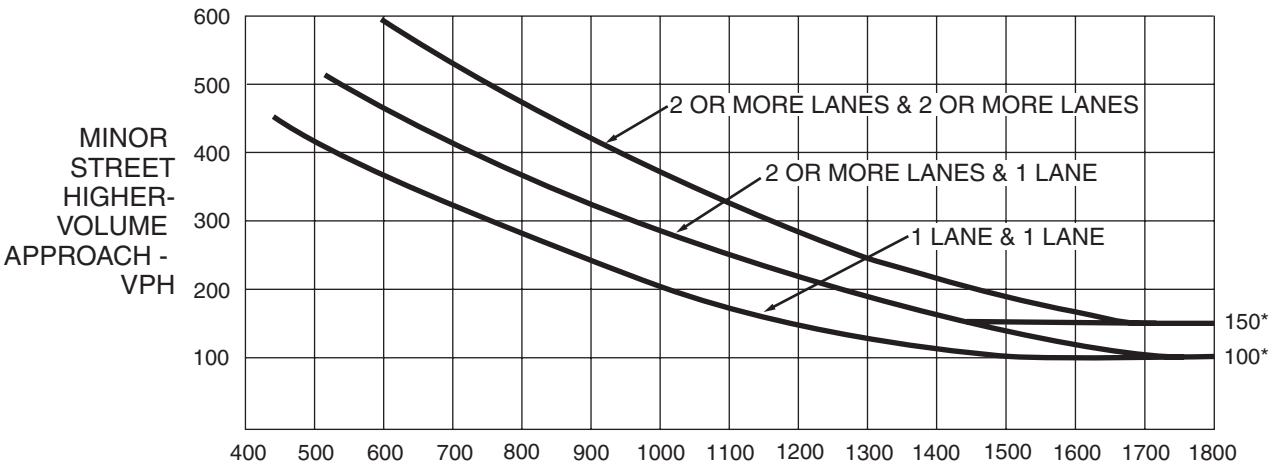


*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

70% Factor Used
Major Street: 2627 vph, Minor Street: 110 vph (left turn only)
Major Street considered 1 lane based on low left and right turn demand.
Minor Street 75 vph threshold chosen based on left turn volume from left turn lane.
Peak Hour Warrant Threshold is Met.

Alternatives 2-4
Honoapiilani Hwy/Luawai Street Intersection
PM Peak Hour

Figure 4C-3. Warrant 3, Peak Hour

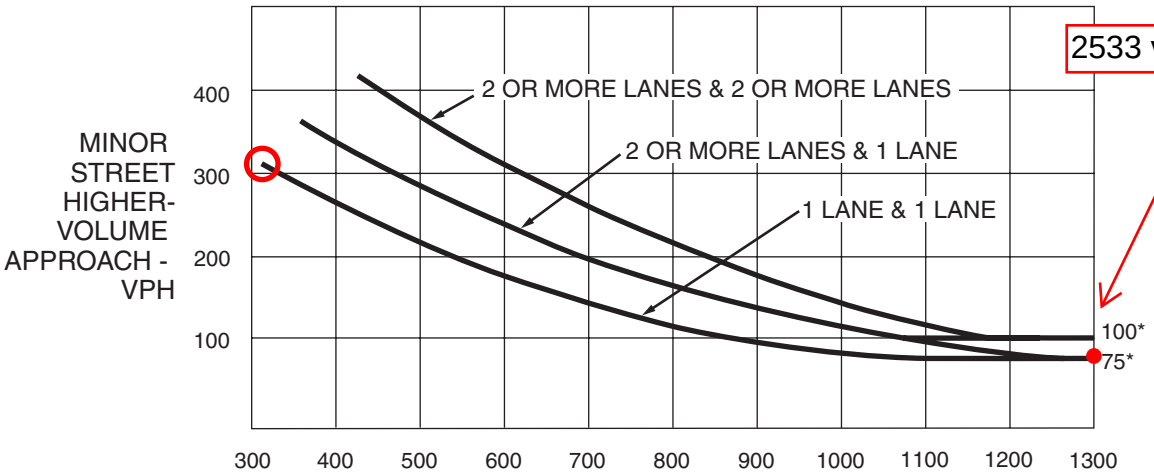


*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)

2533 vph/77 vph



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

70% Factor Used
Major Street: 2533 vph, Minor Street: 77 vph (left turn only)
Major Street considered 1 lane based on low left and right turn demand.
Minor Street 75 vph threshold chosen based on left turn volume from left turn lane.
Peak Hour Warrant Threshold is Met.

WSP USA, Inc.
Supplemental Transportation Evaluation Report

November 2025

HONOAPIʻILANI HIGHWAY IMPROVEMENTS PROJECT,
WEST MAUI: UKUMEHAME TO LAUNIUPOKO

Traffic Evaluation Memo

FINAL ENVIRONMENTAL IMPACT STATEMENT

July 2025

Prepared for

Honoapiʻilani Highway Improvements

Introduction

This technical memo supplements the transportation evaluation conducted as part of the Draft EIS for the proposed improvements of Honoapi‘ilani Highway (State Route No. 30) between Ukumehame and Launiupoko in West Maui, Maui Island. The Honoapi‘ilani Highway Improvements Project (Project) proposes to realign the existing Honoapi‘ilani Highway between Ukumehame and Launiupoko in west Maui, Hawai‘i further inland. Honoapi‘ilani Highway is under the jurisdiction of the State of Hawaii Department of Transportation (HDOT).

The Project is in the area of West Maui served by the existing Honoapi‘ilani Highway between milepost 11 and milepost 17. Honoapi‘ilani Highway is part of Maui’s Belt Road system, a two-lane principal arterial highway that provides the sole access between communities along the west coast of Maui and the rest of the island. The proposed southeastern terminus at milepost 11 is in Ukumehame in the vicinity of Pāpalaua Wayside Park, and the northwestern terminus of the project is at milepost 17 in Launiupoko, where Honoapi‘ilani Highway currently intersects the southern terminus of the Lāhainā Bypass. **FIGURE 1** shows the Project’s study area.

As described in the Draft EIS, the Project is a new two-lane, divided highway that would replace the existing two-lane, undivided highway as the primary regional arterial roadway. The existing Honoapi‘ilani Highway would remain in place and be accessible from the new highway via cross streets that intersect the Build Alternatives. The existing highway would continue to provide access to adjacent properties and the beaches.

A Preferred Alternative was presented at a public hearing on the Draft EIS. Based on public comments received during this public hearing, several refinements were made to the Preferred Alternative and analyzed in the Final EIS and in this transportation technical memorandum. These refinements include:

- Provision of a shared-use path along the new Honoapi‘ilani Highway as an addition to the currently proposed paved shoulders. The proposed shared-use path would augment the proposed *West Maui Greenway Plan* being developed by the Maui County Department of Parks and Recreation, which includes concepts of a greenway trail that would roughly parallel the existing Honoapi‘ilani Highway providing opportunities for new bicycle and pedestrian facilities.

- Public comments at the hearing addressed the need for safe pedestrian and bicycle crossings of the new Honoapi‘ilani Highway, including opinions that only one protected crossing at Luawai Street was not sufficient. The Draft EIS originally proposed signalizing the new Honoapi‘ilani Highway/Luawai Street intersection. As a result of the public hearing, an additional intersection is proposed to be signalized at the intersection of the new Honoapi‘ilani Highway and Ehehene Street.

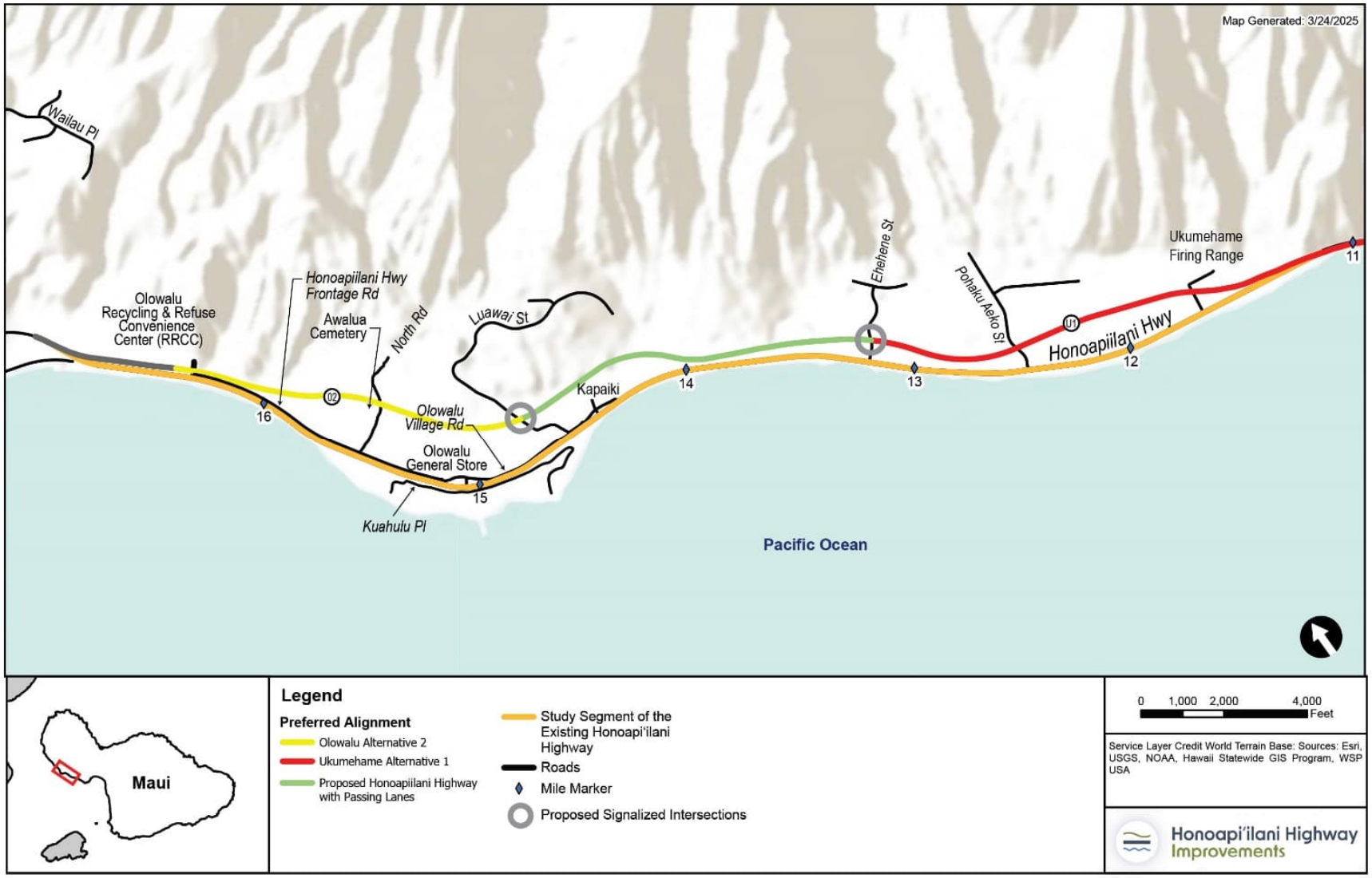
- Passing lanes were examined as an optional feature for the Preferred Alternative and, if included in the Project, would most likely be located centrally between Ehehene Street and Luawai Street.

The configuration and exact location would be determined during final design by the design-build contractor.

This technical memo focuses on the following:

- An updated evaluation of intersection operations on the Preferred Alternative (new, realigned Honoapi‘ilani Highway) at the Luawai Street and Ehehene Street intersections for the Future Year 2045 analysis incorporating the following design refinements:
    - Signalized intersections at both intersections, depicted in grey in **FIGURE 1**.
    - The potential for passing lanes in both directions on Honoapi‘ilani Highway which would generally be anticipated to be located between Luawai Street and Ehehene Street as depicted in green in **FIGURE 1**.
- An evaluation of other potential methods for traffic control:
    - Qualitative assessment of roundabouts and other traffic-control configurations at the Luawai Street and Ehehene Street intersections, as traffic-control alternatives to signalization.

FIGURE 1. **Preferred Alternative Components**



INTERSECTION OPERATIONAL ANALYSIS

Future Roadway Network

The Preferred Alternative (new, realigned Honoapi‘ilani Highway) remains the same as described in the Draft EIS with the exception of the refinements described above.

Luawai Street and Ehehene Street are paved, two-lane, mauka-makai roads originating at Honoapi‘ilani Highway in the vicinity of Olowalu Village and in the Ukumehame area, respectively. They provide access to agricultural, residential, and cultural land uses.

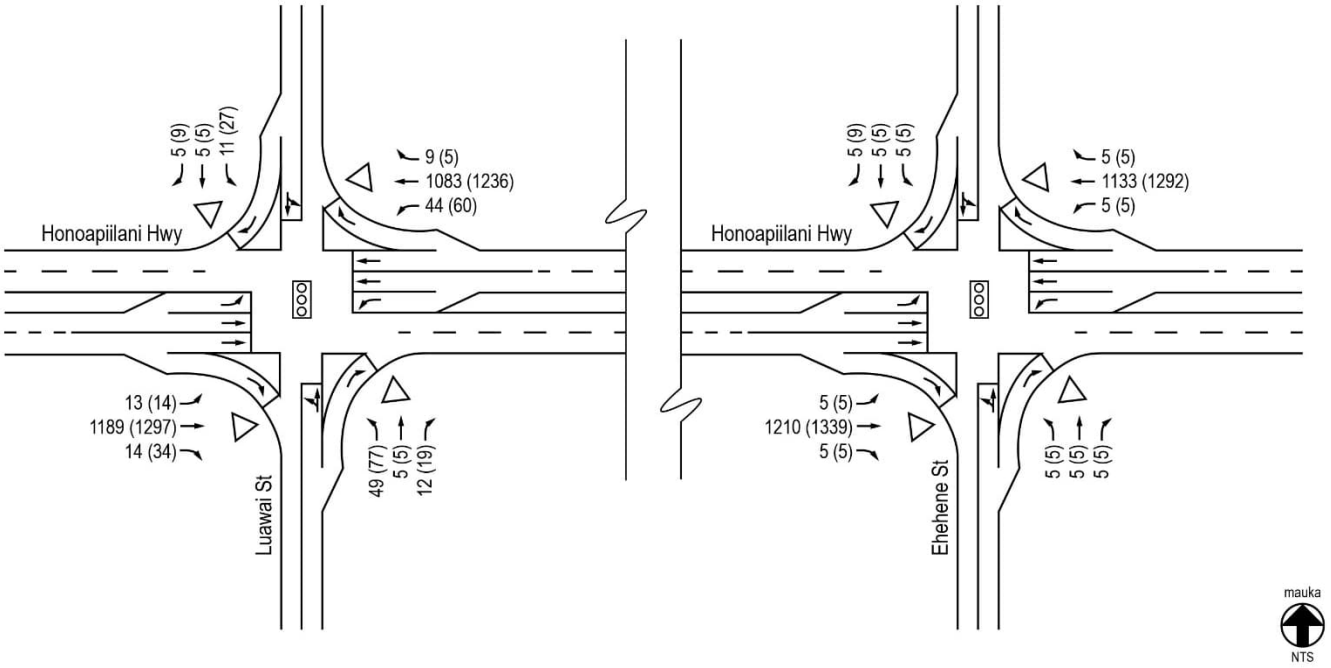
Traffic Operations Analysis

The following assumptions served as the basis for the traffic operations analysis:

- Future Year 2045 AM and PM peak-hour traffic turning movement volumes remain unchanged from those documented in the Draft EIS.
    - Per the proposed revision to the Preferred Alternative, both Luawai Street and Ehehene Street intersections were studied as signalized intersections with the following configuration:
        - Leading exclusive left-turn phasing for the mainline left turn
        - Pedestrian phase provided on all approaches with appropriate minimum crossing green and clearance times for a crossing distance of up to 72 feet assuming a 3.5 feet/second walking speed
        - 120-second signal cycle length providing a balance between serving the mainline through demand and providing side-street needs
- Left-turn storage lanes and channelized right-turn lanes remain unchanged from the pre-revision Preferred Alternative.
- Per the proposed refinement to the Preferred Alternative, passing lanes would be provided in both directions on the new Honoapi‘ilani Highway, resulting in two through lanes at the mainline approaches to the intersections.

FIGURE 2 conceptualizes the lane configurations and projected Year 2045 AM and PM turning movements.

FIGURE 2. **Projected Year 2045 Peak-Hour Traffic Volumes and Lane Configurations**



Intersection Operational Analyses

The two intersections were analyzed using the methodologies for signalized intersections outlined in the *Highway Capacity Manual 6th Edition (HCM6)* and implemented in the Synchro 11 software. Operating conditions at an intersection by approach are expressed as a qualitative measure known as Level of Service (LOS) ranging from A to F. LOS A represents operations with low vehicular delay, while LOS F represents conditions with relatively high vehicular delay. The overall intersection LOS is a weighted average of the LOS of individual traffic movement groups. Attachment A contains the Synchro worksheets as well as LOS thresholds for signalized and unsignalized intersections and arterials. **TABLE 1** displays the projected Year 2045 conditions LOS for the two study intersections with the refined configurations and traffic control and compares these to the originally projected LOS for the Preferred Alternative.

TABLE 1. **Projected Year 2045 Intersection Level of Service: Refined Preferred Alternative**

INTERSECTION	AM PEAK HOUR		PM PEAK HOUR	
	LOS	Delay (seconds)	LOS	Delay (seconds)
Honoapi'ilani Highway at Luawai Street				
Original Draft EIS-Overall Signalized Control	B	10.6	C	21.4
Adjusted Config.-Overall Signalized Control	A	7.1	A	8.1
Honoapi'ilani Highway at Ehehene Street				
Original Draft EIS -Highest Unsignalized Delay Movement	C	23.0	D	27.4
Adjusted Config-Overall Signalized Control	A	5.2	A	5.1

As shown in **TABLE 1**, both intersections are projected to operate at LOS A overall during both peak hours (AM and PM) with the refined Preferred Alternative. This condition is an improvement over the operational levels documented in the original Draft EIS and is attributable primarily to signalization—in the case of Ehehene Street—and to the added through lanes on the new Honoapi‘ilani Highway provided by the passing lanes between Luawai Street and Ehehene Street. Mainline movements are projected to operate at LOS A. Mainline left turns and minor street movements are projected to operate at LOS D or better.

Arterial Roadway Segment Analyses

Per the methodology used in the original Draft EIS, maximum directional traffic volumes for the proposed type of roadway facility were compared to the projected Future Year 2045 traffic volumes to determine the roadway segment LOS. Both AM and PM projected peak-hour Future Year 2045 volumes on the new Honoapi‘ilani Highway were found to be less than the maximum directional operational volume for new Honoapi‘ilani Highway. The maximum directional operational volume is estimated at 1,900 vph. The ratio of Future Year 2045 demand volume to the maximum directional operational volume is analogous to a volume/capacity (V/C) ratio.

The Draft EIS used projected Future Year 2045 traffic volumes and the maximum directional operational volume for the new Honoapi‘ilani Highway, the generalized segment V/C for the Preferred Alternative was estimated at 0.76 with a LOS of C. With the potential addition of passing lanes, the specific segment analysis indicates that the V/C would drop to 0.42 with a LOS A.

ALTERNATIVE TRAFFIC-CONTROL EVALUATION: ROUNDABOUTS AND OTHER NON-SIGNALIZED CONTROLS

One HDOT response to public comments received during the Draft EIS public hearing was to refine the Preferred Alternative to include a shared-use bicycle/pedestrian facility. Key public concerns related to this were to provide controlled and safe crossings of the highway for bicycles and pedestrians. The currently proposed adjustment to the design configuration documented in the original Draft EIS is to add another signalized intersection at Ehehene Street; this is in addition to the already proposed signalized intersection at Luawai Street.

This section identifies alternative traffic-control configurations and qualitatively discusses their ability to provide safe crossings of the new Honoapi'ilani Highway, a major regional arterial roadway. Crossing a high-volume, high-speed arterial highway is a challenge for these modes, and traffic control that preserves a safe crossing environment is a critical evaluation factor.

Several alternative intersection traffic-control alternatives were considered:

- Unsignalized, two-way STOP control on the minor approaches with Rectangular Rapid Flashing Beacons (RRFBs) for the crosswalks on new Honoapi'ilani Highway
- High Intensity Activated Crosswalk (HAWK) Signal traffic-control device designed to help pedestrians safely cross busy streets, especially at mid-block crossings, by activating only when a pedestrian needs to cross and alerting drivers to stop
- Roundabout in a configuration appropriate for a high-volume, high-speed arterial highway
- Grade-separated crossing of the new Honoapi'ilani Highway

Unsignalized, two-way STOP control is the originally proposed configuration at Ehehene Street and had already been deemed unsuitable at Luawai Street. Given the key evaluation factor of pedestrian and bicycle safety for crossing the new Honoapi'ilani Highway, unsignalized, two-way STOP control is also unsuitable for Ehehene Street. Supplementing the unsignalized control with RRFBs improves safety by increasing driver awareness of the crossing activity but still leaves pedestrians and bicyclists vulnerable to the high-speed and high-volume traffic on the new Honoapi'ilani Highway.

A HAWK signal is typically implemented at mid-block locations on a highway. But in this case, the HAWK would be atypically implemented at intersections. Also, given the high-volume, higher-speed configuration of the new Honoapi'ilani Highway, a HAWK would be inappropriate because it leaves travelers who are crossing the corridor vulnerable since having an isolated traffic signal operate only when activated can lead to driver inattention to the unexpected change. A high number of tourists currently and would continue to utilize this travel corridor and their unfamiliarity with the area makes this an important consideration.

A roundabout with an appropriate multilane, large diameter configuration could work from a traffic operations perspective but would not adequately address bicycle and pedestrian safety when crossing

the new Honoapi‘ilani Highway without introducing significant disruption to its capacity and throughput. A roundabout of appropriate size would have a roughly 200-foot diameter, which would require more right-of-way to implement than a signalized intersection. If HDOT were to consider a roundabout option during the design-build process, the design specifications and transportation effects would have to be further analyzed to ensure it is appropriate. In addition, the potential design would likely exceed the physical right-of-way analyzed in this Final EIS which could require NEPA re-evaluation of potential impacts.

Grade-separated crossings would provide a safe crossing of the new Honoapi‘ilani Highway, but there are key issues to consider, including access to the local roadway network, cost, view plane obstruction, and typically low acceptance by intended users.

SUMMARY

This supplemental evaluation of proposed refinements to the Preferred Alternative for the new Honoapi‘ilani Highway improvements determined the following:

- The signalization of Ehehene Street would improve its intersection operational LOS. Because of the added through lanes provided by the proposed passing lanes, intersection operational LOS at Luawai Street would also improve.

- The potential inclusion of passing lanes would improve the segment LOS on the new Honoapi‘ilani Highway where the lanes would be added.

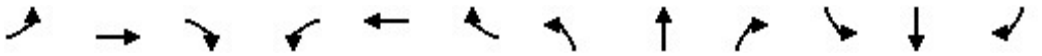
- A review of alternative intersection control strategies determined that two signalized intersections would be the most effective way to provide safe pedestrian and bicycle crossings of the new Honoapi‘ilani Highway with the least impact in terms of cost, right-of-way, and potential environmental impacts. A roundabout would remain a feasible option but if considered would require additional design and environmental assessment.

This supplemental evaluation of the refined Preferred Alternative recommends that the proposed refinements (signalized intersections, shared-use path, and passing lanes) are appropriate, would improve traffic operations, and would achieve the goal of providing safe multimodal crossings of the new Honoapi‘ilani Highway.

Attachment A: Synchro Worksheets

HCM 6th Signalized Intersection Summary
14: Luawai St & Honoapiilani Hwy

03/14/2025



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	1189	14	44	1083	9	49	5	12	11	5	5
Future Volume (veh/h)	13	1189	14	44	1083	9	49	5	12	11	5	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	14	1239	0	46	1128	0	51	5	0	11	5	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	32	1967		88	2078		253	9		211	46	
Arrive On Green	0.02	0.55	0.00	0.05	0.58	0.00	0.07	0.07	0.00	0.07	0.07	0.00
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1352	133	1585	1008	676	1585
Grp Volume(v), veh/h	14	1239	0	46	1128	0	56	0	0	16	0	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1484	0	1585	1684	0	1585
Q Serve(g_s), s	0.3	10.1	0.0	1.1	8.2	0.0	1.2	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.3	10.1	0.0	1.1	8.2	0.0	1.5	0.0	0.0	0.3	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.91		1.00	0.69		1.00
Lane Grp Cap(c), veh/h	32	1967		88	2078		262	0		257	0	
V/C Ratio(X)	0.44	0.63		0.52	0.54		0.21	0.00		0.06	0.00	
Avail Cap(c_a), veh/h	210	5693		420	6112		1117	0		1162	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	20.6	6.5	0.0	19.7	5.4	0.0	19.1	0.0	0.0	18.6	0.0	0.0
Incr Delay (d2), s/veh	9.2	0.3	0.0	4.8	0.2	0.0	0.4	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	1.7	0.0	0.5	1.2	0.0	0.5	0.0	0.0	0.1	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.8	6.8	0.0	24.5	5.6	0.0	19.5	0.0	0.0	18.7	0.0	0.0
LnGrp LOS	C	A		C	A		B	A		B	A	
Approach Vol, veh/h		1253			1174			56			16	
Approach Delay, s/veh		7.1			6.3			19.5			18.7	
Approach LOS		A			A			B			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.8	29.8		6.9	7.1	28.5		6.9				
Change Period (Y+Rc), s	5.0	5.0		4.0	5.0	5.0		4.0				
Max Green Setting (Gmax), s	5.0	73.0		28.0	10.0	68.0		28.0				
Max Q Clear Time (g_c+I1), s	2.3	10.2		3.5	3.1	12.1		2.3				
Green Ext Time (p_c), s	0.0	9.8		0.2	0.0	11.3		0.0				

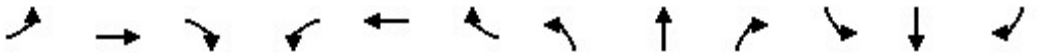
Intersection Summary	
HCM 6th Ctrl Delay	7.1
HCM 6th LOS	A

Notes

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
15: Honoapiilani Hwy & Ehehene St

03/14/2025



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	5	5	5	5	5	5	1133	5	5	1210	5
Future Volume (veh/h)	5	5	5	5	5	5	5	1133	5	5	1210	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	5	5	0	5	5	0	5	1180	0	5	1260	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	166	21		166	21		12	2106		12	2106	
Arrive On Green	0.03	0.03	0.00	0.03	0.03	0.00	0.01	0.59	0.00	0.01	0.59	0.00
Sat Flow, veh/h	827	827	1585	827	827	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	10	0	0	10	0	0	5	1180	0	5	1260	0
Grp Sat Flow(s),veh/h/ln	1655	0	1585	1655	0	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.1	7.6	0.0	0.1	8.3	0.0
Cycle Q Clear(g_c), s	0.2	0.0	0.0	0.2	0.0	0.0	0.1	7.6	0.0	0.1	8.3	0.0
Prop In Lane	0.50		1.00	0.50		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	186	0		186	0		12	2106		12	2106	
V/C Ratio(X)	0.05	0.00		0.05	0.00		0.41	0.56		0.41	0.60	
Avail Cap(c_a), veh/h	1354	0		1354	0		334	6765		334	6765	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	17.8	0.0	0.0	17.8	0.0	0.0	18.4	4.6	0.0	18.4	4.8	0.0
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.1	0.0	0.0	21.2	0.2	0.0	21.2	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.6	0.0	0.1	0.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.9	0.0	0.0	17.9	0.0	0.0	39.6	4.9	0.0	39.6	5.1	0.0
LnGrp LOS	B	A		B	A		D	A		D	A	
Approach Vol, veh/h		10			10			1185			1265	
Approach Delay, s/veh		17.9			17.9			5.0			5.2	
Approach LOS		B			B			A			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.3	27.1		4.9	5.3	27.1		4.9				
Change Period (Y+Rc), s	5.0	5.0		4.0	5.0	5.0		4.0				
Max Green Setting (Gmax), s	7.0	71.0		28.0	7.0	71.0		28.0				
Max Q Clear Time (g_c+I1), s	2.1	9.6		2.2	2.1	10.3		2.2				
Green Ext Time (p_c), s	0.0	10.5		0.0	0.0	11.8		0.0				

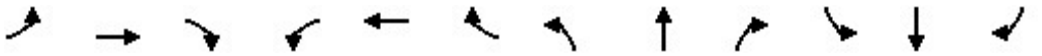
Intersection Summary	
HCM 6th Ctrl Delay	5.2
HCM 6th LOS	A

Notes

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
14: Luawai St & Honoapiilani Hwy

03/14/2025



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	1297	34	60	1236	5	77	5	19	27	5	9
Future Volume (veh/h)	14	1297	34	60	1236	5	77	5	19	27	5	9
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	15	1365	0	63	1301	0	81	5	0	28	5	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	34	2044		104	2186		259	7		242	32	
Arrive On Green	0.02	0.58	0.00	0.06	0.62	0.00	0.08	0.08	0.00	0.08	0.08	0.00
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1417	87	1585	1296	392	1585
Grp Volume(v), veh/h	15	1365	0	63	1301	0	86	0	0	33	0	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1504	0	1585	1688	0	1585
Q Serve(g_s), s	0.4	13.1	0.0	1.7	11.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.4	13.1	0.0	1.7	11.0	0.0	2.7	0.0	0.0	0.8	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.94		1.00	0.85		1.00
Lane Grp Cap(c), veh/h	34	2044		104	2186		266	0		274	0	
V/C Ratio(X)	0.45	0.67		0.60	0.60		0.32	0.00		0.12	0.00	
Avail Cap(c_a), veh/h	180	4965		325	5253		959	0		984	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	24.0	7.2	0.0	22.7	5.8	0.0	21.9	0.0	0.0	21.2	0.0	0.0
Incr Delay (d2), s/veh	9.1	0.4	0.0	5.5	0.3	0.0	0.7	0.0	0.0	0.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	2.6	0.0	0.8	1.9	0.0	1.0	0.0	0.0	0.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.0	7.6	0.0	28.2	6.0	0.0	22.6	0.0	0.0	21.4	0.0	0.0
LnGrp LOS	C	A		C	A		C	A		C	A	
Approach Vol, veh/h		1380			1364			86			33	
Approach Delay, s/veh		7.9			7.1			22.6			21.4	
Approach LOS		A			A			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.9	35.4		8.1	7.9	33.4		8.1				
Change Period (Y+Rc), s	5.0	5.0		4.0	5.0	5.0		4.0				
Max Green Setting (Gmax), s	5.0	73.0		28.0	9.0	69.0		28.0				
Max Q Clear Time (g_c+I1), s	2.4	13.0		4.7	3.7	15.1		2.8				
Green Ext Time (p_c), s	0.0	12.4		0.4	0.0	13.3		0.1				

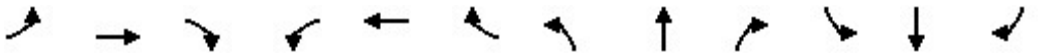
Intersection Summary	
HCM 6th Ctrl Delay	8.1
HCM 6th LOS	A

Notes

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
15: Honoapiilani Hwy & Ehehene St

03/14/2025



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	5	5	5	5	9	5	1292	5	5	1339	5
Future Volume (veh/h)	5	5	5	5	5	9	5	1292	5	5	1339	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	5	5	0	5	5	0	5	1360	0	5	1409	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	150	21		150	21		12	2249		12	2249	
Arrive On Green	0.02	0.02	0.00	0.02	0.02	0.00	0.01	0.63	0.00	0.01	0.63	0.00
Sat Flow, veh/h	828	828	1585	828	828	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	10	0	0	10	0	0	5	1360	0	5	1409	0
Grp Sat Flow(s),veh/h/ln	1655	0	1585	1655	0	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.1	9.5	0.0	0.1	10.1	0.0
Cycle Q Clear(g_c), s	0.2	0.0	0.0	0.2	0.0	0.0	0.1	9.5	0.0	0.1	10.1	0.0
Prop In Lane	0.50		1.00	0.50		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	170	0		170	0		12	2249		12	2249	
V/C Ratio(X)	0.06	0.00		0.06	0.00		0.42	0.60		0.42	0.63	
Avail Cap(c_a), veh/h	1210	0		1210	0		213	6218		213	6218	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	19.9	0.0	0.0	19.9	0.0	0.0	20.6	4.6	0.0	20.6	4.7	0.0
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.1	0.0	0.0	21.3	0.3	0.0	21.3	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.9	0.0	0.1	0.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.1	0.0	0.0	20.1	0.0	0.0	42.0	4.8	0.0	42.0	4.9	0.0
LnGrp LOS	C	A		C	A		D	A		D	A	
Approach Vol, veh/h		10			10			1365			1414	
Approach Delay, s/veh		20.1			20.1			5.0			5.1	
Approach LOS		C			C			A			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.3	31.4		5.0	5.3	31.4		5.0				
Change Period (Y+Rc), s	5.0	5.0		4.0	5.0	5.0		4.0				
Max Green Setting (Gmax), s	5.0	73.0		28.0	5.0	73.0		28.0				
Max Q Clear Time (g_c+I1), s	2.1	11.5		2.2	2.1	12.1		2.2				
Green Ext Time (p_c), s	0.0	13.5		0.0	0.0	14.3		0.0				

Intersection Summary		
HCM 6th Ctrl Delay		5.1
HCM 6th LOS		A

Notes

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HONOAPIʻILANI HIGHWAY IMPROVEMENTS PROJECT,
WEST MAUI: UKUMEHAME TO LAUNIUPOKO

Appendix 3.15 – Air Quality and Energy – Supplemental Information

November 2025

Prepared for

Honoapiʻilani Highway Improvements

Contents

Incomplete or Unavailable Information for Project-Specific MSAT Health Impacts Analysis

Appendix 3.15 Incomplete or Unavailable Information for Project-Specific MSAT Health Impacts Analysis

The following analysis of incomplete or unavailable information for project-specific mobile source air toxic (MSAT) health impacts analysis was taken from Appendix C of the Federal Highway Administration's (FHWA's) January 2023 *Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents*.[1]

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

The U.S. Environmental Protection Agency (USEPA) is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. The USEPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the Integrated Risk Information System, which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects."[2] Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). Appendix D of FHWA's *Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents* summarizes a number of HEI studies. Adverse health effects linked to MSAT compounds at high exposures include cancer in humans in occupational settings, cancer in animals, and irritation to the respiratory tract (including the exacerbation of asthma). Less obvious are the adverse human health effects of MSAT compounds at current environmental concentrations[3] or in the future as vehicle emissions substantially decrease.

The stepwise methodologies for forecasting health impacts include emissions modeling, dispersion modeling, exposure modeling, and then final determination of health impacts—each step in the

1 Federal Highway Administration. January 2023. *Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents*. https://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/msat/fhwa_nepa_msat_memorandum_2023.pdf

2 U.S. Environmental Protection Agency, https://www.epa.gov/iris/)

3 HEI Special Report 16, https://www.healtheffects.org/publication/mobile-source-air-toxics-critical-review-literature-exposure-and-health-effects

process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (that is, 70-year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, and this information is unavailable.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways; to determine the portion of time that people are actually exposed at a specific location; and to establish the extent attributable to a proposed action, especially given that some of the information needed is unavailable.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT due to factors such as low-dose extrapolation and translation of occupational exposure data to the general population—a concern expressed by HEI.[4] As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. The USEPA states that with respect to diesel engine exhaust, "[t]he absence of adequate data to develop a sufficiently confident dose-response relationship from the epidemiologic studies has prevented the estimation of inhalation carcinogenic risk."[5]

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the USEPA as provided by the Clean Air Act to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires USEPA to determine an "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld USEPA's approach to addressing risk in its two-step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable.[6]

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the

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4 HEI Special Report 16, https://www.healtheffects.org/publication/mobile-source-air-toxics-critical-review-literature-exposure-and-health-effects

5 U.S. Environmental Protection Agency IRIS database, Diesel Engine Exhaust, Section II.C. https://iris.epa.gov/static/pdfs/0642_summary.pdf)

6 https://www.cadc.uscourts.gov/internet/opinions.nsf/284E23FFE079CD59852578000050C9DA/$file/07-1053-1120274.pdf.

uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers. The decision makers would need to weigh this information against project benefits—such as reducing traffic congestion, accident rates, fatalities, and improved access for emergency response—which are better suited for quantitative analysis.

HONOAPIʻILANI HIGHWAY IMPROVEMENTS PROJECT,
WEST MAUI: UKUMEHAME TO LAUNIUPOKO

Appendix 3.16 Noise – Supplemental Information

November 2025

Prepared for

Honoapiʻilani Highway Improvements

Contents

Noise Technical Report

Noise Technical Report

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ACRONYMS

ACRONYM	DEFINITION
ANSI	American National Standard Institute
dB	decibel
dBA	A-weighted decibels
EIS	Environmental Impact Statement
FHWA	Federal Highway Administration
HDOT	Hawaiʻi Department of Transportation
L_{eq}	the energy average noise level, in dBA, for a specific time period
NAC	Noise Abatement Criteria
Project	Honoapiʻilani Highway Improvements Project
TNM	Traffic Noise Model

SUMMARY

The Hawai‘i Department of Transportation (HDOT), as the state project sponsor and lead agency, in coordination with the Federal Highway Administration (FHWA), the federal lead agency, has prepared a Final Environmental Impact Statement (Draft EIS) for the Honoapi‘ilani Highway Improvements Project (the Project) in accordance with FHWA regulations implementing NEPA (23 CFR 771.101 to 771.139), and FHWA guidance provided in its Environmental Review Toolkit, 23 United States Code (USC) 139 regarding efficient environmental reviews for project decision-making, and the Hawaii Environmental Policy Act (HEPA) / Hawaii Revised Statutes (HRS) Chapter 343.

The Project’s primary purpose is to provide a reliable transportation facility in West Maui and improve Honoapi‘ilani Highway’s resilience by reducing its vulnerability to coastal hazards. Specifically, the Project is intended to address existing coastal erosion and flooding, as well as future coastal erosion and flooding caused by anticipated sea level rise.

The project route is one of the primary corridors for commuters and tourists traveling between Kahului and Lahaina and has heavy traffic volumes throughout the daytime hours. The posted speed limit is 35 to 55 mph on the existing Honoapi‘ilani Highway alignment. The future posted speed on new Honoapi‘ilani Highway alignment would be 45 mph. The right-of-way is non-uniform in width and varies throughout the project area.

The purpose of this report is to analyze the potential for adverse traffic noise impacts of the Honoapi‘ilani Highway Improvements Project (the Project), provide a comparative assessment of the Build Alternatives, and describe potential noise and vibration impacts of the Project’s construction.

A noise study is required for this project because modifying the horizontal or vertical location of an existing highway and adding future capacity to an existing highway meet the definition of a Type I Project (HDOT, 2016). Type I projects require mitigation of noise levels that approach or exceed the FHWA noise abatement criteria if the mitigation is found to be both feasible and reasonable to provide.

Existing land uses located along this portion of the Honoapi‘ilani Highway include roadways, commercial businesses, office buildings, residential buildings, mixed-use buildings, schools, parks, health care facilities, trails, places of worship, a cemetery, and other uses.

Ten short-term (15-minute) measurements were taken at noise sensitive locations along the proposed alignment along with three 24-hour noise measurements to identify worst-hour noise levels. Sixty-six noise receivers were modeled to predict existing and future conditions noise levels.

The FHWA Traffic Noise Model (TNM) was used to model the noise levels at 66 sites for existing conditions and future project conditions along the Honoapi‘ilani Highway in the project area. Traffic data used for Existing and Future Year 2045 noise predictions were representative of the PM peak hour, which represents the loudest hour of operation for the highway (i.e. the most vehicles operating at the posted speed limit). The 66 modeled sites represent 44 residences, 10 parks, five parks or

recreation areas, one church, one cemetery, three areas of cultural interest, and outdoor areas at eight commercial businesses.

Existing worst-hour traffic noise levels for residential areas range from 35 dBA to 69 dBA depending on the proximity of the receiver to the roadway traffic and the presence of buildings and topography providing noise attenuation between the receiver and the roadway. The worst-hour traffic noise levels do not approach or exceed the NAC at any of the modeled sites.

Future 2045 modeled worst-hour traffic noise levels for the four Build Alternatives are largely the same, with the highest noise levels of 62 dBA predicted at one commercial site, Maui Paintball located in Olowalu. Build Alternative 4 has the highest increase in noise levels over existing noise levels (15 dBA at the Olowalu Petroglyphs) and one impact (substantial increase at the Olowalu Petroglyphs). All four Build Alternatives would not result in any NAC impacts and all alternatives would lower the highest traffic noise levels by 8 dBA to 12 dBA as compared to existing conditions.

One noise barrier was evaluated to reduce traffic noise levels at the one site where noise impacts were predicted with the Project (Build Alternative 4). The evaluated noise barrier was able to achieve the necessary noise reduction to satisfy HDOT Feasibility Criteria; however, the maximum allowance for the evaluated noise barrier that met feasibility was above the planning level cost estimate and will not be considered for placement as part of the Project.

A copy of this final report will be made available to local jurisdictions by HDOT. This report will serve to inform the local planning department of the effects of the highway and highway-construction related noise in the area studied. The information contained within this report can assist local officials in their planning process.

At the time of the Draft EIS publication, there were several undeveloped or vacant lots located near the proposed project improvements. According to HDOT traffic noise policy, if building permits have been submitted for undeveloped properties, the proposed development needs to be included in the noise study. A review of County of Maui's permitted land use was conducted online in March 2023. The review identified no permits or approvals on file within available online files. Between the Draft and Final EIS, four new residences were observed under construction in Ukumehame and the noise study has been updated to include these new locations.

1. INTRODUCTION

The purpose of this report is to analyze the traffic noise impacts of the proposed Honoapi'ilani Highway Improvements Project, Ukumehame to Launiopoko, on the island of Maui. The HDOT and the FHWA are evaluating four building alternatives along with a no build alternative to replace the existing two-lane highway alignment. While construction of the Project would accommodate a two-lane highway (one travel lane in each direction), the Build Alternatives have been considered based on a right-of-way width that is sufficient to accommodate a four-lane highway (two travel lanes in each direction) if the need arises and funding becomes available. All Build Alternatives would have a general right-of-way width of approximately 140 feet with additional area required for new intersections and for stormwater management infrastructure.

This study was prepared in accordance with FHWA rules and procedures (23 CFR 772, 2010) and the State of HDOT Highway Noise Policy and Abatement Guidelines (HDOT, 2016). Report elements include:

1. Measurements of existing noise levels at representative noise sensitive receivers;
2. Prediction of future traffic noise levels;
3. Comparison of existing and predicted future traffic noise levels with the FHWA/HDOT Noise Abatement Criteria (NAC);
4. Recommendations to reduce noise impacts;
5. Evaluation of possible noise barriers; and
6. The effects of construction noise and proposed mitigation measures

2. PROJECT DESCRIPTION

The State of Hawai‘i Department of Transportation (HDOT) and the Federal Highway Administration (FHWA) are evaluating the Honoapi‘ilani Highway Improvements Project (the “Project”) to replace Honoapi‘ilani Highway from Ukumehame to Launiopoko, on the island of Maui. While construction of the Project would accommodate a two-lane highway (one travel lane in each direction), the Build Alternatives have been considered based on a right-of-way width that is sufficient to accommodate a four-lane highway (two travel lanes in each direction) if the need arises and funding becomes available. All Build Alternatives would have a general right-of-way width of approximately 140 feet with additional area required for new intersections and for stormwater management infrastructure. The project location is shown on Figure 2-1.

The Build Alternatives’ alignments are largely drawn from the County of Maui’s Pali to Puamana Parkway Plan (2005) with refinements that include changes reflecting early scoping and public outreach completed prior to the NOI / EISPN and Scoping Report in 2022 and 2023, respectively. The Build Alternatives are shown on Figure 2-2.

All the Build Alternatives are based on the existing Honoapi‘ilani Highway remaining as a local road under the jurisdiction of Maui County. The road would continue to provide access to public parks and beaches along the coast as well as residences, businesses, and cultural resources in the project area. In the future, with much of the existing roadway located makai of the SLR-XA coastal erosion line, and given the focus on nature-based solutions and avoidance of new shoreline hardening, the existing road may no longer be continuous from Lāhainā Bypass to Pāpalaua Wayside Beach. In addition, the existing roadway would not be directly connected at the merge points of the new alignment with Lāhainā Bypass to the north or the Pali connection to the south. A No Build Alternative is included in the analysis.

The Project’s primary purpose is to provide a reliable transportation facility in West Maui and improve Honoapi‘ilani Highway’s resilience by reducing its vulnerability to coastal hazards. Specifically, the Project is intended to address existing coastal erosion and flooding, as well as future coastal erosion and flooding caused by anticipated sea level rise.

The project route is one of the primary corridors for commuters and tourists traveling between Kahului and Lahaina and has heavy traffic volumes throughout the daytime hours. The posted speed limit is 35 to 55 mph on the existing Honoapi‘ilani Highway alignment. The future posted speed on new Honoapi‘ilani Highway alignment would be 45 mph. The right-of-way is non-uniform in width and varies throughout the project area.

A noise study is required for this project because modifying the horizontal or vertical location of an existing highway and adding future capacity to an existing highway meet the definition of a Type I Project (HDOT, 2016). Type I projects require mitigation of noise levels that approach or exceed the FHWA noise abatement criteria if the mitigation is found to be both feasible and reasonable to provide.

FIGURE 2-1. **Project Location**

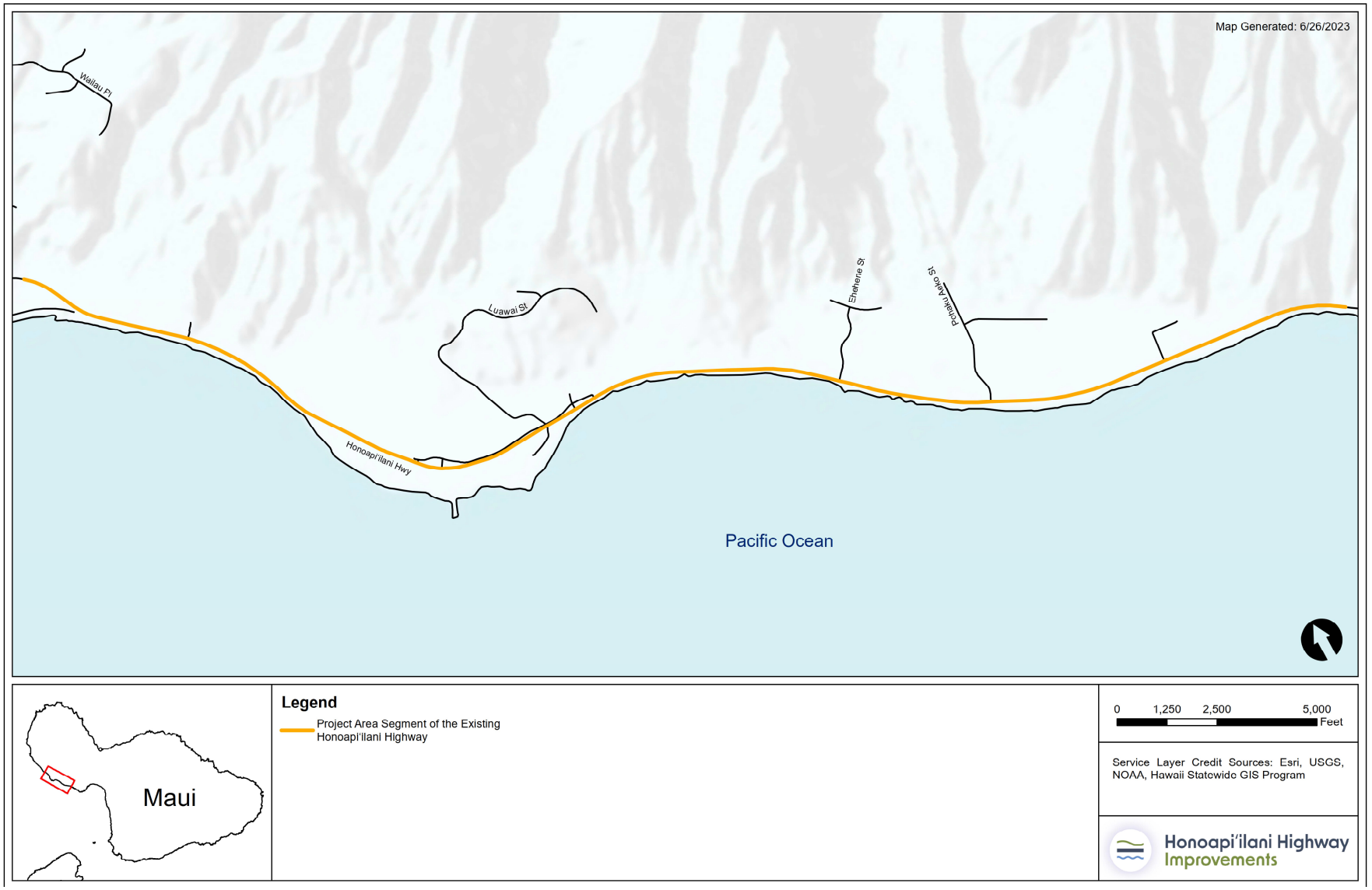
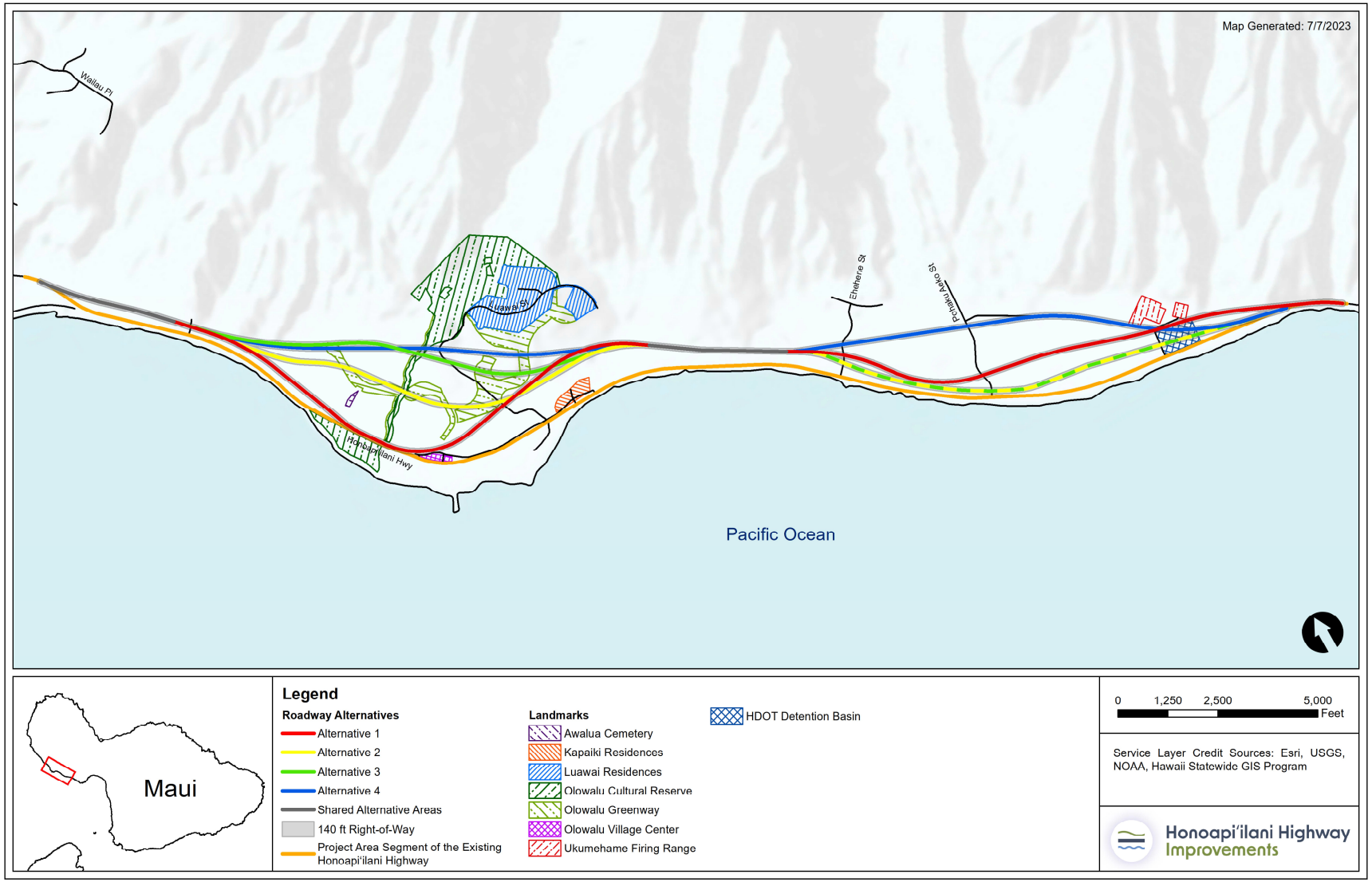


FIGURE 2-2. **Build Alternatives**



3. EXISTING NOISE ENVIRONMENT

3.1 THE STATE OF HAWAI‘I DEPARTMENT OF TRANSPORTATION (HDOT) AND THE FEDERAL HIGHWAY ADMINISTRATION REGULATORY CONTEXT

The Project is a federally funded project and is defined as a Type I noise project under the criteria identified by Title 23 Code of Federal Regulations Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise, as well as the HDOT Highway Noise Policy and Abatement Guidelines.[1] A Type I project is “a proposed Federal or Federal-aid highway project for the construction of a highway on new location or the physical alternation of an existing highway which significantly changes the horizontal or vertical alignment or increases the number of through-traffic lanes.”

The FHWA and HDOT have established the following noise analysis procedures for federally funded projects to provide guidance and criteria for noise studies and noise abatement measures:

- Measurement of existing noise levels at representative noise-sensitive receivers
- Prediction of future traffic noise levels
- Comparison of existing and predicted future traffic noise levels with the FHWA/HDOT NAC
- Recommendations to reduce noise impacts
- Evaluation of possible noise barriers
- The effects of construction noise and proposed mitigation measures

Vibration is a periodic motion or oscillation around an equilibrium position that is most notable during construction of a highway project. Vibration can result in the noticeable movement of building floors, rattling of windows, shaking of items on shelves or hanging on walls, and even rumbling sounds. Vehicular roadways do not result in vibration levels that are perceptible or result in architectural or structural damage. As such, an assessment of vibrations from the highway and bridge operations for the Project was not warranted. However, sensitive receptor locations near construction-related activities have the potential for exposure to high vibration levels. Chapter 5 of this report includes further discussion of potential construction-related impacts.

3.2 METHODOLOGY

This section outlines the approach that was used to collect and evaluate the beneficial and adverse effects of the Build Alternatives related to noise and vibration. It includes an introduction to acoustics, a description of the study area, relevant laws and regulations, and methods for collecting data, assessing impacts, and evaluating possible mitigation measures.

[1] State of Hawaii Department of Transportation (HDOT). 2016. Highway Noise Policy and Abatement Guidelines. April 2016.

3.2.1 Noise Fundamentals

Noise, or sound, is any change in air pressure the human ear can detect, from barely perceptible to levels that can cause hearing damage. In the human ear, these changes in air pressure are translated to sound. The greater the change in air pressure, the louder the sound. For example, a quiet whisper in the library creates a relatively small change in the room air pressure, whereas air pressure changes are much greater in the front row of a rock concert. This section discusses how noise is evaluated (i.e., its definition, transmission characteristics, and measurement) and provides typical noise levels for reference.

3.2.1.1 Decibel Scale

Sound is measured in terms of both loudness and frequency. The unit used to measure the loudness of sound is called a decibel (dB). The dB scale is a logarithmic conversion of air pressure level variations (measured in a unit called a pascal) to a unit of measure with a more convenient numbering system. The adjusted dB scale, referred to as the A-weighted dB (dBA) scale, provides an accurate "single number" measure of what the human ear can hear. This analysis uses dBA as the unit of measure.

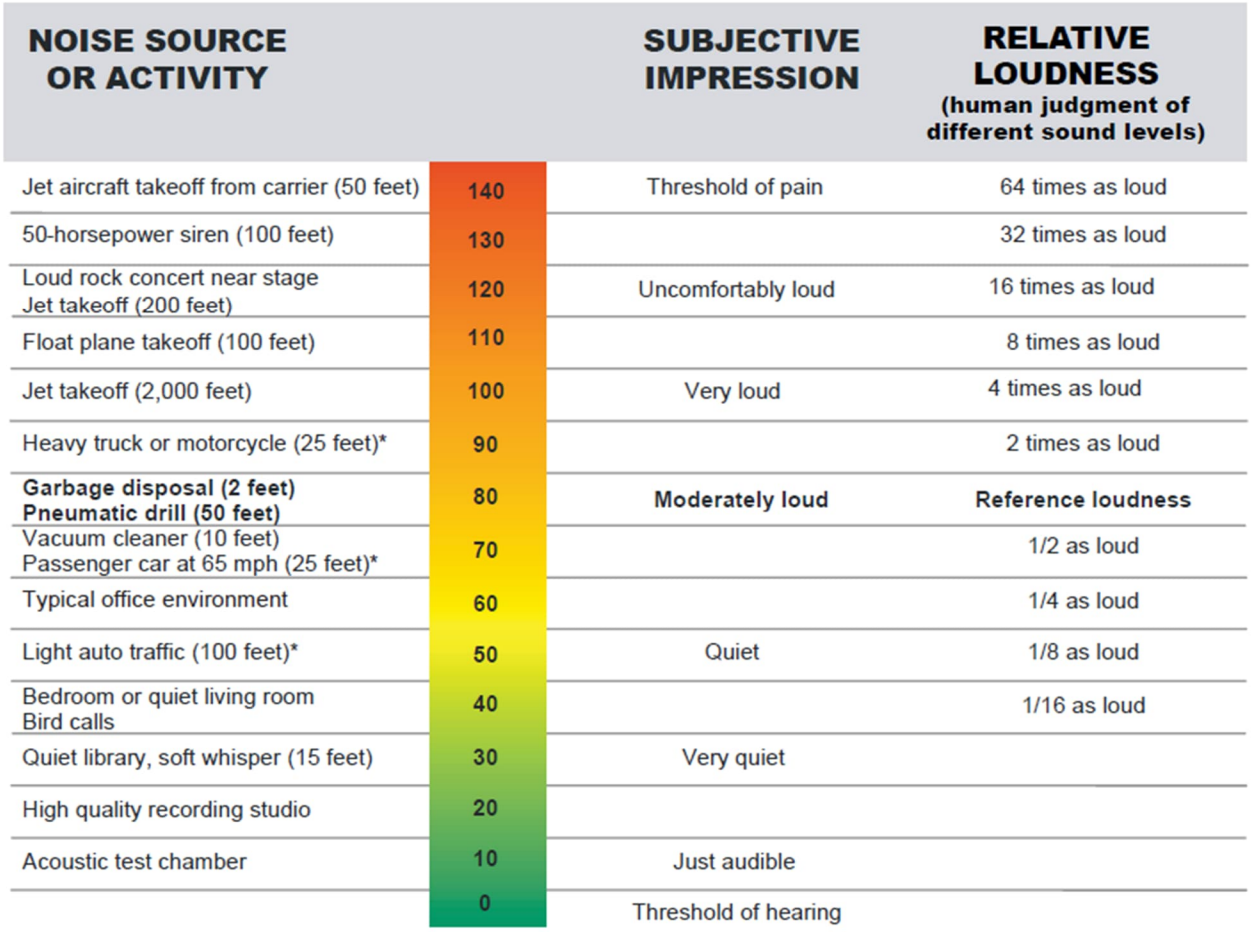
3.2.1.2 Typical Noise Levels

In most neighborhoods, nighttime noise levels are noticeably lower than daytime levels. In a quiet rural area at night, noise levels from crickets or wind rustling leaves on the trees can range between 32 and 35 dBA. As residents start their days and local traffic increases, the same rural area can have noise levels ranging from 50 to 60 dBA. Noise levels in urban neighborhoods are louder than those in rural areas. Noise levels during the day in a noisy urban area are frequently as high as 70 to 80 dBA. Nighttime noise levels in urban areas are generally much quieter than daytime noise levels and can range from 40 to 50 dBA.[2]

Long-term, or continuous, exposure to very loud noises can damage the human ear. Noise levels exceeding 85 dBA over continuous periods can result in permanent hearing loss. Noise levels above 110 dBA become first intolerable, then extremely painful. FIGURE 3-1 shows noise levels for typical transportation sources, followed by a description of a normal human response to each.

[2] Federal Transit Administration. 2018. Transit Noise and Vibration Impact Assessment Manual. FTA Report Number 0123. September 2018

FIGURE 3-1. **Typical Noise Levels**



Source:
Beranek, L.L., 1988. *Noise and Vibration Control*. Institute of Noise Control Engineering. McGraw Hill (1988) and U.S. Environmental Protection Agency (EPA), 1974. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.* Report Number 550/9-74-004.

Public response to noise depends greatly on the range over which the noise varies in an environment. For example, people generally find a moderately high, constant noise level more tolerable than a quiet background level interrupted by high-level noise intrusions. Considering this subjective response, it is often useful to look at a statistical distribution of noise levels over a given time period. Such distributions identify the noise level exceeded and the percentage of time exceeded, allowing a more complete description of the range of noise levels during the given measurement period.

TABLE 3-1 summarizes changes in noise levels that a human can perceive. Generally, the average human is unable to perceive noise level changes until the changes measure in the 2 to 3 dBA range, but these increases are barely perceptible to most listeners, and it is not until the noise level change reaches 5 dBA or more that most humans can readily perceive changes in noise levels.

TABLE 3-1. **Average Human Ability to Perceive Changes in Noise Levels**

NOISE LEVEL CHANGE (dBA)	HUMAN PERCEPTION
0 to 2	Not perceptible to most listeners
2 to 3	Barely perceptible
5	Readily perceptible
10	Clearly perceptible

Source: Bolt Beranek and Newman, Inc. June 1973. Fundamentals and Abatement of Highway Traffic Noise, Report No. PB-222-703. Prepared for FHWA

Noise levels from most sources tend to vary with time. For example, noise levels increase when a car approaches, then reach a maximum peak as it passes, and decrease as the car moves farther away. In this example, noise levels within a 1-minute timeframe may range from 45 dBA as the vehicle approaches to 65 dBA as it passes and return to 45 dBA as it moves farther away. To account for the variance in loudness over time, the equivalent sound level (L_{eq}) is used. The L_{eq} is defined as the energy average noise level, in dBA, for a specific time period (for example, 1 minute). Returning to the example of the passing car, the energy average noise level is assumed to be 60 dBA during the entire time the car is heard as it passes by. In this example, the noise level is stated as 60 dBA L_{eq}. The same approach is used to determine the L_{eq} for other time periods such as hourly (L_{eq} [h]) or over a 24-hour period (L_{eq} [24h]).

3.2.1.3 Noise Propagation

Several factors determine how sound levels decrease, or attenuate, over a distance. Two general categories apply to noise sources: 1) a point source (e.g., a church bell) and 2) a line source (e.g., constant flowing traffic on a busy highway).

A single-point noise source will attenuate at a rate of 6 dB each time the distance from the source doubles. Thus, a point source producing a noise level of 60 dB at 50 feet attenuates to 54 dB at 100 feet and to 48 dB at 200 feet. A line source such as a highway, however, generally reduces at a rate of approximately 3 dB each time the distance doubles. Using the example above, a line source measured at 60 dB at 50 feet would attenuate to 57 dB at 100 feet and to 54 dB at 200 feet.

The physical surroundings between the source and the receiver influence the attenuation of point and line sources. For example, interactions of sound waves with the ground often result in slightly higher attenuation (called ground absorption effects) than the reduction factors given in the preceding paragraph. Other factors affecting the attenuation of sound with distance include existing structures, topography, dense foliage, ground cover, and atmospheric conditions (e.g., wind, temperature, and relative humidity).

3.2.1.4 Noise Criteria

The HDOT Noise Policy and Abatement Guidelines policy implements FHWA regulations on noise abatement. The FHWA has established NAC for different exterior and interior land use activities (TABLE 3-2). The NAC do not constitute legally enforceable noise standards, but represent a yardstick for evaluating the effect of project noise on the surrounding community. The State of Hawai'i has adopted the NAC as its standard.

TABLE 3-2. **Noise Abatement Criteria**

ACTIVITY CATEGORY	ACTIVITY $L_{EQ}(h)$ dBA[1]	CRITERIA $L_{10}(h)$ dBA[2]	EVALUATION LOCATION	DESCRIPTION OF ACTIVITY
A	57	60	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[3]	67	70	Exterior	Residential.
C[3]	67	70	Exterior	Active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, televisions studios, trails, and trail crossings.
D	52	55	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E[3]	72	75	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	----	----	----	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities, (water resources, water treatment, electrical), and warehousing.
G	----	----	----	Undeveloped lands that are not permitted.

Source: U.S. Department of Transportation, Federal Highway Administration. 2010. Highway Traffic Noise: Analysis and Abatement. Revised December 2010.

Notes: $L_{10}(h)$ is the noise level exceeded for 10% of the time of the measurement duration (1 hour).
1 Either Leq(h) or $L_{10}(h)$ (but not both) may be used on a project.
2 The Leq(h) and the $L_{10}(h)$ Activity Criteria values are for impact determination only and are not design standards for noise abatement measures.
3 Includes undeveloped lands permitted for this activity category.

Under HDOT noise policy, a noise impact occurs when the predicted traffic noise levels approach or exceed the NAC, or when the predicted traffic noise levels substantially exceed the existing noise levels. "Approach" means within 1 dBA less than the NAC, and "substantially exceed the existing noise levels" means an increase of at least 15 dBA. If the NAC are approached or exceeded, or if there is a substantial increase above the existing noise level, noise abatement measures must be considered.

3.2.2 Study Area

The noise study area for the Project includes the full project area of approximately 6 miles in length and encompasses the Build Alternatives described in Chapter 2 of this report. As defined in HDOT's noise policy, the Project's noise study area is large enough to include all sensitive receptors identified in the evaluation, which extends beyond an area comprising a 500-foot-wide swath centered along the highway centerline (or the centerline of each Build Alternative). This area is delineated as the noise-sensitive region for traffic noise modeling. However, because the closest sensitive receptor is likely to be farther away than this delineation, particularly in evaluating the Build Alternatives, the actual distance to

the closest appropriate location is described in this Draft Environmental Impact Statement (EIS). Figure 3-2 and Figure 3-3 shown project area zoning and Figure 3-4 and Figure 3-5 show existing land use.

3.2.3 Data Collection Methods

As part of the noise abatement analyses, sound level measurements were recorded and correlated to the 24-hour identification of the worst-noise hour in order to validate the FHWA Traffic Noise Model (TNM), version 2.5. These sound level measurements were not used to establish the existing noise levels in the study area. Once the model was validated with the sound measurement data, the existing sound levels were established by modeling the worst noise hour traffic volumes. Worst-hour or loudest hour traffic from 2023 was used to model existing conditions, and year 2045 traffic was used to model No Build Alternative and Build Alternatives conditions. The following sections describe the methods and equipment used to collect the noise data.

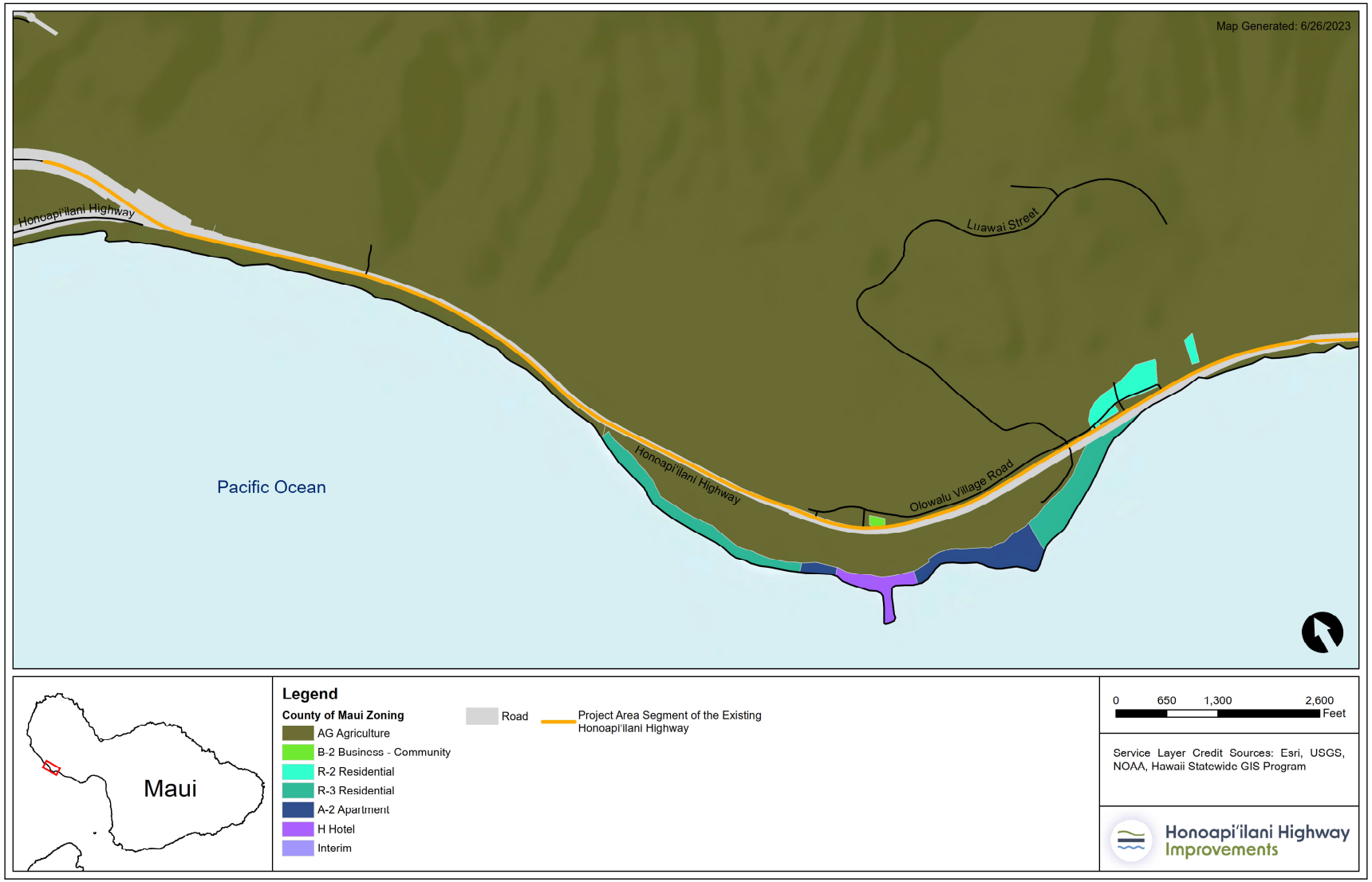
3.2.3.1 Noise Monitoring

HDOT performed noise monitoring from June 20 to June 23, 2023, at 13 outdoor locations within the study area (Figure 3-6). Of the 13 monitoring sites, three were 24-hour measurements and the other 10 were short-term (15 to 30 minutes). HDOT conducted the 24-hour site measurements to document the peak or loudest hour occurring over a 24-hour period at residential and land use activities where sleep occurs. The short-term sites were used primarily for traffic noise and land uses with daytime activities such as residences, parks, and places of worship. Site observations indicated and the noise levels from the three 24-hour sites confirmed that short-term measurement periods provided sufficient traffic noise levels with free-flow traffic conditions for noise model validation and prediction of worst-hour or loudest hour traffic noise levels. Appendix A provides field measurement data and site photographs of the short-term monitoring sites. Appendix B provides hourly noise levels collected at the three 24-hour measurement locations.

HDOT took the noise measurements in accordance with the American National Standard Institute (ANSI) procedures for community noise measurements and the FHWA Noise Measurement Field Guide.[3] The measurement locations were placed at least 5 feet from any solid structure to prevent acoustical reflections and at a height of 5 feet off the ground. The equipment HDOT used for noise monitoring included Larson Davis Type 720 and 820 sound level meters, which were calibrated before and after the measurement period using handheld or software-based equipment calibration. Odin Metrology, Inc. performs a complete system calibration annually with the measurement systems meeting or exceeding the requirements for an ANSI Type I noise measurement system. Appendix C provides laboratory calibration certificates for all field instrumentation used to conduct monitoring.

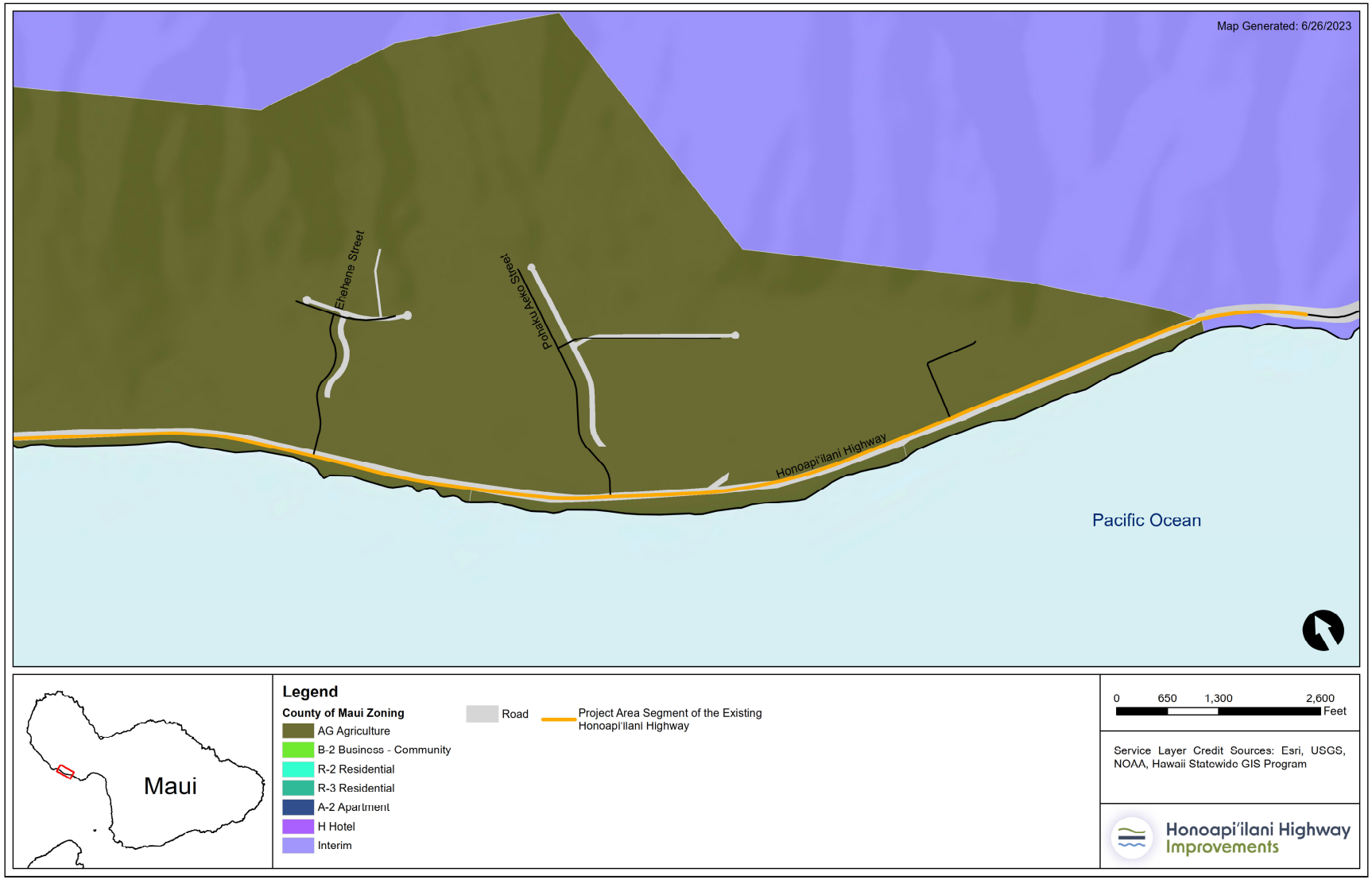
[3] Federal Highway Administration. 2017. Noise Measurement Field Guide – Final Report. FHWA-HEP-18-066.

FIGURE 3-2. **Project Area Zoning, Olowalu**



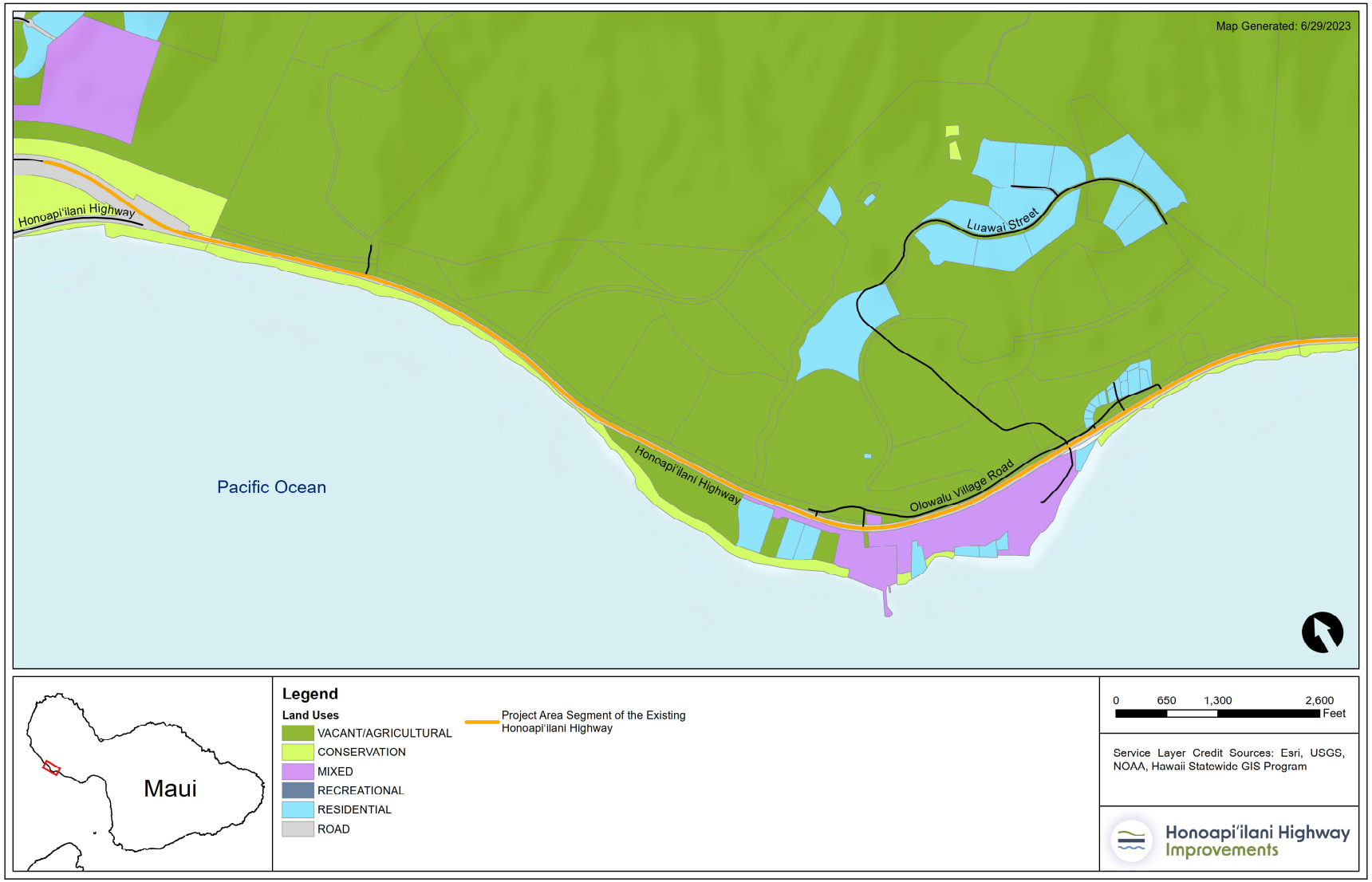
Source: WSP, 2023

FIGURE 3-3. **Project Area Zoning, Ukumehame**



Source: WSP, 2023

FIGURE 3-4. **Project Area Land Use, Olowalu**



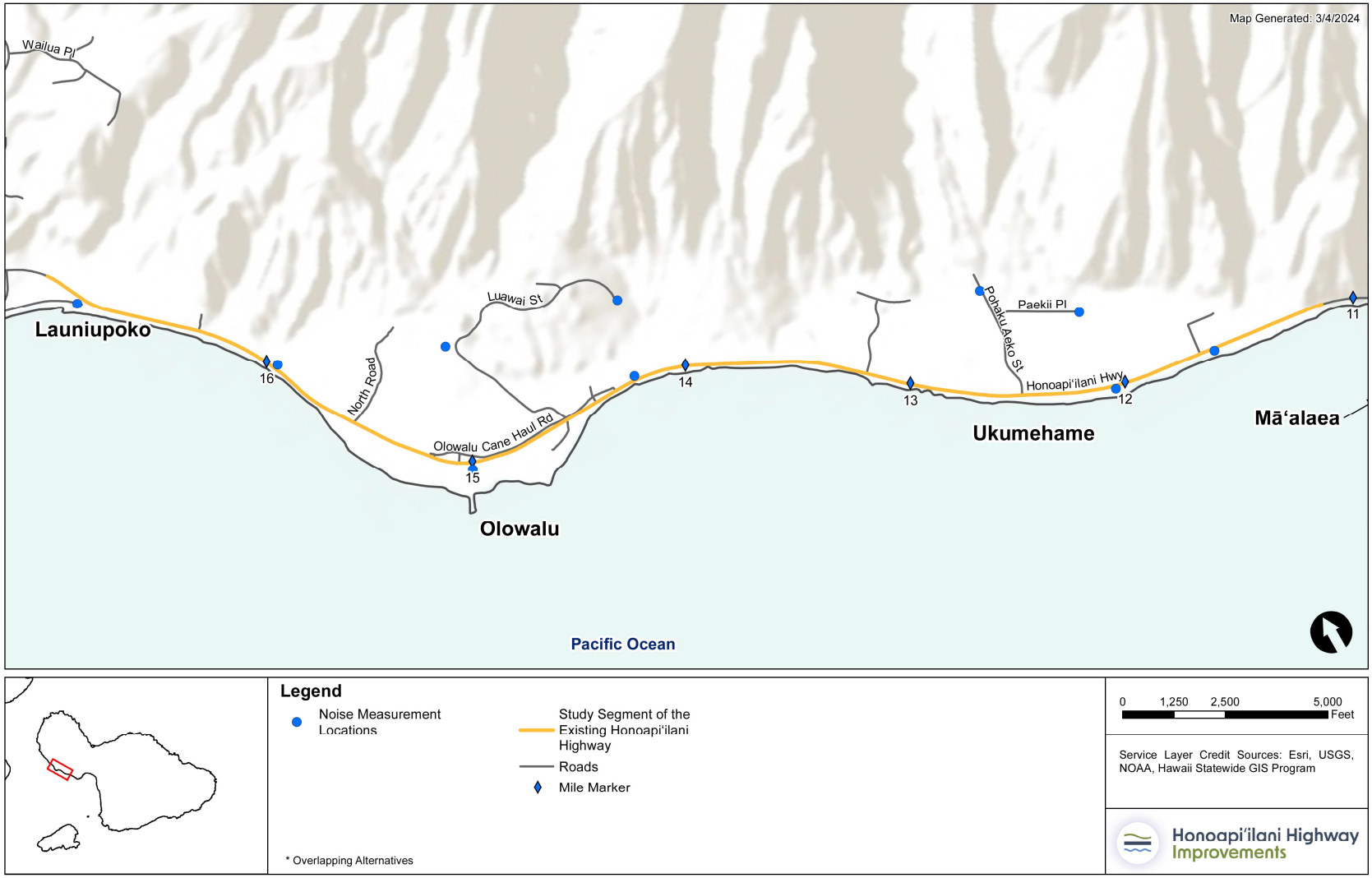
Source: WSP, 2023

FIGURE 3-5. **Project Area Land Use, Ukumehame**



Source: WSP, 2023

FIGURE 3-6. **Noise Monitoring Locations**



Source: WSP, 2023

HDOT performed the noise measurements during satisfactory weather conditions and during times when traffic on Honoapi'ilani Highway was free flowing. The temperatures on these days ranged from 73 to 88 degrees Fahrenheit with mostly sunny skies, no precipitation, and low wind speeds during measurement periods.

HDOT simultaneously counted traffic volumes for the measurement sites. The traffic counts used five vehicle classifications: automobiles, medium trucks, heavy trucks, motorcycles, and buses. HDOT observed the vehicle speeds during the measurements, and the corridor was driven daily to estimate vehicle speeds during measurement periods. Noise measurements were not taken unless traffic conditions were free flowing. HDOT performed traffic counts at 15-minute intervals along Honoapi'ilani Highway from vantage points with direct line-of-sight to traffic. Local traffic was also counted when observed along with notes on observed sound sources not from vehicular traffic.

Noise measurement locations are provided on Figure 3-6 with measured noise level data provided in Table 3-3 and Appendix A.

3.2.3.2 Traffic Noise Model Validation

HDOT used the FHWA (TNM) version 2.5, to model existing traffic noise levels at the measurement sites along the existing lane configuration of Honoapi'ilani Highway and the sites along the Build Alternatives. The model estimates the traffic noise level at a receptor location resulting from a series of straight-line roadway segments. Noise emissions from free-flowing traffic depend on the following:

- Number of automobiles, medium trucks, and heavy trucks per hour
- Vehicular speed
- Reference noise emission levels of specified vehicles

The TNM also considers effects of intervening barriers, topography, trees, and atmospheric absorption. By intent and design, HDOT did not include noise from sources other than traffic; therefore, when non-traffic noise (e.g., aircraft) was considerable in an area, the TNM results were less than the measured noise levels.

HDOT exported base maps as DXF files and imported them into the TNM. In addition, ArcGIS was used to develop the TNM, with major roadways, retaining walls, topographical features, building rows, and sensitive receptors being digitized into the model. The United States Geological Survey 7.5-minute Digital Elevation Model was also used.[4]

HDOT imported the Project's design files into ESRI ArcMap® GIS software to develop geometry for TNM elements such as roadways, receivers, terrain lines, and ground zones. The elevation data was based on existing survey data and roadway design files were developed. HDOT then imported the geometry into the TNM to develop a traffic noise model for existing conditions.

HDOT scaled up traffic volumes counted during the short-term measurement periods to 1-hour volumes and entered the traffic volumes into the TNM along with the measured vehicle speeds to

[4] U.S. Geological Survey (USGS). https://viewer.nationalmap.gov/basic/ (accessed June 2023).

validate the TNM. Measured and modeled noise levels for the measured sites near Honoapi'ilani Highway generally agreed (within 3.0 dBA). TABLE 3-3 compares measured noise levels and levels modeled in the TNM for the measured sites.

TABLE 3-3. **Noise Measurement Data and Traffic Noise Model Validation**

SITE ID	SITE LOCATION	LAND USE	DATE OF MEASUREMENT/ START TIME	MEASURED NOISE LEVEL	MODELED NOISE LEVEL	DIFFERENCE BETWEEN MEASURED – MODELED
ST-1	Luawai Street, east terminus	Adjacent to Residence	6/20/2023/ 11:30	45	N/A	N/A
ST-2	Utility Building near Petroglyphs	Utility Building near Petroglyphs	6/20/2023/ 12:10	47	N/A	N/A
ST-3	Pāpalaua Wayside Park	Park	6/20/2023/ 14:30	71	69	-2
ST-4	Adjacent to Residence on Pāhaku 'Aeko Street	Adjacent to Residence	6/20/2023/ 14:55	44	N/A	N/A
ST-5	Adjacent to Olowalu Lanakila Hawaiian Church	Adjacent to Church	6/20/2023/ 15:35	63	64	1
ST-6	Paeki'i Place, east terminus	Adjacent to Residence	6/21/2023/ 11:50	47	N/A	N/A
ST-7	Ukumehame Beach Park	Park	6/21/2023/ 12:55	66	67	1
ST-8	Southern terminus of former Honoapi'ilani Highway	Adjacent to Beach	6/21/2023/ 15:25	58	60	2
ST-9	Olowalu Landing Parking	Adjacent to Park	6/21/2023/ 15:55	60	60	0
ST-10	Honoapi'ilani Highway frontage, south of Recycling Center	Adjacent to access road	6/21/2023/ 16:35	63	63	0

Source: WSP, 2023.

N/A 30-minute noise measurements were conducted at sites ST-1, ST-2, ST-4, and ST-6 as a sample of existing ambient conditions. Measured noise levels at these sites were not validated within TNM due to the distance from the existing Honoapi'ilani Highway alignment over 1,500 feet from each site where roadway noise was not audible at the time of the noise measurement.

Traffic data used for existing year 2023 and future year 2045 noise predictions were the PM peak hour provided by the traffic analysis performed for the Project. Modeled traffic volumes are included in the Appendix D of this report. Modeled volumes included the following vehicle percentages: 1.0% heavy trucks or vehicles with more than three axles, 2.5% medium trucks or three-axle vehicles, and 96.5% automobiles or two-axle vehicles. The vehicle mix is based on modeled vehicle classifications and traffic information provided by HDOT and the Honoapi'ilani Highway Draft EIS's traffic data collection.

3.2.3.3 Results of Existing Noise Measurements

TABLE 3-3 presents the measured noise levels at each of the 10 short-term measurement locations. Existing measured levels ranged from 44 dBA to 71 dBA depending on the proximity of the measurement to the existing Honoapi‘ilani Highway alignment. The primary noise source at measurement locations located within a few hundred feet of Honoapi‘ilani Highway was traffic noise from Honoapi‘ilani Highway. At receptor sites ST-1, ST-2, ST-4, and ST-6, 30-minute noise measurements were conducted to document a sample of ambient conditions at these locations over 1,500 feet from Honoapi‘ilani Highway, where roadway noise was not audible at the time of the noise measurement.

3.2.4 Existing and Future Noise-Sensitive Land Uses

HDOT identified existing and future noise-sensitive land uses and activities adjacent to Honoapi‘ilani Highway and nearby roadways through site inspections and existing mapping. Existing land uses located along this portion of the highway include residential buildings, parks, trails, places of worship, a cemetery, cultural resource areas, and other uses. The residences along the study area are Category B, and the recreation areas, parks, places of worship, and similar uses are Category C. Category B and Category C activities have an exterior NAC of $L_{eq}(h)$ of 67 dBA. Category E commercial businesses are in the area have an exterior NAC of $L_{eq}(h)$ of 72 dBA.

During site observations, HDOT identified areas of undeveloped land within the study area that could be part of a future development. HDOT reviewed Maui’s Automated Planning and Permitting System online permitting files in April 2023 for any permitted development located within 500 feet of the centerline of the project alternative alignments.[5] At the time of this Draft EIS, no permits are on file at the City and County of Honolulu Department of Planning and Permitting for planned developments along the study area. In January 2025 and subsequent to publication of the Draft EIS, four additional new housing construction in the Ukumehame subdivision was observed in the project area and were added to the receptors modeled for the noise assessment (sites M63, M64, M65, and M66).

3.2.4.1 Existing Conditions

HDOT included 64 modeled sites in the TNM to describe noise levels at noise-sensitive land uses located along the study area. The 66 modeled sites represent 48 residences, 10 parks, five parks or recreation areas, one church, one cemetery, three areas of cultural interest, and outdoor areas at eight commercial businesses. Figure 3-6 shows the approximate locations of the modeled sites.

TABLE 3-4 presents the modeled existing worst-hour traffic noise levels, the number of receptors represented by each measurement site, and the NAC for each of the short-term and modeled measurement locations. Worst-hour traffic noise levels for residential areas range from 35 dBA to 69 dBA depending on the proximity of the receiver to the roadway traffic and the presence of buildings and

[5] https://mapps.co.maui.hi.us/energov_prod/selfservice/MauiCountyHIProd#/search

topography providing noise attenuation between the receiver and the roadway. The worst-hour traffic noise levels do not approach or exceed the NAC at any of the modeled sites.

TABLE 3-4. **Predicted Existing Worst-Hour Traffic Noise Levels**

SITE ID	DESCRIPTION OF RECEIVERS REPRESENTED	NUMBER OF RECEIVERS REPRESENTED	HDOT NOISE ABATEMENT CATEGORY (CRITERION*)	MODELED EXISTING 2023 WORST-HOUR LEQ(H), DBA	IMPACT TYPE* (S, A/E, OR NONE)
UKUMEHAME					
M1	Pāpalaua Wayside Park	1	C/66	60	None
M2	Ukumehame Beach Park	1	C/66	62	None
M3	Ukumehame Firing Range	1	E/71	46	None
M4	Residence at Paeki'i Pl.	1	B/66	41	None
M5	Residence at Pōhaku 'Aeko St.	1	B/66	41	None
M6	SOD Farm at Ehehene St.	2	B/66, E/71	46	None
M7	Residence at Ehehene St.	1	B/66	44	None
M8	Residence beyond Ehehene St.	1	B/66	39	None
M9	Ukumehame Mauka Cultural Sites	1	C/66	38	None
M61	Residence at north end of Ehehene St.	1	B/66	42	None
M62	Residence along Ukumehame Stream	1	B/66	51	None
M63	Residence at Pōhaku 'Aeko St.	1	B/66	49	None
M64	Residence at Pōhaku 'Aeko St.	1	B/66	46	None
M65	Residence at Pōhaku 'Aeko St.	1	B/66	44	None
M66	Residence at Pōhaku 'Aeko St.	1	B/66	43	None
OLOWALU					
M10	Olowalu Lanakila Hawaiian Church	1	C/66	56	None
M11	Residence at Olowalu Village Rd.	1	B/66	54	None
M12	Residence at Olowalu Village Rd.	1	B/66	59	None
M13	Residence at Olowalu Village Rd.	1	B/66	58	None
M14	Residence at Olowalu Village Rd.	1	B/66	57	None
M15	Residence at Olowalu Village Rd.	1	B/66	57	None
M16	Residence at Olowalu Village Rd.	1	B/66	57	None
M17	Residence at Olowalu Village Rd.	1	B/66	60	None
M18	Residence at Olowalu Village Rd.	1	B/66	54	None
M19	Residence at Olowalu Village Rd.	1	B/66	55	None
M20	Residence at Olowalu Village Rd.	1	B/66	53	None
M21	Residence at Olowalu Village Rd.	1	B/66	53	None
M22	Residence at Olowalu Village Rd.	1	B/66	60	None
M23	Olowalu Beach	1	C/66	50	None

SITE ID	DESCRIPTION OF RECEIVERS REPRESENTED	NUMBER OF RECEIVERS REPRESENTED	HDOT NOISE ABATEMENT CATEGORY (CRITERION*)	MODELED EXISTING 2023 WORST-HOUR LEQ(H), DBA	IMPACT TYPE* (S, A/E, OR NONE)
M24	Camp Olowalu	1	C/66	56	None
M25	Residence at Olowalu Village Rd.	1	B/66	48	None
M26	Residence at Olowalu Village Rd.	1	B/66	48	None
M27	Residence at Olowalu Village Rd.	1	B/66	49	None
M28	Olowalu Landing	1	C/66	47	None
M29	Commercial – Plantation House	1	E/71	48	None
M30	Residence at Kuahulu Pl.	1	B/66	51	None
M31	Residence at Kuahulu Pl.	1	B/66	49	None
M32	Residence at Kuahulu Pl.	1	B/66	48	None
M33	Commercial – Leoda's	1	E/71	66	None
M34	Residence/Commercial – General Store	2	B/66, E/71	65	None
M35	Commercial – The Maui Butterfly Farm	1	E/71	65	None
M36	Commercial – Olowalu Juice Stand	1	E/71	69	None
M37	Residence at Luawai St.	1	B/66	41	None
M38	Residence at Luawai St.	1	B/66	43	None
M39	Residence at Luawai St.	1	B/66	43	None
M40	Residence at Luawai St.	1	B/66	43	None
M41	Residence at Luawai St.	1	B/66	42	None
M42	Residence at Luawai St.	1	B/66	43	None
M43	Residence at Luawai St.	1	B/66	43	None
M44	Residence at Luawai St.	1	B/66	42	None
M45	Residence at Luawai St.	1	B/66	41	None
M46	Residence at Kalai Pl.	1	B/66	41	None
M47	Residence at Kalai Pl.	1	B/66	41	None
M48	Residence at Kalai Pl.	1	B/66	43	None
M49	Residence at Luawai St.	1	B/66	42	None
M50	Residence at Luawai St.	1	B/66	42	None
M51	Residence at Kalai Pl.	1	B/66	41	None
M52	Residence at Kalai Pl.	1	B/66	40	None
M53	Olowalu Cultural Reserve	1	C/66	35	None
M54	Residence at Luawai St.	1	B/66	36	None
M55	Olowalu Petroglyphs	7	C/66	36	None
M56	Residence at Luawai St.	1	B/66	41	None
M57	Residence at Luawai St.	1	B/66	41	None
M58	Awalua Cemetery	1	C/66	46	None

SITE ID	DESCRIPTION OF RECEIVERS REPRESENTED	NUMBER OF RECEIVERS REPRESENTED	HDOT NOISE ABATEMENT CATEGORY (CRITERION*)	MODELED EXISTING 2023 WORST-HOUR LEQ(H), DBA	IMPACT TYPE* (S, A/E, OR NONE)
M59	Commercial - Paintball	1	E/71	49	None
M60	Residence at Olowalu Village Road	1	B/66	45	None

Source: WSP, 2023, 2025.
Note: See Table 16-2 for descriptions of Noise Abatement Categories.
Bold = level approaches or exceeds the NAC.
The calculation of dwelling units represented by site M55 were calculated using HDOT's method of comparing the impact area (estimated at 30,000 square feet) to the typical urban lot size of 4,200 square feet when required to determine noise barrier feasibility and reasonableness.
A "Receiver" is an area of frequent human outdoor activity, homes, apartments, parks, etc.
*Impact Type: S = Substantial Increase (15 dBA or more), A/E = Approach or Exceed NAC.

4. FUTURE TRAFFIC NOISE LEVELS

The noise analysis considers traffic noise levels at receivers for the future No Build Alternative and four Build Alternatives.

4.1 PREDICTION METHODOLOGY

The FHWA TNM was used to model the noise levels in 2045 at 66 modeled sites that represent 48 residences, 10 parks, five parks or recreation areas, one church, one cemetery, three areas of cultural interest, and outdoor areas at eight commercial businesses with and without the proposed project improvements (Project Alternatives 1, 2, 3, and 4) along the proposed new Honoapi‘ilani Highway alignments. Input variables to noise modeling and analysis include traffic volumes, vehicle speeds, and vehicle fleet mix (automobile, medium truck, and heavy truck percentages). The noise analysis considers the peak traffic hour as the noisiest hour of the day. The number of vehicles expected to travel on Honoapi‘ilani Highway in 2045 is predicted to be greater than existing conditions (2023), but the greatest contribution to traffic noise would remain Honoapi‘ilani Highway. Appendix D provides future modeled traffic data. Build Alternative noise levels are shown by receptor location in **FIGURE 4-1** for Olowalu and **FIGURE 4-2** for Ukumehame and presented in **TABLE 4-1**.

4.1.1 Noise Impact Analysis

In terms of the one-hour Leq(h) noise descriptor, a noise impact could potentially require mitigation if either of the following conditions is predicted to occur:

- Future year traffic noise approaches (within 1 dBA) or exceeds the FHWA NAC; or
- Future year traffic noise substantially exceeds (15 dBA or more) the existing ambient noise level.

4.1.2 No Build Alternative

Predicted 2045 traffic noise levels for the No Build Alternative are expected to be within 2 dBA of existing noise levels. An increase of 1 dBA to 2 dBA in future noise levels is predicted at most sites, which is the result of an increase in future traffic. The NAC of 67 dBA L_{eq}(h) is predicted to be approached or exceeded at one of the 68 modeled sites representing one residence located next to the Olowalu General Store (Table 4-1). Worst-hour future traffic noise levels for the No Build Alternative range from 36 dBA to 70 dBA depending on the proximity of the receiver to Honoapi‘ilani Highway.

4.1.3 Build Alternative 1

Predicted 2045 traffic noise levels for Build Alternative 1 are expected to be within 13 dBA of existing noise levels. An increase of 9 dBA to a decrease of up to 13 dBA in future noise levels is predicted at sites in Ukumehame. An increase of up to 13 dBA to a decrease of up to 10 dBA in future noise levels

is predicted at sites in Olowalu. The change in traffic noise levels throughout the project area is affected by an increase in future traffic noise levels; however, the primary factor is the new Honoapi‘ilani Highway alignment included in Build Alternative 1. The NAC of 67 dBA $L_{eq}(h)$ is not predicted to be approached or exceeded at any of the 60 modeled sites and no sites are predicted to experience a substantial increase impact resulting from an increase in traffic noise levels by 15 dBA over existing noise levels (Table 4-1). Worst-hour future traffic noise levels for the Build Alternative 1 range from 38 dBA to 62 dBA depending on the proximity of the receiver to Honoapi‘ilani Highway. The highest noise levels are predicted to decrease from 69 dBA to 60 dBA in comparison to existing noise levels as a result of shifting Honoapi‘ilani Highway farther away from most noise-sensitive land uses located closer to the existing Honoapi‘ilani Highway alignment.

FIGURE 4-1. **Modeled 2045 Noise Levels with the Project - Olowalu**

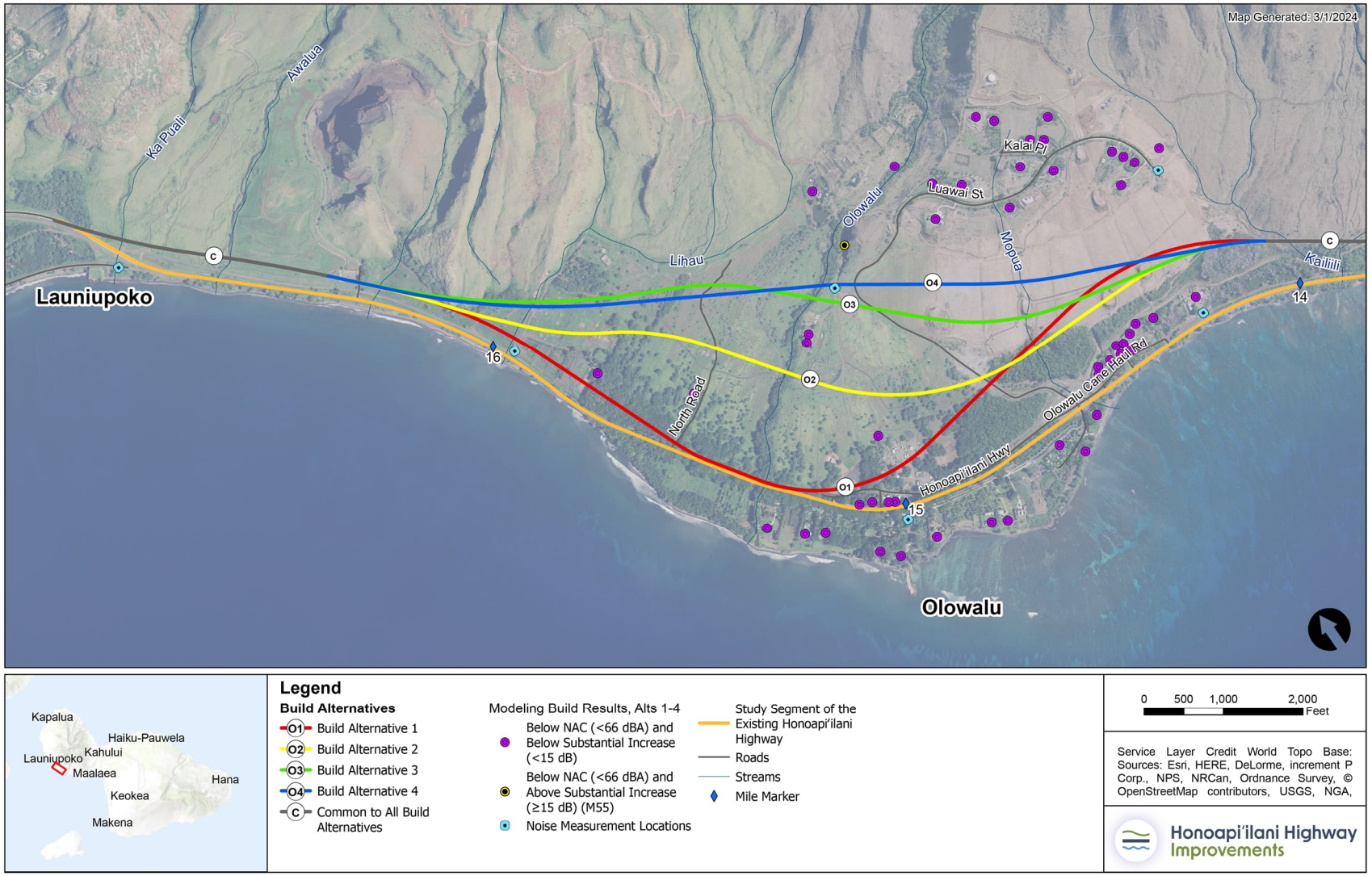


FIGURE 4-2. **Modeled 2045 Noise Levels with the Project - Ukumehame**

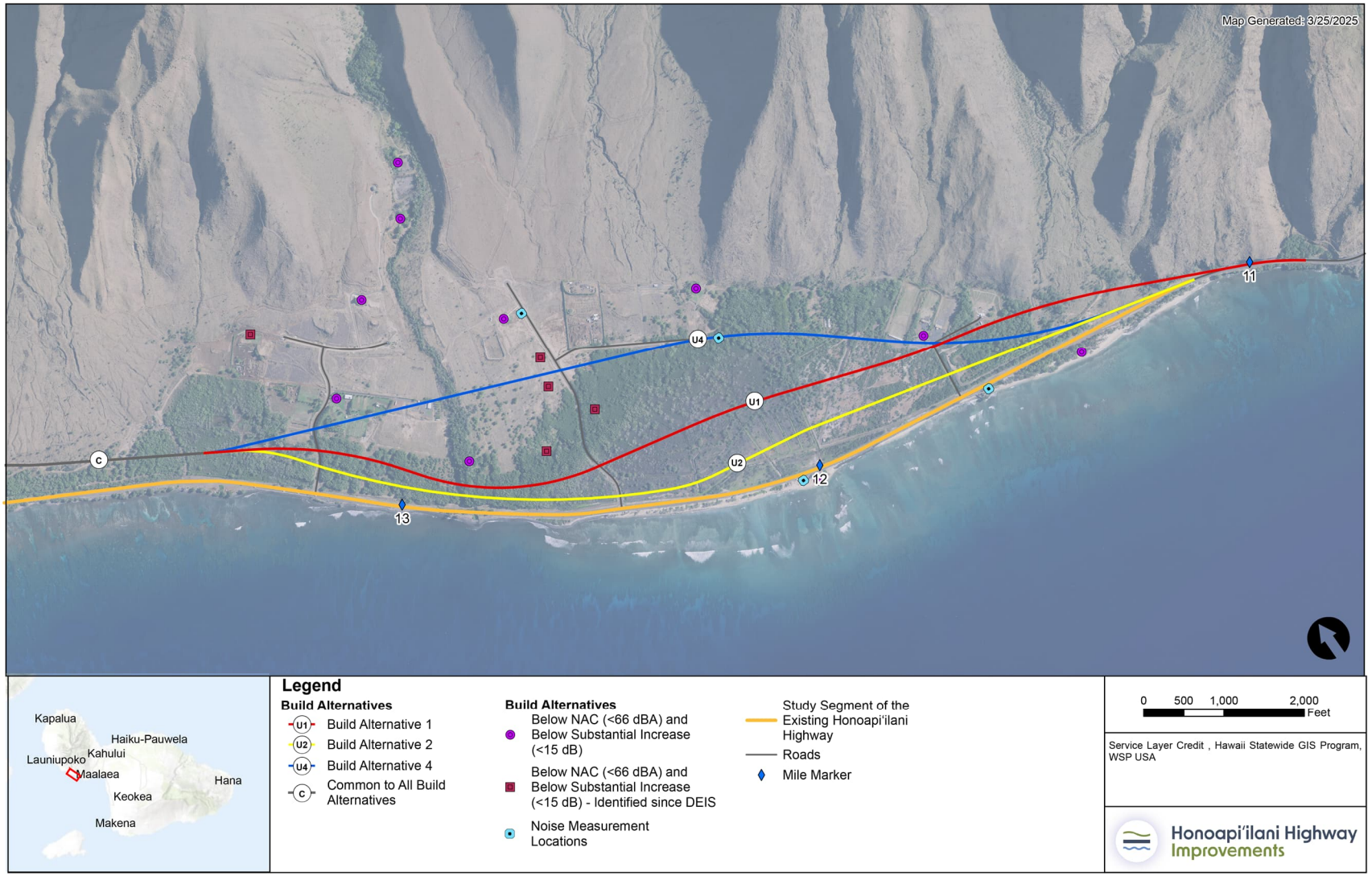


TABLE 4-1. **Predicted Existing Worst-Hour Traffic Noise Levels**

SITE ID	LOCATION/DESCRIPTION	NUMBER OF RECEIVERS REPRESENTED	HDOT NOISE ABATEMENT CATEGORY (CRITERION*)	MODELED EXISTING 2023 WORST-HOUR LEQ(H), DBA	MODELED NO BUILD 2045 WORST-HOUR LEQ(H), DBA	LEQ(H), DBA INCREASE (+) OR DECREASE (-)	MODELED BUILD ALT 1 2045 WORST-HOUR LEQ(H), DBA	LEQ(H), DBA INCREASE (+) OR DECREASE (-)	MODELED BUILD ALT 2 2045 WORST-HOUR LEQ(H), DBA	LEQ(H), DBA INCREASE (+) OR DECREASE (-)	MODELED BUILD ALT 3 2045 WORST-HOUR LEQ(H), DBA	LEQ(H), DBA INCREASE (+) OR DECREASE (-)	MODELED BUILD ALT 4 2045 WORST-HOUR LEQ(H), DBA	LEQ(H), DBA INCREASE (+) OR DECREASE (-)	IMPACT TYPE* (S, A/E, OR NONE) ALTS 1 TO 4
UKUMEHAME															
M1	Pāpalaua Wayside Park	1	C/66	60	61	1	52	-8	56	-4	56	-4	55	-5	None
M2	Ukumehame Beach Park	1	C/66	62	63	1	49	-13	53	-9	53	-9	45	-17	None
M3	Ukumehame Firing Range	1	E/71	46	48	2	55	9	52	6	52	6	55	9	None
M4	Residence at Paeki'i Pl.	1	B/66	41	42	1	45	4	42	1	42	1	51	10	None
M5	Residence at Pōhaku 'Aeko St.	1	B/66	41	42	1	43	2	42	1	42	1	48	7	None
M6	SOD Farm at Ehehene St.	2	B/66, E/71	46	48	2	51	5	49	3	49	3	57	11	None
M7	Residence at Ehehene St.	1	B/66	44	46	2	45	1	45	1	45	1	47	3	None
M8	Residence beyond Ehehene St.	1	B/66	39	40	1	40	1	40	1	40	1	41	2	None
M9	Ukumehame Mauka Cultural Sites	1	C/66	38	39	1	39	1	38	0	38	0	39	1	None
M61	Residence at north end of Ehehene St.	1	B/66	42	44	2	44	2	44	2	44	2	45	3	None
M62	Residence along Ukumehame Stream	1	B/66	51	52	1	57	6	54	3	54	3	49	-2	None
M63	Residence at Pōhaku 'Aeko St.	1	B/66	49	50	1	56	7	52	3	52	3	48	-1	None
M64	Residence at Pōhaku 'Aeko St.	1	B/66	46	48	2	52	6	48	2	48	2	53	7	None
M65	Residence at Pōhaku 'Aeko St.	1	B/66	44	46	2	48	4	45	1	45	1	61	**17**	**S-Alt 4**
M66	Residence at Pōhaku 'Aeko St.	1	B/66	43	44	1	46	3	44	1	44	1	60	**17**	**S-Alt 4**
OLOWALU															
M10	Olowalu Lanakila Hawaiian Church	1	C/66	56	58	2	51	-5	53/52	-3	52	-4	52	-4	None
M11	Residence at Olowalu Village Rd.	1	B/66	54	55	1	51	-3	53/50	-1	51	-3	50	-4	None
M12	Residence at Olowalu Village Rd.	1	B/66	59	61	2	49	-10	50/48	-9	49	-10	48	-11	None
M13	Residence at Olowalu Village Rd.	1	B/66	58	60	2	49	-9	50/48	-8	49	-9	47	-11	None
M14	Residence at Olowalu Village Rd.	1	B/66	57	59	2	49	-8	51/49	-6	49	-8	47	-10	None
M15	Residence at Olowalu Village Rd.	1	B/66	57	58	1	50	-7	51/49	-6	48	-9	47	-10	None
M16	Residence at Olowalu Village Rd.	1	B/66	57	58	1	50	-7	51/49	-6	48	-9	47	-10	None
M17	Residence at Olowalu Village Rd.	1	B/66	60	61	1	50	-10	51/48	-9	48	-12	47	-13	None
M18	Residence at Olowalu Village Rd.	1	B/66	54	55	1	50	-4	52/50	-2	49	-5	48	-6	None
M19	Residence at Olowalu Village Rd.	1	B/66	55	56	1	50	-5	51/49	-4	49	-6	48	-7	None
M20	Residence at Olowalu Village Rd.	1	B/66	53	55	2	50	-3	52/50	-1	50	-3	48	-5	None
M21	Residence at Olowalu Village Rd.	1	B/66	53	54	1	51	-2	53/50	0	51	-2	49	-4	None
M22	Residence at Olowalu Village Rd.	1	B/66	60	62	2	51	-9	50/49	-10	49	-11	48	-12	None
M23	Olowalu Beach	1	C/66	50	51	1	47	-3	46/46	-4	46	-4	45	-5	None

SITE ID	LOCATION/DESCRIPTION	NUMBER OF RECEIVERS REPRESENTED	HDOT NOISE ABATEMENT CATEGORY (CRITERION*)	MODELED EXISTING 2023 WORST-HOUR LEQ(H), DBA	MODELED NO BUILD 2045 WORST-HOUR LEQ(H), DBA	LEQ(H), DBA INCREASE (+) OR DECREASE (-)	MODELED BUILD ALT 1 2045 WORST-HOUR LEQ(H), DBA	LEQ(H), DBA INCREASE (+) OR DECREASE (-)	MODELED BUILD ALT 2 2045 WORST-HOUR LEQ(H), DBA	LEQ(H), DBA INCREASE (+) OR DECREASE (-)	MODELED BUILD ALT 3 2045 WORST-HOUR LEQ(H), DBA	LEQ(H), DBA INCREASE (+) OR DECREASE (-)	MODELED BUILD ALT 4 2045 WORST-HOUR LEQ(H), DBA	LEQ(H), DBA INCREASE (+) OR DECREASE (-)	IMPACT TYPE* (S, A/E, OR NONE) ALTS 1 TO 4
M24	Camp Olowalu	1	C/66	56	58	2	50	-6	49/48	-7	48	-8	48	-8	None
M25	Residence at Olowalu Village Rd.	1	B/66	48	49	1	46	-2	44/44	-4	44	-4	44	-4	None
M26	Residence at Olowalu Village Rd.	1	B/66	48	50	2	47	-1	45/45	-3	44	-4	44	-4	None
M27	Residence at Olowalu Village Rd.	1	B/66	49	51	2	48	-1	45/44	-4	43	-6	44	-5	None
M28	Olowalu Landing	1	C/66	47	49	2	47	0	44/43	-3	42	-5	42	-5	None
M29	Commercial – Plantation House	1	E/71	48	49	1	49	1	44/43	-4	42	-6	43	-5	None
M30	Residence at Kuahulu Pl.	1	B/66	51	52	1	52	1	45/44	-6	43	-8	43	-8	None
M31	Residence at Kuahulu Pl.	1	B/66	49	51	2	52	3	45/44	-4	43	-6	43	-6	None
M32	Residence at Kuahulu Pl.	1	B/66	48	50	2	51	3	45/44	-3	42	-6	42	-6	None
M33	Commercial – Leoda's	1	E/71	66	68	2	58	-8	55/55	-11	55	-11	55	-11	None
M34	Residence/Commercial – Store	2	B/66, E/71	65	67	2	58	-7	54/54	-11	54	-11	54	-11	None
M35	Commercial –Maui Butterfly Farm	1	E/71	65	66	1	58	-7	53/53	-12	53	-12	53	-12	None
M36	Commercial – Olowalu Juice Stand	1	E/71	69	70	1	60	-9	58/58	-11	58	-11	58	-11	None
M37	Residence at Luawai St.	1	B/66	41	42	1	45	4	44/47	3	45	4	45	4	None
M38	Residence at Luawai St.	1	B/66	43	45	2	48	5	47/50	4	47	4	47	4	None
M39	Residence at Luawai St.	1	B/66	43	44	1	47	4	46/50	3	46	3	47	4	None
M40	Residence at Luawai St.	1	B/66	43	44	1	47	4	46/49	3	46	3	46	3	None
M41	Residence at Luawai St.	1	B/66	42	44	2	49	7	47/49	5	48	6	49	7	None
M42	Residence at Luawai St.	1	B/66	43	44	1	46	3	46/49	3	45	2	46	3	None
M43	Residence at Luawai St.	1	B/66	43	44	1	47	4	46/49	3	46	3	48	5	None
M44	Residence at Luawai St.	1	B/66	42	43	1	45	3	46/47	4	45	3	47	5	None
M45	Residence at Luawai St.	1	B/66	41	42	1	44	3	43/44	2	43	2	43	2	None
M46	Residence at Kalai Pl.	1	B/66	41	42	1	43	2	43/47	2	43	2	43	2	None
M47	Residence at Kalai Pl.	1	B/66	41	43	2	44	3	43/45	2	43	2	43	2	None
M48	Residence at Kalai Pl.	1	B/66	43	44	1	46	3	45/48	2	45	2	46	3	None
M49	Residence at Luawai St.	1	B/66	42	43	1	44	2	44/47	2	44	2	44	2	None
M50	Residence at Luawai St.	1	B/66	42	44	2	45	3	45/49	3	45	3	45	3	None
M51	Residence at Kalai Pl.	1	B/66	41	42	1	43	2	43/43	2	42	1	42	1	None
M52	Residence at Kalai Pl.	1	B/66	40	42	2	43	3	43/43	3	42	2	42	2	None
M53	Olowalu Cultural Reserve	1	C/66	35	36	1	38	3	39/41	4	40	5	40	5	None
M54	Residence at Luawai St.	1	B/66	36	37	1	38	2	40/40	4	44	8	44	8	None
M55	Olowalu Petroglyphs	7	C/66	36	37	1	38	2	41/41	5	48	12	51	**15**	**S – Alt 4**
M56	Residence at Luawai St.	1	B/66	41	42	1	44	3	53/52	12	53	12	51	10	None
M57	Residence at Luawai St.	1	B/66	41	43	2	44	3	54/54	13	51	10	50	9	None

SITE ID	LOCATION/DESCRIPTION	NUMBER OF RECEIVERS REPRESENTED	HDOT NOISE ABATEMENT CATEGORY (CRITERION*)	MODELED EXISTING 2023 WORST-HOUR LEQ(H), DBA	MODELED NO BUILD 2045 WORST-HOUR LEQ(H), DBA	LEQ(H), DBA INCREASE (+) OR DECREASE (-)	MODELED BUILD ALT 1 2045 WORST-HOUR LEQ(H), DBA	LEQ(H), DBA INCREASE (+) OR DECREASE (-)	MODELED BUILD ALT 2 2045 WORST-HOUR LEQ(H), DBA	LEQ(H), DBA INCREASE (+) OR DECREASE (-)	MODELED BUILD ALT 3 2045 WORST-HOUR LEQ(H), DBA	LEQ(H), DBA INCREASE (+) OR DECREASE (-)	MODELED BUILD ALT 4 2045 WORST-HOUR LEQ(H), DBA	LEQ(H), DBA INCREASE (+) OR DECREASE (-)	IMPACT TYPE* (S, A/E, OR NONE) ALTS 1 TO 4
M58	Awalua Cemetery	1	C/66	46	47	1	51	5	51/50	5	45	-1	46	0	None
M59	Commercial - Paintball	1	E/71	49	51	2	62	13	53/52	4	49	0	50	1	None
M60	Residence at Olowalu Village Road	1	B/66	45	47	2	54	9	51/51	6	46	1	46	1	None

Source: WSP, 2023, 2025.
Note: See Table 16-2 for descriptions of Noise Abatement Categories.
Bold = level approaches or exceeds the NAC or reach substantial increase impact of 15 dBA or above compared to existing conditions noise levels.
The calculation of dwelling units represented by site M55 were calculated using HDOT's method of comparing the impact area (estimated at 30,000 square feet) to the typical urban lot size of 4,200 square feet when required to determine noise barrier feasibility and reasonableness.
A "Receiver" is an area of frequent human outdoor activity, homes, apartments, parks, etc.
*Impact Type: S = Substantial Increase (15 dBA or more), A/E = Approach or Exceed NAC.

4.1.4 Build Alternative 2

Predicted 2045 traffic noise levels for Build Alternative 2 are expected to be within 13 dBA of existing noise levels. An increase of 6 dBA to a decrease of up to 9 dBA in future noise levels is predicted at sites in Ukumehame. An increase of up to 13 dBA to a decrease of up to 12 dBA in future noise levels is predicted at sites in Olowalu. The change in traffic noise levels throughout the project route is affected by an increase in future traffic noise levels; however, the primary factor is the new Honoapi'ilani Highway alignment included in Build Alternative 2. The NAC of 67 dBA $L_{eq}(h)$ is not predicted to be approached or exceeded at any of the 60 modeled sites, and no sites are predicted to experience a substantial increase impact resulting from an increase in traffic noise levels by 15 dBA over existing noise levels (Table 4-1). Worst-hour future traffic noise levels for Build Alternative 2 range from 38 dBA to 58 dBA depending on the proximity of the receiver to Honoapi'ilani Highway. The highest noise levels are predicted to decrease from 69 dBA to 58 dBA in comparison to existing noise levels as a result of shifting Honoapi'ilani Highway farther away from most noise-sensitive land uses located closer to the existing Honoapi'ilani Highway alignment.

4.1.5 Build Alternative 3

Predicted 2045 traffic noise levels for Build Alternative 3 are expected to be within 12 dBA of existing noise levels. An increase of 6 dBA to a decrease of up to 8 dBA in future noise levels is predicted at sites in Ukumehame. An increase of up to 13 dBA to a decrease of up to 12 dBA in future noise levels is predicted at sites in Olowalu. The change in traffic noise levels throughout the project route is affected by an increase in future traffic noise levels; however, the primary factor is the new Honoapi'ilani Highway alignment included in Build Alternative 3. The NAC of 67 dBA $L_{eq}(h)$ is not predicted to be approached or exceeded at any of the 60 modeled sites and no sites are predicted to experience a substantial increase impact resulting from an increase in traffic noise levels by 15 dBA over existing noise levels (Table 4-1). Worst-hour future traffic noise levels for Build Alternative 3 range from 38 dBA to 58 dBA depending on the proximity of the receiver to Honoapi'ilani Highway. The highest noise levels are predicted to decrease from 69 dBA to 58 dBA in comparison to existing noise levels as a result of shifting Honoapi'ilani Highway farther away from most noise-sensitive land uses located closer to the existing Honoapi'ilani Highway alignment.

4.1.6 Build Alternative 4

Predicted 2045 traffic noise levels for Build Alternative 4 are expected to be within 17 dBA of existing noise levels. An increase of 17 dBA to a decrease of up to 17 dBA in future noise levels is predicted at sites in Ukumehame. The 17 dBA increases are at receptor sites M65 and M66 on Pōhaku 'Aeko Street. An increase of up to 15 dBA to a decrease of up to 13 dBA in future noise levels is predicted at sites in Olowalu. The change in traffic noise levels throughout the project route is affected by an increase in future traffic noise levels; however, the primary factor is the new Honoapi'ilani Highway alignment included in Build Alternative 4. The NAC of 67 dBA $L_{eq}(h)$ is not predicted to be approached or exceeded at any of the 60 modeled sites. One site, the Olowalu Petroglyphs, represented by modeled site M55, is predicted to experience a substantial increase impact resulting from an increase in traffic noise levels of 15 dBA over existing noise levels (Table 4-1). Worst-hour future traffic noise

levels for Build Alternative 4 range from 38 dBA to 58 dBA depending on the proximity of the receiver to Honoapi'ilani Highway. The highest noise levels are predicted to decrease from 69 dBA to 59 dBA in comparison to existing noise levels as a result of shifting Honoapi'ilani Highway farther away from most noise-sensitive land uses located closer to the existing Honoapi'ilani Highway alignment.

4.2 COMPARATIVE ASSESSMENT

Predicted 2045 traffic noise levels for the four Build Alternatives are largely the same, with the highest noise levels of 62 dBA predicted at one commercial site, Maui Paintball located in Olowalu. In Olowalu, Build Alternative 4 has the highest increase in noise levels over existing noise levels (15 dBA at the Olowalu Petroglyphs) and one impact (substantial increase at the Olowalu Petroglyphs). In Ukumehame, Build Alternative 4 has the highest increase in noise levels (17dBA at modeled sites M65 and M66 which represent two residences located along Pōhaku 'Aeko Street) which are considered impacts with substantial increase over 15dBA. All four Build Alternatives would not result in any NAC impacts and all alternatives would lower the highest traffic noise levels by 8 dBA to 12 dBA as compared to existing conditions.

4.3 PREFERRED ALTERNATIVE

Chapter 5 of Draft EIS identified the Preferred Alternative based on environmental assessment of the four Build Alternatives and the No Build Alternative and in consideration of public and agency input during the scoping process and other consultation opportunities, the Hawai'i Department of Transportation (HDOT) and Federal Highway Administration (FHWA) have identified the Preferred Alternative as a combination of Build Alternative 2 in Olowalu and Build Alternative 1 in Ukumehame.

In the Final EIS, the identified Preferred Alternative was further refined based on design considerations such as avoidance of cultural resources and natural resources and optimizing the roadway alignment based on input from public comments and agency consultation. The refined alignment was evaluated for any potential changes to the noise assessment. Error! Reference source not found.Error! Reference source not found. presents a comparison of the noise level results for the Preferred Alternative in the Draft EIS and Final EIS and includes the new residences identified between the Draft and Final EIS. The alignment shifts have a modest change in modeled noise levels, and in no instance does the change result in noise levels that are considered an adverse increase of 15 dBA or more or in noise levels above the established threshold of 66 dBA (Chapter 3.16 provides a detailed explanation of noise criteria and impact methodologies).

In Ukumehame, all but one of the originally modeled sites have a slight reduction in noise levels based on the refinements to the Preferred Alternative. The one location where the increment is higher is at Pāpalaua Wayside Park, where the Preferred Alternative is still anticipated to have a net reduction in worst-case noise levels. In Olowalu, the majority of the sites experience a slight decrease in noise levels. Where the alignment is slightly mauka of the Draft EIS Preferred Alternative, there are several small incremental increases associated with the refined alignment. Overall, the noise increases and noise levels remain well below threshold levels that indicate an adverse effect.

TABLE 4-2. **Predicted Existing and Future Build Worst-Hour Traffic Noise Levels for the Preferred Alternative**

SITE ID	LOCATION/DESCRIPTION	MODELED EXISTING 2023 WORST-HOUR LEQ, DBA	MODELED DRAFT EIS PREFERRED ALT 2045 WORST-HOUR LEQ, DBA	LEQ, DBA INCREASE (+) OR DECREASE (-)	MODELED FINAL EIS REFINED PREFERRED ALT 2045 WORST-HOUR LEQ, DBA	LEQ, DBA INCREASE (+) OR DECREASE (-)	CHANGE DRAFT EIS TO FINAL EIS	IMPACT TYPE* (S, A/E, OR NONE)
Ukumehame								
M1	Pāpalaua Wayside Park	60	52	-8	57	-3	4	None
M2	Ukumehame Beach Park	62	49	-13	47	-15	-2	None
M3	Ukumehame Firing Range	46	55	9	56	10	1	None
M4	Residence at Paeki'i Pl.	41	45	4	43	2	-2	None
M5	Residence at Pōhaku 'Aeko St.	41	43	2	42	1	-1	None
M6	SOD Farm at Ehehene St.	46	51	5	50	4	-1	None
M7	Residence at Ehehene St.	44	45	1	45	1	0	None
M8	Residence beyond Ehehene St.	39	40	1	40	1	0	None
M9	Ukumehame Cultural Sites	38	39	1	38	0	-1	None
M61	Residence - north end Ehehene St.	42	44	2	44	2	0	None
M62	Residence - Ukumehame Stream	51	57	6	55	4	-2	None
M63	Residence at Pōhaku 'Aeko St.	49	56	7	54	5	-2	None
M64	Residence at Pōhaku 'Aeko St.	46	52	6	50	4	-2	None
M65	Residence at Pōhaku 'Aeko St.	44	48	4	47	3	-1	None
M66	Residence at Pōhaku 'Aeko St.	43	46	3	45	2	-1	None
Olowalu								
M10	Olowalu Lanakila Hawaiian Church	56	53	-3	52	-4	-1	None
M11	Residence at Olowalu Village Rd.	54	53	-1	50	-4	-3	None
M12	Residence at Olowalu Village Rd.	59	50	-9	48	-11	-2	None
M13	Residence at Olowalu Village Rd.	58	50	-8	48	-10	-2	None
M14	Residence at Olowalu Village Rd.	57	51	-6	49	-8	-2	None

SITE ID	LOCATION/DESCRIPTION	MODELED EXISTING 2023 WORST-HOUR LEQ, DBA	MODELED DRAFT EIS PREFERRED ALT 2045 WORST-HOUR LEQ, DBA	LEQ, DBA INCREASE (+) OR DECREASE (-)	MODELED FINAL EIS REFINED PREFERRED ALT 2045 WORST-HOUR LEQ, DBA	LEQ, DBA INCREASE (+) OR DECREASE (-)	CHANGE DRAFT EIS TO FINAL EIS	IMPACT TYPE* (S, A/E, OR NONE)
M15	Residence at Olowalu Village Rd.	57	51	-6	49	-8	-2	None
M16	Residence at Olowalu Village Rd.	57	51	-6	49	-8	-2	None
M17	Residence at Olowalu Village Rd.	60	51	-9	48	-12	-3	None
M18	Residence at Olowalu Village Rd.	54	52	-2	50	-4	-2	None
M19	Residence at Olowalu Village Rd.	55	51	-4	49	-6	-2	None
M20	Residence at Olowalu Village Rd.	53	52	-1	50	-3	-2	None
M21	Residence at Olowalu Village Rd.	53	53	0	50	-3	-3	None
M22	Residence at Olowalu Village Rd.	60	50	-10	49	-11	-1	None
M23	Olowalu Beach	50	46	-4	46	-4	0	None
M24	Camp Olowalu	56	49	-7	48	-8	-1	None
M25	Residence at Olowalu Village Rd.	48	44	-4	44	-4	0	None
M26	Residence at Olowalu Village Rd.	48	45	-3	45	-3	0	None
M27	Residence at Olowalu Village Rd.	49	45	-4	44	-5	-1	None
M28	Olowalu Landing	47	44	-3	43	-4	-1	None
M29	Commercial – Plantation House	48	44	-4	43	-5	-1	None
M30	Residence at Kuahulu Pl.	51	45	-6	44	-7	-1	None
M31	Residence at Kuahulu Pl.	49	45	-4	44	-5	-1	None
M32	Residence at Kuahulu Pl.	48	45	-3	44	-4	-1	None
M33	Commercial – Leoda's	66	55	-11	55	-11	0	None
M34	Residence/Commercial – Store	65	54	-11	54	-11	0	None
M35	Commercial –Maui Butterfly Farm	65	53	-12	53	-12	0	None
M36	Commercial – Olowalu Juice Stand	69	58	-11	58	-11	0	None

SITE ID	LOCATION/DESCRIPTION	MODELED EXISTING 2023 WORST-HOUR LEQ, DBA	MODELED DRAFT EIS PREFERRED ALT 2045 WORST-HOUR LEQ, DBA	LEQ, DBA INCREASE (+) OR DECREASE (-)	MODELED FINAL EIS REFINED PREFERRED ALT 2045 WORST-HOUR LEQ, DBA	LEQ, DBA INCREASE (+) OR DECREASE (-)	CHANGE DRAFT EIS TO FINAL EIS	IMPACT TYPE* (S, A/E, OR NONE)
M37	Residence at Luawai St.	41	44	3	47	6	3	None
M38	Residence at Luawai St.	43	47	4	50	7	3	None
M39	Residence at Luawai St.	43	46	3	50	7	4	None
M40	Residence at Luawai St.	43	46	3	49	6	3	None
M41	Residence at Luawai St.	42	47	5	49	7	2	None
M42	Residence at Luawai St.	43	46	3	49	6	3	None
M43	Residence at Luawai St.	43	46	3	49	6	3	None
M44	Residence at Luawai St.	42	46	4	47	5	1	None
M45	Residence at Luawai St.	41	43	2	44	3	1	None
M46	Residence at Kalai Pl.	41	43	2	47	2	0	None
M47	Residence at Kalai Pl.	41	43	2	45	4	2	None
M48	Residence at Kalai Pl.	43	45	2	48	5	3	None
M49	Residence at Luawai St.	42	44	2	47	5	3	None
M50	Residence at Luawai St.	42	45	3	49	7	4	None
M51	Residence at Kalai Pl.	41	43	2	43	2	0	None
M52	Residence at Kalai Pl.	40	43	3	43	3	0	None
M53	Olowalu Cultural Reserve	35	39	4	41	6	2	None
M54	Residence at Luawai St.	36	40	4	40	4	0	None
M55	Olowalu Petroglyphs	36	41	5	41	5	0	None
M56	Residence at Luawai St.	41	53	12	52	11	-1	None
M57	Residence at Luawai St.	41	54	13	54	13	0	None
M58	Awalua Cemetery	46	51	5	50	4	-1	None

SITE ID	LOCATION/DESCRIPTION	MODELED EXISTING 2023 WORST-HOUR LEQ, DBA	MODELED DRAFT EIS PREFERRED ALT 2045 WORST-HOUR LEQ, DBA	LEQ, DBA INCREASE (+) OR DECREASE (-)	MODELED FINAL EIS REFINED PREFERRED ALT 2045 WORST-HOUR LEQ, DBA	LEQ, DBA INCREASE (+) OR DECREASE (-)	CHANGE DRAFT EIS TO FINAL EIS	IMPACT TYPE* (S, A/E, OR NONE)
M59	Commercial – Paintball	49	53	4	52	3	-1	None
M60	Residence at Olowalu Village Rd	45	51	6	51	6	0	None

5. NOISE ABATEMENT MEASURES

Noise abatement measures must be considered as part of the Project if traffic noise impacts are identified and should be provided where it is feasible and reasonable to do so. Impacts occur at sites where traffic noise levels approach or exceed the NAC of L_{eq}(h) 67 dBA, or substantially exceed (by 15 dBA or more) the ambient noise levels. HDOT's Highway Noise Policy and Abatement Guidelines are used to determine whether noise abatement measures can be implemented, depending on whether these measures are reasonable and feasible based on the following criteria:[6]

- Provide at least 5 dBA highway traffic noise reduction for two-thirds of front-row receptors located along the subject Type I project.
- Determination that it is possible to design and construct the barrier after considering issues related to safety, barrier height, topography, drainage, utilities, maintenance, maintenance access to adjacent properties, and access to adjacent properties.
- Consideration of viewpoints of the property owners and residents benefited by the barrier.
- Cost of noise abatement does not exceed $60,000 per benefited receptor.
- Achieve noise reduction design goal of 7 dBA for 75% of the benefited front-row receptors located along the subject project.

The noise abatement evaluated for the project is based on a planning level cost estimate of the feasible abatement measures identified in this Draft EIS. The price per square foot of noise barrier construction is based on the average cost of HDOT's two most recent noise barriers constructed in 2010 ($42.00) along with an escalation of construction cost of 3% per year ($61.68 in 2023).

After determining whether each evaluated noise barrier can satisfy HDOT's feasibility criteria, each feasible noise barrier was then evaluated by comparing the maximum allowable cost to the construction cost estimate. If any barrier meets cost-reasonableness criteria, adjoining property owners would be consulted to determine whether a barrier is desired by the residents. A noise barrier is deemed reasonable only if the estimated cost is less than the maximum allowable cost and a majority of the residents want a barrier.

5.1 NOISE ABATEMENT EVALUATION: 2045 BUILD ALTERNATIVES

Based on the predicted 2045 traffic noise levels, one of the 60 modeled sites (modeled site M55) is predicted to reach the 15 dBA substantial increase threshold when compared to existing noise levels. Future worst-hour noise levels at the Olowalu Petroglyphs site (modeled site M55) are predicted to be

[6] State of Hawaii Department of Transportation (HDOT). 2016. Highway Noise Policy and Abatement Guidelines. April 2016.

51 dBA, as compared to 36 dBA under existing conditions. The substantial increase impact at the Olowalu Petroglyphs is only predicted under Build Alternative 4.

All sites predicted to have a noise impact require the evaluation of noise abatement. One noise barrier was evaluated for Build Alternative 4 to reduce traffic noise levels at the Olowalu Petroglyphs site. The location of the evaluated noise barrier for Build Alternative 4 (Noise Barrier 1) is presented in Figure 16-4. A summary of the noise barrier evaluation is provided below.

5.1.1 Noise Barrier 1, Build Alternative 4 in Olowalu

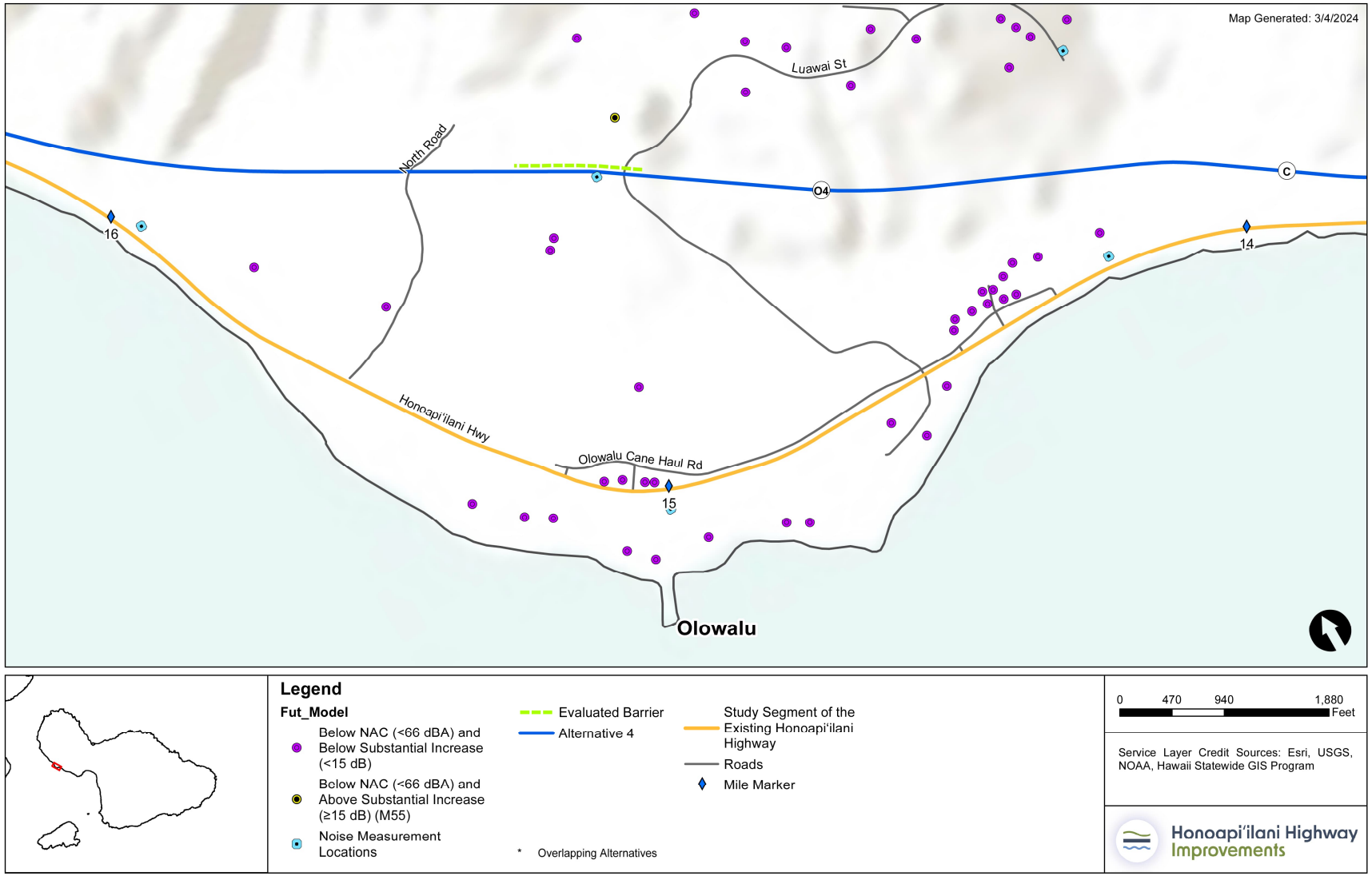
Noise Barrier 1 was evaluated along the northbound Honoapi'ilani Highway right-of-way at the top of slope north of Luawai Street (FIGURE 5-1) to mitigate for noise impacts at site M55. The analysis considered a barrier length of approximately 1,076 linear feet at heights from 8 feet to 20 feet. At 20 feet high, Noise Barrier 1 would provide at least 5 dBA reduction to the one front-row receptor and is constructible based on a planning level review and is therefore feasible. At 20 feet high and 1,076 feet in length, Noise Barrier 1 meets the 7-dBA noise reduction design goal by providing at least a 7-dBA reduction to at least 75% of the benefited first row receptors located behind the barrier. At an allowance of $60,000 per benefited residence or residential equivalent, the maximum allowance for Noise Barrier 1 is $420,000. The calculation of dwelling units represented by site M55 were calculated using HDOT's method of comparing the impact area (estimated at 30,000 square feet) to the typical urban lot size of 4,200 square feet when required to determine noise barrier feasibility and reasonableness.

A planning level cost of $61.68 per square feet was used for Noise Barrier 1. The planning level cost estimate for Noise Barrier 1 is $1,327,353; therefore, the barrier is not reasonable relative to HDOT's cost per benefited receptor allowance. Barrier heights below 20 feet were evaluated, but would not provide the required benefit to meet HDOT's 7-dBA noise reduction design goal. Therefore, Noise Barrier 1 is deemed not reasonable under HDOT's Highway Noise Policy and Abatement Guidelines and will not be included in the Project.

5.1.2 Build Alternative 4 in Ukumehame

While all sites predicted to have a noise impact require the evaluation of noise abatement and mitigation, it is noted that under Alternative 4, the houses adversely affected by noise are parcels that would be a total acquisition and the residences would be removed and no additional mitigation assessment is considered.

FIGURE 5-1. **Evaluated Noise Barrier Location, Build Alternative 4**



Source: WSP, 2023

5.1.3 Preliminary Noise Mitigation Findings / Statement of Likelihood

A substantial increase impact of 15 dBA or more above existing conditions is predicted with Alternative 4 at the Olowalu Petroglyphs site (modeled site M55) with Build Alternative 4 in Olowalu as well as at with Alternative 4 in Ukumehame at the residence sites M65 and M66 in Ukumehame. No other substantial increase impacts or impacts are predicted to approach or exceed the FHWA noise abatement criteria with any other Build Alternative.

One noise barrier was evaluated to reduce traffic noise levels at the one site where noise impacts were predicted with the Project (Build Alternative 4 in Olowalu). The evaluated noise barrier was able to achieve the necessary noise reduction to satisfy HDOT Feasibility Criteria; however, the maximum allowance for the evaluated noise barrier that met feasibility was below the planning level cost estimate and will not be considered for placement as part of the Project if Alternative 4 were selected as the Preferred Alternative. Since sites M65 and M66 under Alternative 4 in Ukumehame would be acquired for Right of Way purposes they have not been evaluated for potential abatement. It is noted that Alternative 4 in Olowalu and Ukumeham are not part of the selected Preferred Alternative.

6. CONSTRUCTION NOISE IMPACTS

Construction for the new Honoapi'ilani Highway involves the use of heavy machinery that may result in increased noise levels to adjacent noise sensitive land uses. HDOH maintains community noise control standards (HAR §11-46) that also apply to construction noise. These specifications would be adhered to, and a noise permit would be obtained for construction activities performed during standard work hours (Monday through Friday 7:00 a.m. to 6:00 p.m. and Saturday 9:00 a.m. to 6:00 p.m.). Based on these operational standards and the required HDOH noise permit, a qualitative overview of construction noise effects is presented below.

The duration and level of construction noise is dependent on the type of activity being performed. Construction activities such as drilling, excavation, and grading would typically be associated with increased noise levels whereas paving and restriping are generally less noise intensive activities.

Areas where drilling, excavating, and grading are planned would be anticipated to generate the highest noise levels during construction. Noise generated by construction equipment, including trucks, graders, excavators, drilling equipment, concrete mixers, and generators can reach levels from 76 A-weighted decibels (dBA) to 85 dBA at a distance of 50 feet. Construction equipment noise emissions are regulated by the Environmental Protection Agency's Noise Control Program (Title 40 Code of Federal Regulations Part 204). Presently, air compressors are the only equipment under regulation, and no new regulations are under consideration.

Noise levels for equipment that could be used during the excavation and construction of the Project are presented in Table 6-1. The noise levels presented are at a reference distance of 50 feet. Construction equipment noise levels decrease at a rate of approximately 6 dBA per doubling of distance; therefore, at a distance of 100 feet the noise levels would be about 6 dBA less than the levels shown in the table. Similarly, at a distance of 200 feet the noise levels would be approximately 12 dBA less than shown in the table. Intervening structures or topography can act as a noise barrier to further reduce noise levels.

TABLE 6-1. **Construction Equipment Noise Levels**

Equipment	DECIBELS AT 50 FEET	EQUIPMENT	DECIBELS AT 50 FEET
Air Compressor	78	Generator	81
Auger Drill Rig	84	Gradall	83
Backhoe	78	Grader	85
Blasting	94	Jack Hammer	89
Compactor	83	Hoe Ram	90

Equipment	DECIBELS AT 50 FEET	EQUIPMENT	DECIBELS AT 50 FEET
Concrete Mixer Truck	79	Paver	77
Concrete Pump Truck	81	Pneumatic Tool	85
Crane	81	Pump	81
Dozer	82	Rock Drill	81
Drill Rig Truck	84	Roller	80
Dump Truck	76	Scraper	84
Excavator	81	Ventilation Fan	79
Flat Bed Truck	74		

Source: FHWA Roadway Construction Noise Model, 2006.

The State of Hawai'i Department of Health (DOH) maintains community noise control standards that apply to construction noise. The project is not allowed to exceed the stipulated noise limits unless a variance is granted by the DOH.

Noise control measures during construction would be implemented to minimize construction noise and the effect on existing noise-sensitive land uses. The general noise abatement measures presented below are identified as guidance to be used in the development of construction plans.

1. Design Considerations - During the early stages of construction plan development, strategic placement of stationary equipment, such as compressors and generators, can be considered for use as shielding against construction noise.
2. Source Control - The contractor would comply with HDOT Standard Specifications and all local sound control and noise level rules, regulations, and ordinances which apply to work performed pursuant to the contract. Each internal combustion engine used for any purpose on the job, or related to the job, would be equipped with a muffler of a type recommended by the manufacturer. No internal combustion engine would be operated without a muffler.
3. Community Relations - Community meetings can be held to explain the construction work, time involved, and the control measures to be taken to reduce noise associated with construction.

The aforementioned measures would be incorporated into site-specific construction plans, and additional noise emission limits could be developed as well.

REFERENCES

County of Maui's Automated Planning & Permitting System (MAPPS); Online research of building permits within the Project study area at: https://mapps.co.maui.hi.us/energov_prod/selfservice/MauiCountyHIProd#/search on March 19, 2023.

State of Hawai'i, Department of Transportation (HDOT), Highways Divisions; *Highway Noise Policy and Abatement Guidelines*, April, 2016.

State of Hawai'i, Department of Transportation (HDOT), Highways Divisions; Traffic Data for use in the Traffic Noise Study, Email correspondence with Jillian Chen, HDOT Highways Division, November and December, 2019.

U.S. Department of Transportation, Federal Highway Administration (FHWA), 1973. *Fundamentals and Abatement of Highway Traffic Noise*. Washington D.C.

U.S. Department of Transportation, Federal Highway Administration (FHWA), 1982. *"Procedures for Abatement of Highway Traffic Noise and Construction Noise."* Washington, D.C.

U.S. Department of Transportation, Federal Highway Administration (FHWA), 1996. *Measurement of Highway-Related Noise*. Washington D.C.

U.S. Department of Transportation, Federal Highway Administration (FHWA), 1998, 2004. *FHWA Traffic Noise Model User's Guide*. Washington D.C.

U.S. Department of Transportation. Federal Highway Administration (FHWA). 2006. FHWA Highway Construction Noise Handbook and Roadway Construction Noise Model (version 1.0). Washington, D.C.

U.S. Department of Transportation, Federal Highway Administration (FHWA) directive "Highway Traffic Noise: Analysis and Abatement," Revised December 2010.

U.S. Code of Federal Regulations (CFR) Part 772 (23 CFR Part 772), July 2010.

U.S. Environmental Protection Agency (EPA), 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. Report Number 550/9-74-004.

United States Geological Survey (USGS), October 28, 2004. Last access online in June 2023 at: http://seamless.usgs.gov/website/seamless/index.asp.

WSP USA Inc. (WSP), 2023a. Preliminary Project Design Files for use in the Traffic Noise Modeling and Analysis. WSP Honolulu, HI, May 2020.

WSP USA Inc. (WSP), 2023b. Existing and future traffic data for use in the Traffic Noise Modeling and Analysis. WSP Honolulu, HI, May 2020.

APPENDIX A – FIELD DATA SHEETS AND SITE PHOTOGRAPHS

Appendix A contains data sheets that describe noise measurements conducted in support of the noise analysis for the Honoapi‘ilani Project from June 20, 2023 to June 22, 2023. The field data sheets include measured noise levels, descriptions of measurement activities and locations, site observations, site photographs, traffic data collected during all short-term measurements.

Field data sheets for sites ST-1 to ST-10 relate to short-term measurements conducted to validate the FHWA Traffic Noise Modeled developed for this project.

Field data sheets for sites LT-1 to LT-3 describe long-term measurement conducted in support of the traffic noise analysis and project construction. Appendix B contains hourly data plotted for each long-term measurement.

Noise Measurement Data Sheet

Project Name: Honoapi'ilani Highway	Project Number: 31000290.000
Measurement Site: ST-1	Address: Near 256 Luawai St.
Staff: Romero, Yoshioka	Location: Luakwai Street, east terminus
Weather: Sunny with clouds, no precipitation	Temperature / Wind: 73°F / 0-4 mph mauka
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 06/20/23	Start Time / Duration: 11:30 / 15-minute

Sound Level Results

Leq:	45.0
Lmax:	53.5
Lmin:	39.2
L90:	42.1
L50:	44.0
L10:	47.0
L1:	57.4

Concurrent Traffic Count

	Roadway / Direction	Speed (mph)	Roadway / Direction	Speed (mph)
	HonoHwy NB		HonoHwy SB	
Autos	152	55	226	55
Medium Trucks	3	55	3	55
Heavy Trucks	0	0	0	0
Motos	0	0	0	0
Buses	0	0	0	0

Photographs:



View makai.



View mauka.

Site Layout:



ST-1 approximately 28 feet from Luawai St.

Notes:

Measurement location not for model validation.
Traffic noise from Honoapi'ilani Highway not audible.
Noise assessment location at outdoor use areas of nearby residences.

Noise Measurement Data Sheet

Project Name: Honoapi'ilani Highway	Project Number: 31000290.000
Measurement Site: ST-2	Address: Approximately 224 feet from Luawai St.
Staff: Romero, Yoshioka	Location: Approximately 500 mauka from Olowalu Petroglyphs
Weather: Sunny with clouds, no precipitation	Temperature / Wind: 73°F / 0-6 mph mauka
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 06/20/23	Start Time / Duration: 12:10 / 15-minute

Photographs:



View makai.



View mauka.

Sound Level Results

Leq:	46.8
Lmax:	57.9
Lmin:	39.3
L90:	41.3
L50:	44.3
L10:	49.8
L1:	55.8

Concurrent Traffic Count

	Roadway / Direction	Speed (mph)	Roadway / Direction	Speed (mph)
	HonoHwy NB		HonoHwy SB	
Autos	152	55	226	55
Medium Trucks	3	55	3	55
Heavy Trucks	0	0	0	0
Motos	0	0	0	0
Buses	0	0	0	0

Site Layout:



ST-2 approximately 224 feet from Luawai St.

Notes:

Measurement location not for model validation.
Traffic noise from Honoapi'ilani Highway not audible.
Noise assessment location at outdoor use area at Olowalu Petroglyphs.

Noise Measurement Data Sheet

Project Name: Honoapi'ilani Highway	Project Number: 31000290.000
Measurement Site: ST-3	Address: Approximately 43 feet from Honoapi'ilani Highway
Staff: Romero, Yoshioka	Location: Papalaua Wayside Park
Weather: Sunny with clouds, no precipitation	Temperature / Wind: 73◦F / 0-4 mph mauka
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 06/20/23	Start Time / Duration: 2:30 / 15-minute

Photographs:



View makai.



View mauka.

Sound Level Results

Leq:	71.3
Lmax:	83.9
Lmin:	58.2
L90:	65.3
L50:	70.4
L10:	73.8
L1:	77.9

Concurrent Traffic Count

	Roadway / Direction	Speed (mph)	Roadway / Direction	Speed (mph)
	HonoHwy NB		HonoHwy SB	
Autos	250	45	237	45
Medium Trucks	1	45	10	45
Heavy Trucks	0	0	0	0
Motos	1	45	0	0
Buses	0	0	0	0

Site Layout:



ST-3 approximately 43 feet from traveling lanes on Honoapi'ilani Highway.

Notes:

Measurement location for model validation.
Traffic noise from Honoapi'ilani Highway was primary noise source during measurement.
Noise assessment location at Papalaua Wayside Park.

Noise Measurement Data Sheet

Project Name: Honoapi'ilani Highway	Project Number: 31000290.000
Measurement Site: ST-4	Address: Near 383 Pohaku Aeko St.
Staff: Romero, Yoshioka	Location: Approximately 14 feet from Pohaku Aeko St.
Weather: Sunny with clouds, no precipitation	Temperature / Wind: 74◦F / 0-3 mph mauka
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 06/20/23	Start Time / Duration: 2:55 / 15-minute

Photographs:



View makai.



View mauka.

Sound Level Results

Leq:	44.3
Lmax:	57.2
Lmin:	39.9
L90:	41.1
L50:	42.6
L10:	46.6
L1:	51.8

Concurrent Traffic Count

	Roadway / Direction	Speed (mph)	Roadway / Direction	Speed (mph)
	HonoHwy NB		HonoHwy SB	
Autos	250	45	237	45
Medium Trucks	1	45	10	45
Heavy Trucks	0	0	0	0
Motos	0	0	0	0
Buses	0	0	0	0

Site Layout:



ST-4 approximately 14 feet from traveling lanes on Pohaku Aeko St.

Notes:

Measurement location not for model validation.
Traffic noise from Honoapi'ilani Highway was not audible during measurement.
Noise assessment location at nearby residence.

Noise Measurement Data Sheet

Project Name: Honoapi'ilani Highway	Project Number: 31000290.000
Measurement Site: ST-5	Address: Adjacent to Olowalu Lanakila Hawaiian Church
Staff: Romero, Yoshioka	Location: Approximately 75 feet from Honoapi'ilani Highway
Weather: Sunny with clouds, no precipitation	Temperature / Wind: 75◦F / 0-2 mph mauka
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 06/20/23	Start Time / Duration: 3:35 / 15-minute

Photographs:



View makai.



View mauka.

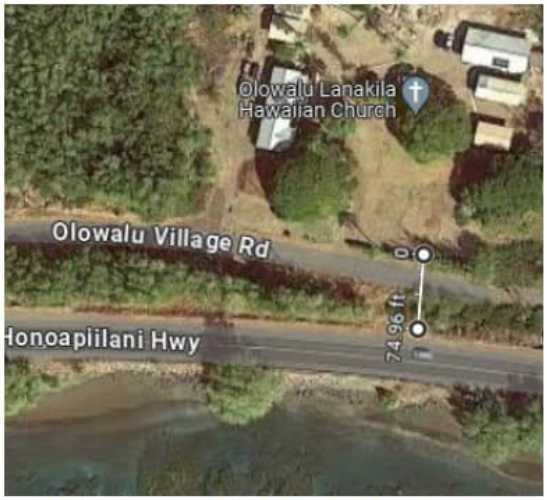
Sound Level Results

Leq:	63.4
Lmax:	73.8
Lmin:	52.1
L90:	59.4
L50:	62.5
L10:	65.8
L1:	69.5

Concurrent Traffic Count

	Roadway / Direction	Speed (mph)	Roadway / Direction	Speed (mph)
	HonoHwy NB		HonoHwy SB	
Autos	251	45	302	45
Medium Trucks	5	45	6	45
Heavy Trucks	1	45	1	45
Motos	1	45	0	0
Buses	0	0	0	0

Site Layout:



ST-5 approximately 75 feet from traveling lanes on Honoapi'ilani Highway.

Notes:

Measurement location for model validation.
Traffic noise from Honoapi'ilani Highway was primary noise source during measurement.
Noise assessment location at outdoor use areas at church and nearby residences.

Noise Measurement Data Sheet

Project Name: Honoapi'ilani Highway	Project Number: 31000290.000
Measurement Site: ST-6	Address: Paeki'i Place cul-de-sac.
Staff: Romero, Yoshioka	Location: Approximately 34 feet Paeki'i Place edge of pavement.
Weather: Sunny with clouds, no precipitation	Temperature / Wind: 70◦F / 0-1 mph mauka
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 06/21/23	Start Time / Duration: 11:50 / 15-minute

Sound Level Results

Leq:	47.1
Lmax:	70.9
Lmin:	39.3
L90:	41.1
L50:	43.4
L10:	46.8
L1:	58.0

Concurrent Traffic Count

	Roadway / Direction	Speed (mph)	Roadway / Direction	Speed (mph)
	HonoHwy NB		HonoHwy SB	
Autos	244	45	244	45
Medium Trucks	1	45	3	45
Heavy Trucks	3	40	3	40
Motos	0	0	0	0
Buses	0	0	0	0

Photographs:



View makai.



View mauka.

Site Layout:



ST-6 approximately 34 feet from Paeki'i Place edge of pavement.

Notes:

Measurement location not for model validation.
Traffic noise from Honoapi'ilani Highway was not audible during measurement.
Noise assessment location at nearby residence.

Noise Measurement Data Sheet

Project Name: Honoapi'ilani Highway	Project Number: 31000290.000
Measurement Site: ST-7	Address: 615 HI-30 Lahaina
Staff: Romero, Yoshioka	Location: Ukumehame Beach Park
Weather: Sunny with clouds, no precipitation	Temperature / Wind: 71°F / 0-6 mph mauka
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 06/21/23	Start Time / Duration: 12:55 / 15-minute

Photographs:



View makai.



View mauka.

Sound Level Results

Leq:	65.6
Lmax:	80.8
Lmin:	55.0
L90:	59.6
L50:	63.4
L10:	68.0
L1:	74.0

Concurrent Traffic Count

	Roadway / Direction	Speed (mph)	Roadway / Direction	Speed (mph)
	HonoHwy NB		HonoHwy SB	
Autos	238	45	208	45
Medium Trucks	5	45	12	45
Heavy Trucks	2	45	0	0
Motos	1	45	1	45
Buses	0	0	0	0

Site Layout:



ST-7 approximately 50 feet from nearest traveling lane on Honoapi'ilani Highway.

Notes:

Measurement location for model validation.
Traffic noise from Honoapi'ilani Highway was the primary noise source during measurement.
Noise assessment location at outdoor use locations at Park.

Noise Measurement Data Sheet

Project Name: Honoapi'ilani Highway	Project Number: 31000290.000
Measurement Site: ST-8	Address: Approximately 100 feet from nearest traveling lane on Honoapi'ilani Highway
Staff: Romero, Yoshioka	Location: Southern terminus of former Honoapi'ilani Highway
Weather: Sunny with clouds, no precipitation	Temperature / Wind: 76°F / 0-6 mph mauka
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 06/21/23	Start Time / Duration: 3:25 / 15-minute

Sound Level Results

Leq:	58.4
Lmax:	76.6
Lmin:	44.8
L90:	53.1
L50:	57.1
L10:	60.9
L1:	65.3

Concurrent Traffic Count

	Roadway / Direction	Speed (mph)	Roadway / Direction	Speed (mph)
	HonoHwy NB		HonoHwy SB	
Autos	267	50	271	50
Medium Trucks	5	50	4	50
Heavy Trucks	0	0	1	45
Motos	1	50	3	50
Buses	0	0	0	0

Photographs:



View makai.



View mauka.

Site Layout:



ST-8 approximately 100 feet from nearest traveling lane on Honoapi'ilani Highway.

Notes:

Measurement location for model validation.
Traffic noise from Honoapi'ilani Highway was the primary noise source during measurement.
Noise assessment location at outdoor use locations at Beach.

Noise Measurement Data Sheet

Project Name: Honoapi'ilani Highway	Project Number: 31000290.000
Measurement Site: ST-9	Address: Approximately 145 feet from nearest traveling lane on Honoapi'ilani Highway
Staff: Romero, Yoshioka	Location: Olowalu Landing Parking
Weather: Sunny with clouds, no precipitation	Temperature / Wind: 76°F / 0-2 mph mauka
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 06/21/23	Start Time / Duration: 3:55 / 15-minute

Sound Level Results

Leq:	60.1
Lmax:	66.3
Lmin:	53.5
L90:	56.8
L50:	59.6
L10:	62.1
L1:	64.6

Concurrent Traffic Count

	Roadway / Direction	Speed (mph)	Roadway / Direction	Speed (mph)
	HonoHwy NB		HonoHwy SB	
Autos	210	45	318	45
Medium Trucks	2	45	10	45
Heavy Trucks	0	0	0	0
Motos	0	0	0	0
Buses	0	0	0	0

Photographs:



View makai.



View mauka.

Site Layout:



ST-9 approximately 145 feet from nearest traveling lane on Honoapi'ilani Highway.

Notes:

Measurement location for model validation.
Traffic noise from Honoapi'ilani Highway was the primary noise source during measurement.
Noise assessment location at beach and outdoor use locations at nearby residences.

Noise Measurement Data Sheet

Project Name: Honoapi'ilani Highway	Project Number: 31000290.000
Measurement Site: ST-10	Address: Approximately 85 feet from nearest traveling lane on Honoapi'ilani Highway
Staff: Romero, Yoshioka	Location: Dirt Road north of 814 HI-30
Weather: Sunny with clouds, no precipitation	Temperature / Wind: 77°F / 0-4 mph mauka
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 06/21/23	Start Time / Duration: 4:35 / 15-minute

Photographs:



View makai.



View mauka.

Sound Level Results

Leq:	63.3
Lmax:	74.3
Lmin:	53.1
L90:	58.9
L50:	62.3
L10:	65.8
L1:	70.1

Concurrent Traffic Count

	Roadway / Direction	Speed (mph)	Roadway / Direction	Speed (mph)
	HonoHwy NB		HonoHwy SB	
Autos	254	45	324	45
Medium Trucks	4	45	7	45
Heavy Trucks	0	0	0	0
Motos	0	0	1	45
Buses	0	0	0	0

Site Layout:



ST-10 approximately 85 feet from nearest traveling lane on Honoapi'ilani Highway.

Notes:

Measurement location for model validation.
Traffic noise from Honoapi'ilani Highway was the primary noise source during measurement.
Noise assessment location at beach and outdoor use locations at nearby residences.

Noise Measurement Data Sheet

Project Name: Honoapi'lani Highway	Project Number: 31000290.000
24-Hour Noise Measurements: LT-1	Address: 820 Olowalu Village Rd, Lahaina, HI 96761
Staff: Romero, Yoshioka	Location: The Maui Butterfly Farm
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 73◦F / variable
Instrumentation / S/N: LD720 / 0161 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 6/20/2023 – 6/21/2023	Start Time / Duration: 11:00 a.m. / 24-hour

Sound Level Results

LDN:	69
Daytime Average:	65.5
Nighttime Average:	61.7
Peak Hour:	68
Peak Hour Time:	7:00 a.m.

Site Layout



LT-1 located approximately 50 feet from Honoapi'lani Highway.

Photographs



View makai towards Honoapi'lani Highway. Pelican case containing sound level meter hanging on right.



View mauka away from Honoapi'lani Highway. Pelican case containing sound level meter hanging on right.

Notes:

Sound level meter contained in Pelican case with mic running outside to collect hourly noise levels. Measurement conducted from open-air butterfly enclosure screened with netting. Measured noise levels used to assess noise levels near Honoapi'lani Highway.

Noise Measurement Data Sheet

Project Name: Honoapi'lani Highway	Project Number: 31000290.000
24-Hour Noise Measurements: LT-2	Address: Adjacent to 255 Luawai St., Lahaina, HI 96761
Staff: Romero, Yoshioka	Location: Luawai St. terminus
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 74◦F / variable
Instrumentation / S/N: LD720 / 0514 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 6/20/2023 – 6/21/2023	Start Time / Duration: 1:00 p.m. / 24-hour

Sound Level Results

LDN:	63
Daytime Average:	64.2
Nighttime Average:	49.9
Peak Hour:	73
Peak Hour Time:	9:00 p.m.

Site Layout



LT-2 located approximately 18 feet from Luawai St.

Photographs



View makai towards Honoapi'lani Highway. Sound level meter in Pelican case hanging in tree to right of view.



View mauka away from Honoapi'lani Highway. Sound level meter in Pelican case hanging in tree to left of view.

Notes:

Sound level meter contained in Pelican case with mic running outside to collect hourly noise levels. Measurement conducted from tree near Luawai St. Measured noise levels used to assess noise levels near Luawai St.

Noise Measurement Data Sheet

Project Name: Honoapi'lani Highway	Project Number: 31000290.000
24-Hour Noise Measurements: LT-3	Address: Paeki'I Pl. cul-de-sac near 849 Paeki'I Pl., Lahaina, HI 96761
Staff: Romero, Yoshioka	Location: Luawai St. terminus
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 74◦F / variable
Instrumentation / S/N: LD720 / 0161 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 6/21/2023 – 6/22/2023	Start Time / Duration: 1:00 p.m. / 24-hour

Sound Level Results

LDN:	61
Daytime Average:	54.1
Nighttime Average:	54.7
Peak Hour:	60
Peak Hour Time:	9:00 a.m.

Site Layout



LT-3 located approximately 45 feet from center of Paeki'I Pl. cul-de-sac.

Photographs



View makai towards Honoapi'lani Highway. Sound level meter in Pelican case hanging in tree adjacent to Paeki'I Pl. cul-de-sac.



View mauka away from Honoapi'lani Highway to nearest residence at 849 Paeki'I Pl.

Notes:

Sound level meter contained in Pelican case with mic running outside to collect hourly noise levels. Measurement conducted from tree adjacent to Paeki'I Pl. cul-de-sac. Measured noise levels used to assess noise levels near Paeki'I Pl.

APPENDIX B – LONG-TERM MEASUREMENT DATA

The following information measurement data was collected in June of 2023 in support of the Honoapi'ilani Project to support the traffic noise analysis and project construction.

TABLE B-1A. **Site LT1 - Hourly Noise Measured Levels**

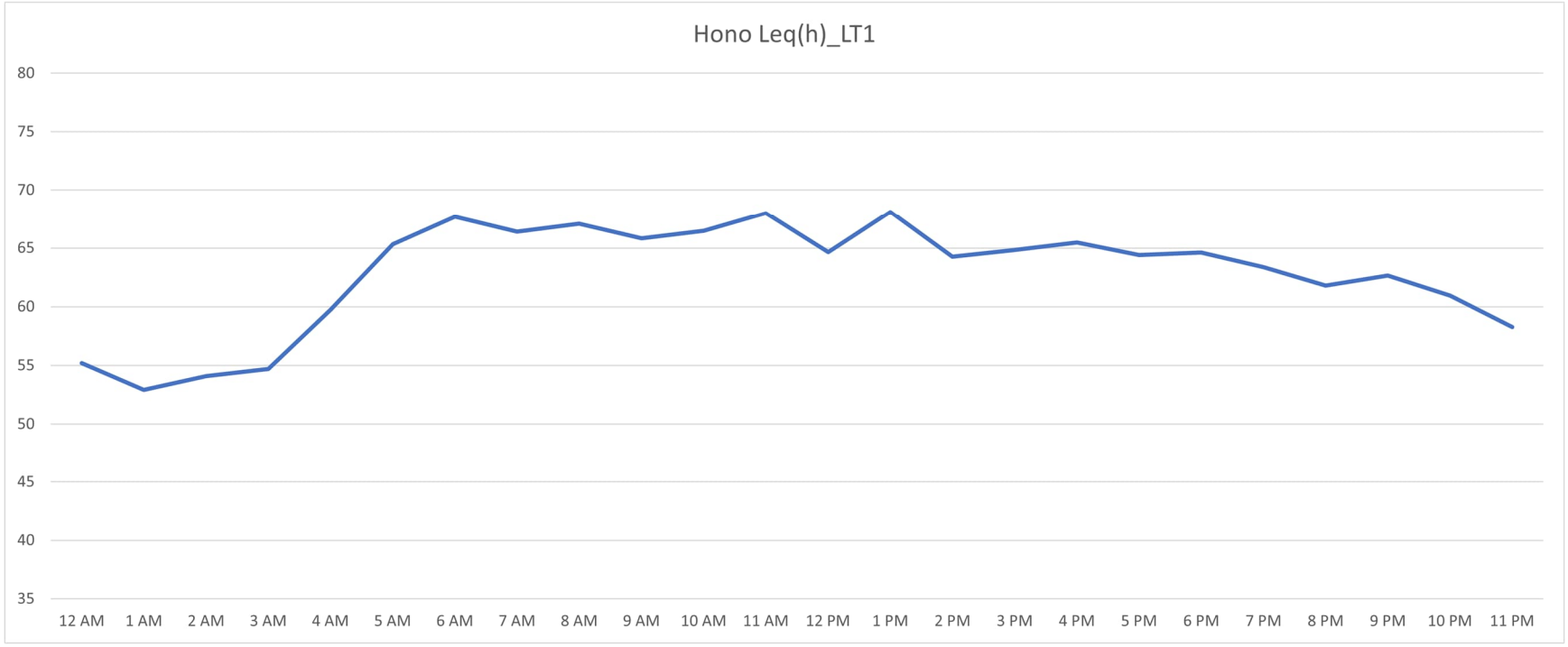
Site	Location	Number	Date	Time	Duration	Leq	Lmax	Lmin	Peak	L(1)	L(10)	L(50)	L(90)
Hono_LT1	Maui Butterfly Farm - 820 Olowalu Village Rd	LT1	21-Jun-23	0:00:00	3600	55.2	75.1	37.7	90.6	66.0	60.1	41.2	38.6
Hono_LT1	Maui Butterfly Farm - 820 Olowalu Village Rd	LT1	21-Jun-23	1:00:00	3600	52.9	76.5	38.0	95.2	64.9	55.1	40.0	38.5
Hono_LT1	Maui Butterfly Farm - 820 Olowalu Village Rd	LT1	21-Jun-23	2:00:00	3600	54.1	76.0	37.3	89.9	66.5	56.8	40.1	38.3
Hono_LT1	Maui Butterfly Farm - 820 Olowalu Village Rd	LT1	21-Jun-23	3:00:00	3600	54.7	72.8	37.2	87.8	66.1	59.3	42.3	38.4
Hono_LT1	Maui Butterfly Farm - 820 Olowalu Village Rd	LT1	21-Jun-23	4:00:00	3600	59.7	77.5	38.0	92.6	70.7	64.1	49.6	41.0
Hono_LT1	Maui Butterfly Farm - 820 Olowalu Village Rd	LT1	21-Jun-23	5:00:00	3600	65.3	80.4	41.7	94.8	74.3	69.0	62.5	51.4
Hono_LT1	Maui Butterfly Farm - 820 Olowalu Village Rd	LT1	21-Jun-23	6:00:00	3600	67.7	81.0	45.0	94.3	77.6	70.6	65.2	57.3
Hono_LT1	Maui Butterfly Farm - 820 Olowalu Village Rd	LT1	21-Jun-23	7:00:00	3600	66.4	86.4	47.0	101.7	73.3	68.9	65.0	59.3
Hono_LT1	Maui Butterfly Farm - 820 Olowalu Village Rd	LT1	21-Jun-23	8:00:00	3600	67.1	88.1	49.1	101.3	76.2	69.0	64.8	60.0
Hono_LT1	Maui Butterfly Farm - 820 Olowalu Village Rd	LT1	21-Jun-23	9:00:00	3600	65.8	81.9	50.7	95.4	73.4	68.1	64.6	60.8
Hono_LT1	Maui Butterfly Farm - 820 Olowalu Village Rd	LT1	21-Jun-23	10:00:00	3600	66.5	82.7	53.7	95.5	76.4	68.8	63.9	60.5
Hono_LT1	Maui Butterfly Farm - 820 Olowalu Village Rd	LT1	20-Jun-23	11:00:00	3600	68.0	94.3	53.5	106.2	77.8	69.2	65.3	61.0
Hono_LT1	Maui Butterfly Farm - 820 Olowalu Village Rd	LT1	20-Jun-23	12:00:00	3600	64.7	85.6	51.6	98.0	72.4	66.5	62.8	58.3
Hono_LT1	Maui Butterfly Farm - 820 Olowalu Village Rd	LT1	20-Jun-23	13:00:00	3600	68.1	86.6	50.6	97.3	80.2	68.7	63.5	59.0
Hono_LT1	Maui Butterfly Farm - 820 Olowalu Village Rd	LT1	20-Jun-23	14:00:00	3600	64.3	84.7	47.9	102.0	72.2	66.4	62.8	58.5
Hono_LT1	Maui Butterfly Farm - 820 Olowalu Village Rd	LT1	20-Jun-23	15:00:00	3600	64.8	84.2	49.9	92.9	72.5	67.4	63.4	59.2
Hono_LT1	Maui Butterfly Farm - 820 Olowalu Village Rd	LT1	20-Jun-23	16:00:00	3600	65.5	83.0	50.1	110.6	72.6	67.5	64.4	61.4
Hono_LT1	Maui Butterfly Farm - 820 Olowalu Village Rd	LT1	20-Jun-23	17:00:00	3600	64.4	75.1	46.6	90.9	70.5	66.8	63.7	58.8
Hono_LT1	Maui Butterfly Farm - 820 Olowalu Village Rd	LT1	20-Jun-23	18:00:00	3600	64.6	82.6	46.2	100.1	72.0	67.4	63.2	55.3
Hono_LT1	Maui Butterfly Farm - 820 Olowalu Village Rd	LT1	20-Jun-23	19:00:00	3600	63.4	84.2	41.6	99.2	71.6	66.0	61.8	49.6
Hono_LT1	Maui Butterfly Farm - 820 Olowalu Village Rd	LT1	20-Jun-23	20:00:00	3600	61.8	72.5	41.2	87.4	68.9	65.3	60.6	47.3
Hono_LT1	Maui Butterfly Farm - 820 Olowalu Village Rd	LT1	20-Jun-23	21:00:00	3600	62.7	79.1	39.2	94.1	71.2	65.9	61.0	45.8
Hono_LT1	Maui Butterfly Farm - 820 Olowalu Village Rd	LT1	20-Jun-23	22:00:00	3600	61.0	76.2	39.5	91.0	69.7	65.0	56.9	42.8
Hono_LT1	Maui Butterfly Farm - 820 Olowalu Village Rd	LT1	20-Jun-23	23:00:00	3600	58.3	75.4	37.8	93.7	68.0	63.2	49.2	39.3

Site LT1	Maui Butterfly Farm, Butterfly Pavilion - 820 Olowalu Village Rd

Daytime Hours (7:00AM to 5:00PM)
Evening Hours (5:00PM to 10:00PM)
Nighttime Hours (10:00PM to 7:00AM)

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TABLE B-1B. **Site LT1 - Hourly Noise Measured Levels**



WSP 2023

TABLE B-2A. **Site LT2 - Hourly Noise Measured Levels**

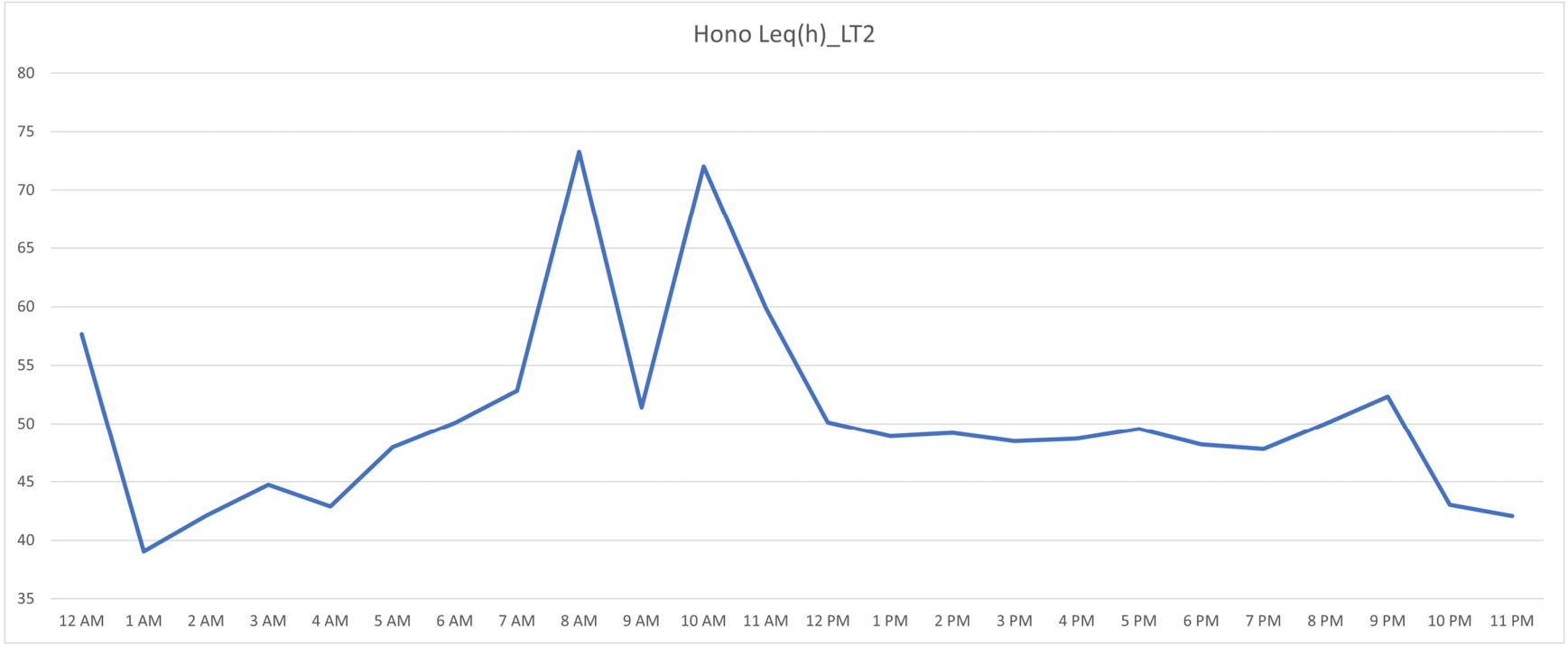
Site	Location	Number	Date	Time	Duration	Leq	Lmax	Lmin	Peak	L(1)	L(10)	L(50)	L(90)
Hono_LT2	Adjacent to 255 Luawai St	LT2	21-Jun-23	0:00:00	3600	57.7	65.6	38.0	85.5	63.0	62.4	53.2	38.5
Hono_LT2	Adjacent to 255 Luawai St	LT2	21-Jun-23	1:00:00	3600	39.1	47.4	38.0	72.1	41.9	39.9	38.8	38.2
Hono_LT2	Adjacent to 255 Luawai St	LT2	21-Jun-23	2:00:00	3600	42.1	61.5	38.0	77.2	51.0	44.3	39.6	38.3
Hono_LT2	Adjacent to 255 Luawai St	LT2	21-Jun-23	3:00:00	3600	44.7	61.5	38.0	82.0	54.2	47.8	40.0	38.3
Hono_LT2	Adjacent to 255 Luawai St	LT2	21-Jun-23	4:00:00	3600	42.9	56.8	38.0	86.0	52.3	46.3	39.7	38.3
Hono_LT2	Adjacent to 255 Luawai St	LT2	21-Jun-23	5:00:00	3600	48.0	68.4	38.6	86.1	59.5	49.4	43.2	40.0
Hono_LT2	Adjacent to 255 Luawai St	LT2	21-Jun-23	6:00:00	3600	50.1	71.1	39.5	85.0	61.4	50.1	43.6	40.9
Hono_LT2	Adjacent to 255 Luawai St	LT2	21-Jun-23	7:00:00	3600	52.8	70.4	39.3	87.1	64.7	55.9	46.3	41.4
Hono_LT2	Adjacent to 255 Luawai St	LT2	21-Jun-23	8:00:00	3600	73.3	92.5	40.1	115.6	87.6	73.4	58.9	44.3
Hono_LT2	Adjacent to 255 Luawai St	LT2	21-Jun-23	9:00:00	3600	51.4	74.9	40.9	91.0	62.1	53.4	46.7	43.5
Hono_LT2	Adjacent to 255 Luawai St	LT2	21-Jun-23	10:00:00	3600	72.0	92.1	41.8	104.9	87.2	62.6	49.0	44.6
Hono_LT2	Adjacent to 255 Luawai St	LT2	21-Jun-23	11:00:00	3600	59.9	88.7	39.7	100.5	70.2	52.8	45.5	41.8
Hono_LT2	Adjacent to 255 Luawai St	LT2	21-Jun-23	12:00:00	3600	50.1	67.5	39.6	83.6	59.7	53.7	46.1	41.6
Hono_LT2	Adjacent to 255 Luawai St	LT2	20-Jun-23	13:00:00	3600	49.2	69.7	42.0	83.2	56.4	51.3	47.4	44.4
Hono_LT2	Adjacent to 255 Luawai St	LT2	20-Jun-23	14:00:00	3600	48.5	67.7	40.9	81.9	56.4	50.4	47.0	44.4
Hono_LT2	Adjacent to 255 Luawai St	LT2	20-Jun-23	15:00:00	3600	48.7	66.8	40.6	79.4	57.1	50.3	47.0	44.3
Hono_LT2	Adjacent to 255 Luawai St	LT2	20-Jun-23	16:00:00	3600	49.6	77.4	41.0	105.9	55.9	50.1	46.6	44.0
Hono_LT2	Adjacent to 255 Luawai St	LT2	20-Jun-23	17:00:00	3600	48.2	73.7	39.6	89.2	51.8	48.1	45.8	42.8
Hono_LT2	Adjacent to 255 Luawai St	LT2	20-Jun-23	18:00:00	3600	47.8	65.3	39.0	88.9	58.2	50.3	44.4	41.0
Hono_LT2	Adjacent to 255 Luawai St	LT2	20-Jun-23	19:00:00	3600	50.0	59.2	38.6	81.4	58.0	53.9	47.1	40.5
Hono_LT2	Adjacent to 255 Luawai St	LT2	20-Jun-23	20:00:00	3600	52.3	66.6	38.7	85.5	62.0	56.7	44.9	39.5
Hono_LT2	Adjacent to 255 Luawai St	LT2	20-Jun-23	21:00:00	3600	43.0	57.8	38.5	71.2	48.8	45.0	42.0	40.1
Hono_LT2	Adjacent to 255 Luawai St	LT2	20-Jun-23	22:00:00	3600	42.1	49.6	38.0	66.2	47.2	45.3	40.9	38.4
Hono_LT2	Adjacent to 255 Luawai St	LT2	20-Jun-23	23:00:00	3600	46.8	74.0	38.1	87.4	59.6	43.3	39.2	38.2

Site LT2	Adjacent to 255 Luawai St

Daytime Hours (7:00AM to 5:00PM)
Evening Hours (5:00PM to 10:00PM)
Nighttime Hours (10:00PM to 7:00AM)

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TABLE B-2B. **Site LT2 - Hourly Noise Measured Levels**



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TABLE B-3A. **Site LT3 - Hourly Noise Measured Levels**

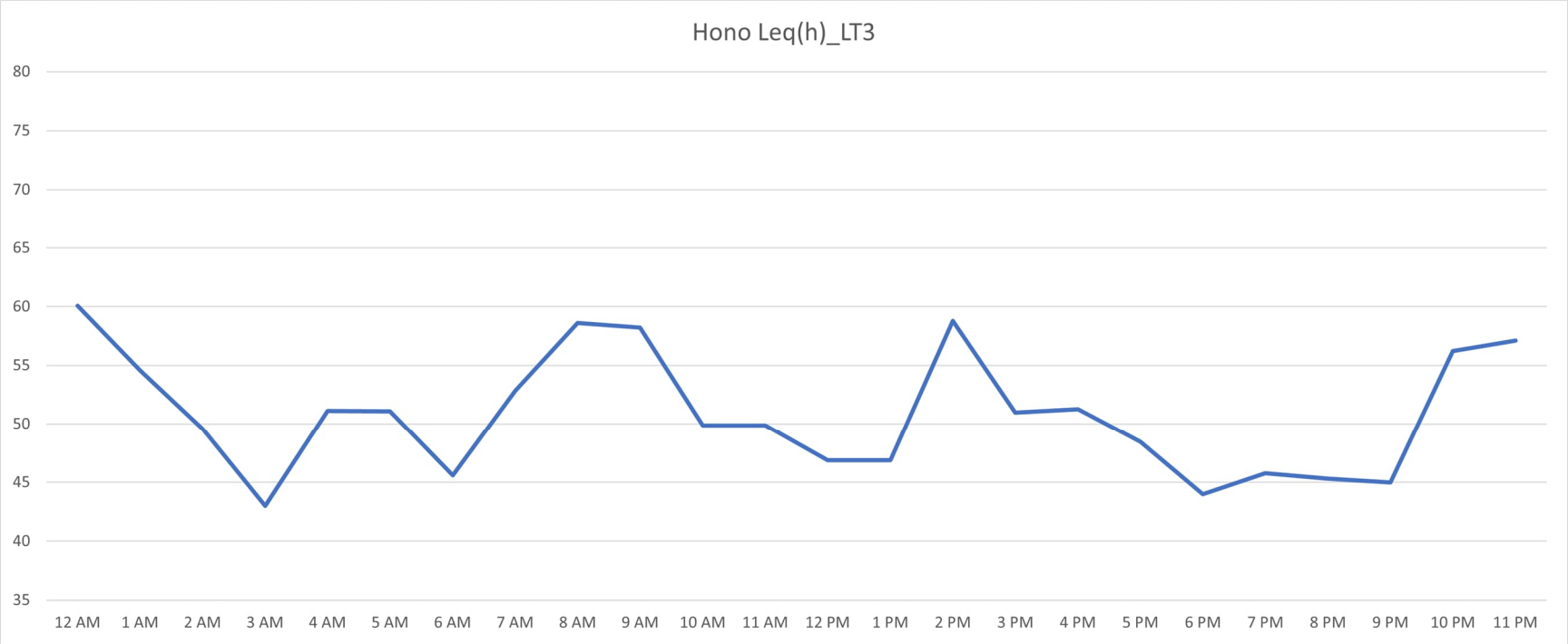
Site	Location	Number	Date	Time	Duration	Leq	Lmax	Lmin	Peak	L(1)	L(10)	L(50)	L(90)
Hono_LT3	Paeki'i Place Terminus	LT3	22-Jun-23	0:00:00	3600	60.1	76.3	44.8	92.3	68.1	63.5	57.5	52.4
Hono_LT3	Paeki'i Place Terminus	LT3	22-Jun-23	1:00:00	3600	54.6	66.7	42.9	92.4	62.8	58.1	52.1	47.6
Hono_LT3	Paeki'i Place Terminus	LT3	22-Jun-23	2:00:00	3600	49.6	67.4	37.5	91.6	60.9	53.1	42.4	38.4
Hono_LT3	Paeki'i Place Terminus	LT3	22-Jun-23	3:00:00	3600	43.0	59.6	37.1	92.3	55.6	43.9	38.4	37.3
Hono_LT3	Paeki'i Place Terminus	LT3	22-Jun-23	4:00:00	3600	51.1	65.7	37.2	86.1	62.1	55.8	41.6	37.8
Hono_LT3	Paeki'i Place Terminus	LT3	22-Jun-23	5:00:00	3600	51.1	67.7	39.3	85.1	60.9	54.1	47.3	42.2
Hono_LT3	Paeki'i Place Terminus	LT3	22-Jun-23	6:00:00	3600	45.6	64.2	38.8	81.8	54.5	47.9	42.8	40.4
Hono_LT3	Paeki'i Place Terminus	LT3	22-Jun-23	7:00:00	3600	52.8	72.7	38.6	94.7	63.2	56.6	45.2	40.7
Hono_LT3	Paeki'i Place Terminus	LT3	22-Jun-23	8:00:00	3600	58.6	73.7	39.1	93.6	69.2	62.8	51.7	42.2
Hono_LT3	Paeki'i Place Terminus	LT3	22-Jun-23	9:00:00	3600	58.2	74.4	39.0	99.8	69.3	62.9	47.9	41.1
Hono_LT3	Paeki'i Place Terminus	LT3	22-Jun-23	10:00:00	3600	49.9	66.8	39.2	93.4	60.2	53.3	44.6	40.6
Hono_LT3	Paeki'i Place Terminus	LT3	22-Jun-23	11:00:00	3600	46.9	63.4	38.7	88.9	58.2	49.1	42.2	39.8
Hono_LT3	Paeki'i Place Terminus	LT3	22-Jun-23	12:00:00	3600	58.8	72.3	38.9	93.0	69.2	63.4	52.4	41.7
Hono_LT3	Paeki'i Place Terminus	LT3	21-Jun-23	13:00:00	3600	51.0	67.9	39.2	85.3	61.2	54.0	47.1	42.4
Hono_LT3	Paeki'i Place Terminus	LT3	21-Jun-23	14:00:00	3600	51.3	71.8	38.3	89.9	61.9	53.9	46.2	40.6
Hono_LT3	Paeki'i Place Terminus	LT3	21-Jun-23	15:00:00	3600	48.4	62.9	38.1	88.3	59.1	51.5	44.3	40.8
Hono_LT3	Paeki'i Place Terminus	LT3	21-Jun-23	16:00:00	3600	44.0	63.0	37.8	91.1	50.9	45.7	42.3	39.5
Hono_LT3	Paeki'i Place Terminus	LT3	21-Jun-23	17:00:00	3600	45.8	60.9	37.5	82.9	54.7	49.6	41.7	38.6
Hono_LT3	Paeki'i Place Terminus	LT3	21-Jun-23	18:00:00	3600	45.3	64.1	37.9	85.2	54.4	48.1	42.1	39.1
Hono_LT3	Paeki'i Place Terminus	LT3	21-Jun-23	19:00:00	3600	45.0	61.3	37.0	92.4	56.1	48.1	40.0	37.5
Hono_LT3	Paeki'i Place Terminus	LT3	21-Jun-23	20:00:00	3600	56.2	74.5	38.1	90.6	66.2	59.6	50.7	42.6
Hono_LT3	Paeki'i Place Terminus	LT3	21-Jun-23	21:00:00	3600	57.1	69.6	38.1	92.3	66.4	61.3	52.9	41.5
Hono_LT3	Paeki'i Place Terminus	LT3	21-Jun-23	22:00:00	3600	57.6	69.2	41.6	96.8	65.7	61.3	55.1	48.4
Hono_LT3	Paeki'i Place Terminus	LT3	21-Jun-23	23:00:00	3600	55.7	68.6	37.8	87.9	65.0	60.2	51.1	40.1

Site LT3	Paeki'i Place Terminus

Daytime Hours (7:00AM to 5:00PM)
Evening Hours (5:00PM to 10:00PM)
Nighttime Hours (10:00PM to 7:00AM)

WSP 2023

TABLE B-3B. **Site LT3 - Hourly Noise Measured Levels**



WSP 2023

APPENDIX C – FIELD INSTRUMENTATION CALIBRATION CERTIFICATES

Appendix C presents calibration certificates from annual laboratory calibration of all field instrumentation used to collect noise measurement data for the Honoapi'ilani Highway Project traffic noise analysis.

CERTIFICATE OF CALIBRATION
27333-5
FOR LARSON DAVIS
PRECISION INTEGRATING AND LOGGING SOUND LEVEL METER

Model **820** — Serial No. **1194**
ID No. **N/A**
With Microphone Model **2560** — Serial No. **3150**
With Preamplifier Model **PRM828** — Serial No. **1681**

Customer: **WSP USA**
Seattle, WA 98154 — P.O. No. **Admin Home 1828**

was tested and met Larson Davis specifications at the points tested and as outlined in ANSI S1.4-1983 Type 1; IEC 651-1979 Type 1

on **24 AUG 2022** **BY HAROLD LYNCH**
Service Manager

As received and as left condition: Within Specification.
Re-calibration due on: **24 AUG 2023**

Certified References*

Mfg.	Type	Serial No.	Cal Date	Due Date
B&K	1051	1846829	08 SEP 2021	08 SEP 2022
B&K	2636	1601487	16 MAY 2022	16 MAY 2023
B&K	4226	3274134	30 NOV 2021	30 NOV 2022
B&K	4231	2094472	15 FEB 2022	15 FEB 2023
HP	34401A	US36071531	25 MAY 2022	25 MAY 2023
HP	3458A	2823A17713	20 SEP 2021	20 SEP 2022

Performed in Compliance with ANSI, NCSL Z-540-1, 1994 and ISO 17025, ISO 9001:2015 Certification NQA No. 11252
*References are traceable to NIST (National Institute of Standards and Technology).

Note: For calibration data see enclosed pages.
The data represent both "as found" and "as left" condition.

Reference Test Procedure: **ACCT Procedure 812-820 Version 3.5.1.**

Temperature	Relative Humidity	Barometric Pressure
23°C	**39 %**	**984.36** hPa

Note: This calibration report shall not be reproduced, except in full, without written consent by Odin Metrology, Inc.

Signed:

ODIN METROLOGY, INC.
CALIBRATION OF SOUND & VIBRATION INSTRUMENTATION
3533 OLD CONEJO ROAD, SUITE 125 THOUSAND OAKS CA 91320
PHONE: (805) 375-0830 FAX: (805) 375-0405

Doc. Rev. 16 Feb 2018

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Odin Metrology, Inc.
Calibration of Sound & Vibration Instruments

Certificate Number: **27333-7**

Certificate of Calibration for Larson Davis 1/2" Random Incidence Microphone

This calibration is performed by comparison with measurement reference standard microphone:

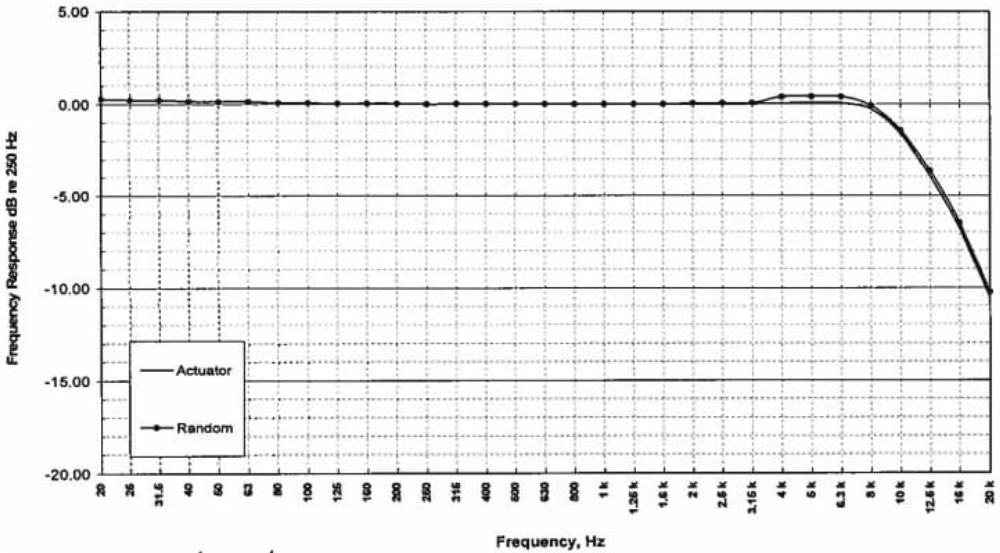
Reference Standards	
Type No.	4134/UA0825
Serial No.	1866524
Calibrated by	DANAK
Cal Date	23 SEP 2021
Due Date	23 SEP 2023

Type no.	**2560**
Serial no.	**3150**
With preamplifier type no.	**N/A**
Preamplifier Serial no.	**N/A**
Submitted by	**WSP USA Seattle, WA 98154**
Purchase order no.	**Admin Home 1828**
Asset no.	**N/A**

a) Estimated uncertainty of comparison: ± 0.05 dB
b) Estimated uncertainty of reference microphone: ± 0.04 dB
c) Total uncertainty: $\sqrt{a^2 + b^2}$ = ± 0.064 dB
d) Expanded uncertainty (coverage factor k = 2 for 95% confidence level): = ± 0.13 dB

Performance Data		
Open circuit sensitivity at 1,013 hPa, 23°C, 50% RH, 251.2 Hz	-26.31	dB re 1 V/Pa
	48.39	mV/Pa
System sensitivity (with preamplifier) at 251.2 Hz	N/A	dB re 1 V/Pa
	N/A	mV/Pa

Microphone Frequency Response Type 2560
S/N 3150 : Measured 25 Aug 2022



Calibration performed by

Harold Lynch, Service Manager

Condition of Test		
Ambient Pressure	988.38	hPa
Temperature	23	°C
Relative Humidity	39	%
Polarization Voltage	200	V
Frequency	251.2	Hz
Date of Calibration	25 AUG 2022	
Re-calibration due on	25 AUG 2023	

ODIN METROLOGY, INC.
3533 Old Conejo Road, Suite 125
Thousand Oaks, CA 91320
Phone: (805) 375-0830; Fax: (805) 375-0405

The calibration data is both "as found" and "as final." At the time of calibration this microphone was found to be **within** the manufacturer's specifications.
Calibration Procedure: **OM-P-1008-Microphone Rev. 1.2 20130618.**

This calibration is traceable to DANAK/DPLA No. **M2.10-1478-2.1** and through inter-laboratory comparisons to NIST Test Number: **683/289533-17.** *See page 2 Traceability.

Note: This calibration report shall not be reproduced, except in full, without written consent of Odin Metrology, Inc.

CERTIFICATE OF CALIBRATION
27333-1
FOR LARSON DAVIS
INTEGRATING SOUND LEVEL METER

Model **720** Serial No. **0161**
ID No. **N/A**
With 3/8" electret microphone Serial No. **B1087**

Customer: **WSP USA**
Seattle, WA 98154 P.O. No. **Admin Home 1828**

was tested to Larson Davis specifications at the points tested and as outlined in ANSI S1.4-1983 Type 2; IEC 651-1979 Type 2

on **24 AUG 2022** **BY HAROLD LYNCH**
Service Manager

As received and as left condition: Within Specifications.
Re-calibration due on: **24 AUG 2023**

Certified References*

Mfg.	Type	Serial No.	Cal Date	Due Date
B&K	4134	1315901	16 FEB 2022	16 FEB 2023
B&K	4226	3274134	30 NOV 2021	30 NOV 2022
HP	34401A	3146A48348	16 OCT 2021	16 OCT 2022

Calibration System operates in conformance to ANSI/ NCSL Z540-1, 1994 and ISO 17025, ISO 9001:2015 Certification NQA No. 11252
*References are traceable to NIST (National Institute of Standards and Technology).

Note: For calibration data see enclosed pages.
The data represent both "as found" and "as left" conditions.

Reference Test Procedure: **Odin Metrology Procedure for Larson Davis 720.**
Uncertainty of Reference 4226 in Pressure:
31.5 Hz-4k Hz: ± .20 dB 4k Hz-8k Hz: ± .25 dB
Uncertainty of ANSI Type 2 S.L.M.: 31.5 Hz-2k Hz: ± 2 dB
2k Hz-4k Hz: ± 2.5 dB 4k Hz-5k Hz: ± 3.0 dB 5k Hz-6.3k Hz: ± 3.5 dB 6.3k Hz-8k Hz: ± 4.5 dB
Uncertainty Ratio: > 4:1

Temperature	Relative Humidity	Barometric Pressure
23°C	**39 %**	**984.36** hPa

Note: This calibration report shall not be reproduced, except in full, without written consent by Odin Metrology, Inc.
Signed:

ODIN METROLOGY, INC.
CALIBRATION OF SOUND & VIBRATION INSTRUMENTATION
3533 OLD CONEJO ROAD, SUITE 125 THOUSAND OAKS CA 91320
PHONE: (805) 375-0830 FAX: (805) 375-0405

CERTIFICATE OF CALIBRATION
27333-2
FOR LARSON DAVIS
INTEGRATING SOUND LEVEL METER

Model **720** — Serial No. **0514**
ID No. **N/A**
With 3/8" electret microphone — Serial No. **B4105**

Customer: **WSP USA**
Seattle, WA 98154 — P.O. No. **Admin Home 1828**

was tested to Larson Davis specifications at the points tested and as outlined in ANSI S1.4-1983 Type 2; IEC 651-1979 Type 2

on **24 AUG 2022** **BY HAROLD LYNCH**
Service Manager

As received and as left condition: Within Specifications.
Re-calibration due on: **24 AUG 2023**

Certified References*

Mfg.	Type	Serial No.	Cal Date	Due Date
B&K	4134	1315901	16 FEB 2022	16 FEB 2023
B&K	4226	3274134	30 NOV 2021	30 NOV 2022
HP	34401A	3146A48348	16 OCT 2021	16 OCT 2022

Calibration System operates in conformance to ANSI/ NCSL Z540-1, 1994 and ISO 17025, ISO 9001:2015 Certification NQA No. 11252
*References are traceable to NIST (National Institute of Standards and Technology).

Note: For calibration data see enclosed pages.
The data represent both "as found" and "as left" conditions.

Reference Test Procedure: **Odin Metrology Procedure for Larson Davis 720.**
Uncertainty of Reference 4226 in Pressure:
31.5 Hz-4k Hz: ± .20 dB 4k Hz-8k Hz: ± .25 dB
Uncertainty of ANSI Type 2 S.L.M.: 31.5 Hz-2k Hz: ± 2 dB
2k Hz-4k Hz: ± 2.5 dB 4k Hz-5k Hz: ± 3.0 dB 5k Hz-6.3k Hz: ± 3.5 dB 6.3k Hz-8k Hz: ± 4.5 dB
Uncertainty Ratio: > 4:1

Temperature	Relative Humidity	Barometric Pressure
23°C	**39 %**	**984.36** hPa

Note: This calibration report shall not be reproduced, except in full, without written consent by Odin Metrology, Inc.
Signed: Harold Lynch

ODIN METROLOGY, INC.
CALIBRATION OF SOUND & VIBRATION INSTRUMENTATION
3533 OLD CONEJO ROAD, SUITE 125 THOUSAND OAKS CA 91320
PHONE: (805) 375-0830 FAX: (805) 375-0405

CERTIFICATE OF CALIBRATION
27333-3
FOR LARSON DAVIS
INTEGRATING SOUND LEVEL METER

Model **720** — Serial No. **0634**
ID No. **N/A**
With 3/8" electret microphone — Serial No. **B8330**

Customer: **WSP USA**
Seattle, WA 98154 — P.O. No. **Admin Home 1828**

was tested to Larson Davis specifications at the points tested and as outlined in ANSI S1.4-1983 Type 2; IEC 651-1979 Type 2

on **24 AUG 2022** **BY HAROLD LYNCH**
Service Manager

As received and as left condition: Within Specifications.
Re-calibration due on: **24 AUG 2023**

Certified References*

Mfg.	Type	Serial No.	Cal Date	Due Date
B&K	4134	1315901	16 FEB 2022	16 FEB 2023
B&K	4226	3274134	30 NOV 2021	30 NOV 2022
HP	34401A	3146A48348	16 OCT 2021	16 OCT 2022

Calibration System operates in conformance to ANSI/ NCSL Z540-1, 1994 and ISO 17025, ISO 9001:2015 Certification NQA No. 11252
*References are traceable to NIST (National Institute of Standards and Technology).

Note: For calibration data see enclosed pages.
The data represent both "as found" and "as left" conditions.

Reference Test Procedure: **Odin Metrology Procedure for Larson Davis 720.**
Uncertainty of Reference 4226 in Pressure:
31.5 Hz-4k Hz: ± .20 dB 4k Hz-8k Hz: ± .25 dB
Uncertainty of ANSI Type 2 S.L.M.: 31.5 Hz-2k Hz: ± 2 dB
2k Hz-4k Hz: ± 2.5 dB 4k Hz-5k Hz: ± 3.0 dB 5k Hz-6.3k Hz: ± 3.5 dB 6.3k Hz-8k Hz: ± 4.5 dB
Uncertainty Ratio: > 4:1

Temperature	Relative Humidity	Barometric Pressure
23°C	**39 %**	**984.36** hPa

Note: This calibration report shall not be reproduced, except in full, without written consent by Odin Metrology, Inc.
Signed: Harold Lynch

ODIN METROLOGY, INC.
CALIBRATION OF SOUND & VIBRATION INSTRUMENTATION
3533 OLD CONEJO ROAD, SUITE 125 THOUSAND OAKS CA 91320
PHONE: (805) 375-0830 FAX: (805) 375-0405

Doc. Rev 14 Jul 2021

Page 1 of 4

Odin Metrology, Inc.
Calibration of Sound & Vibration Instruments

Certificate Number: **27333-4**

Certificate of Calibration for Larson Davis Calibrator

This calibration is performed by comparison with measurement reference standard microphone:

Type No.	4134
Serial No.	1315901
Calibrated by	HL
Cal Date	16 FEB 2022
Due Date	16 FEB 2023

a) Estimated uncertainty of comparison: ± 0.05 dB
b) Estimated uncertainty of calibration service for standard pistonphone: ± 0.06 dB
c) Total uncertainty: $\sqrt{a^2+b^2}$ = ± 0.08 dB
d) Expanded uncertainty (coverage factor k = 2 for 95% confidence level): = ± 0.16 dB

This acoustic calibrator has been calibrated using standards with values traceable to the National Institute of Standards and Technology. This calibration is traceable to NIST Test Number **683/289533-17.**

CONDITION OF TEST		
Ambient Pressure	**988.38**	hPa
Temperature	**23**	°C
Relative Humidity	**39**	%
Date of Calibration	**25 AUG 2022**	
Re-calibration due on	**25 AUG 2023**	

The calibration of this acoustic calibrator was performed using a test system conforming to the requirements of ANSI/NCSLZ540-1, 1994, ISO 17025, and ISO 9001:2015, Certification NQA No. 11252.

Calibration procedure: **OM-P-1001-Acoustic_Calibrator, Rev. 1.0 20130522.**

Calibration performed by

Harold Lynch, Service Manager

Calibrator type	**CAL200**
Serial no.	**2239**
Submitted by	**WSP USA** **Seattle, WA 98154**
Purchase order no.	**Admin Home 1828**
Asset no.	**N/A**

This calibrator has been found to perform **within** the specifications listed below at the normalized conditions stated.

SPL produced in coupler terminated by a loading volume of a ½" microphone	94.0 ± 0.2 dB 114 ± 0.2 dB
Frequency	1,000 Hz ± 1%
Distortion	< 2%
At 1,013 hPa, 23°C, and 65% relative humidity	

PERFORMANCE AS RECEIVED		
Frequency	**1000.0**	Hz
SPL (94 dB)	**93.95**	dB
SPL (114 dB)	**113.97**	dB
Distortion (at 94 dB)	**0.3**	%
Battery Voltage	**9.3**	V

Was adjustment performed? **No**
Were batteries replaced? **No**

FINAL PERFORMANCE		
Frequency	**1000.0**	Hz
SPL (94 dB)	**93.95**	dB
SPL (114 dB)	**113.97**	dB
Distortion (at 94 dB)	**0.3**	%

Note: This calibrator was **within** manufacturer's specifications as received.

ODIN METROLOGY, INC.
3533 OLD CONEJO ROAD, SUITE 125
THOUSAND OAKS, CA 91320
PHONE: (805) 375-0830; FAX: (805) 375-0405

Note: This calibration report shall not be reproduced, except in full, without written consent of Odin Metrology, Inc.

APPENDIX D – MODELED TRAFFIC DATA

Appendix D provides traffic data modeled for the traffic noise analysis. Traffic data includes traffic volumes, speeds, and vehicle mix by roadway for worst-hour Existing 2019, 2045 No Build, and 2045 Build traffic data provided by the Honoapi’ilani Highway Traffic Team.

TABLE D-1. **Existing Conditions 2023 Modeled Traffic Noise Levels – PM Peak Hour (Olowalu)**

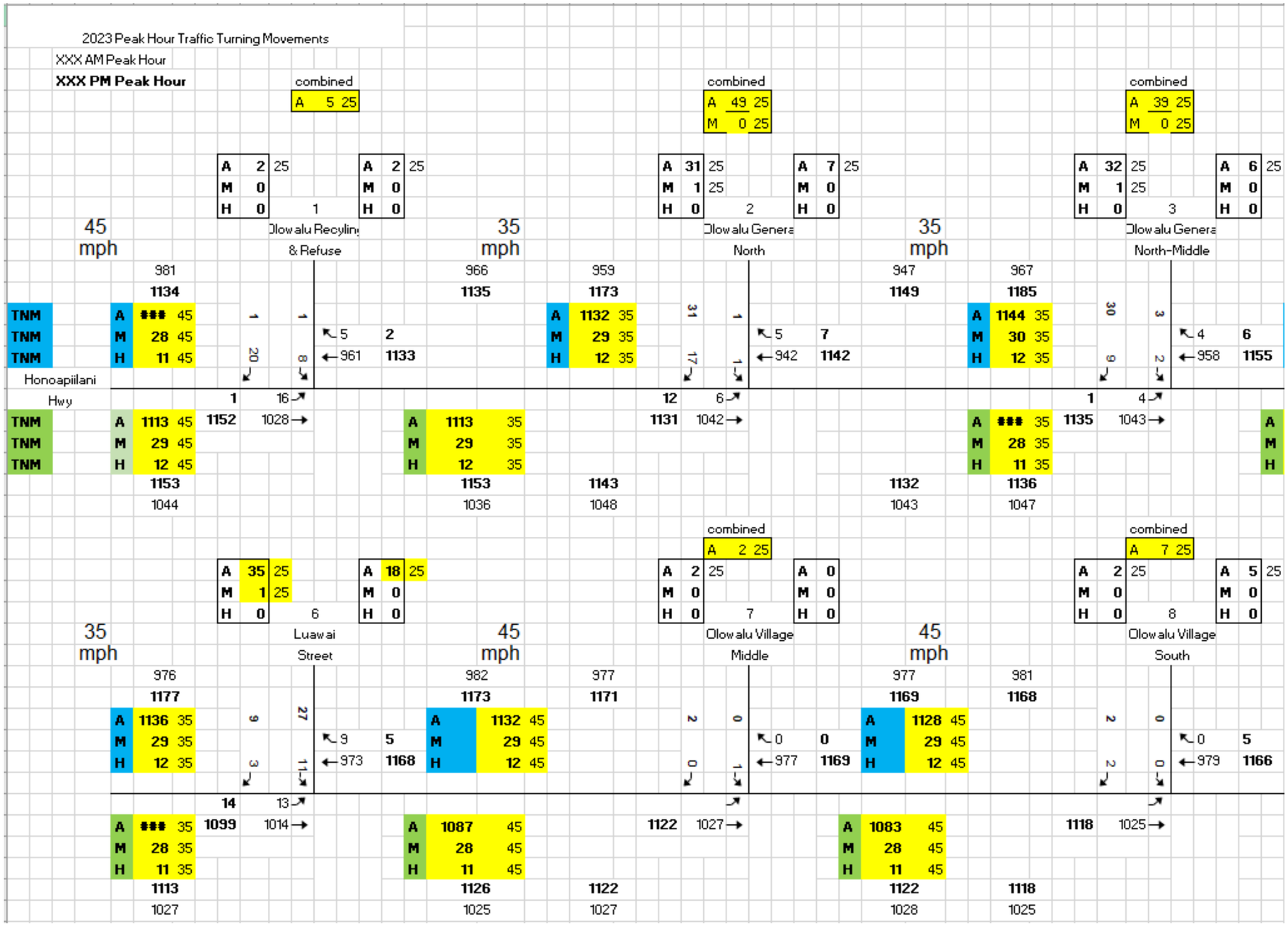


TABLE D-2. **Existing Conditions 2023 Modeled Traffic Noise Levels – PM Peak Hour (Ukumehame)**

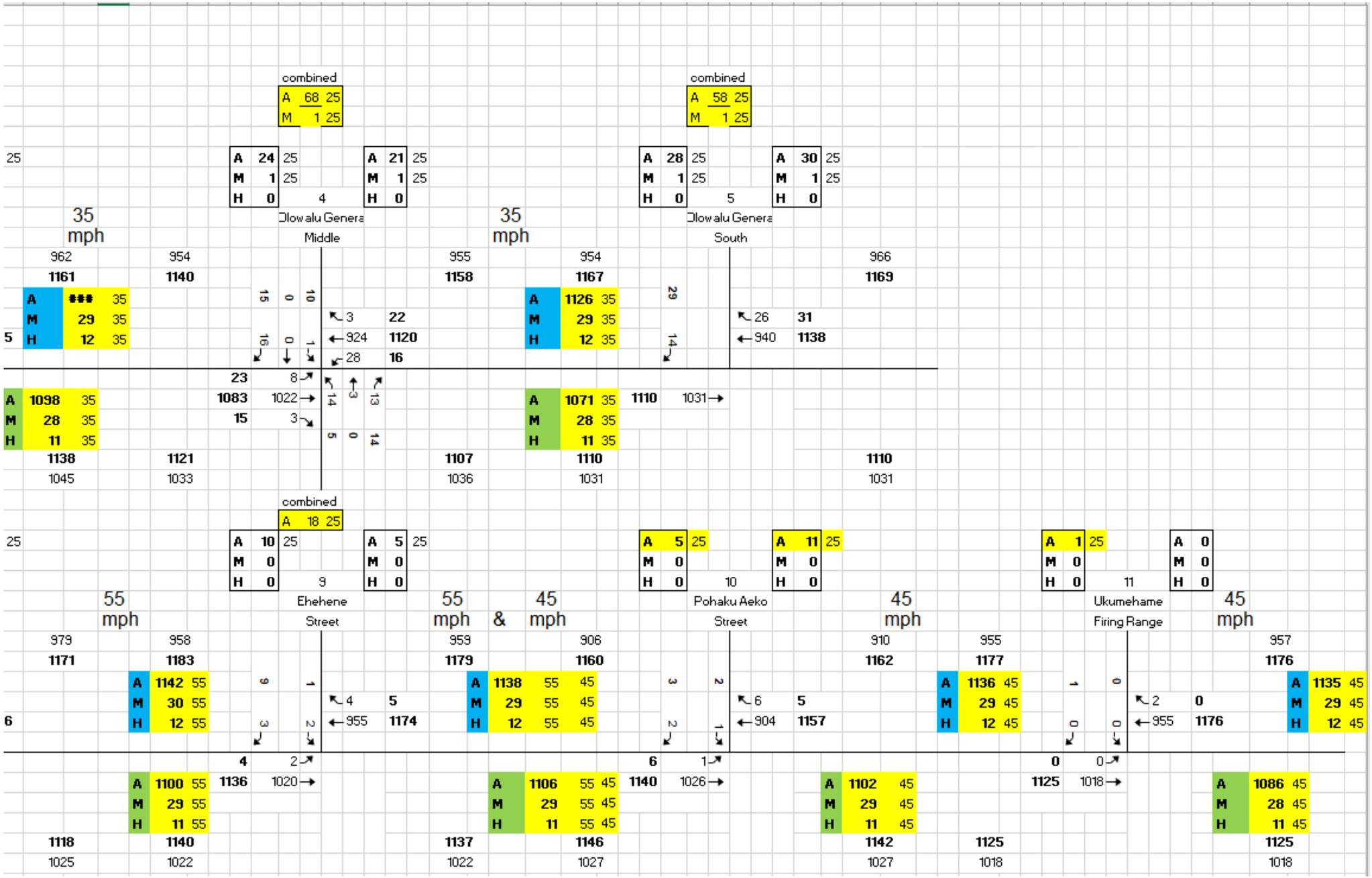


TABLE D-3. **No Build 2045 Modeled Traffic Noise Levels – PM Peak Hour (Olowalu)**

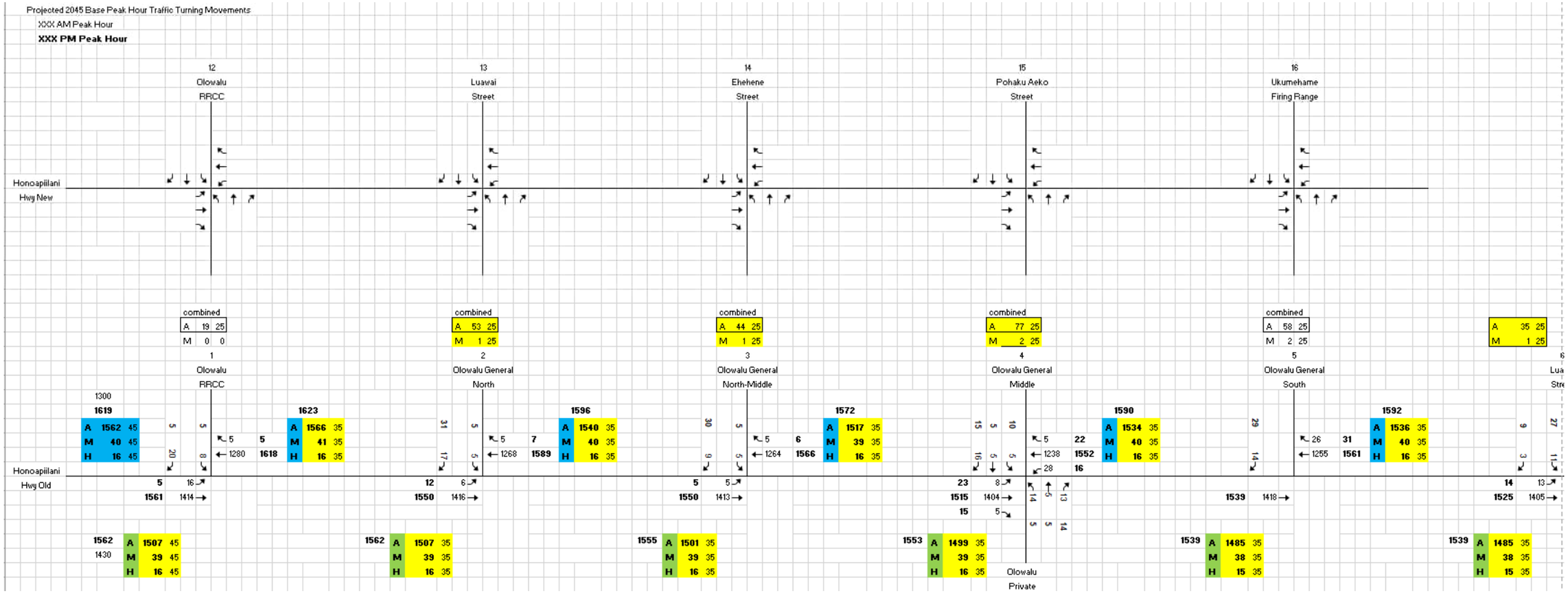


TABLE D-4. **No Build 2045 Modeled Traffic Noise Levels – PM Peak Hour (Ukumehame)**

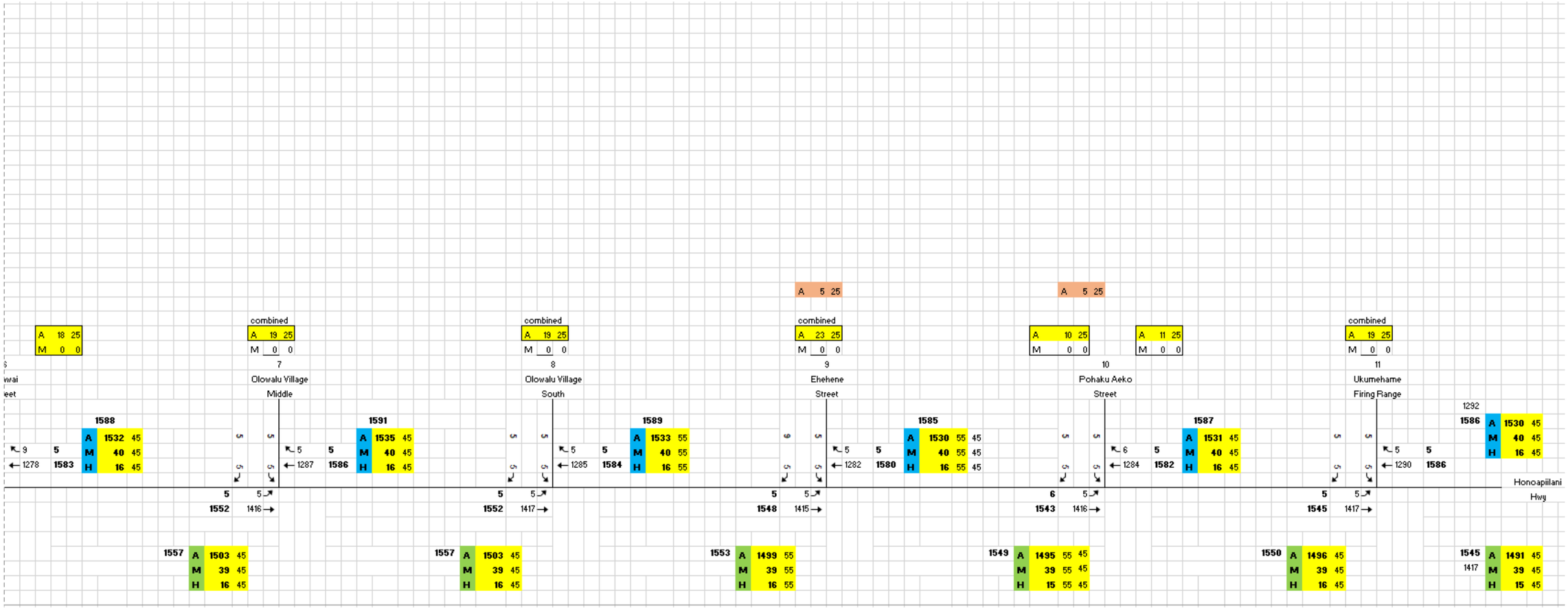


TABLE D-5. **Build Alternative 1 2045 Modeled Traffic Noise Levels – PM Peak Hour (Olowalu)**

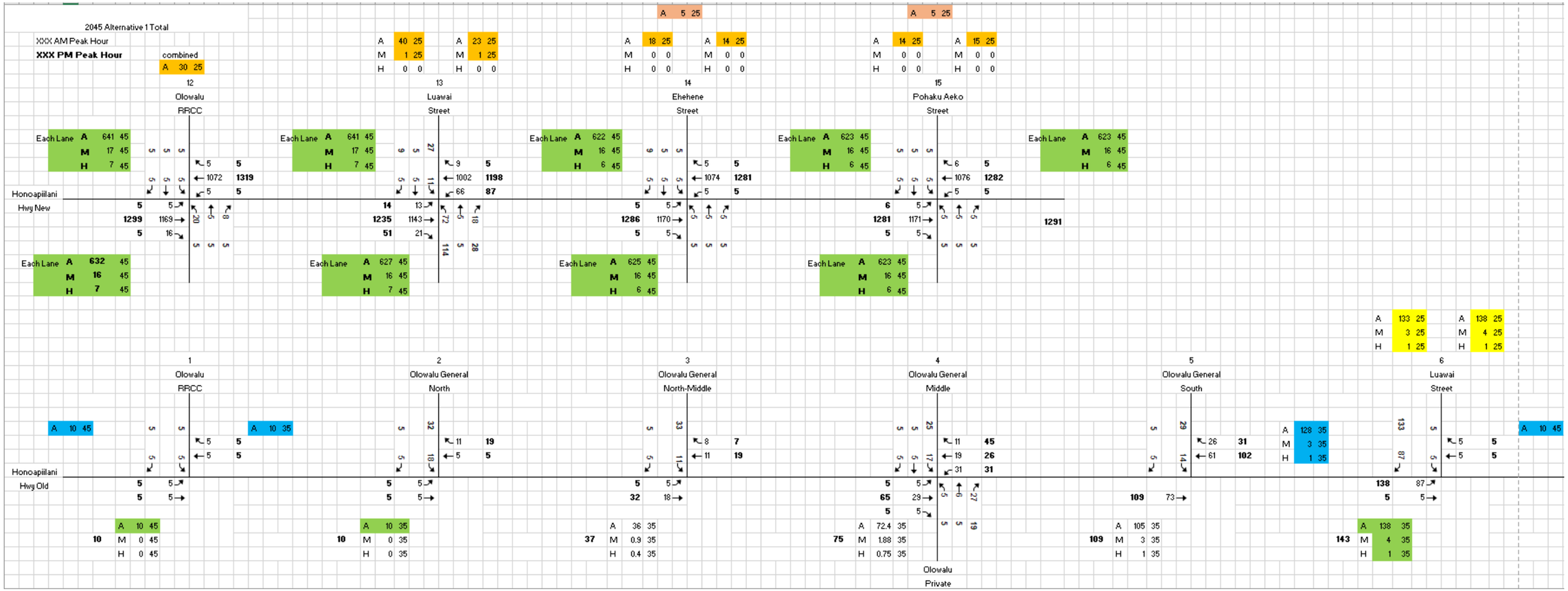


TABLE D-6. **Build Alternative 1 2045 Modeled Traffic Noise Levels – PM Peak Hour (Ukumehame)**

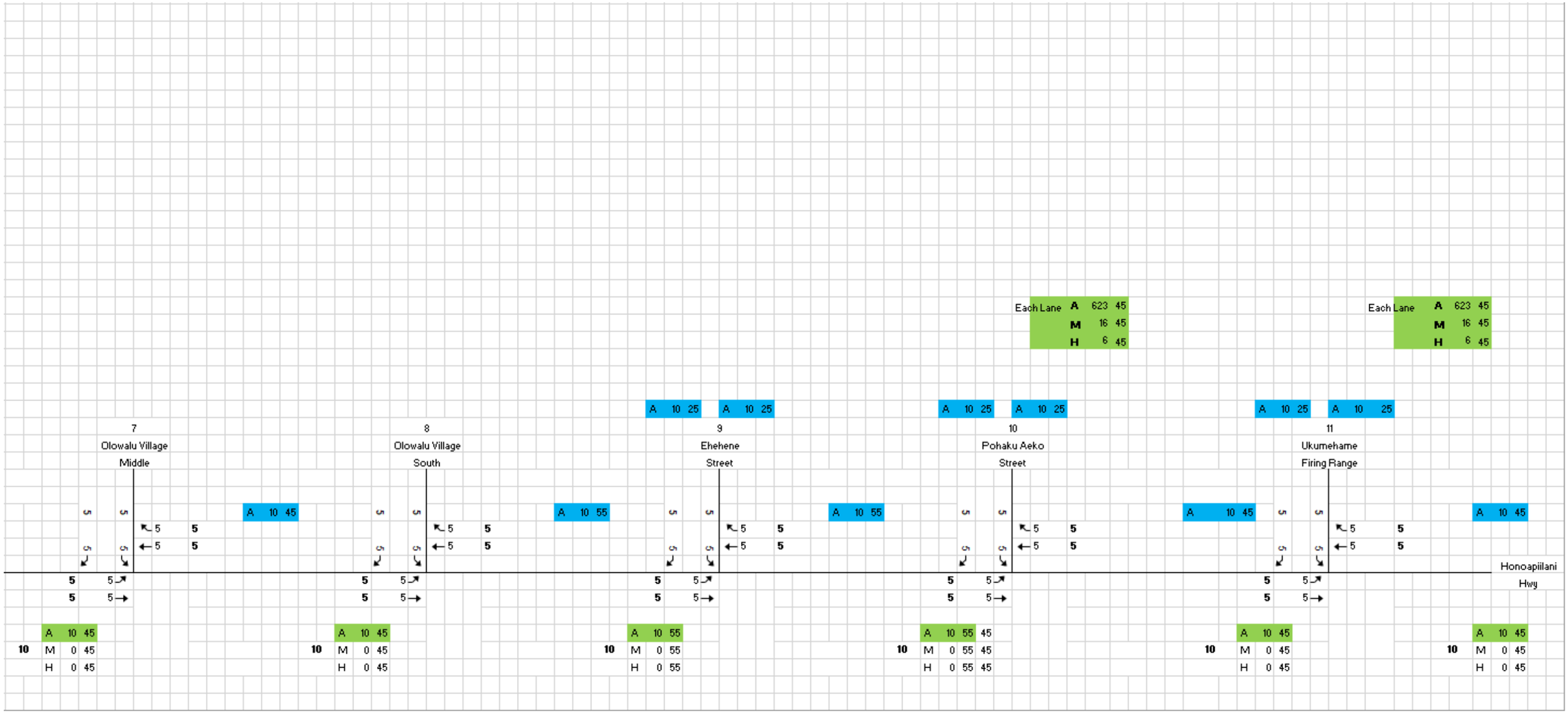


TABLE D-7. **Build Alternative 2 2045 Modeled Traffic Noise Levels – PM Peak Hour (Olowalu)**

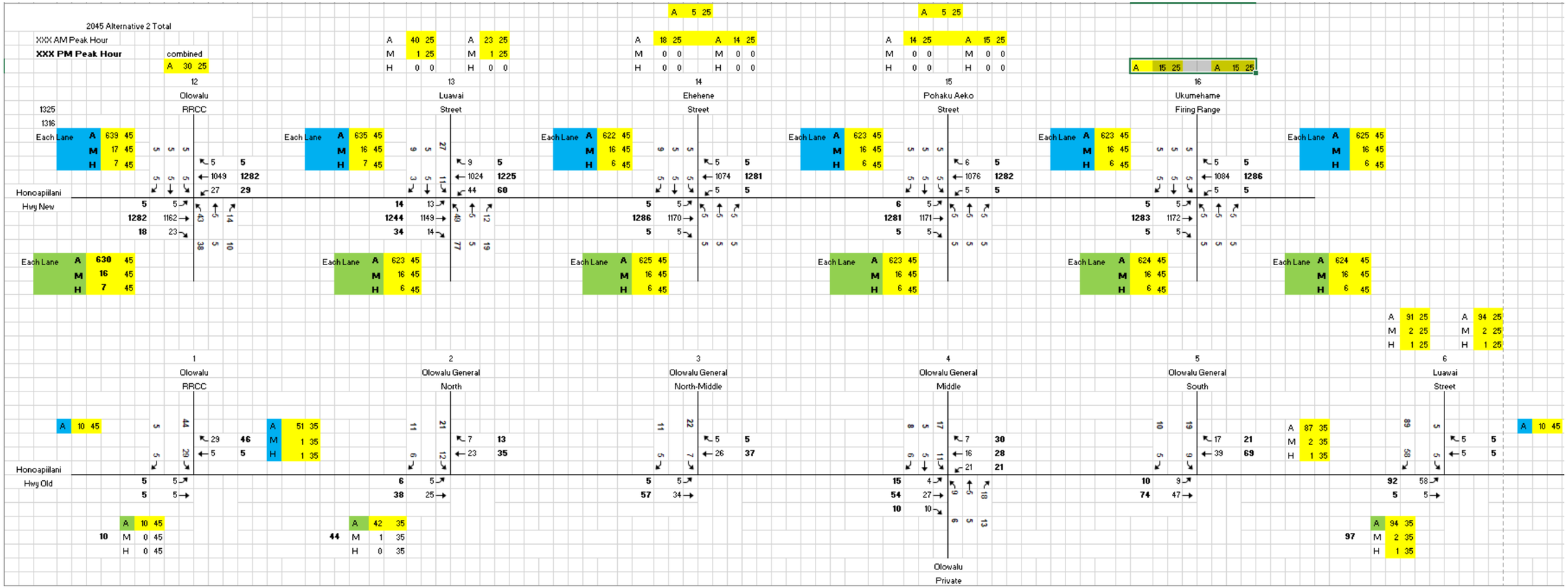


TABLE D-8. **Build Alternative 2 2045 Modeled Traffic Noise Levels – PM Peak Hour (Ukumehame)**

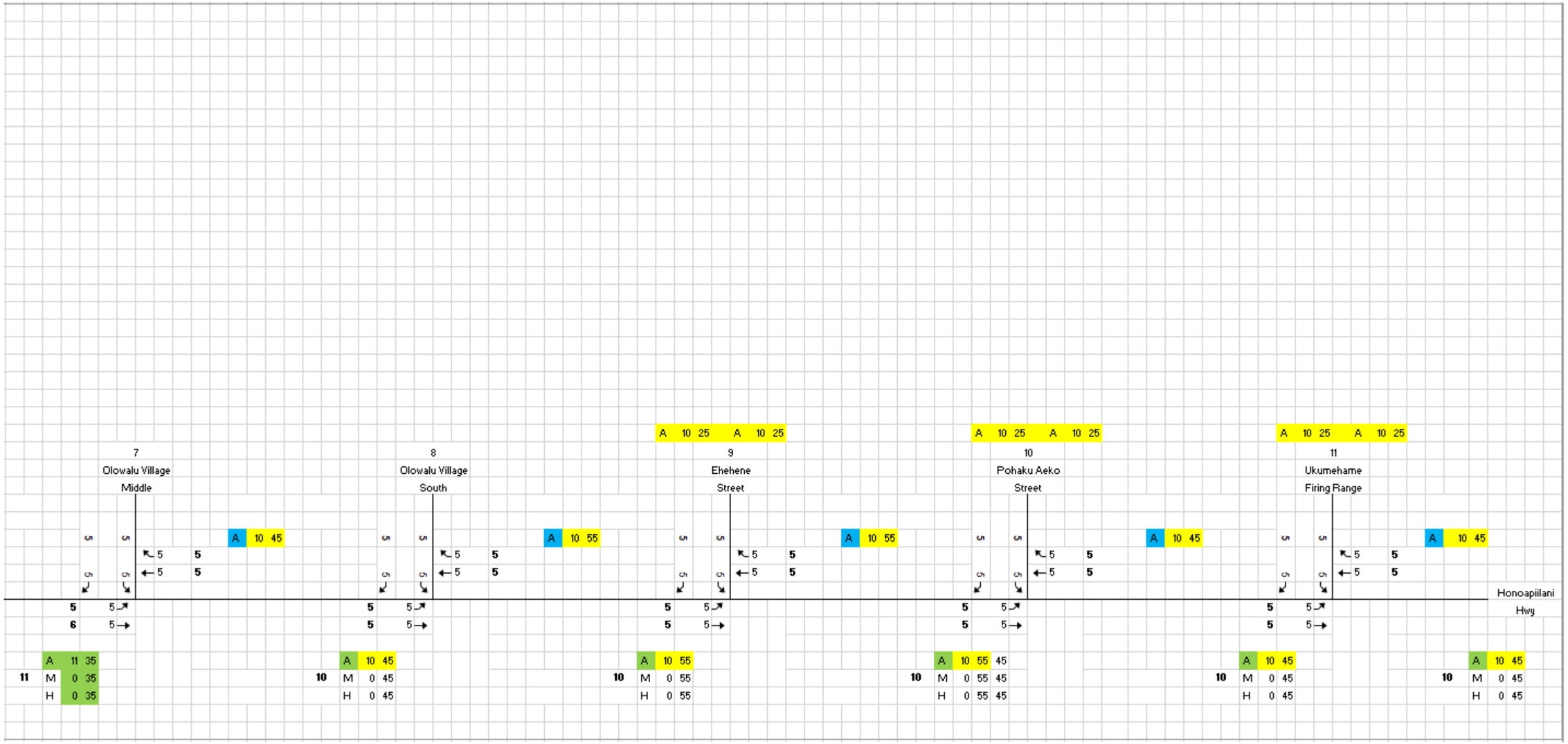


TABLE D-9. **Build Alternative 3 2045 Modeled Traffic Noise Levels – PM Peak Hour (Olowalu)**

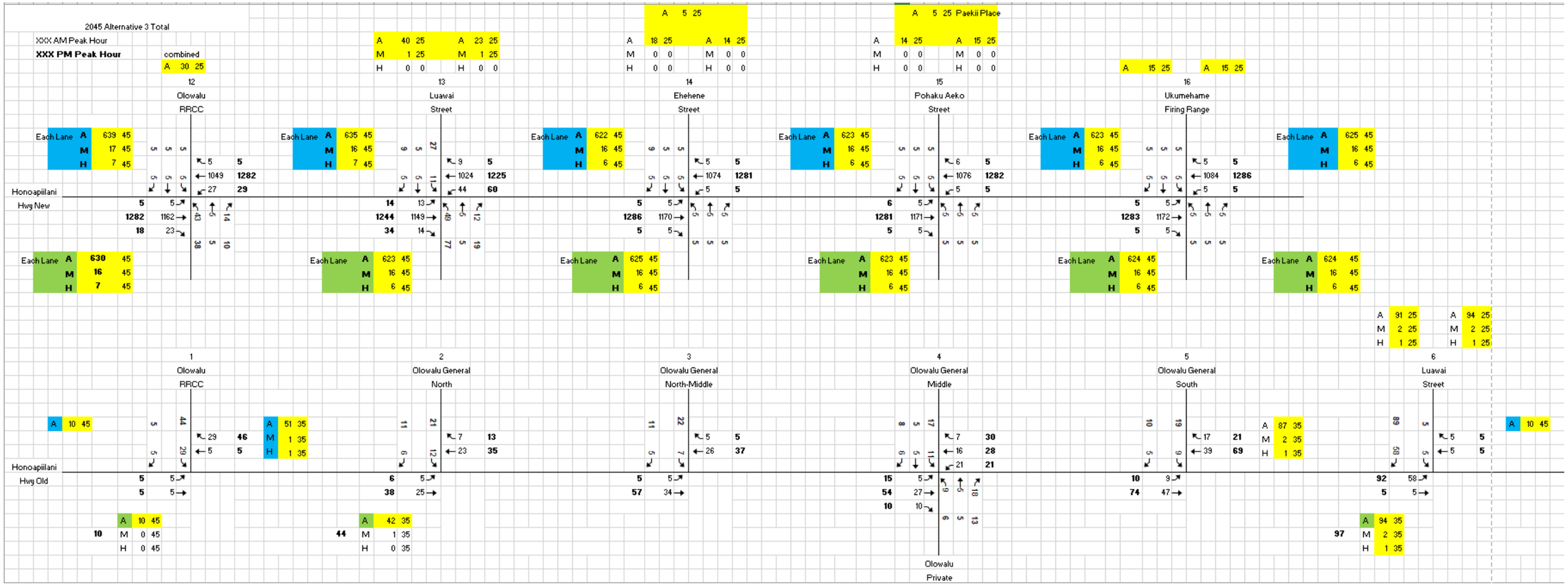


TABLE D-10. **Build Alternative 3 2045 Modeled Traffic Noise Levels – PM Peak Hour (Ukumehame)**

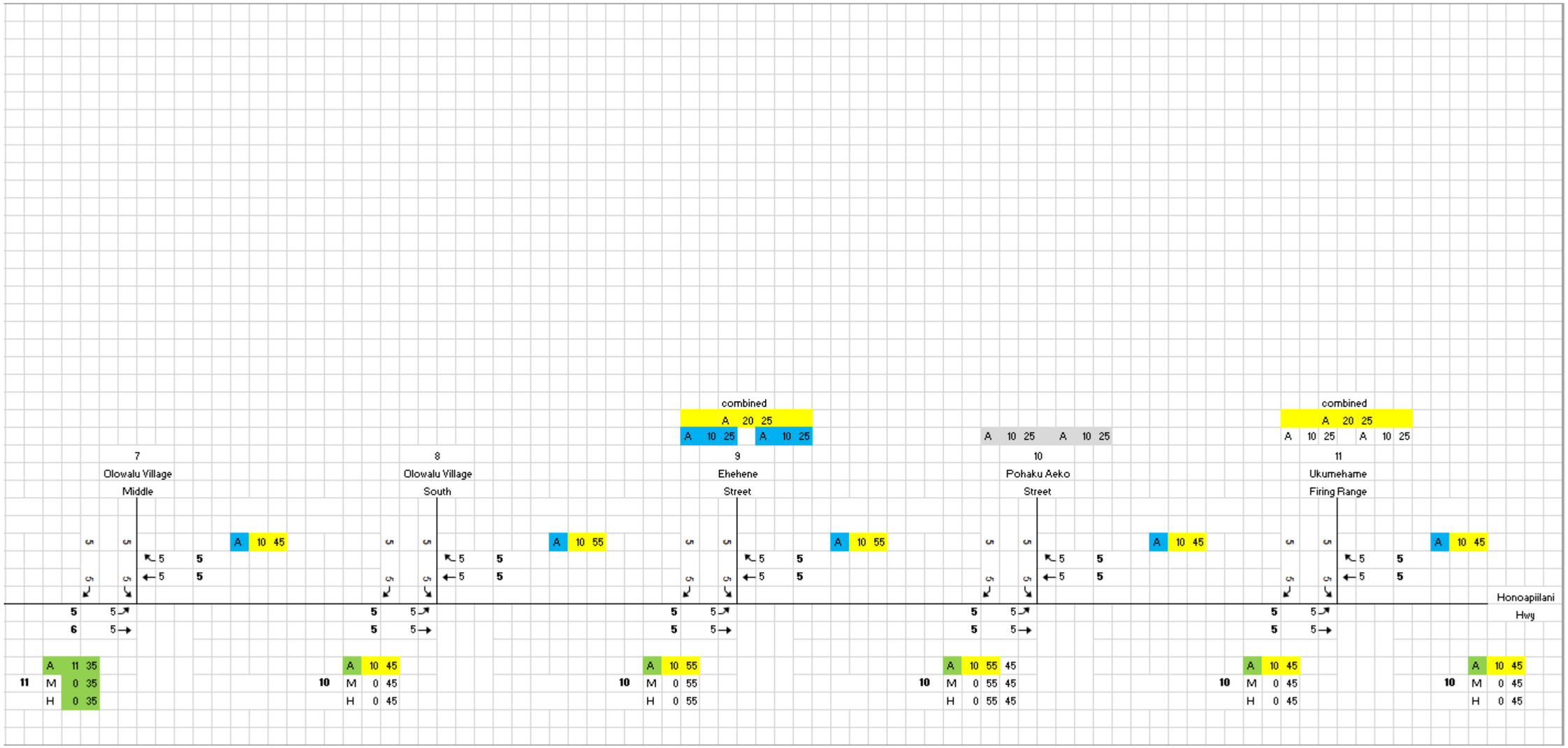

combined
A 20 25
A 10 25 A 10 25
7
Olowalu Village
Middle
8
Olowalu Village
South
9
Ehehene
Street
10
Pohaku Aeko
Street
A 10 25 A 10 25
11
Ukumehame
Firing Range
combined
A 20 25
A 10 25 A 10 25
A 10 45
A 10 55
A 10 45
A 10 55 45
A 10 45
A 10 45
5 5
5 5
5 5

TABLE D-11. **Build Alternative 4 2045 Modeled Traffic Noise Levels – PM Peak Hour (Olowalu)**

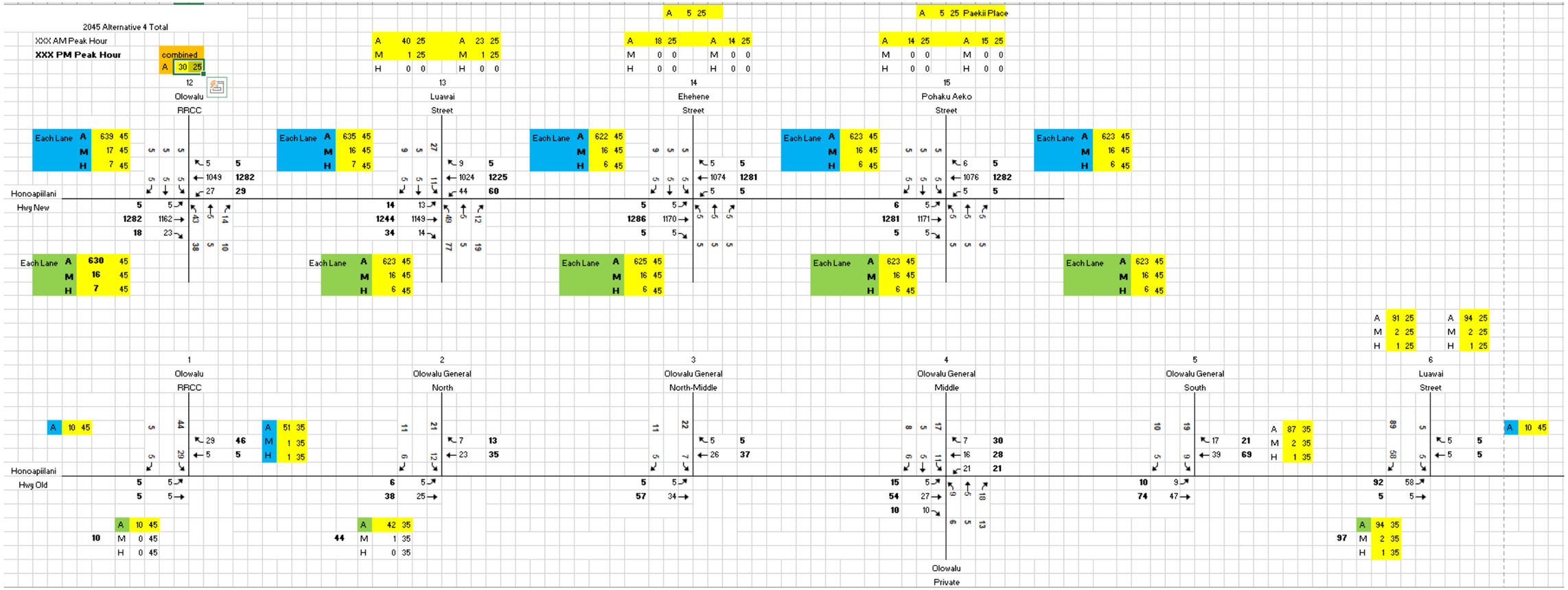
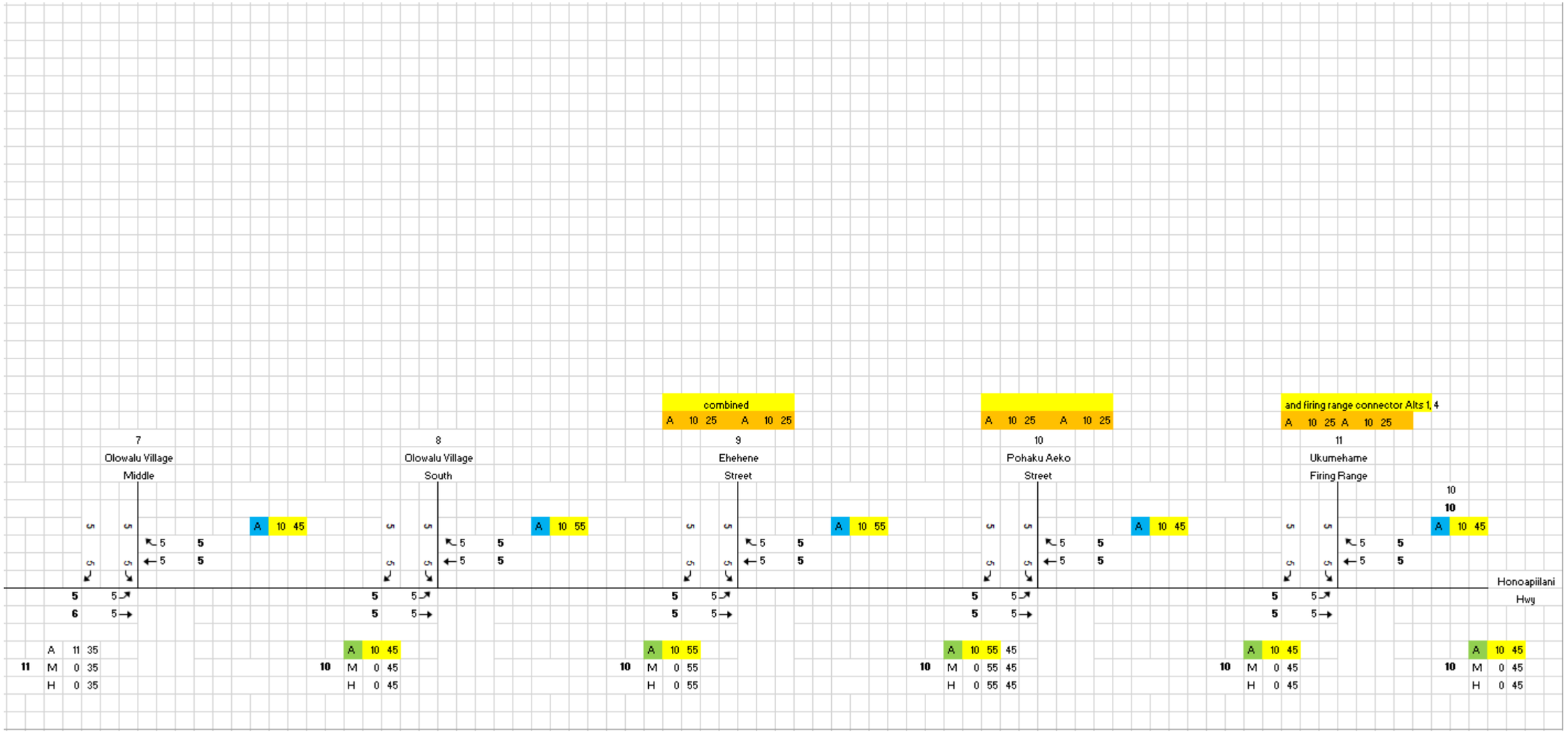


TABLE D-12. **Build Alternative 4 2045 Modeled Traffic Noise Levels – PM Peak Hour (Ukumehame)**



APPENDIX E – TRAFFIC NOISE MODELING DATA

TNM v2.5 files of all noise modeling files are provided electronically with the Final Noise Technical Report. Modeling files developed for this report are organized and labeled as shown in Table E-1.

TABLE E-1. **TNM File Names and Descriptions**

TNM FILE NAME	DESCRIPTION OF CONTENTS
HDOT_HonoHwy _TNM_Validations	File contains 10 files with modeled noise levels from measurement locations. Sites used for model validation are: Val_FM3 aligns with Measurement Site ST-3; Val_FM_5 aligns with Measurement Site ST-5; Val_FM7 aligns with Measurement Site ST-7; Val_FM_8 aligns with Measurement Site ST-8; Val_FM9 aligns with Measurement Site ST-9; Val_FM_10 aligns with Measurement Site ST-10.
HDOT_HonoHwy _TNM_Existing	File contains existing conditions modeled noise levels.
HDOT_HonoHwy _TNM_No Build	File contains future No Build modeled noise levels.
HDOT_HonoHwy _TNM_Alt1	File contains future Build Alternative 1 modeled noise levels.
HDOT_HonoHwy _TNM_Alt2	File contains future Build Alternative 2 modeled noise levels.
HDOT_HonoHwy _TNM_Alt3	File contains future Build Alternative 3 modeled noise levels.
HDOT_HonoHwy _TNM_Alt4	File contains future Build Alternative 4 modeled noise levels.
HDOT_HonoHwy _TNM_Alt4_Mitigation	File contains future Build Alternative 4, Noise Barrier 1 barrier evaluation.

Source: WSP, 2024.

HONOAPIʻILANI HIGHWAY IMPROVEMENTS PROJECT,
WEST MAUI: UKUMEHAME TO LAUNIUPOKO

Appendix 3.18 – Hazardous Materials – Supplemental Information

November 2025

Prepared for

Honoapiʻilani Highway Improvements

Prepared by

wsp

November 2025

Contents

EDR Aerial Photo Decade Package
EDR Historical Topography and Maps
EDR Area/Corridor Report
EDR Database Report: Well Search Report and Map
EDR City Directory Image Report
Photographic Documentation

EDR
Aerial Photo Decade Package

HDOT Honoapiilani Hwy Improvements

HDOT Honoapiilani Hwy Improvements

Lahaina, HI 96761

Inquiry Number: 7324924.4

May 03, 2023

The EDR Aerial Photo Decade Package

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

Date EDR Searched Historical Sources:

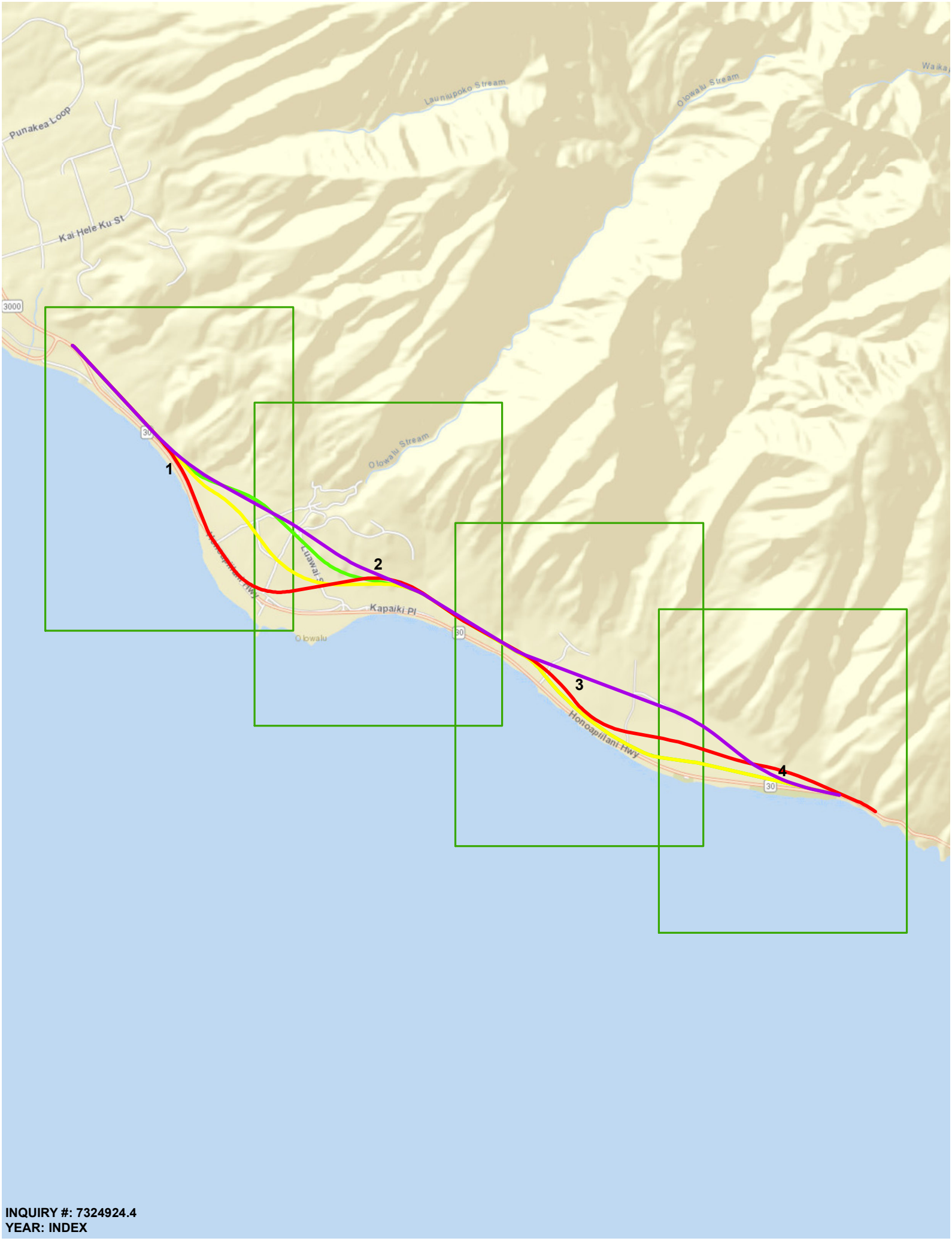
Aerial Photography May 03, 2023

Target Property:

HDOT Honoapiilani Hwy Improvements

Lahaina, HI 96761

Year	***Scale***	***Details***	***Source***
1950	Aerial Photograph. Scale: 1"=1000'	Flight Year: 1950	USGS
1965	Aerial Photograph. Scale: 1"=1000'	Flight Year: 1965	USDA
1976	Aerial Photograph. Scale: 1"=1000'	Flight Year: 1976	USGS
1977	Aerial Photograph. Scale: 1"=1000'	Flight Year: 1977	USGS
1992	Aerial Photograph. Scale: 1"=1000'	Flight Year: 1992	USGS
2000-2001	Aerial Photograph. Scale: 1"=1000'	Flight Year: 2000-2001	USGS/DOQQ
2010	Aerial Photograph. Scale: 1"=1000'	Flight Year: 2010	USDA
2015	Aerial Photograph. Scale: 1"=1000'	Flight Year: 2015	USDA
2017	Aerial Photograph. Scale: 1"=1000'	Flight Year: 2017	USDA



INQUIRY #: 7324924.4
YEAR: INDEX



INQUIRY #: 7324924.4
YEAR: 1950
SCALE: 1"=1000'



INQUIRY #: 7324924.4
YEAR: 1950
SCALE: 1"=1000'



INQUIRY #: 7324924.4
YEAR: 1950
SCALE: 1"=1000'



INQUIRY #: 7324924.4
YEAR: 1950
SCALE: 1"=1000'



INQUIRY #: 7324924.4
YEAR: 1965
SCALE: 1"=1000'



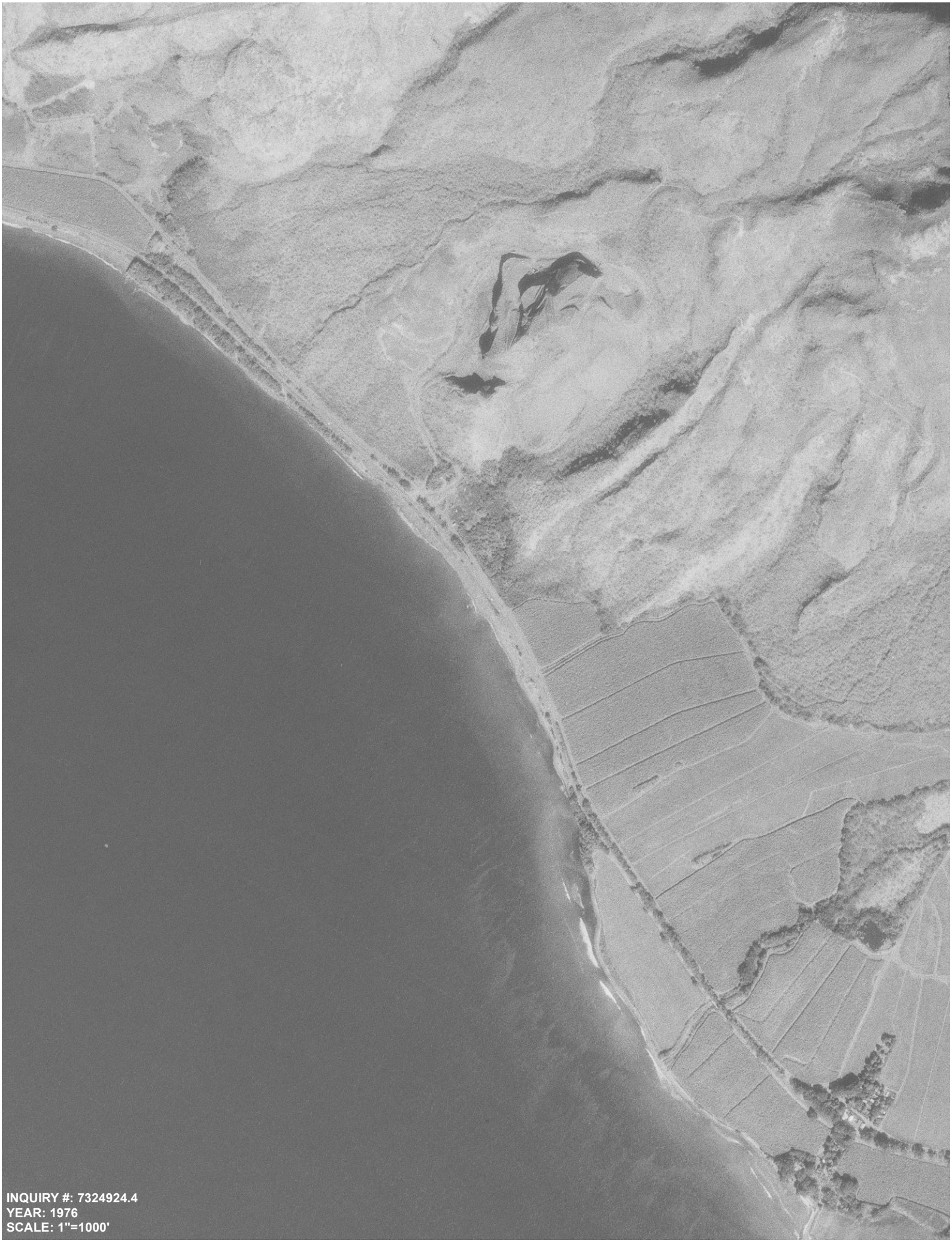
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SCALE: 1"=1000'



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YEAR: 1965
SCALE: 1"=1000'



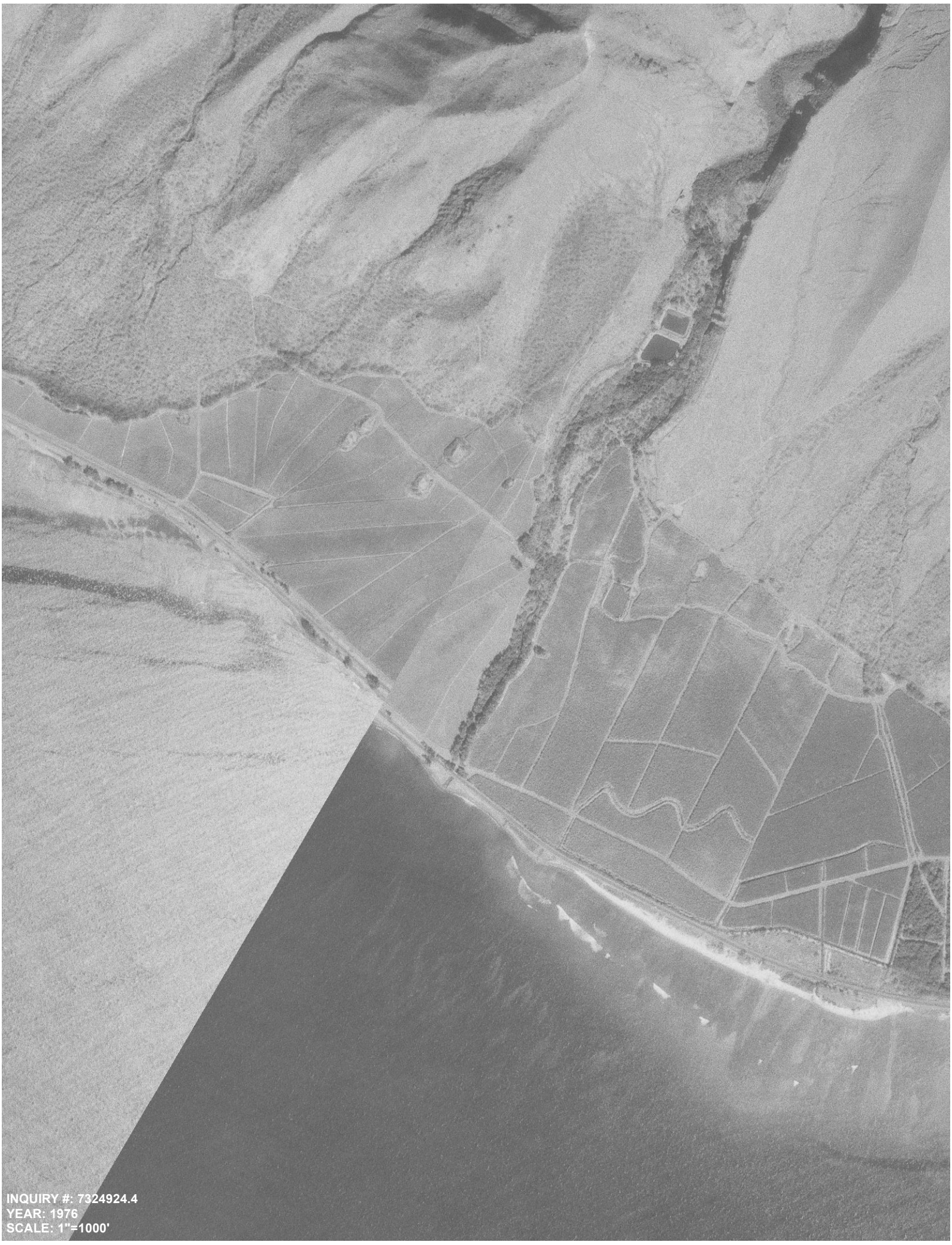
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INQUIRY #: 7324924.4
YEAR: 1976
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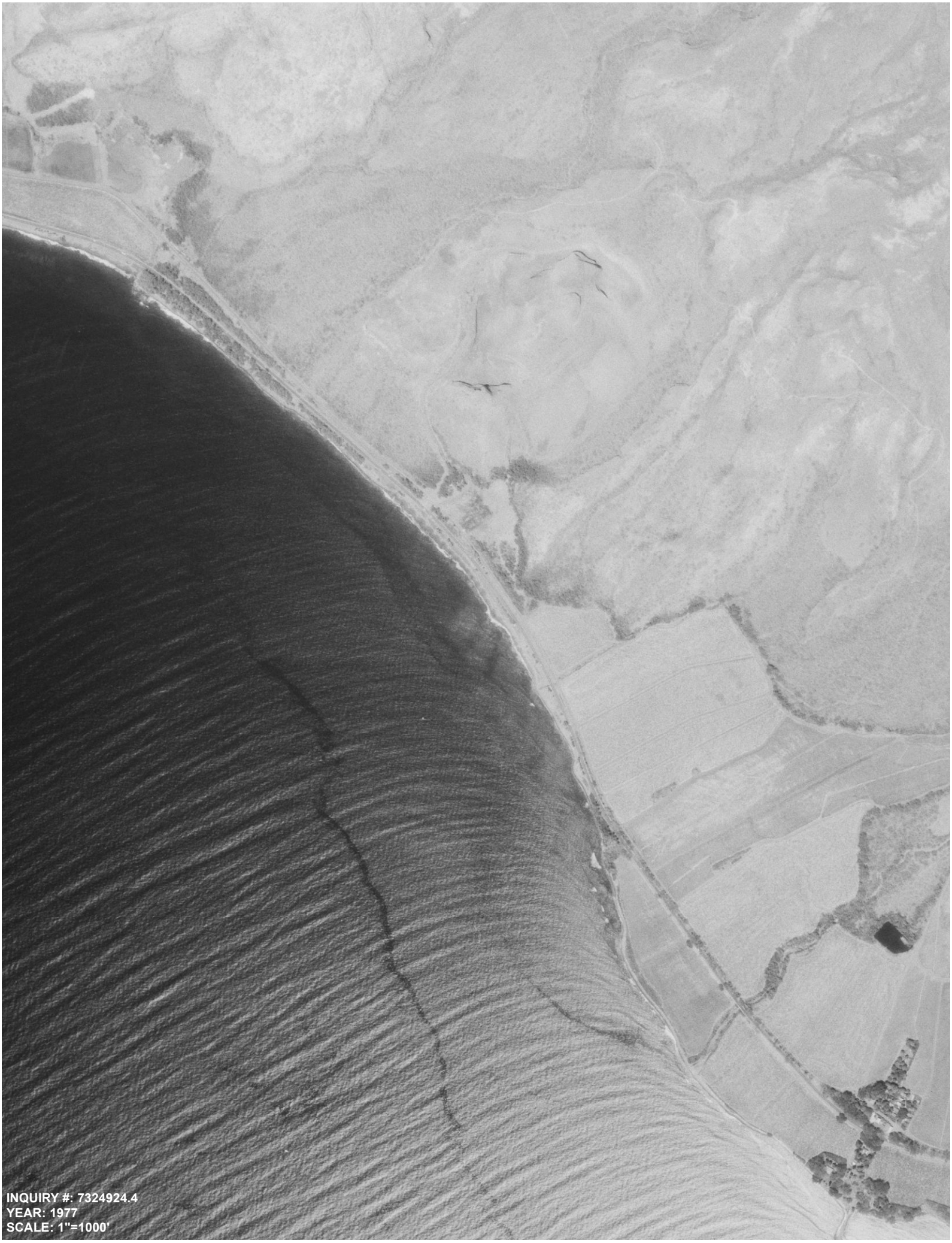
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SCALE: 1"=1000'



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YEAR: 1976
SCALE: 1"=1000'



INQUIRY #: 7324924.4
YEAR: 1976
SCALE: 1"=1000'



INQUIRY #: 7324924.4
YEAR: 1977
SCALE: 1"=1000'



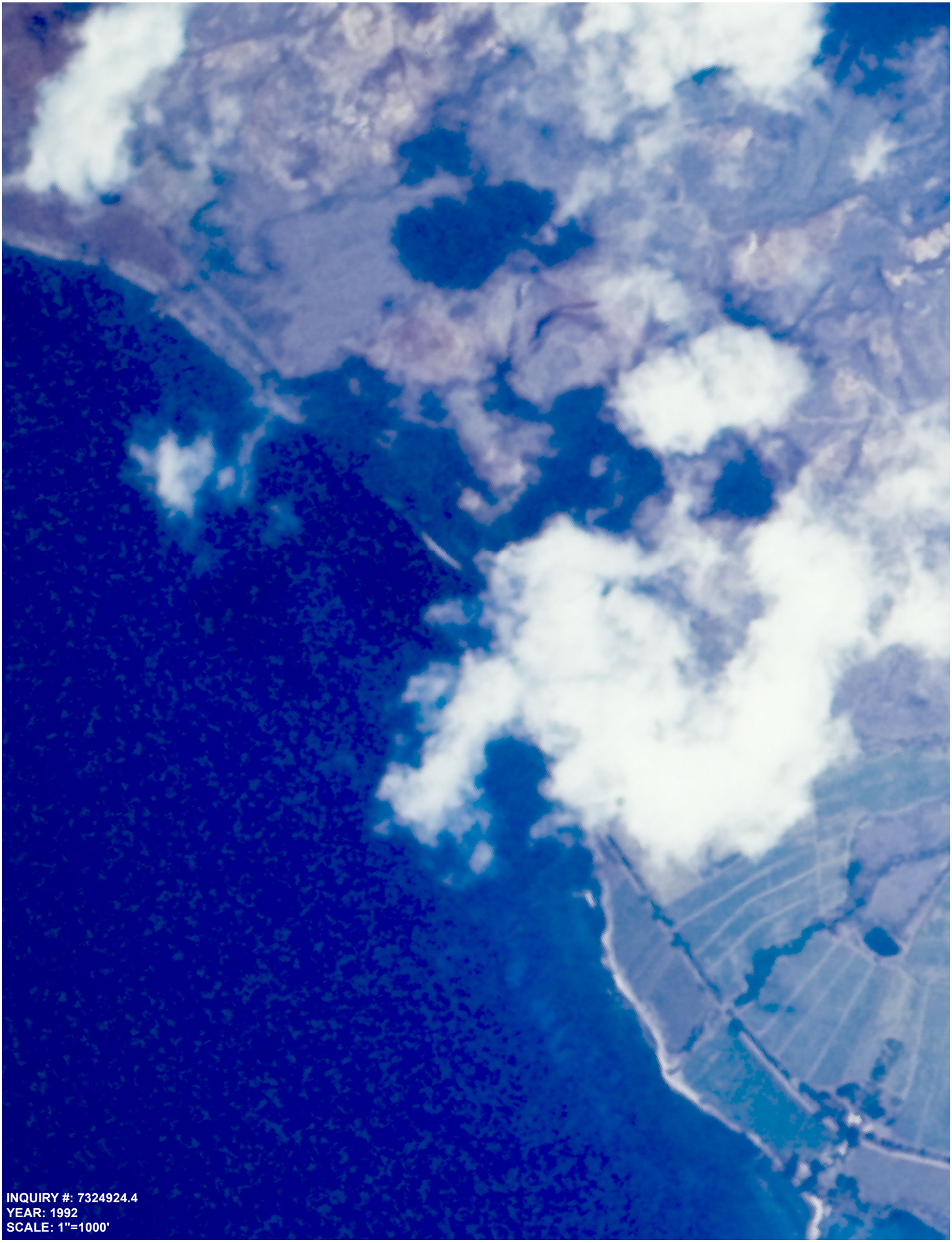
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YEAR: 1977
SCALE: 1"=1000'



INQUIRY #: 7324924.4
YEAR: 1977
SCALE: 1"=1000'

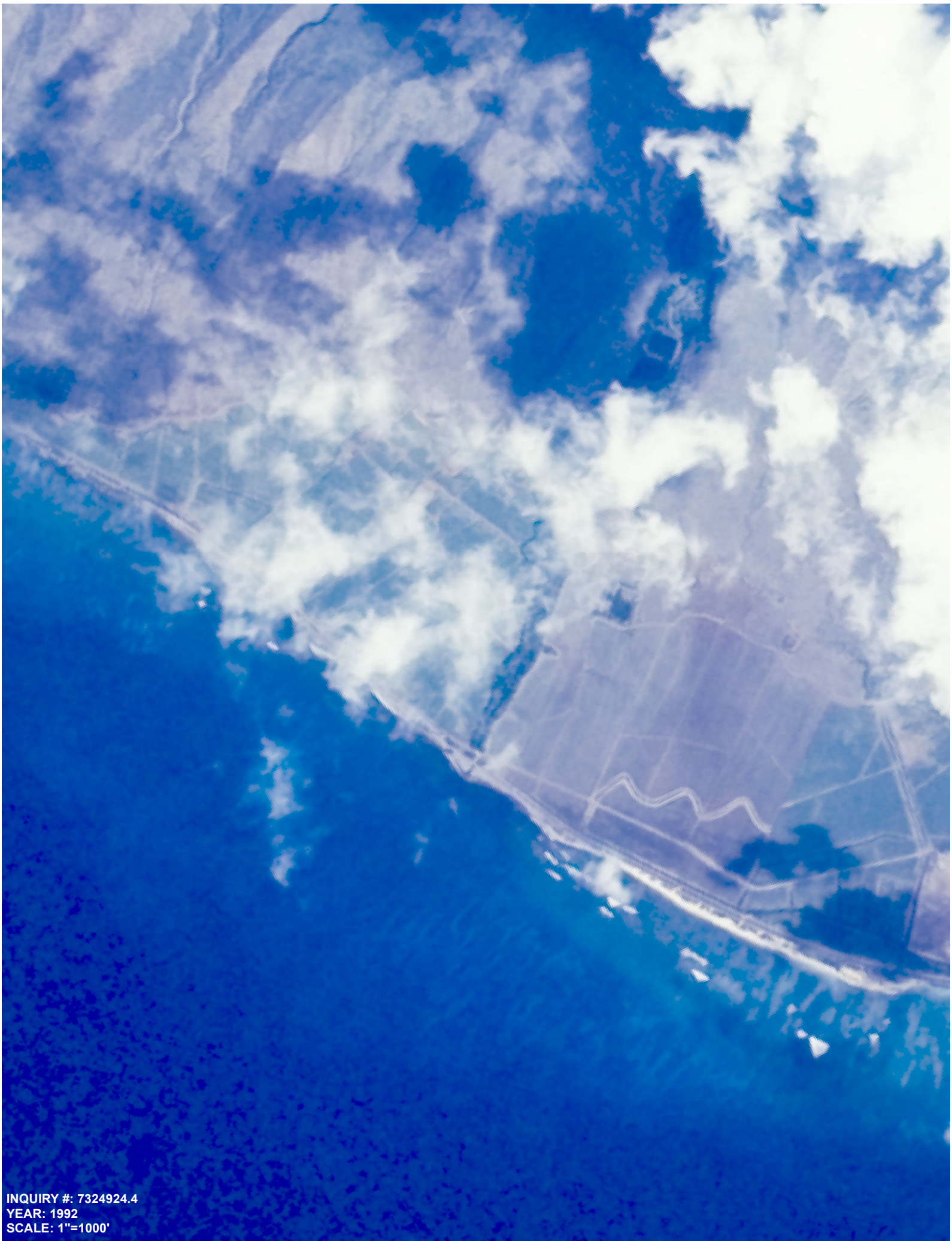


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YEAR: 1992
SCALE: 1"=1000'



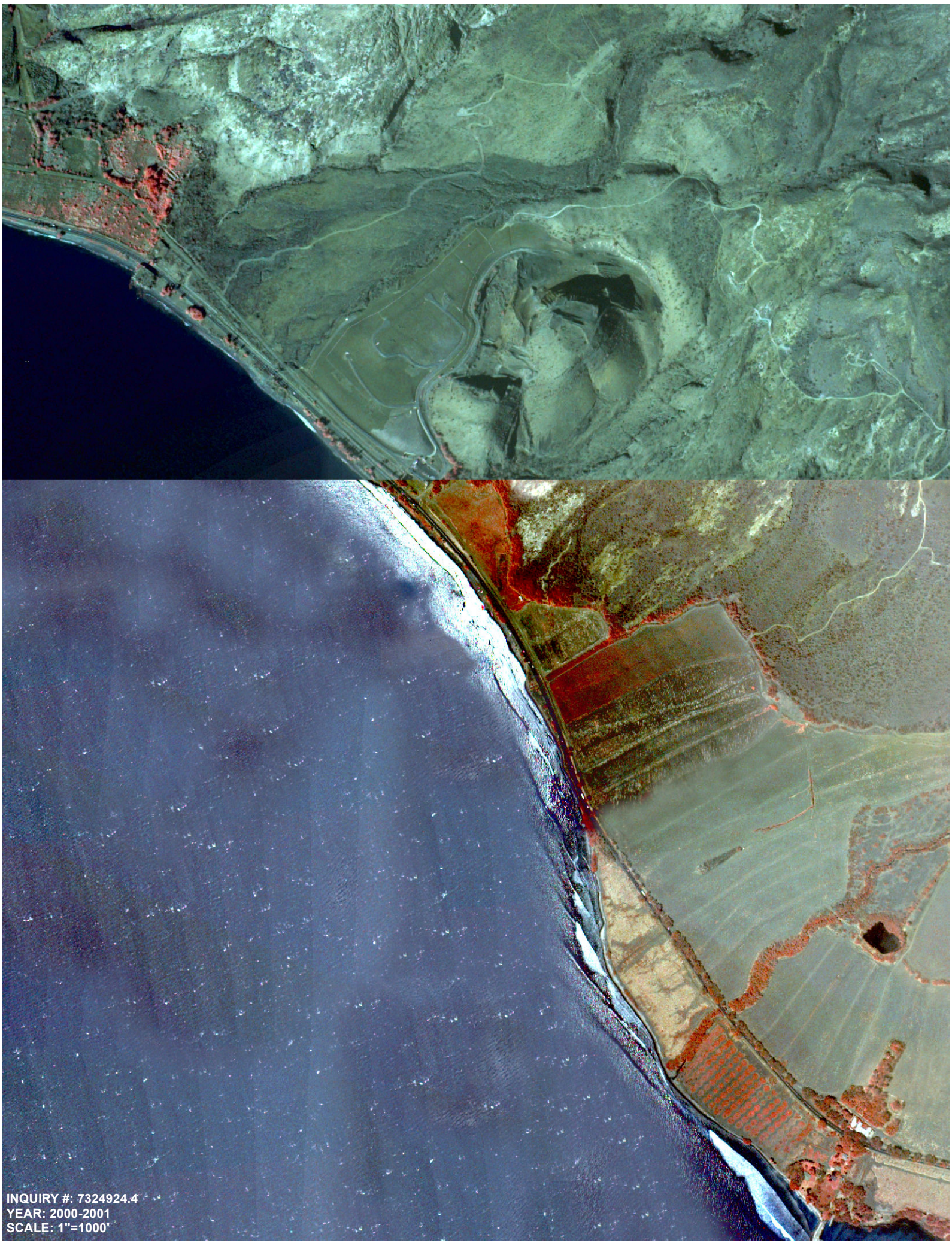
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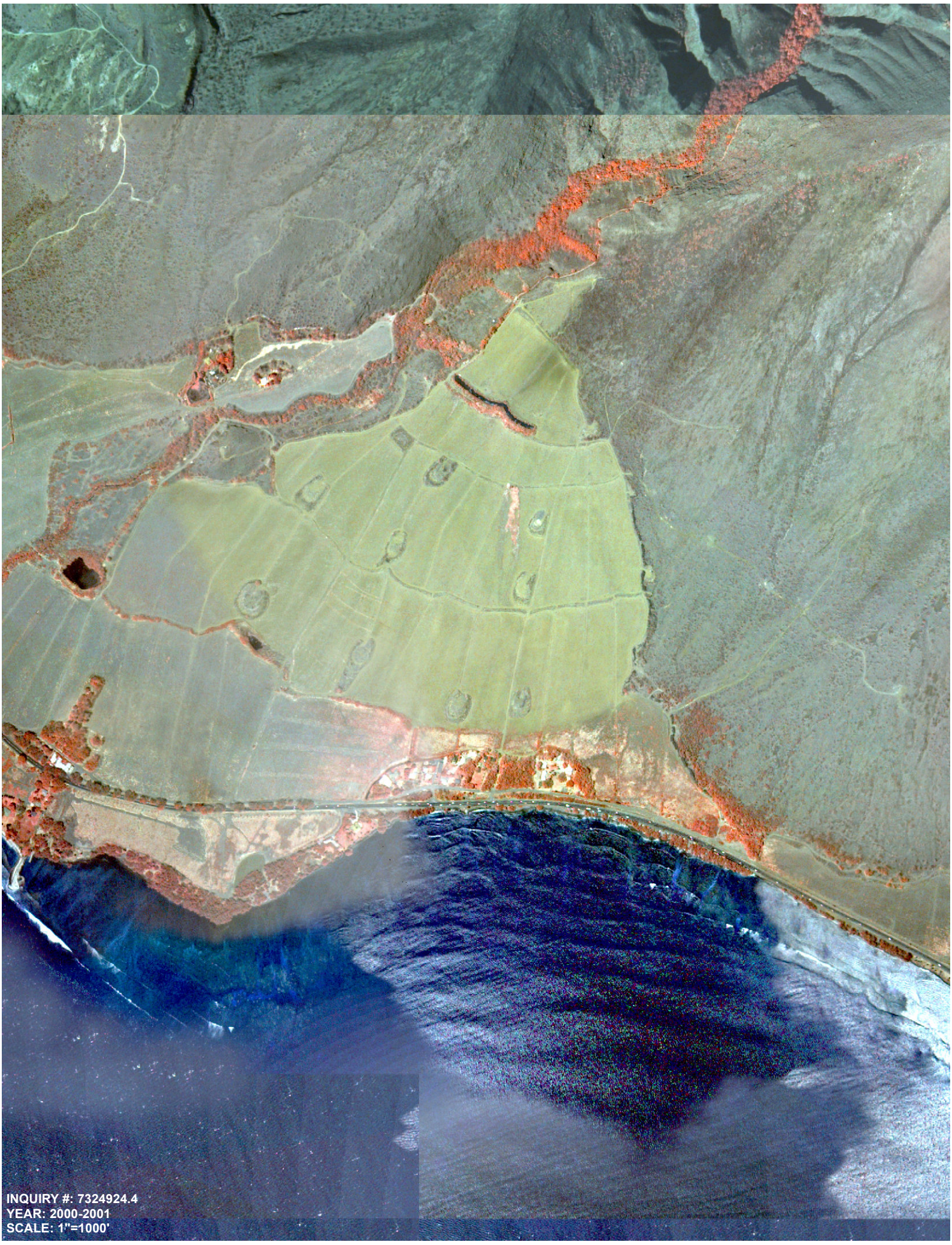


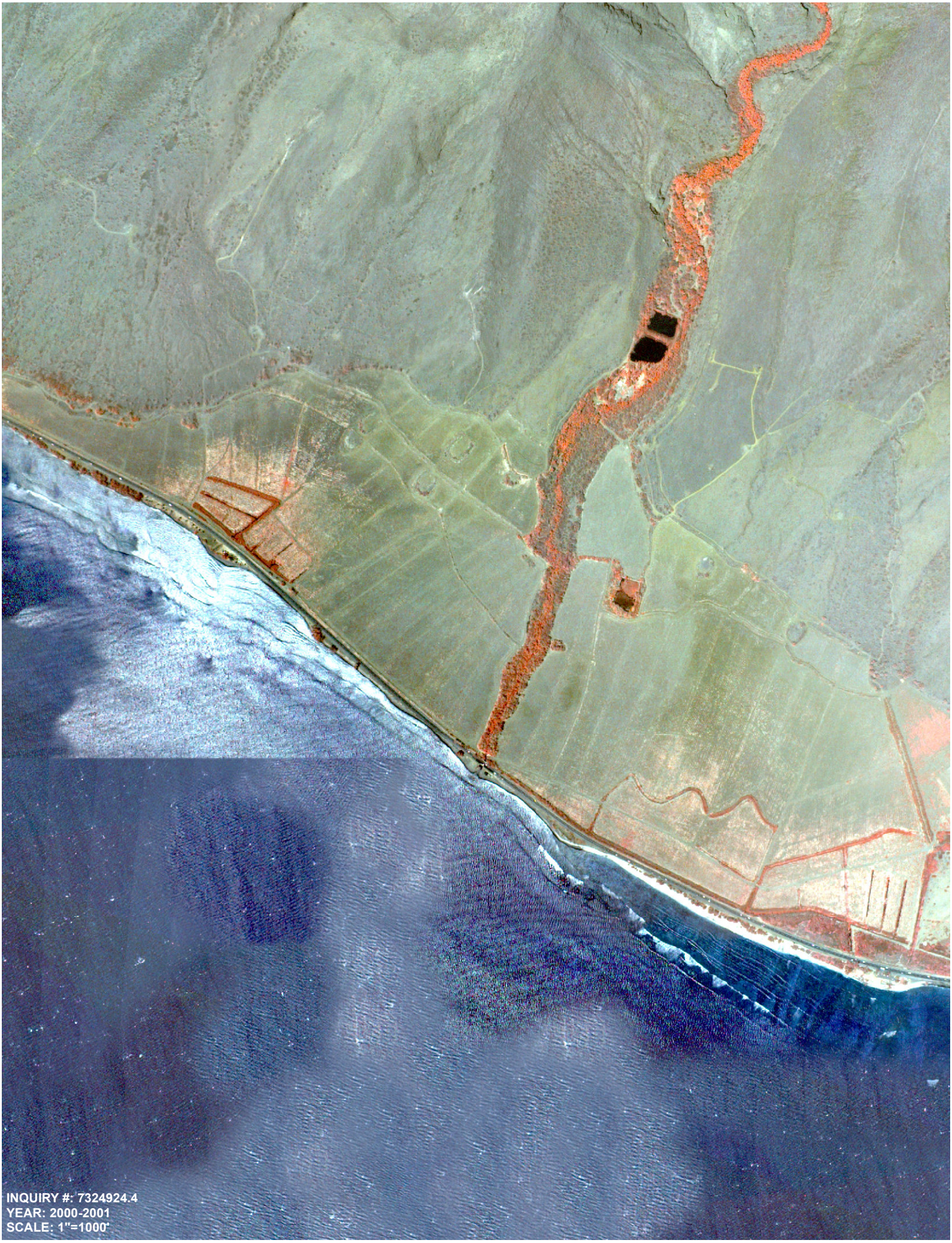
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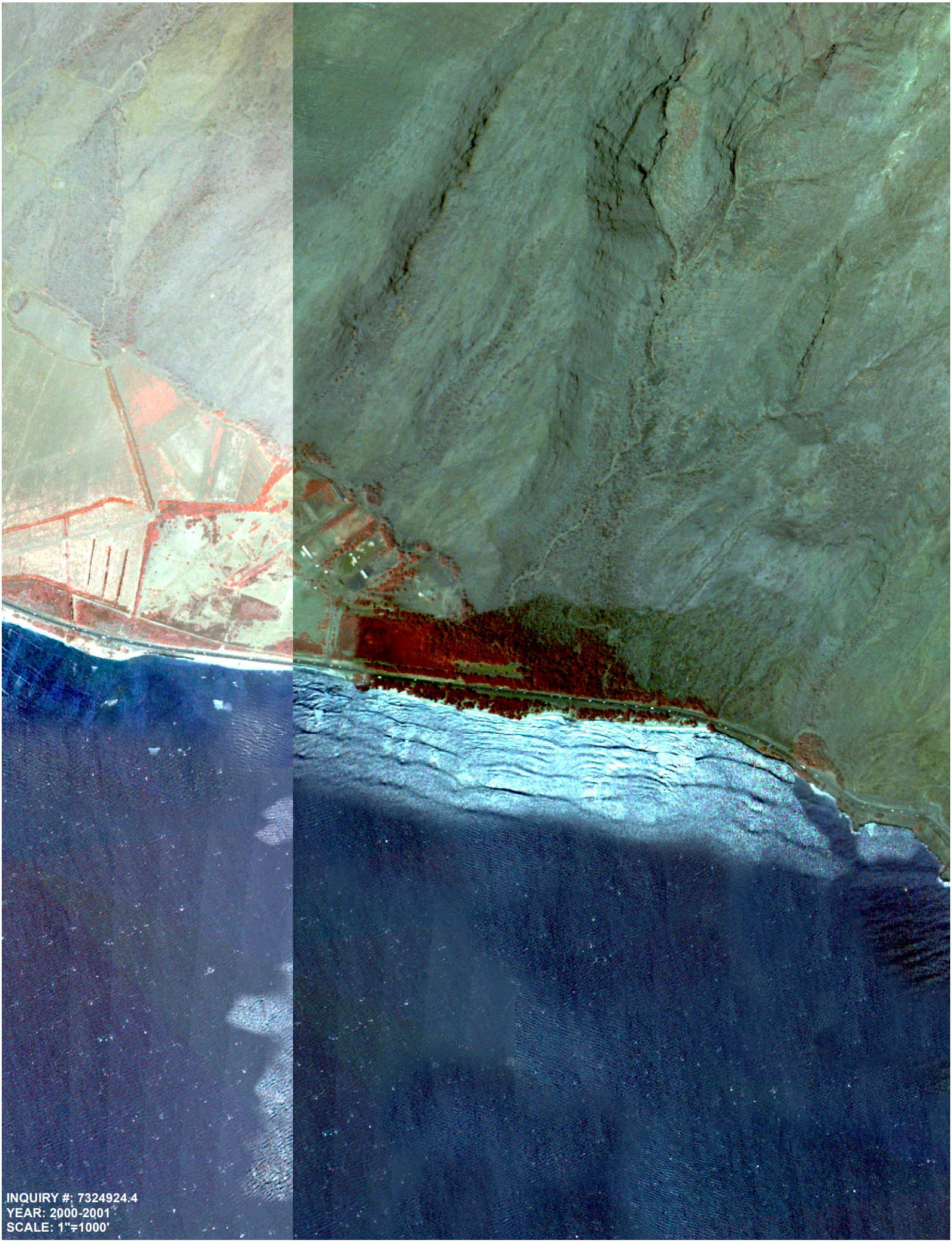


INQUIRY #: 7324924.4
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SCALE: 1"=1000'


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YEAR: 2000-2001
SCALE: 1"=1000'


INQUIRY #: 7324924.4
YEAR: 2000-2001
SCALE: 1"=1000'


INQUIRY #: 7324924.4
YEAR: 2000-2001
SCALE: 1"=1000'


INQUIRY #: 7324924.4
YEAR: 2000-2001
SCALE: 1"=1000'


INQUIRY #: 7324924.4
YEAR: 2010
SCALE: 1"=1000'



INQUIRY #: 7324924.4
YEAR: 2010
SCALE: 1"=1000'


INQUIRY #: 7324924.4
YEAR: 2010
SCALE: 1"=1000'


INQUIRY #: 7324924.4
YEAR: 2010
SCALE: 1"=1000'



INQUIRY #: 7324924.4
YEAR: 2015
SCALE: 1"=1000'


INQUIRY #: 7324924.4
YEAR: 2015
SCALE: 1"=1000'

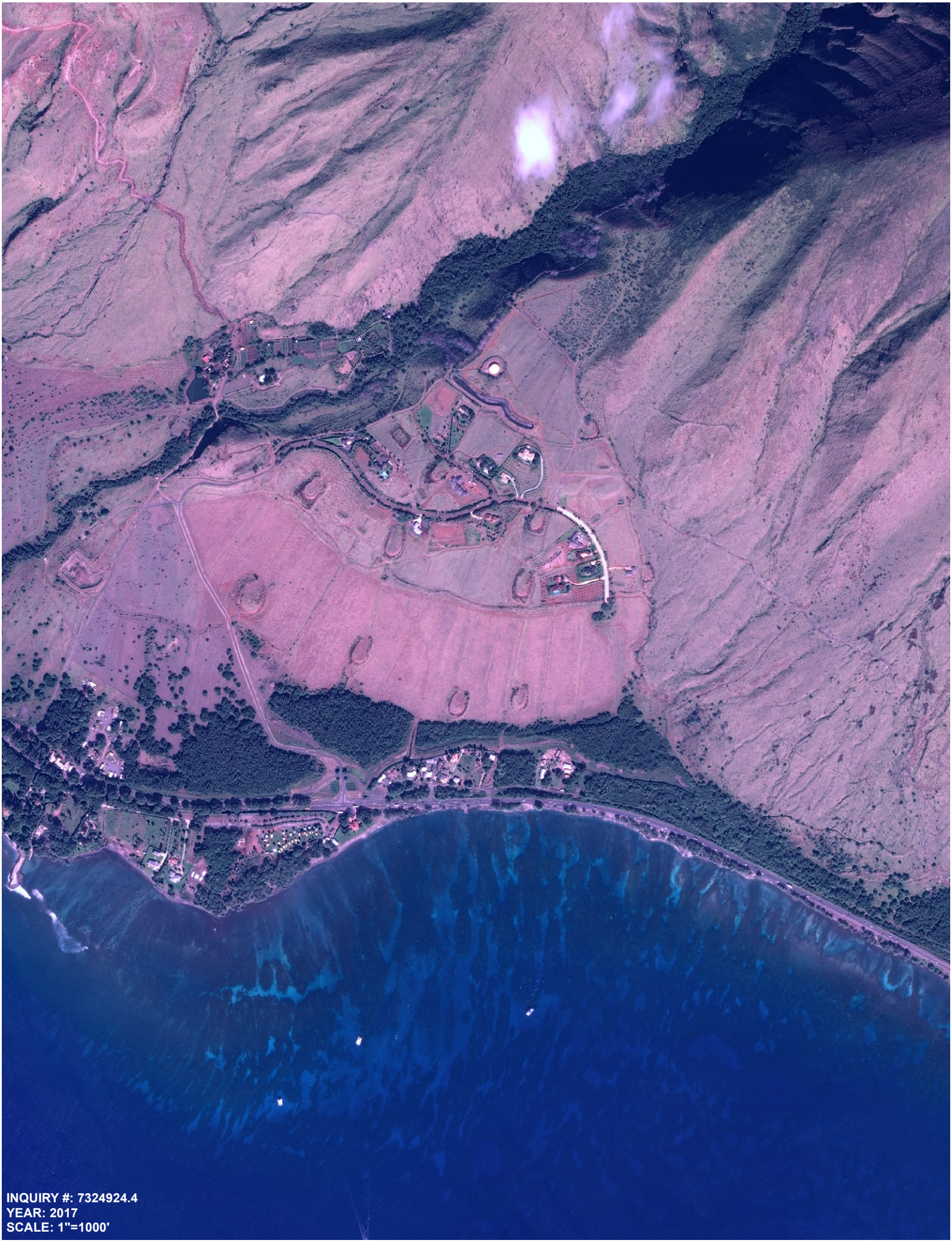


INQUIRY #: 7324924.4
YEAR: 2015
SCALE: 1"=1000'

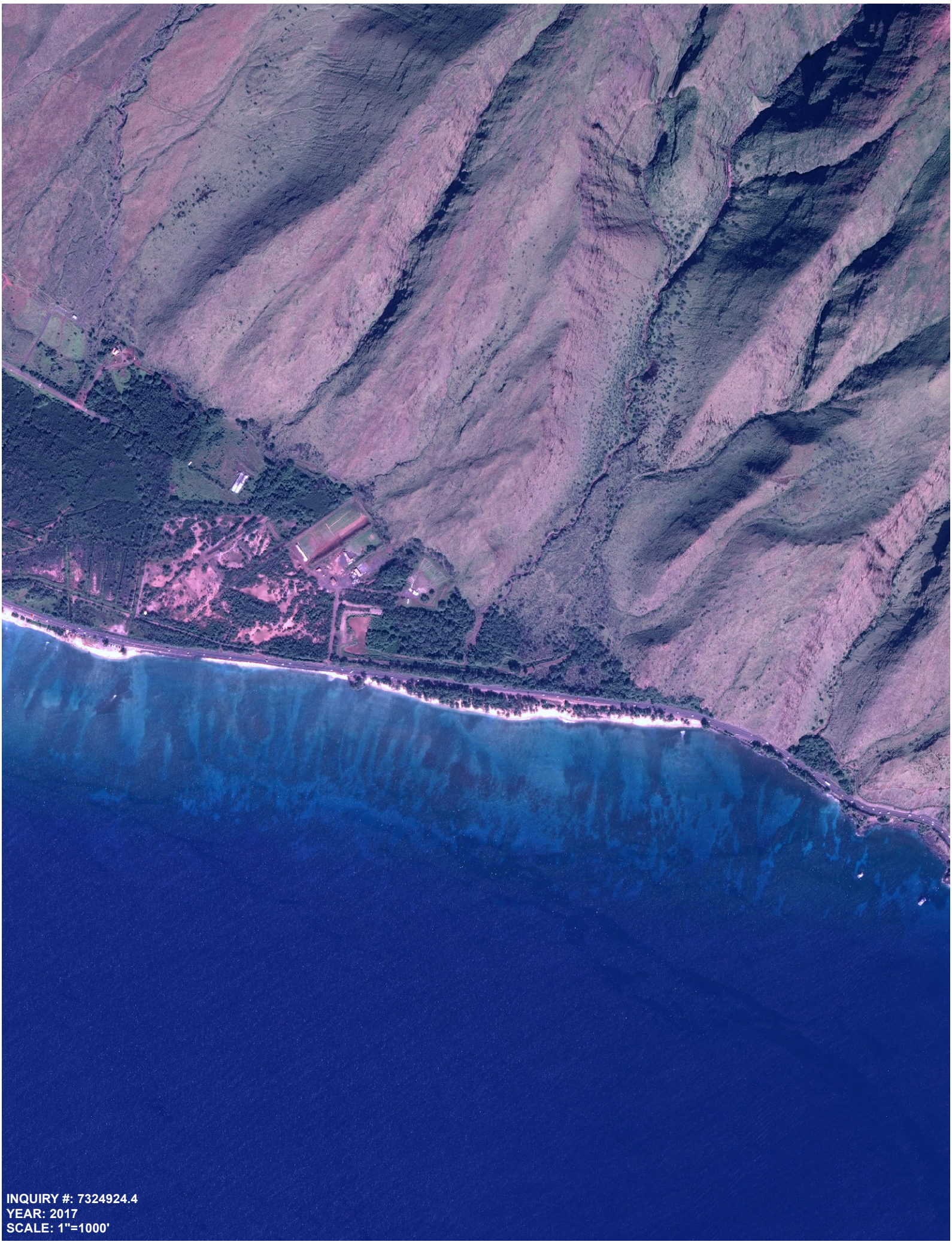


INQUIRY #: 7324924.4
YEAR: 2015
SCALE: 1"=1000'


INQUIRY #: 7324924.4
YEAR: 2017
SCALE: 1"=1000'


INQUIRY #: 7324924.4
YEAR: 2017
SCALE: 1"=1000'


INQUIRY #: 7324924.4
YEAR: 2017
SCALE: 1"=1000'



INQUIRY #: 7324924.4
YEAR: 2017
SCALE: 1"=1000'

EDR
Historical Topography and Maps

HDOT Honoapiilani Hwy Improvements

HDOT Honoapiilani Hwy Improvements

Lahaina, HI 96761

Inquiry Number: 7324924.1

May 03, 2023

EDR Historical Topo Map Report

with QuadMatch™

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Historical Topo Map Report

05/03/23

Site Name:	Client Name:
HDOT Honoapiilani Hwy Impro	WSP
HDOT Honoapiilani Hwy Impro	999 3rd Avenue
Lahaina, HI 96761	Seattle, WA 98104
EDR Inquiry # 7324924.1	Contact: April Ryckman

EDR Topographic Map Library has been searched by EDR and maps covering the target property location as provided by WSP were identified for the years listed below. EDR's Historical Topo Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topo Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the late 1800s.

Search Results:

P.O.# NA

Project: 31000290.000

Coordinates:

Latitude:	20.80899 20° 48' 32" North
Longitude:	-156.60301 -156° 36' 11" West
UTM Zone:	Zone 4 North
UTM X Meters:	749486.66
UTM Y Meters:	2302862.98
Elevation:	31.94' above sea level

Maps Provided:

2017	1955, 1956
2013	1954, 1955
1992	1954, 1955, 1956
1992, 1996	1923
1992, 1996, 1997	
1983	
1961	
1955	

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Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

2017 Source Sheets



Olowalu
2017
7.5-minute, 24000



Maalaea
2017
7.5-minute, 24000



Lahaina
2017
7.5-minute, 24000



Wailuku
2017
7.5-minute, 24000

2013 Source Sheets



Maalaea
2013
7.5-minute, 24000



Wailuku
2013
7.5-minute, 24000



Olowalu
2013
7.5-minute, 24000



Lahaina
2013
7.5-minute, 24000

1992 Source Sheets



Olowalu
1992
7.5-minute, 24000
Aerial Photo Revised 1992

1992, 1996 Source Sheets



Maalaea
1996
7.5-minute, 24000
Aerial Photo Revised 1996

Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

1992 Source Sheets



Lahaina
1992
7.5-minute, 24000
Aerial Photo Revised 1992

1992, 1996, 1997 Source Sheets



Wailuku
1997
7.5-minute, 24000
Aerial Photo Revised 1997

1983 Source Sheets



Olowalu
1983
7.5-minute, 24000
Aerial Photo Revised 1977



LAHAINA
1983
7.5-minute, 24000



Maalaea
1983
7.5-minute, 24000
Aerial Photo Revised 1977



Wailuku
1983
7.5-minute, 24000
Aerial Photo Revised 1977

1961 Source Sheets



MAUI
1961
15-minute, 62500

Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

1955 Source Sheets



Olowalu
1955
7.5-minute, 24000
Aerial Photo Revised 1950

1955, 1956 Source Sheets



Lahaina
1956
7.5-minute, 24000
Aerial Photo Revised 1950

1954, 1955 Source Sheets



Maalaea
1954
7.5-minute, 24000
Aerial Photo Revised 1950

1954, 1955, 1956 Source Sheets



Wailuku
1955
7.5-minute, 24000
Aerial Photo Revised 1950

Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

1923 Source Sheets



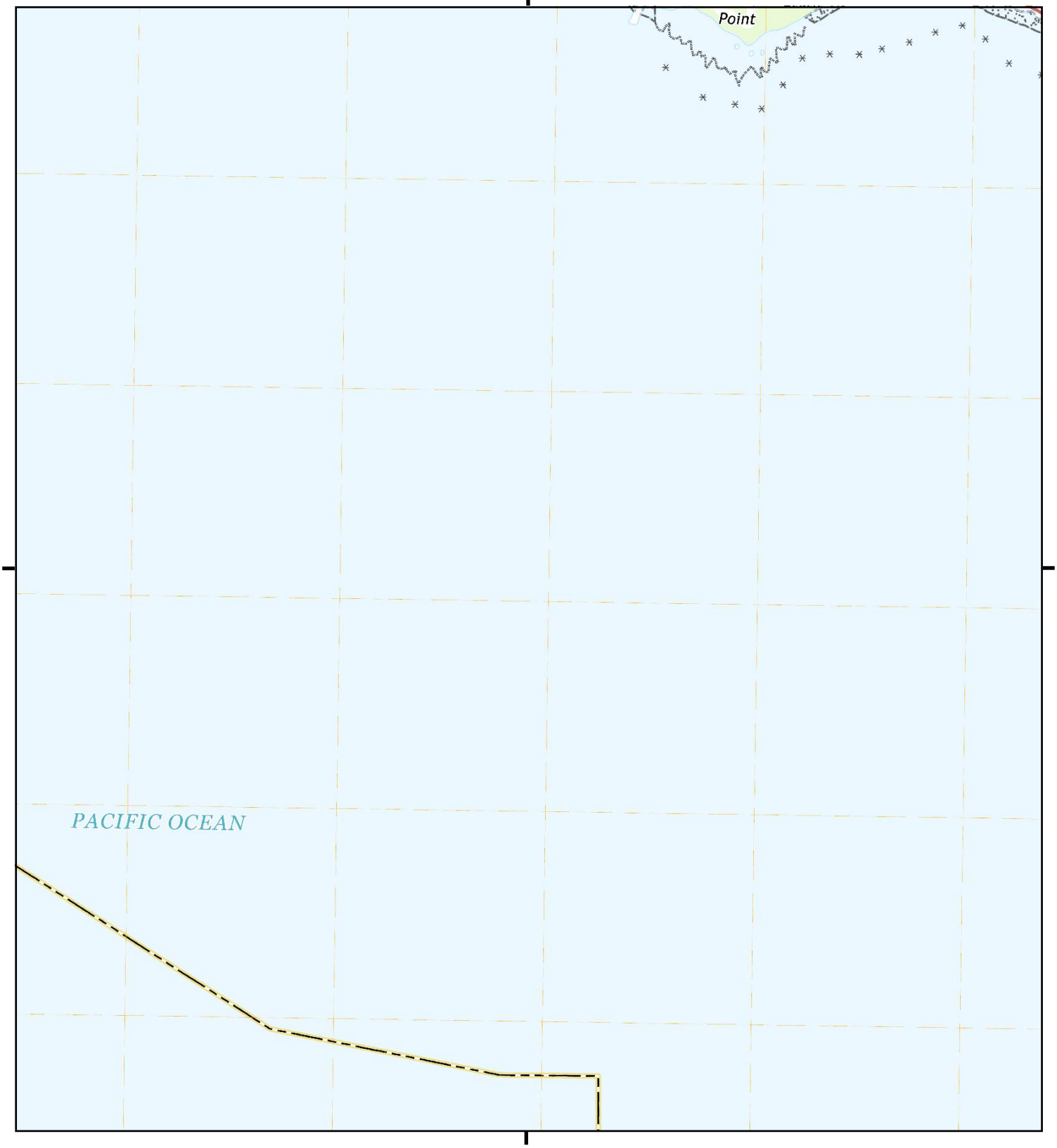
LAUNIUPOKO
1923
7.5-minute, 31680



MAALAEA
1923
7.5-minute, 31680

Historical Topo Map

2017



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

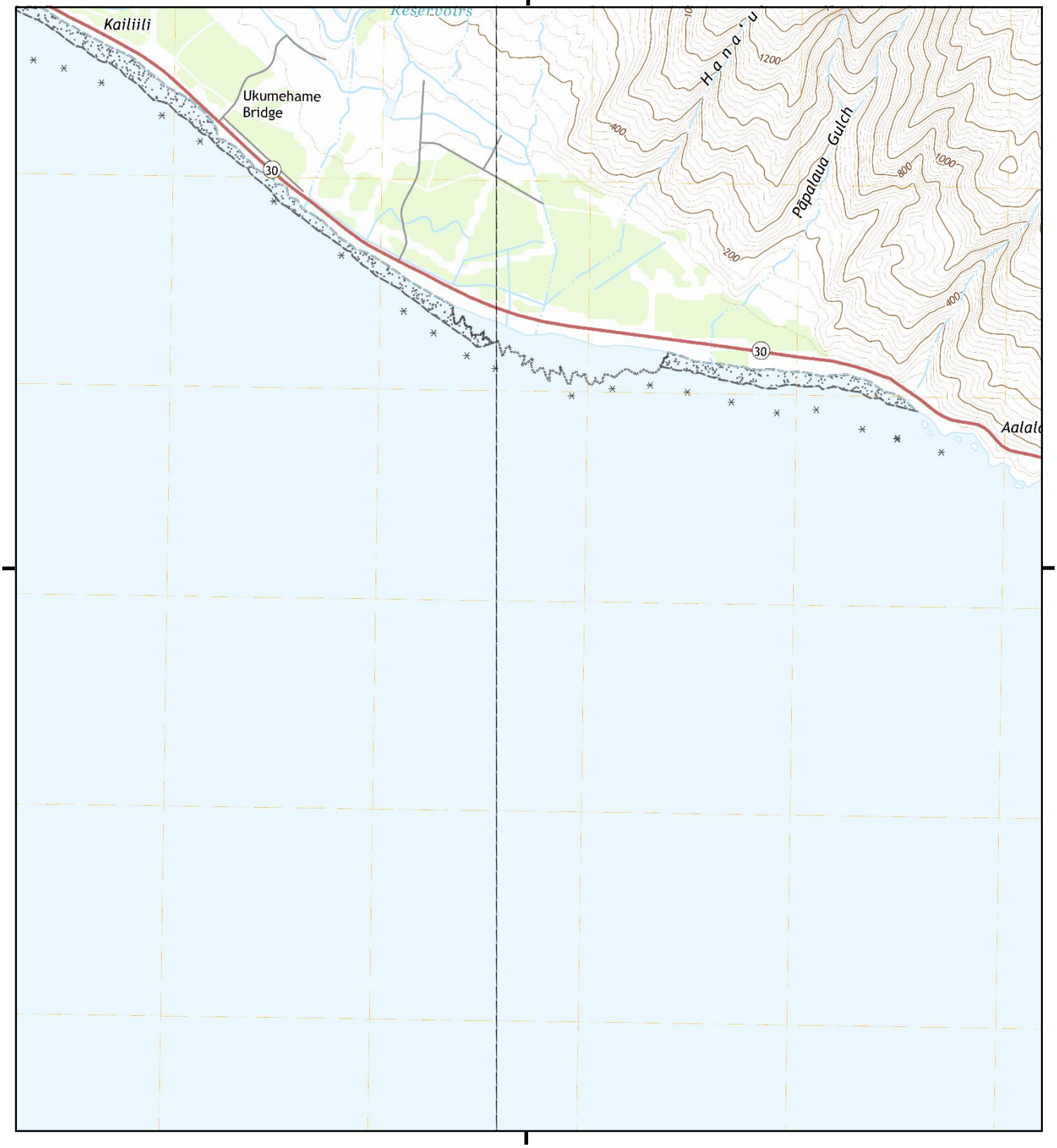
TP, Olowalu, 2017, 7.5-minute

SITE NAME: HDOT Honoapiilani Hwy Improvements
ADDRESS: HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761
CLIENT: WSP

N

Historical Topo Map

2017



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

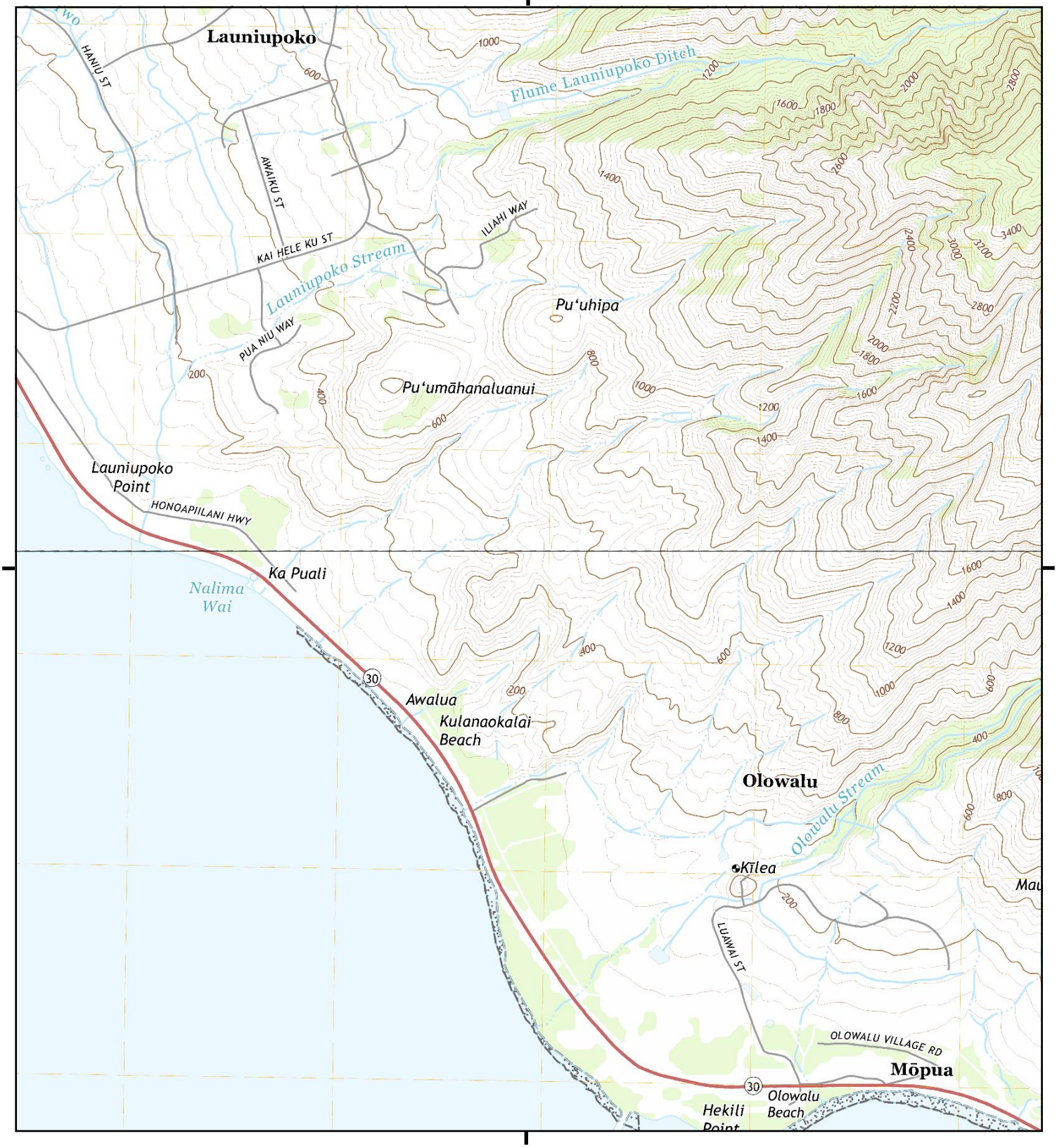
TP, Maalaea, 2017, 7.5-minute
W, Olowalu, 2017, 7.5-minute

SITE NAME: HDOT Honoapiilani Hwy Improvements
ADDRESS: HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761
CLIENT: WSP

N

Historical Topo Map

2017



This report includes information from the following map sheet(s).

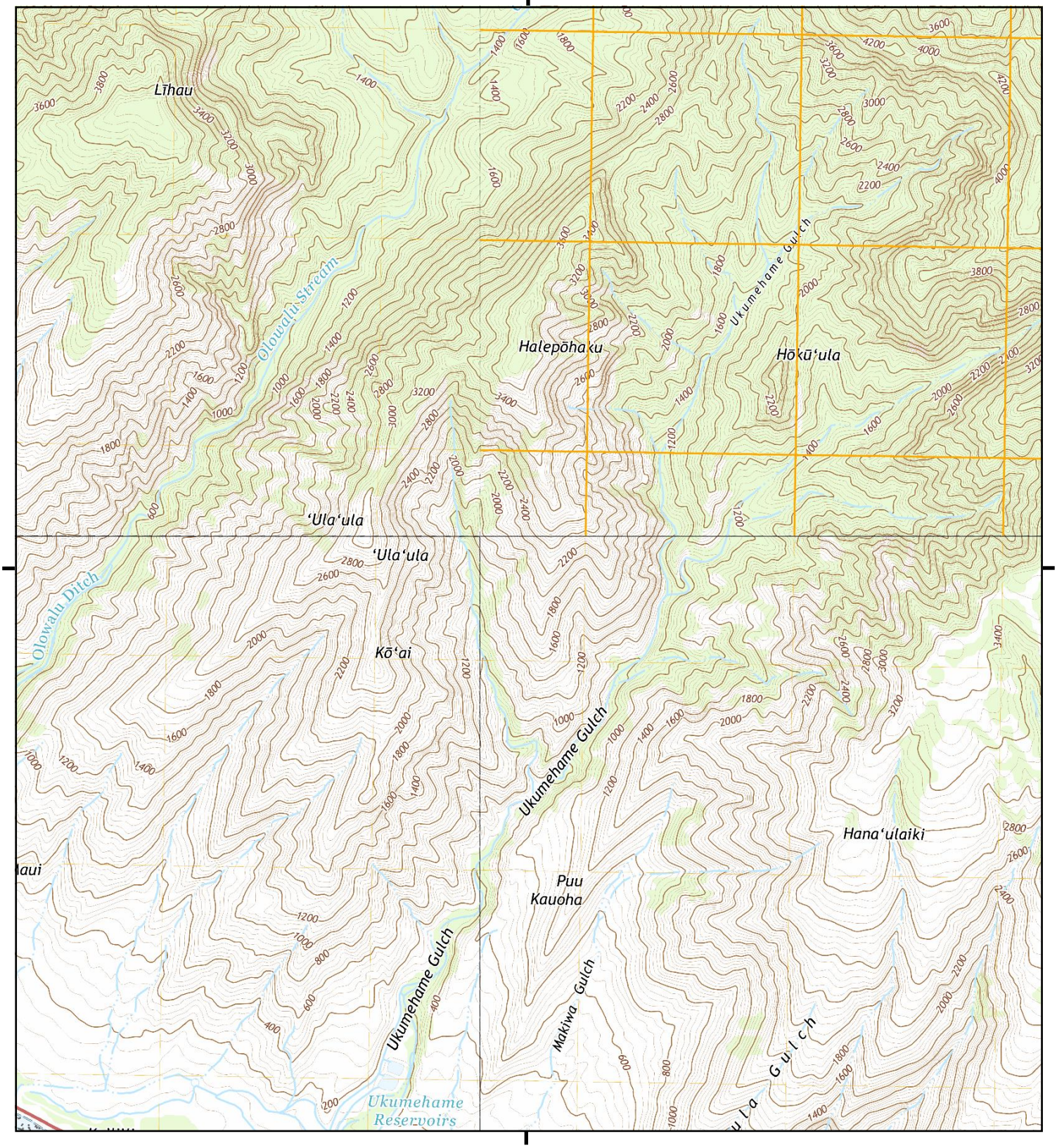
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, Olowalu, 2017, 7.5-minute
N, Lahaina, 2017, 7.5-minute

SITE NAME: HDOT Honoapiilani Hwy Improvements
ADDRESS: HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761
CLIENT: WSP

N



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

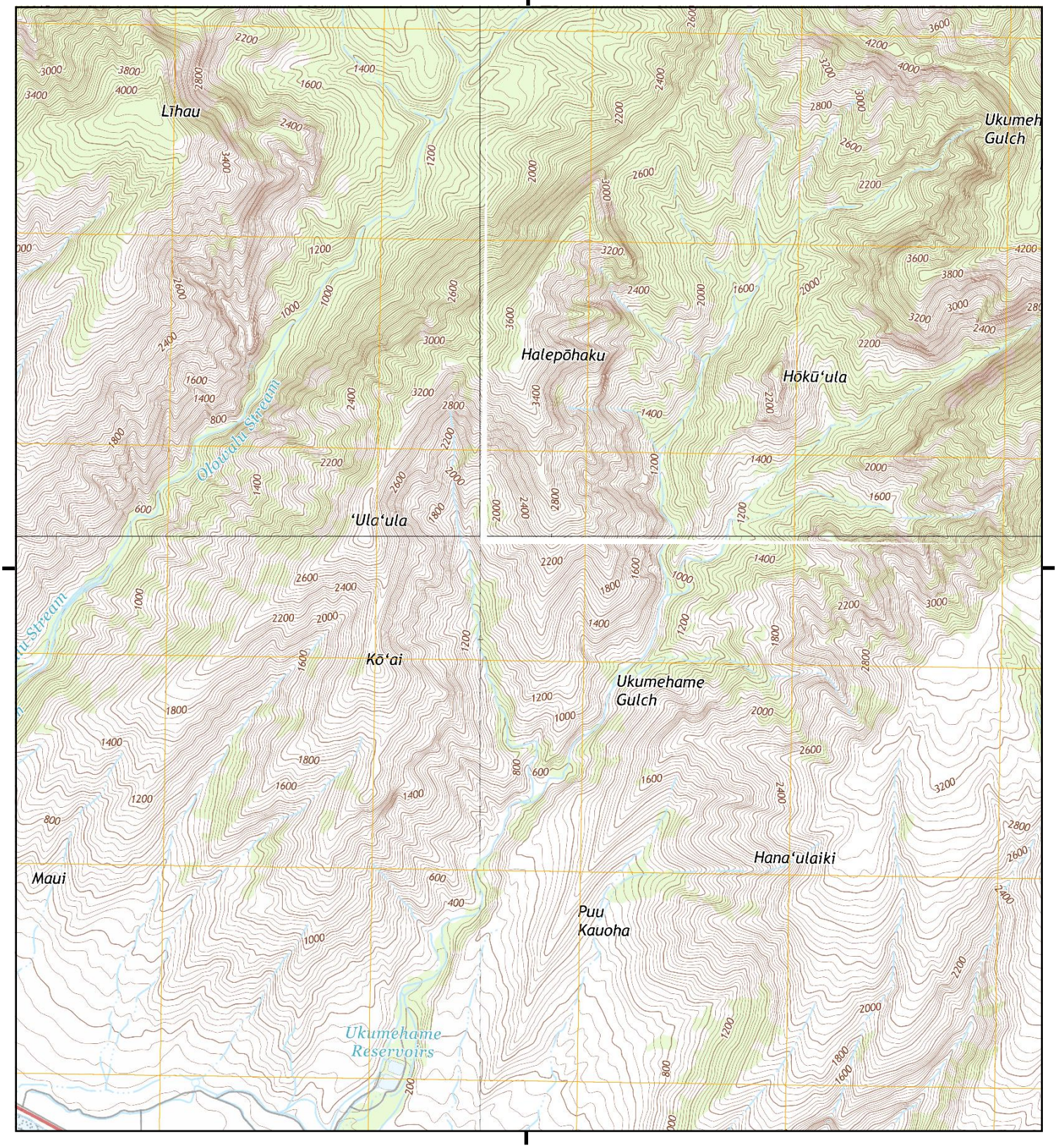
TP, Maalaea, 2017, 7.5-minute
N, Lahaina, 2017, 7.5-minute
NE, Wailuku, 2017, 7.5-minute
SW, Olowalu, 2017, 7.5-minute

SITE NAME: HDOT Honoapiilani Hwy Improvements
ADDRESS: HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761
CLIENT: WSP

N

Historical Topo Map

2013



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

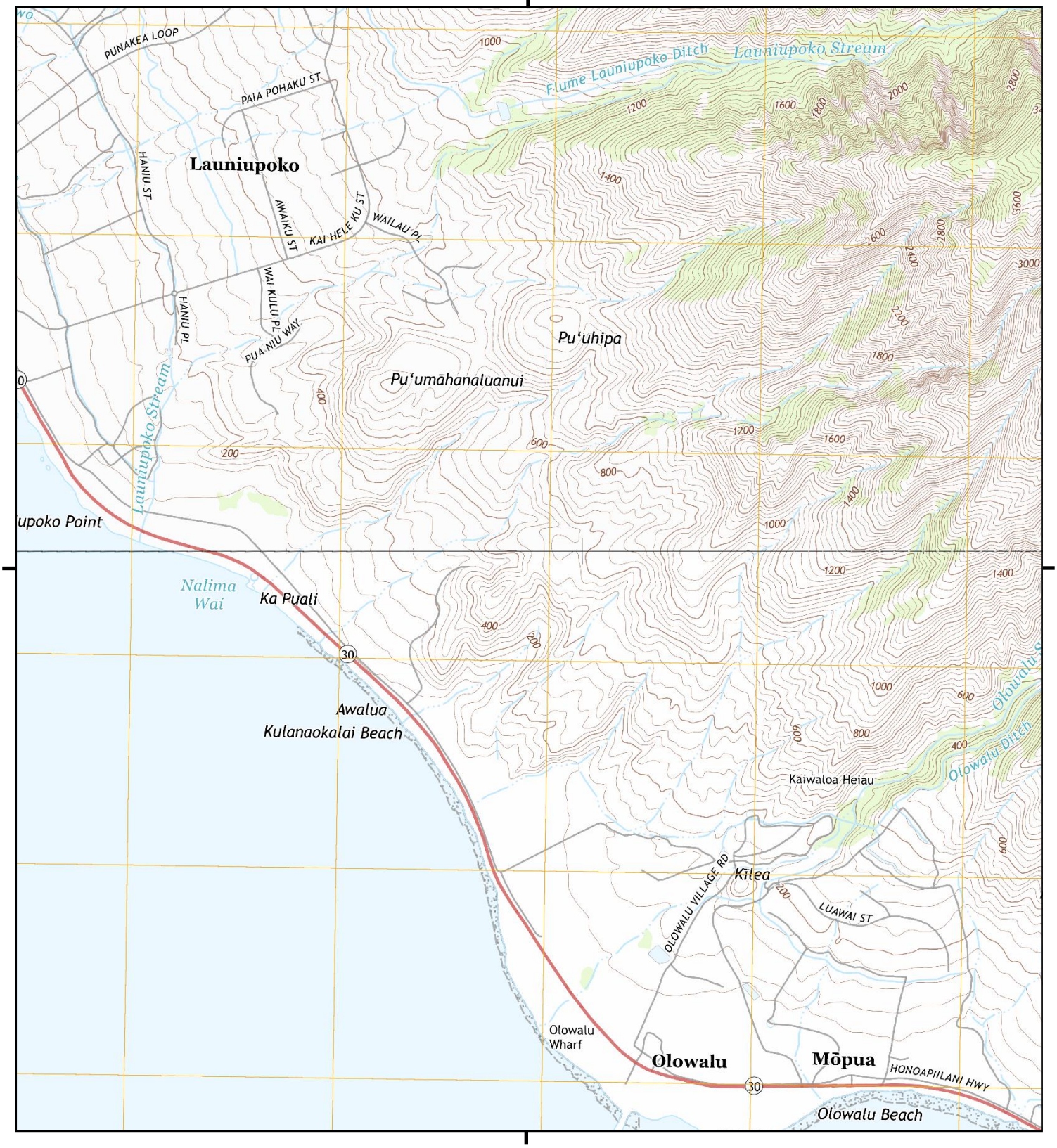
TP, Maalaea, 2013, 7.5-minute
N, Lahaina, 2013, 7.5-minute
NE, Wailuku, 2013, 7.5-minute
SW, Olowalu, 2013, 7.5-minute

SITE NAME: HDOT Honoapiilani Hwy Improvements
ADDRESS: HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761
CLIENT: WSP

N

Historical Topo Map

2013



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, Olowalu, 2013, 7.5-minute
N, Lahaina, 2013, 7.5-minute

SITE NAME: HDOT Honoapiilani Hwy Improvements
ADDRESS: HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761
CLIENT: WSP

N

Historical Topo Map

2013



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

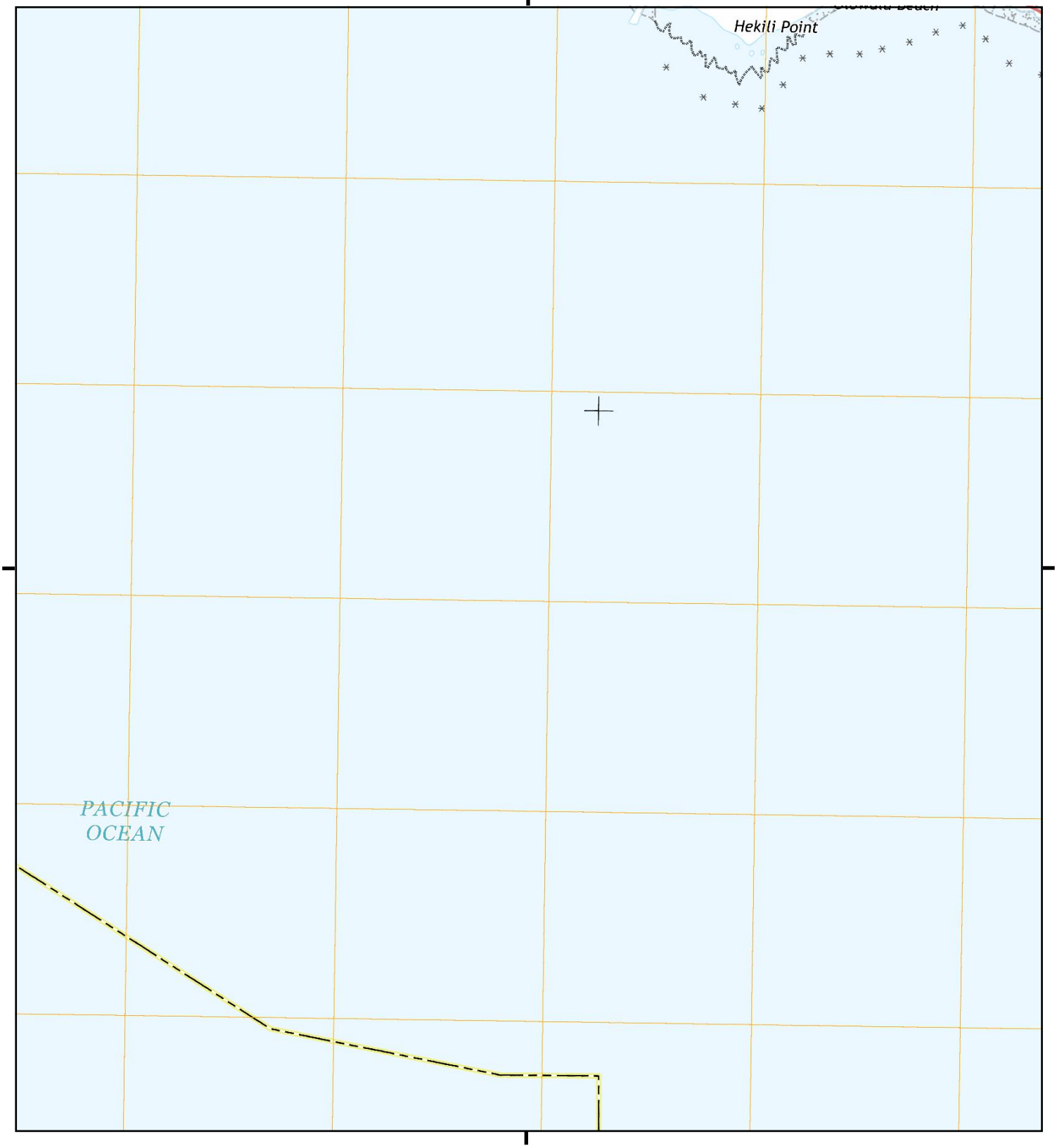
TP, Maalaea, 2013, 7.5-minute
W, Olowalu, 2013, 7.5-minute

SITE NAME: HDOT Honoapiilani Hwy Improvements
ADDRESS: HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761
CLIENT: WSP

N

Historical Topo Map

2013



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

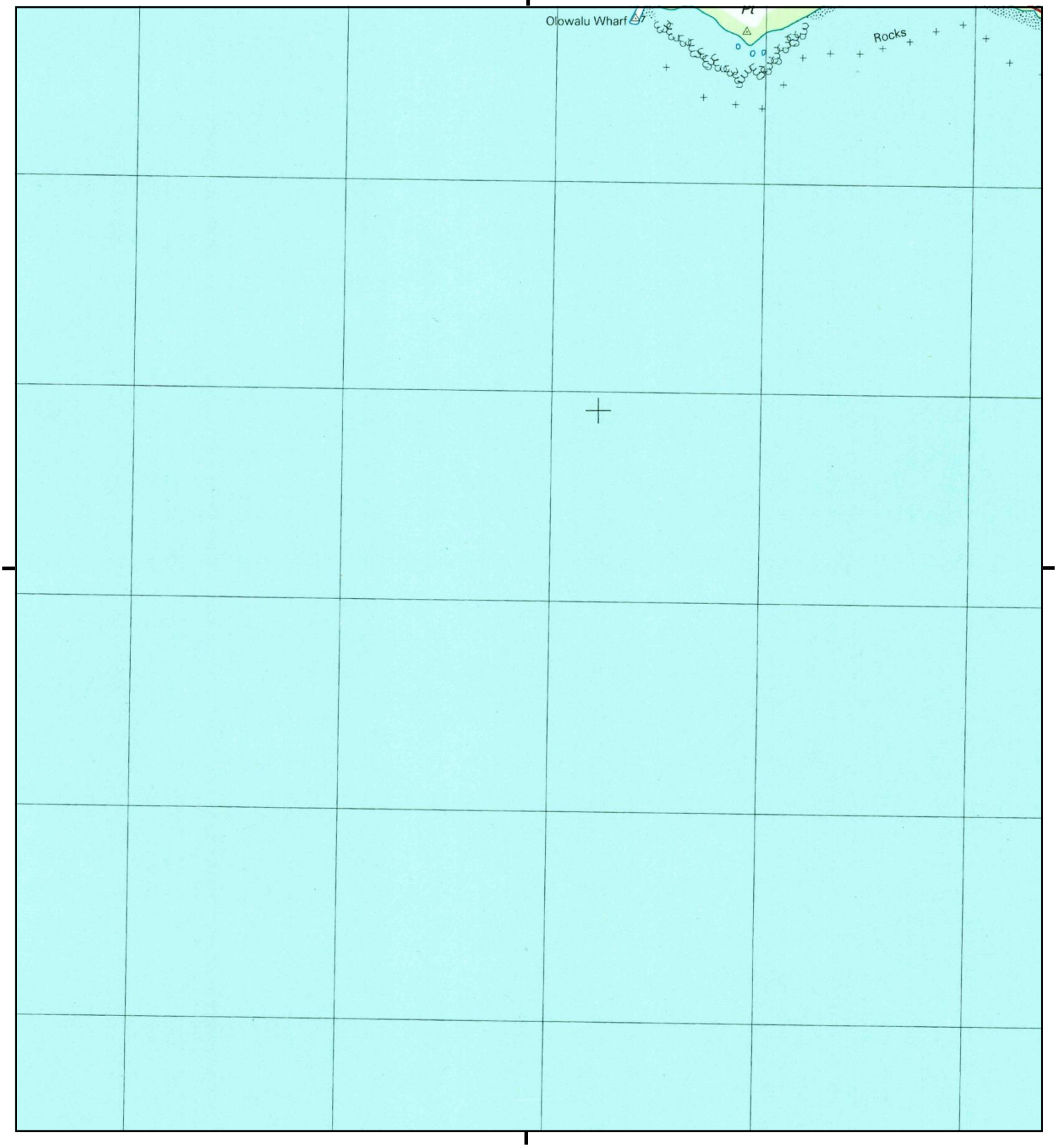
TP, Olowalu, 2013, 7.5-minute

SITE NAME: HDOT Honoapiilani Hwy Improvements
ADDRESS: HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761
CLIENT: WSP

N

Historical Topo Map

1992



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

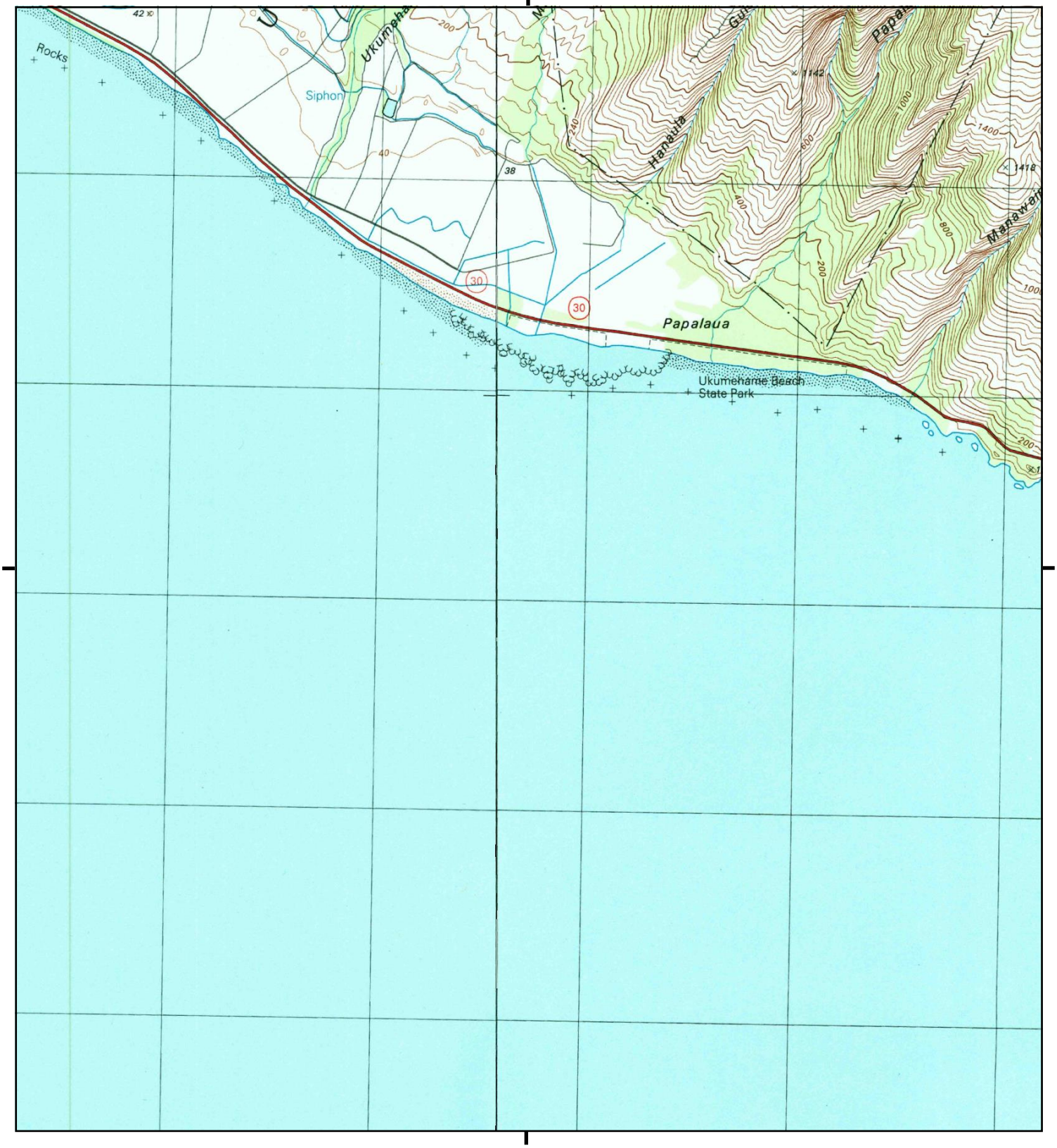
TP, Olowalu, 1992, 7.5-minute

SITE NAME: HDOT Honoapiilani Hwy Improvements
ADDRESS: HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761
CLIENT: WSP

N

Historical Topo Map

1992, 1996



This report includes information from the following map sheet(s).

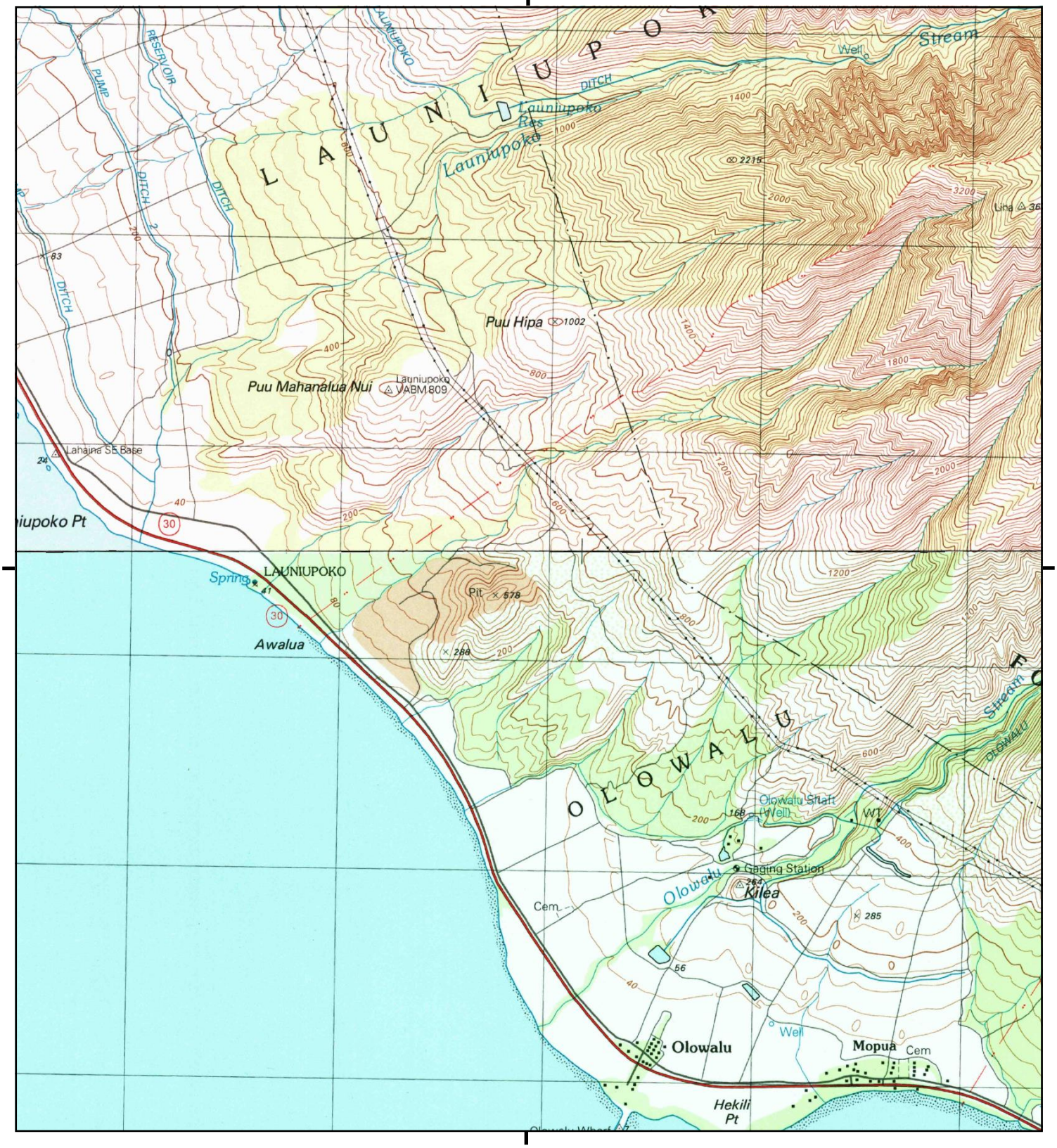
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, Maalaea, 1996, 7.5-minute
W, Olowalu, 1992, 7.5-minute

SITE NAME: HDOT Honoapiilani Hwy Improvements
ADDRESS: HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761
CLIENT: WSP

N



This report includes information from the following map sheet(s).

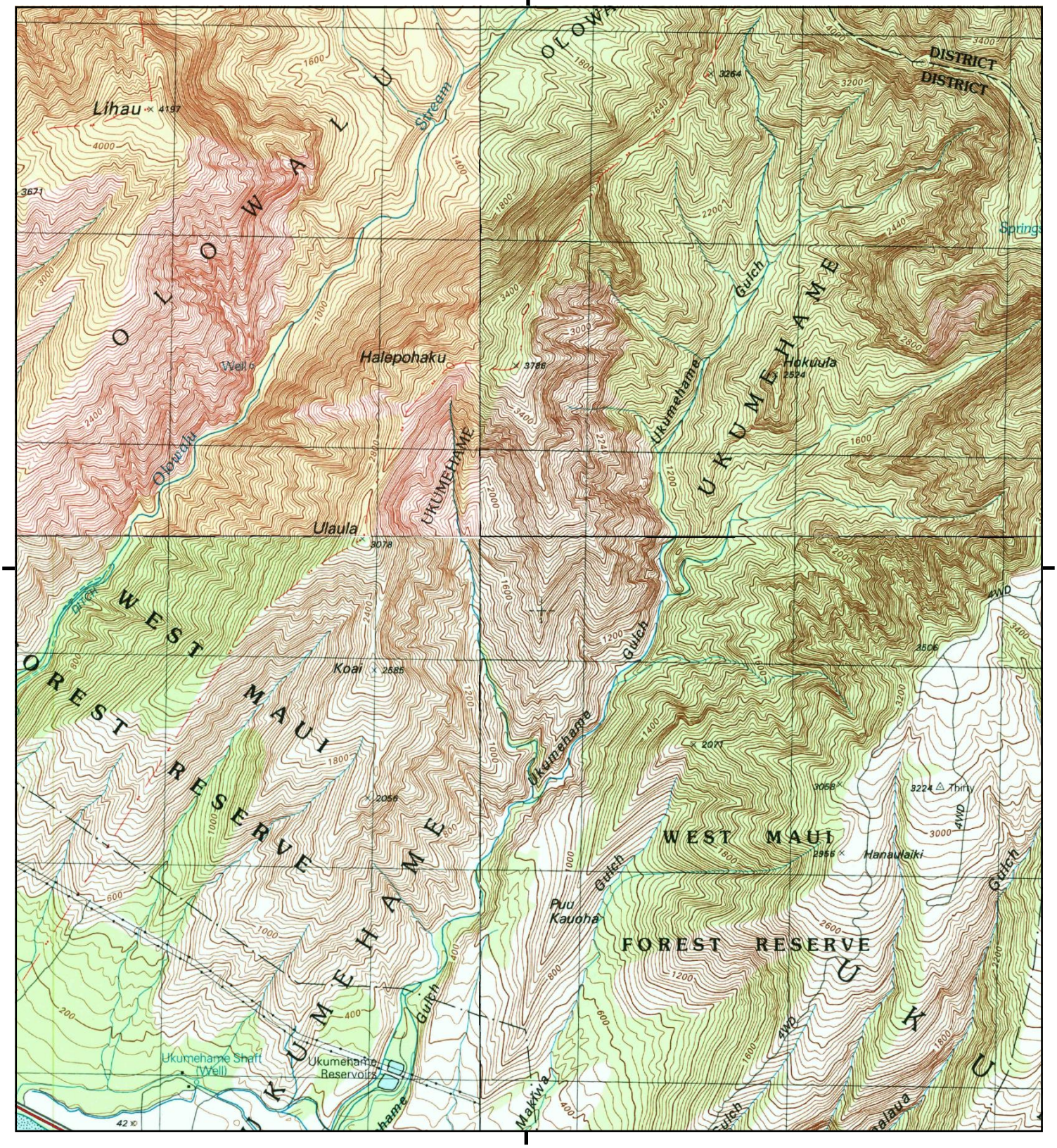
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, Olowalu, 1992, 7.5-minute
N, Lahaina, 1992, 7.5-minute

SITE NAME: HDOT Honoapiilani Hwy Improvements
ADDRESS: HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761
CLIENT: WSP

N



This report includes information from the following map sheet(s).

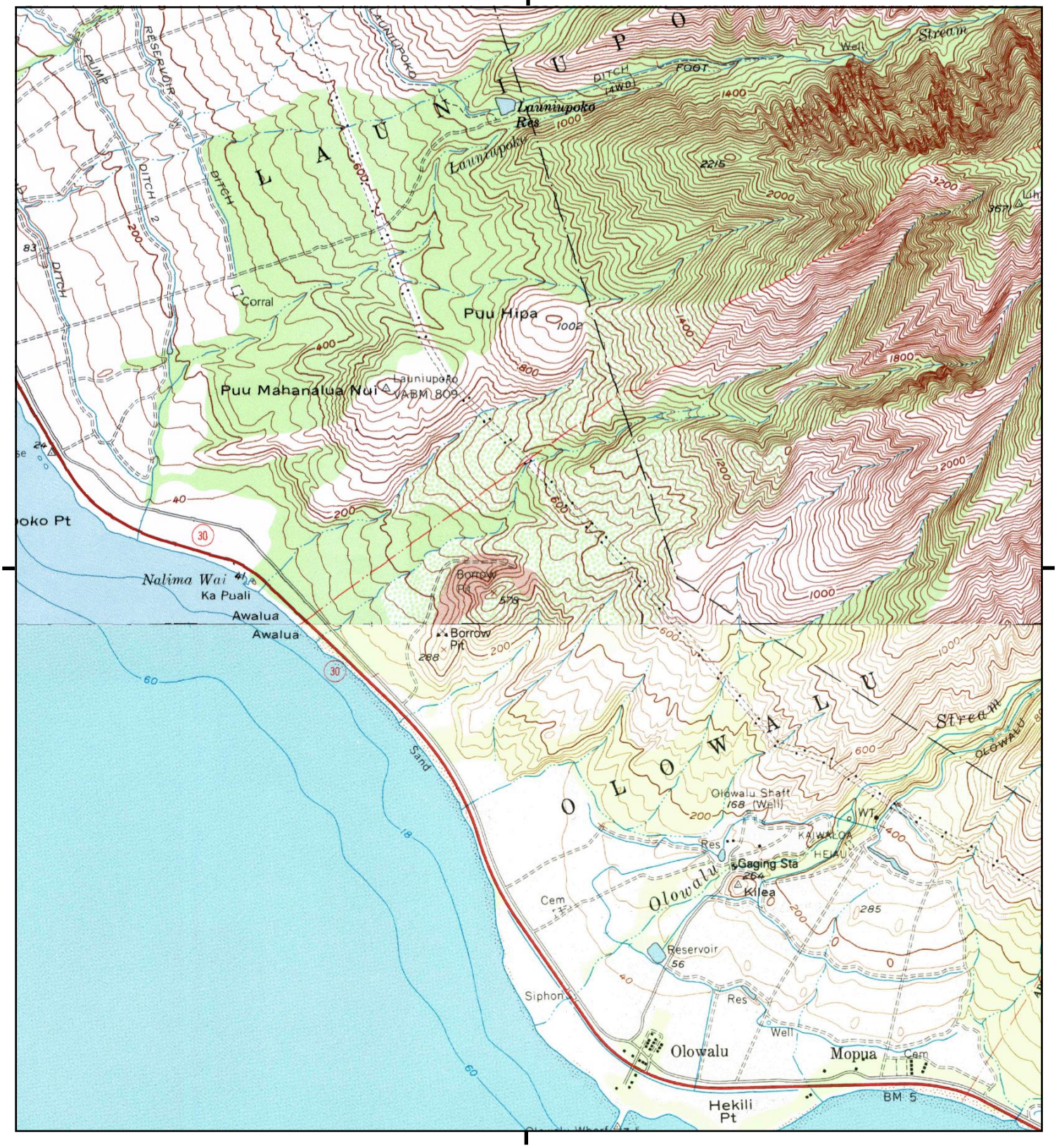
0 Miles 0.25 0.5 1 1.5

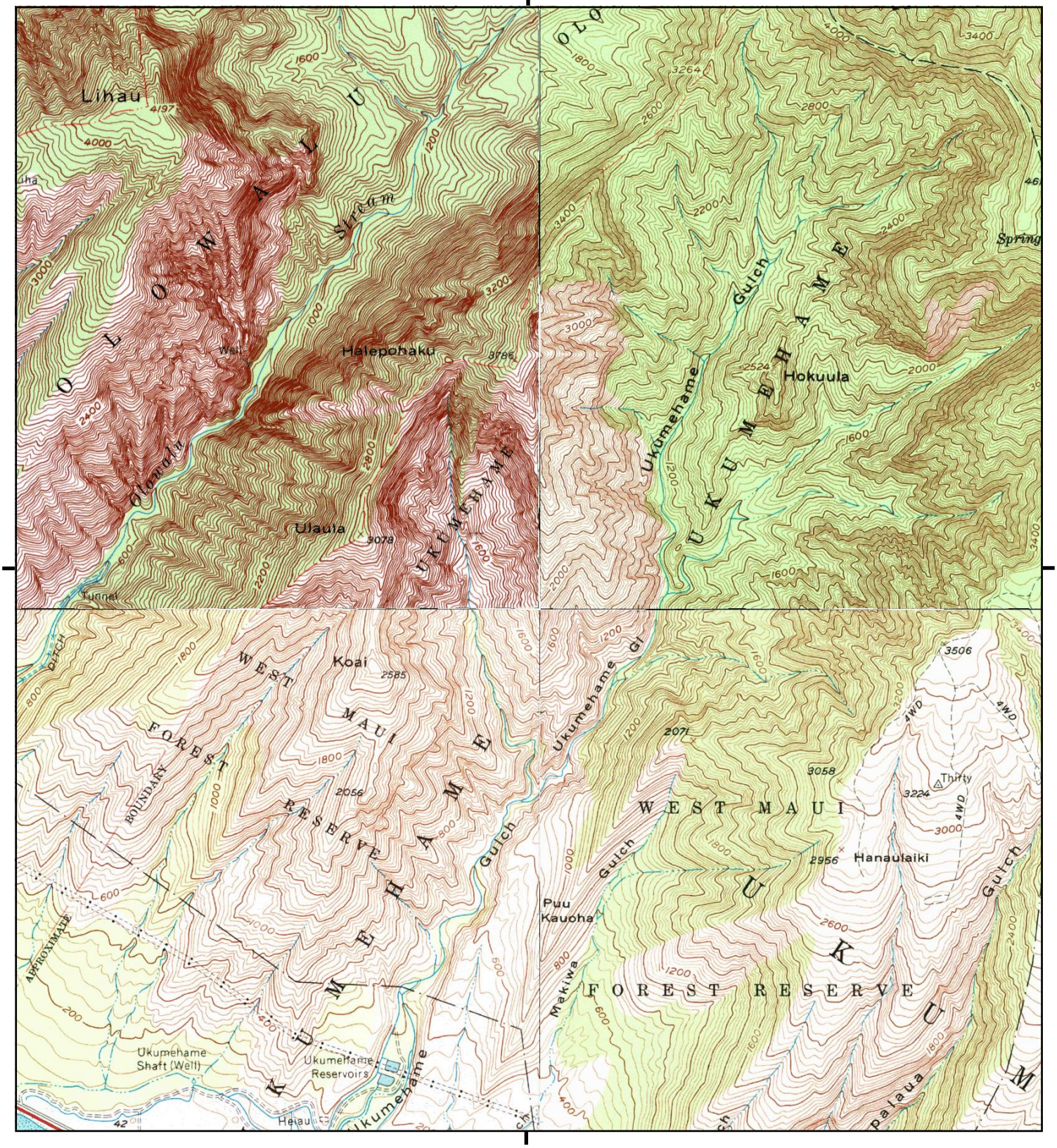
NW N NE
W E
SW S SE

TP, Maalaea, 1996, 7.5-minute
N, Wailuku, 1997, 7.5-minute
SW, Olowalu, 1992, 7.5-minute
NW, Lahaina, 1992, 7.5-minute

SITE NAME: HDOT Honoapiilani Hwy Improvements
ADDRESS: HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761
CLIENT: WSP

N


Launiupoko Res
Launiupoko
Launiupoko
Launiupoko



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

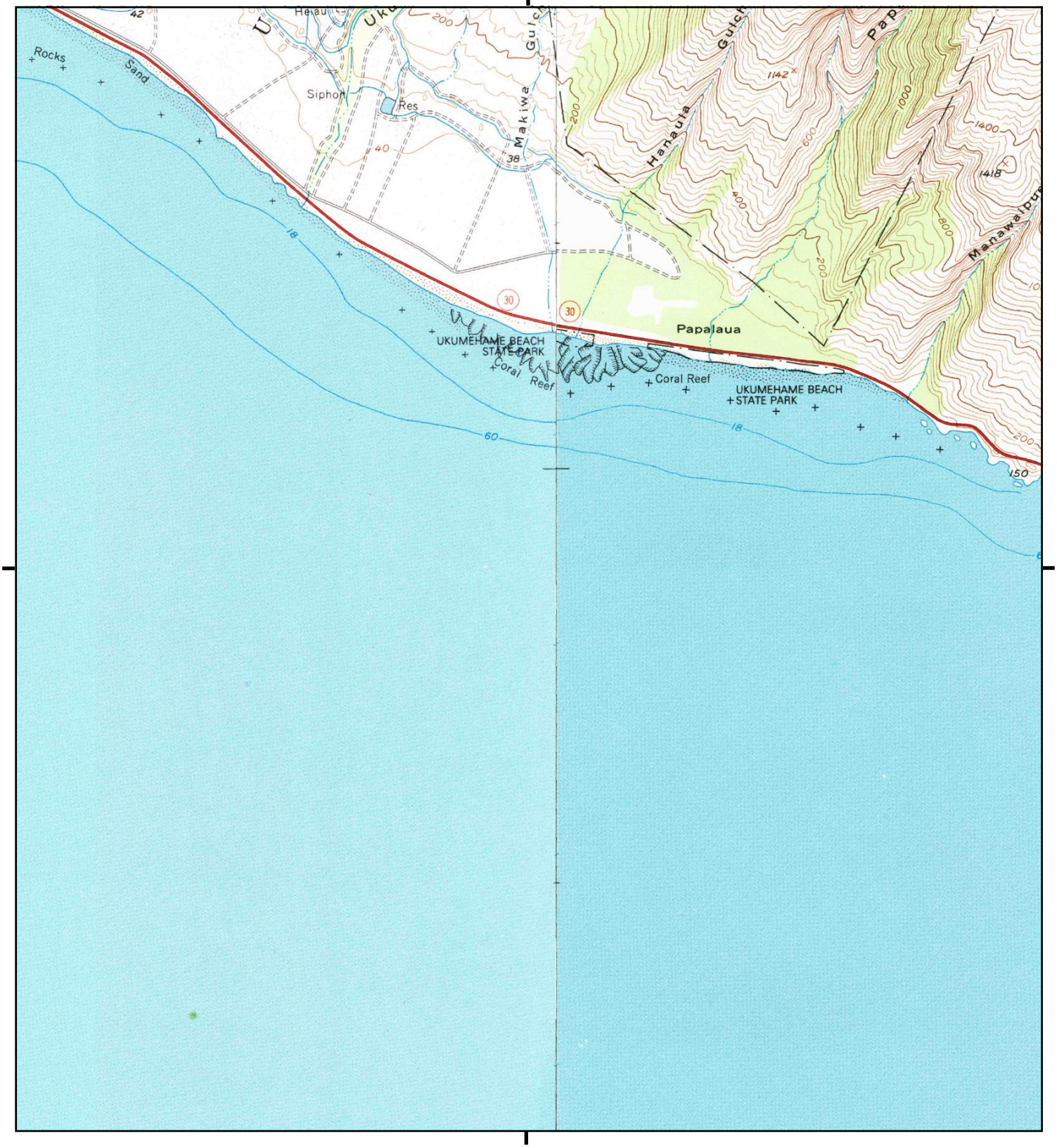
TP, Maalaea, 1983, 7.5-minute
N, LAHAINA, 1983, 7.5-minute
NE, Wailuku, 1983, 7.5-minute
SW, Olowalu, 1983, 7.5-minute

SITE NAME: HDOT Honoapiilani Hwy Improvements
ADDRESS: HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761
CLIENT: WSP

N

Historical Topo Map

1983



This report includes information from the following map sheet(s).

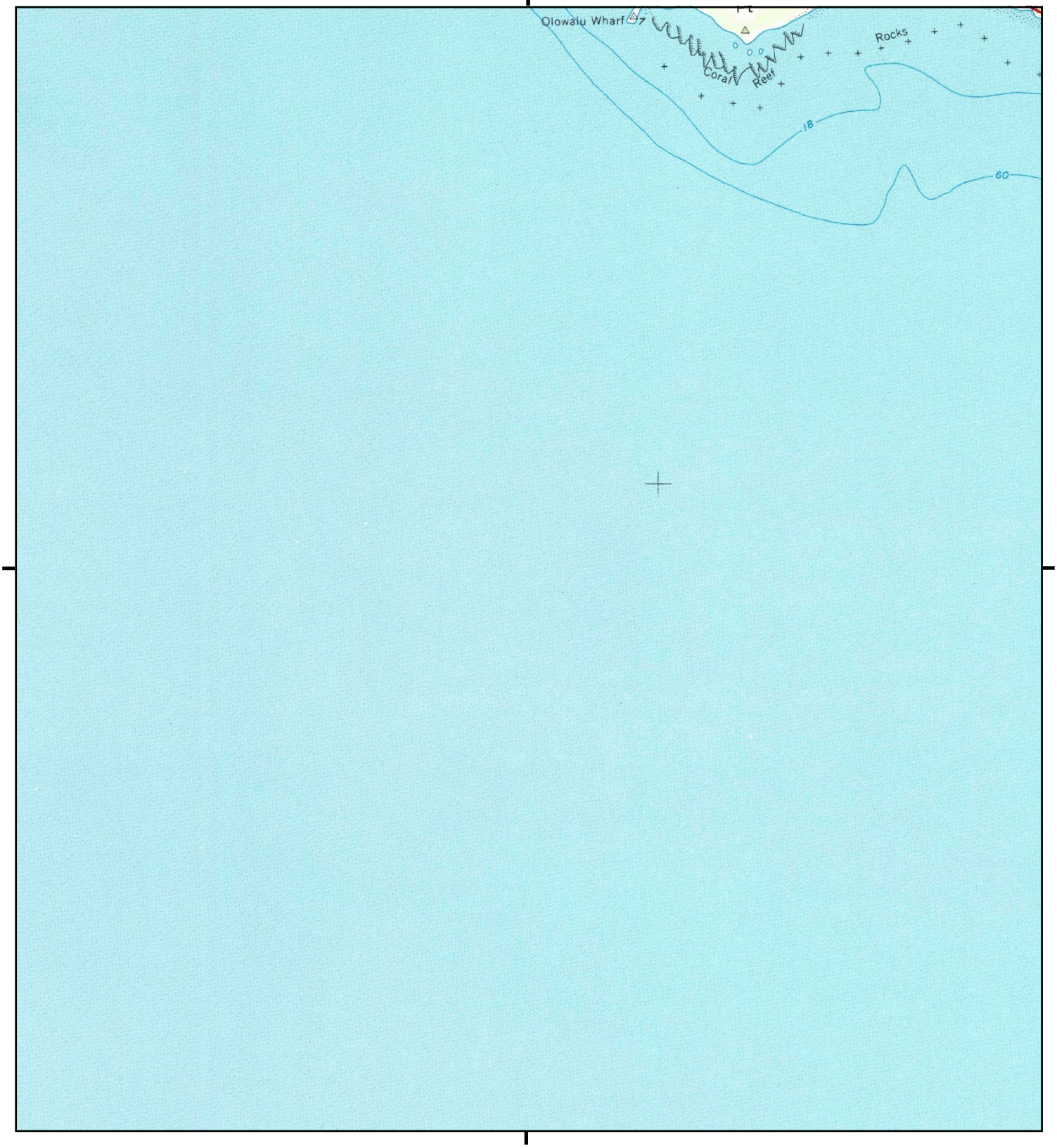
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, Maalaea, 1983, 7.5-minute
W, Olowalu, 1983, 7.5-minute

SITE NAME: HDOT Honoapiilani Hwy Improvements
ADDRESS: HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761
CLIENT: WSP

N



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, Olowalu, 1983, 7.5-minute

SITE NAME: HDOT Honoapiilani Hwy Improvements
ADDRESS: HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761
CLIENT: WSP

N



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

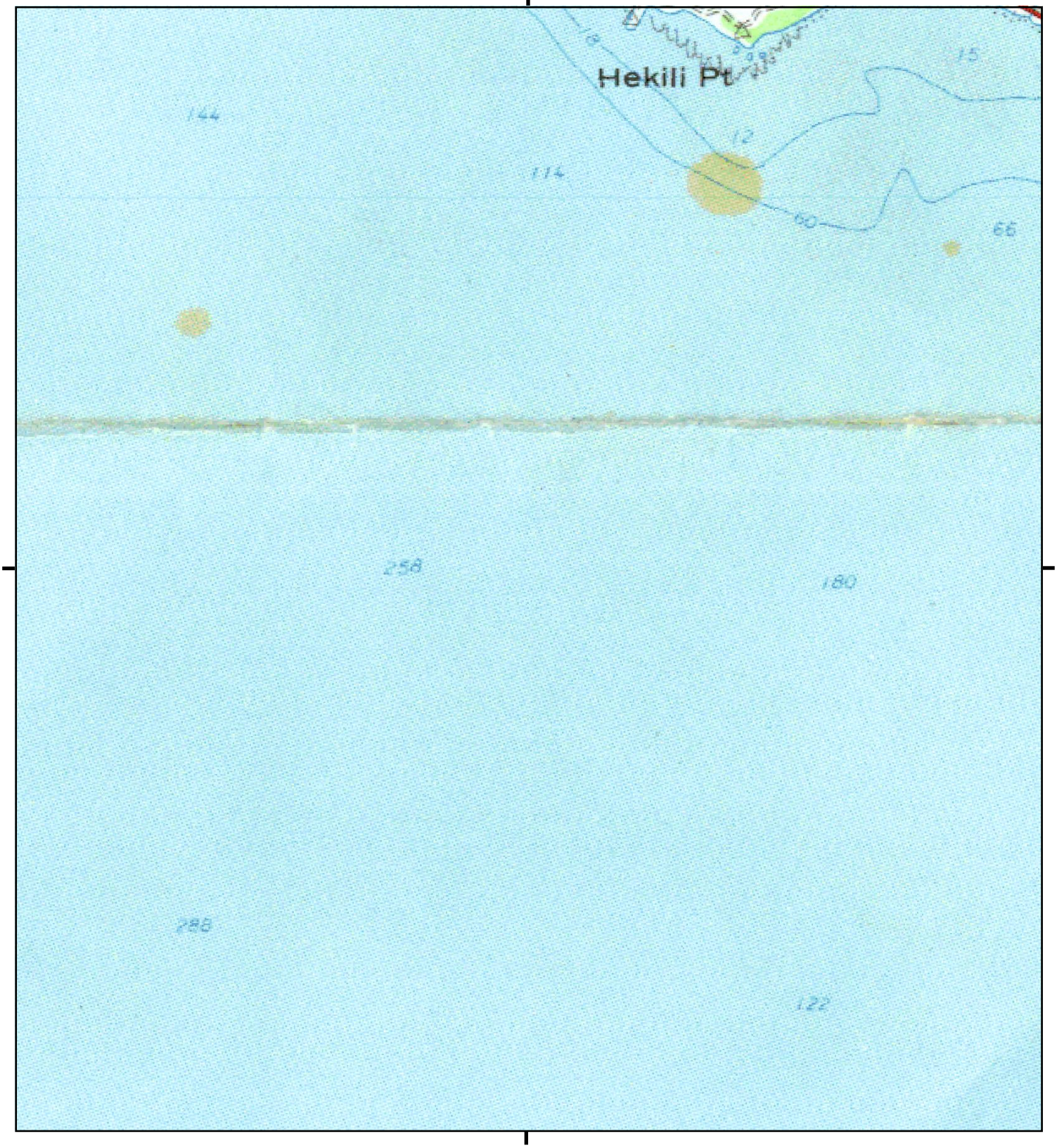
TP, MAUI, 1961, 15-minute

SITE NAME: HDOT Honoapiilani Hwy Improvements
ADDRESS: HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761
CLIENT: WSP

N

Historical Topo Map

1961



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, MAUI, 1961, 15-minute

SITE NAME: HDOT Honoapiilani Hwy Improvements
ADDRESS: HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761
CLIENT: WSP

N



This report includes information from the following map sheet(s).

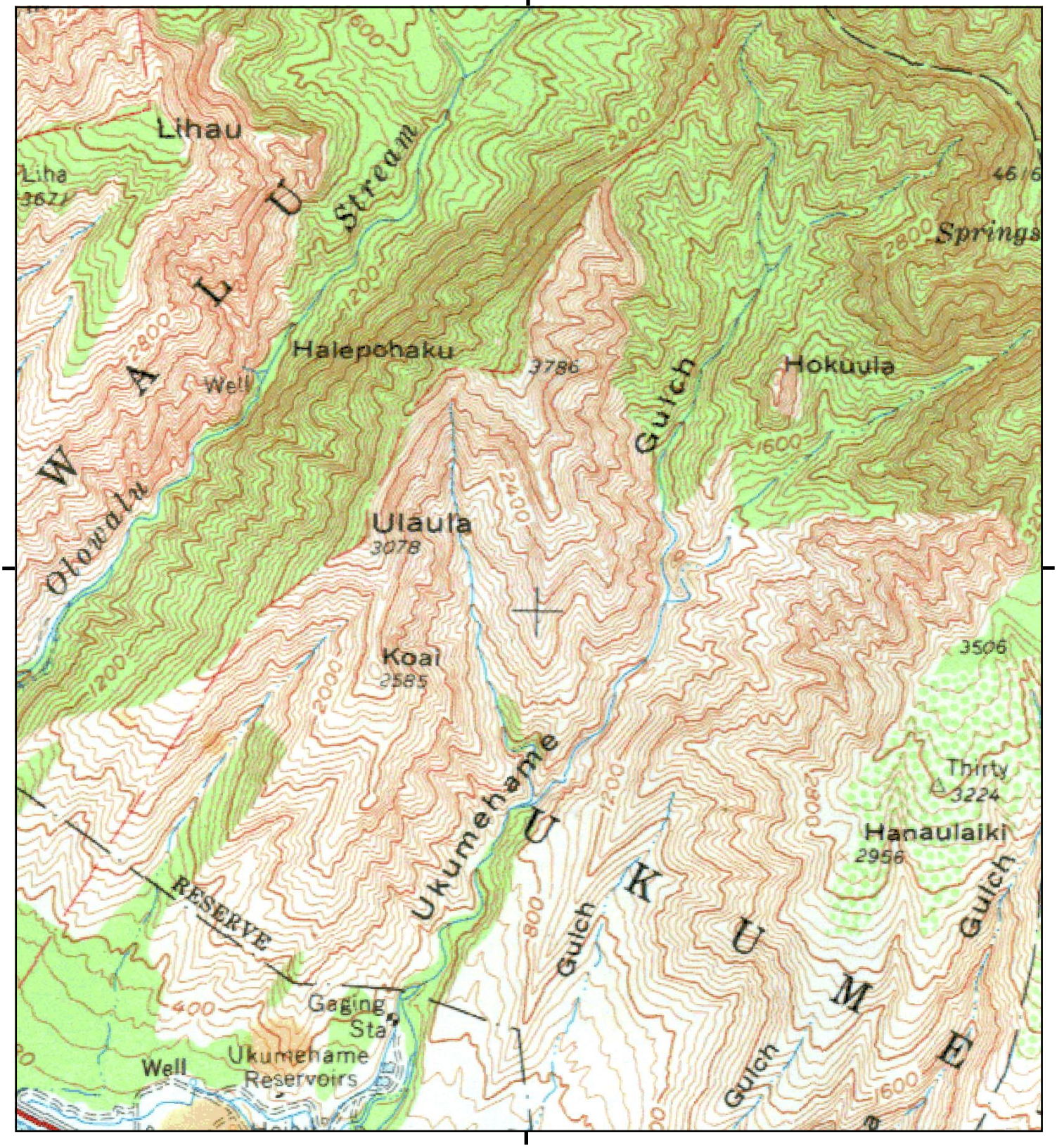
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, MAUI, 1961, 15-minute

SITE NAME: HDOT Honoapiilani Hwy Improvements
ADDRESS: HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761
CLIENT: WSP

N



This report includes information from the following map sheet(s).

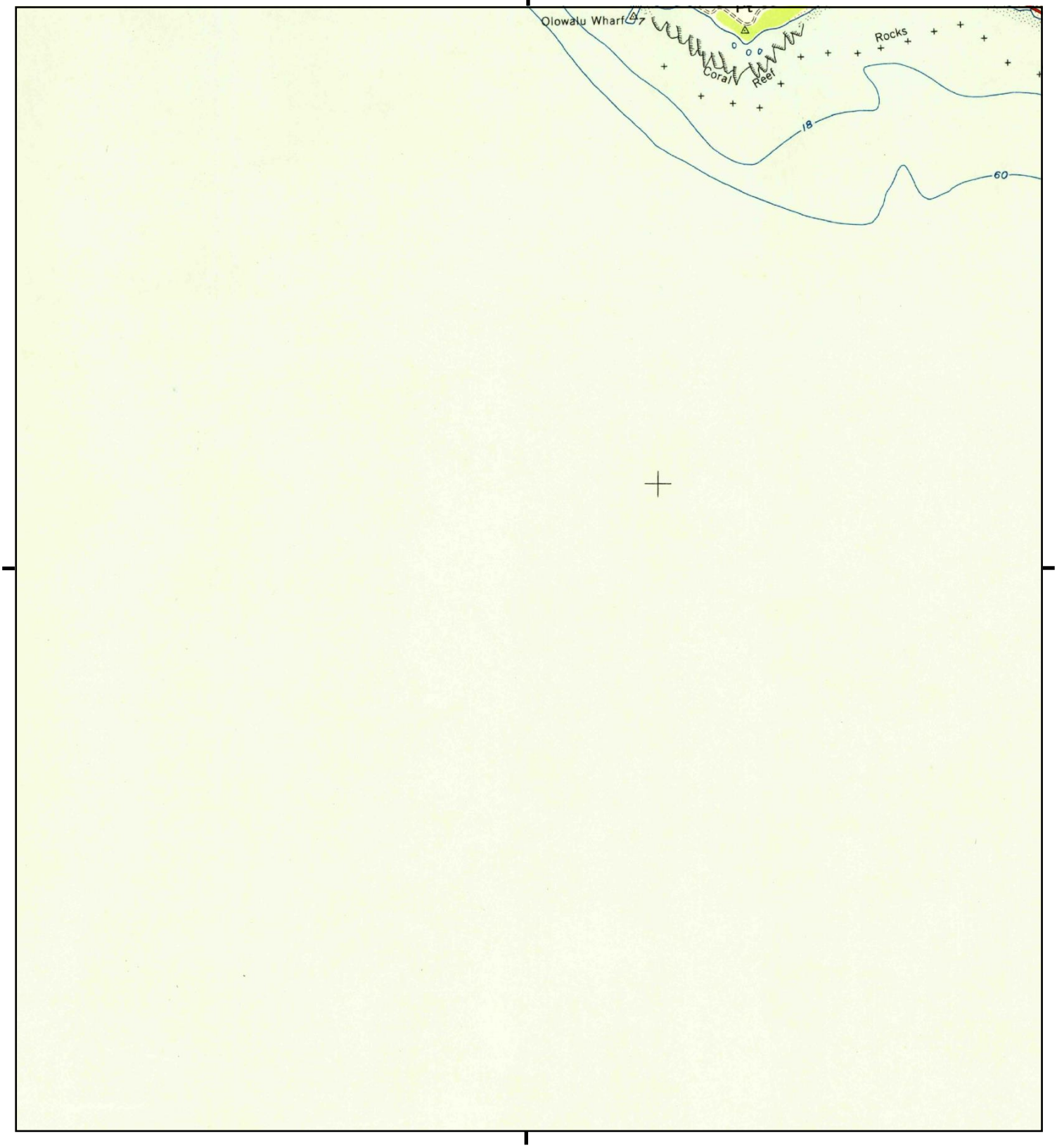
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, MAUI, 1961, 15-minute

SITE NAME: HDOT Honoapiilani Hwy Improvements
ADDRESS: HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761
CLIENT: WSP

N



This report includes information from the following map sheet(s).

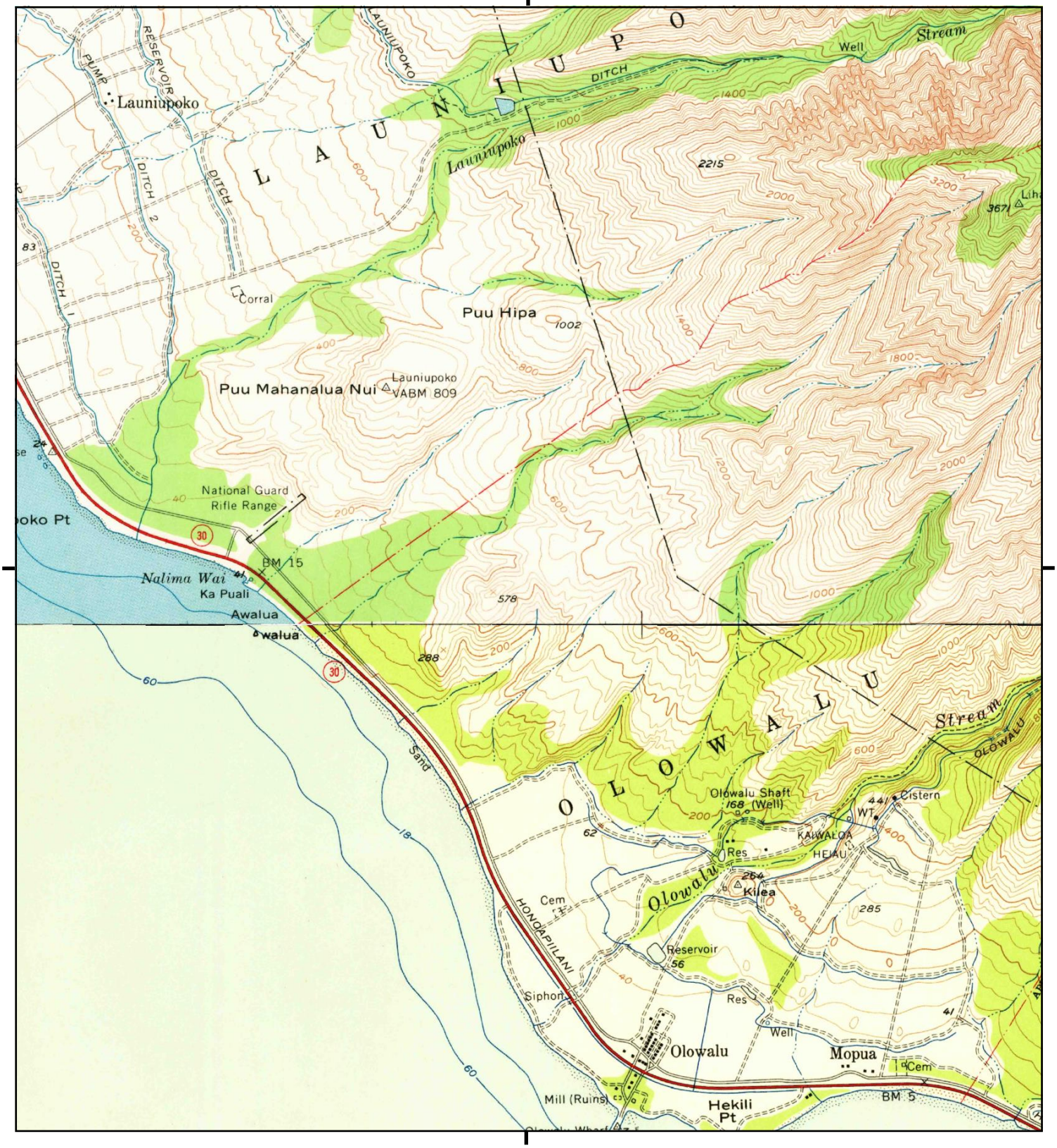
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, Olowalu, 1955, 7.5-minute

SITE NAME: HDOT Honoapiilani Hwy Improvements
ADDRESS: HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761
CLIENT: WSP

N



This report includes information from the following map sheet(s).

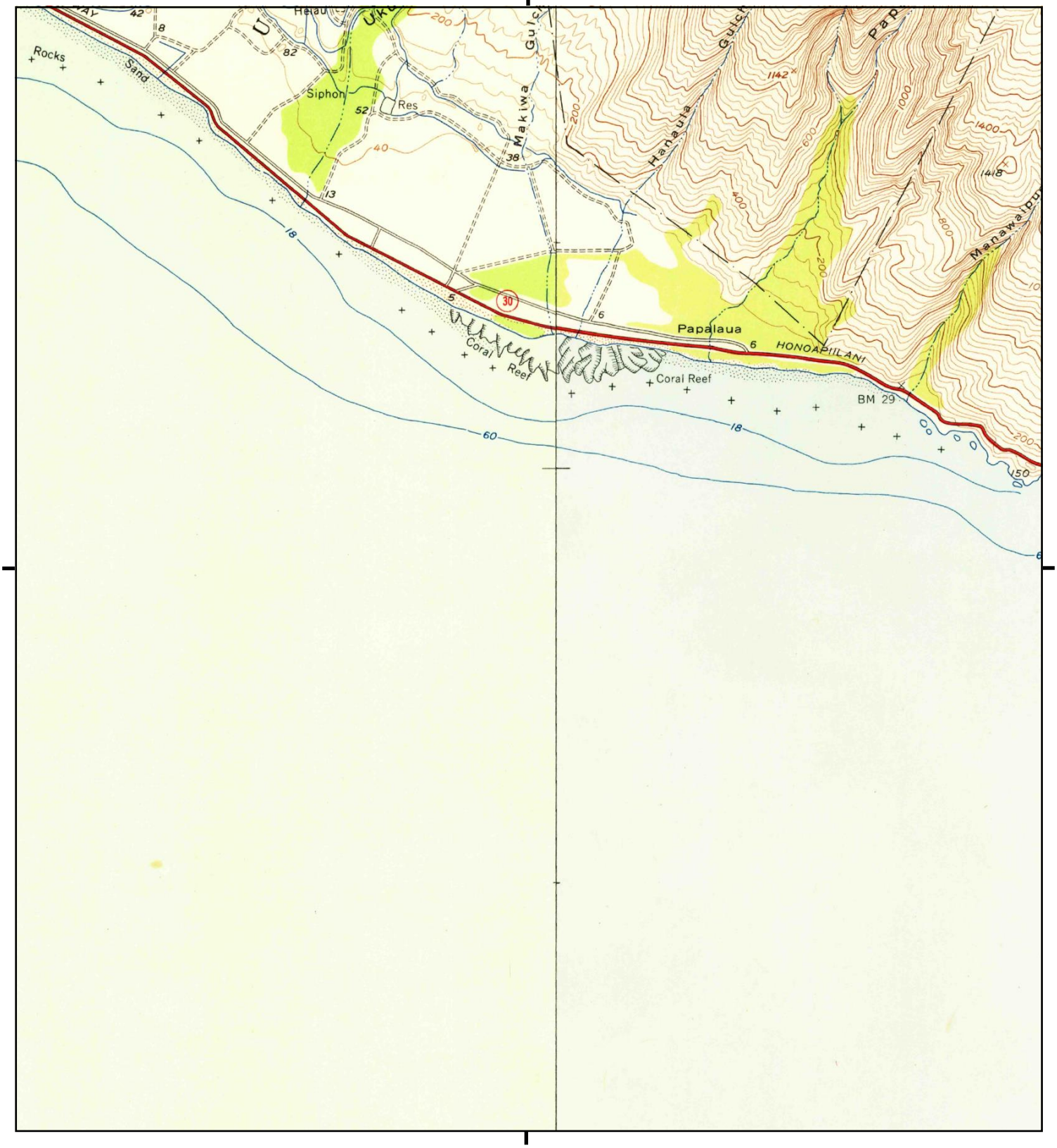
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, Olowalu, 1955, 7.5-minute
N, Lahaina, 1956, 7.5-minute

SITE NAME: HDOT Honoapiilani Hwy Improvements
ADDRESS: HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761
CLIENT: WSP

N



This report includes information from the following map sheet(s).

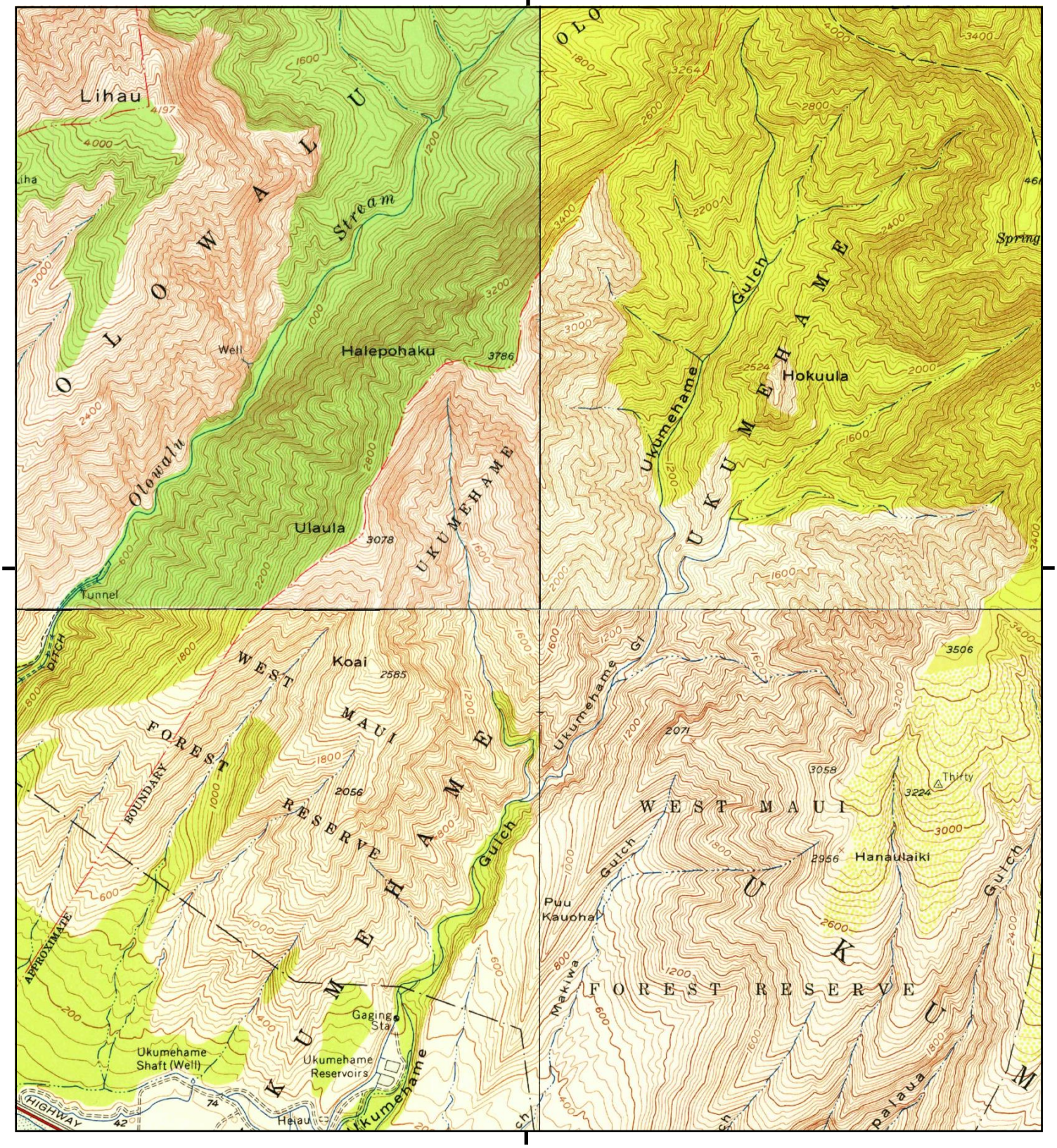
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

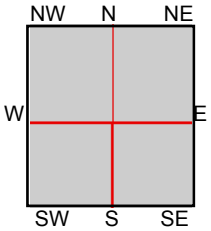
TP, Maalaea, 1954, 7.5-minute
W, Olowalu, 1955, 7.5-minute

SITE NAME: HDOT Honoapiilani Hwy Improvements
ADDRESS: HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761
CLIENT: WSP

N



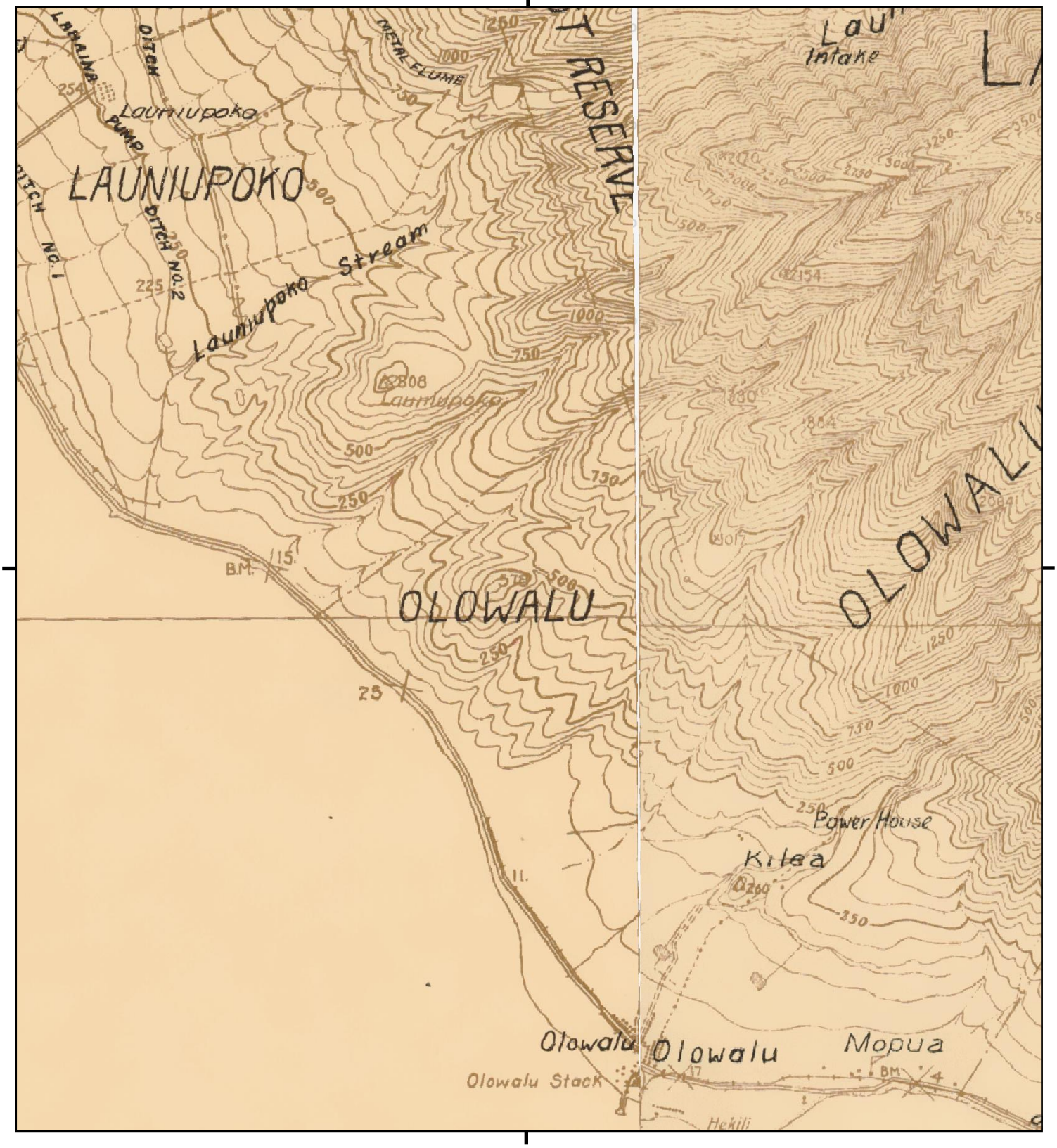
This report includes information from the following map sheet(s).



TP, Maalaea, 1954, 7.5-minute
N, Lahaina, 1956, 7.5-minute
NE, Wailuku, 1955, 7.5-minute
SW, Olowalu, 1955, 7.5-minute

SITE NAME: HDOT Honoapiilani Hwy Improvements
ADDRESS: HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761
CLIENT: WSP

N



This report includes information from the following map sheet(s).

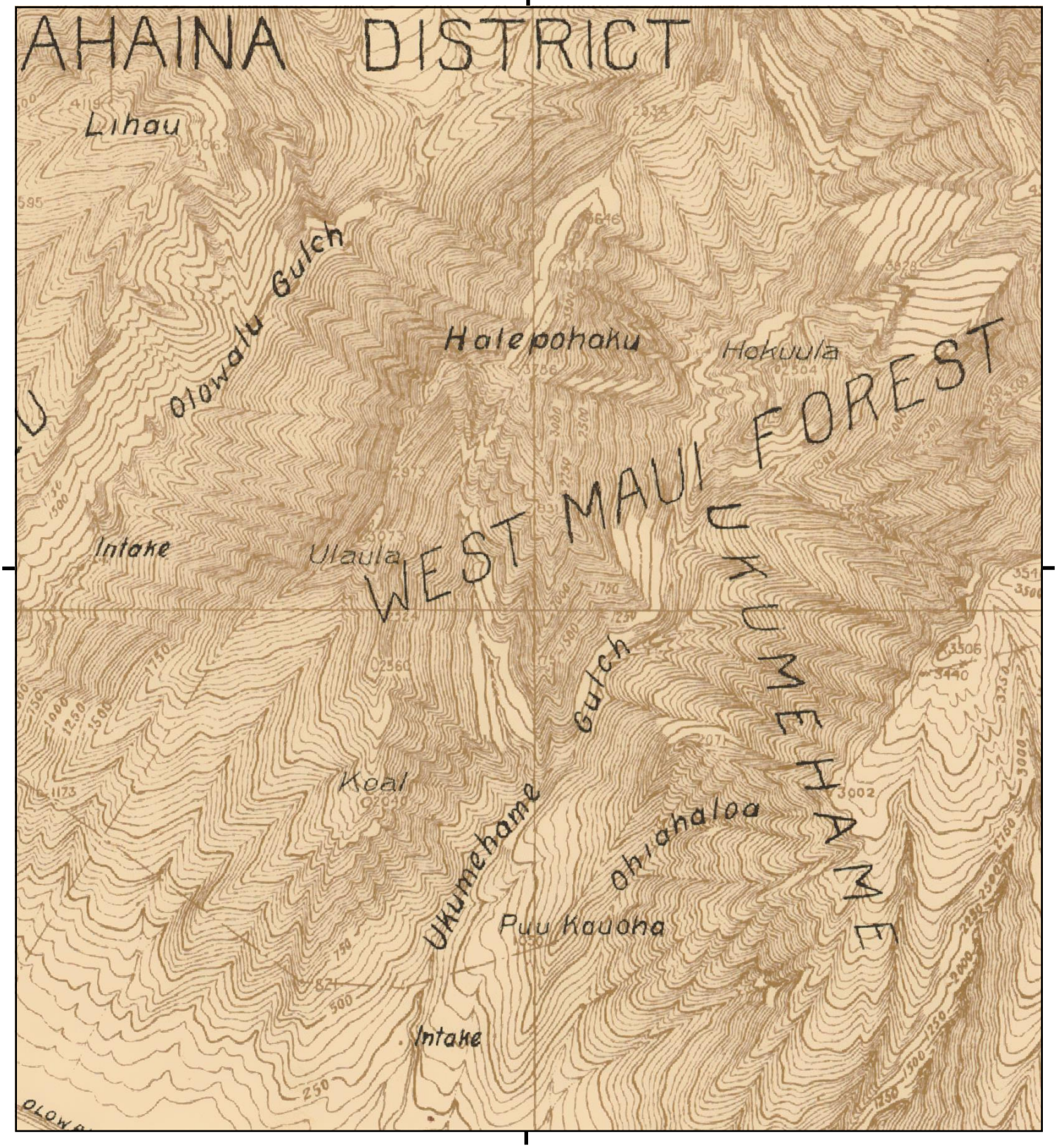
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, LAUNIUPOKO, 1923, 7.5-minute
E, MAALAEA, 1923, 7.5-minute

SITE NAME: HDOT Honoapiilani Hwy Improvements
ADDRESS: HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761
CLIENT: WSP

N



This report includes information from the following map sheet(s).

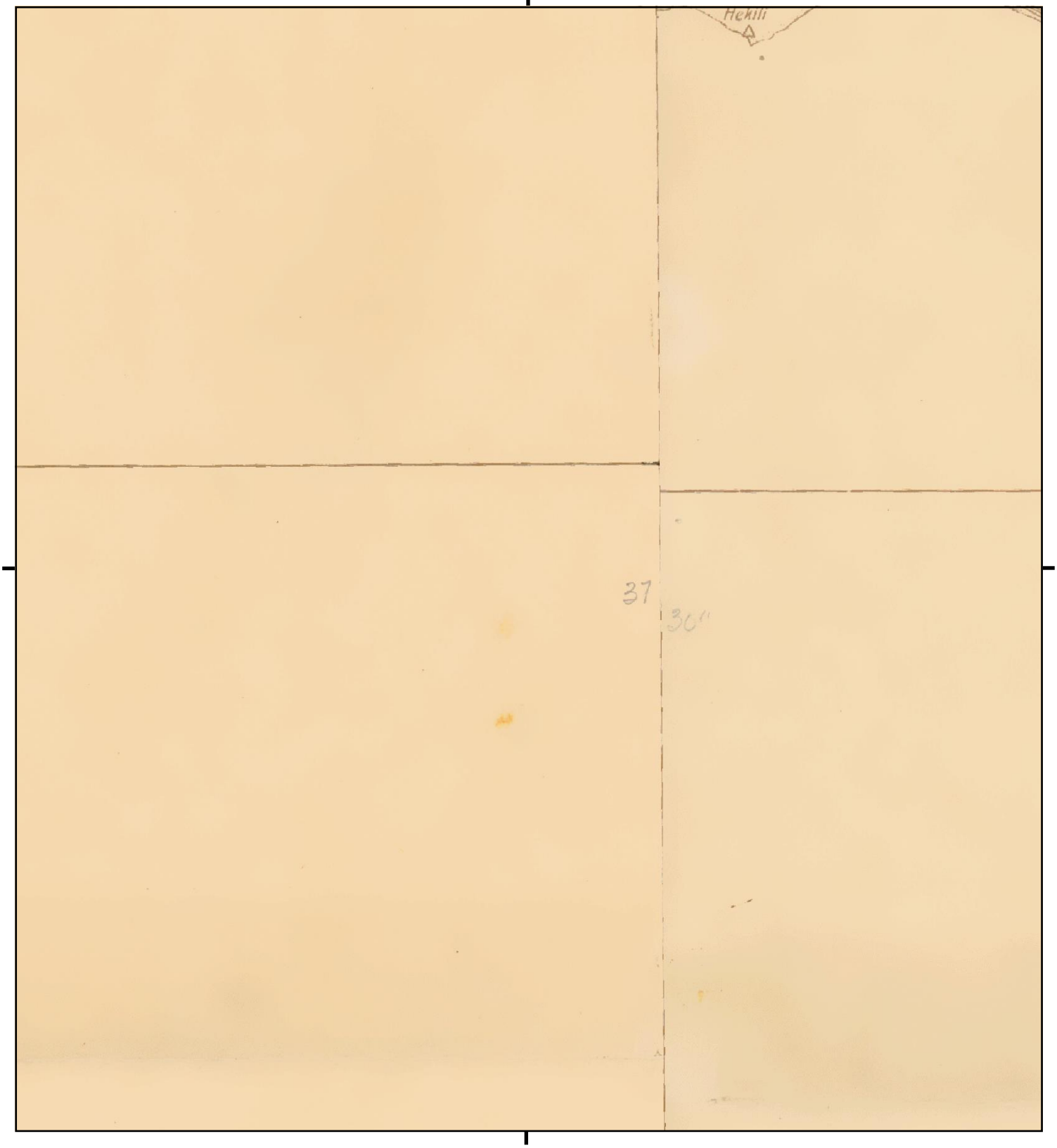
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, MAALAEA, 1923, 7.5-minute

SITE NAME: HDOT Honoapiilani Hwy Improvements
ADDRESS: HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761
CLIENT: WSP

N



This report includes information from the following map sheet(s).

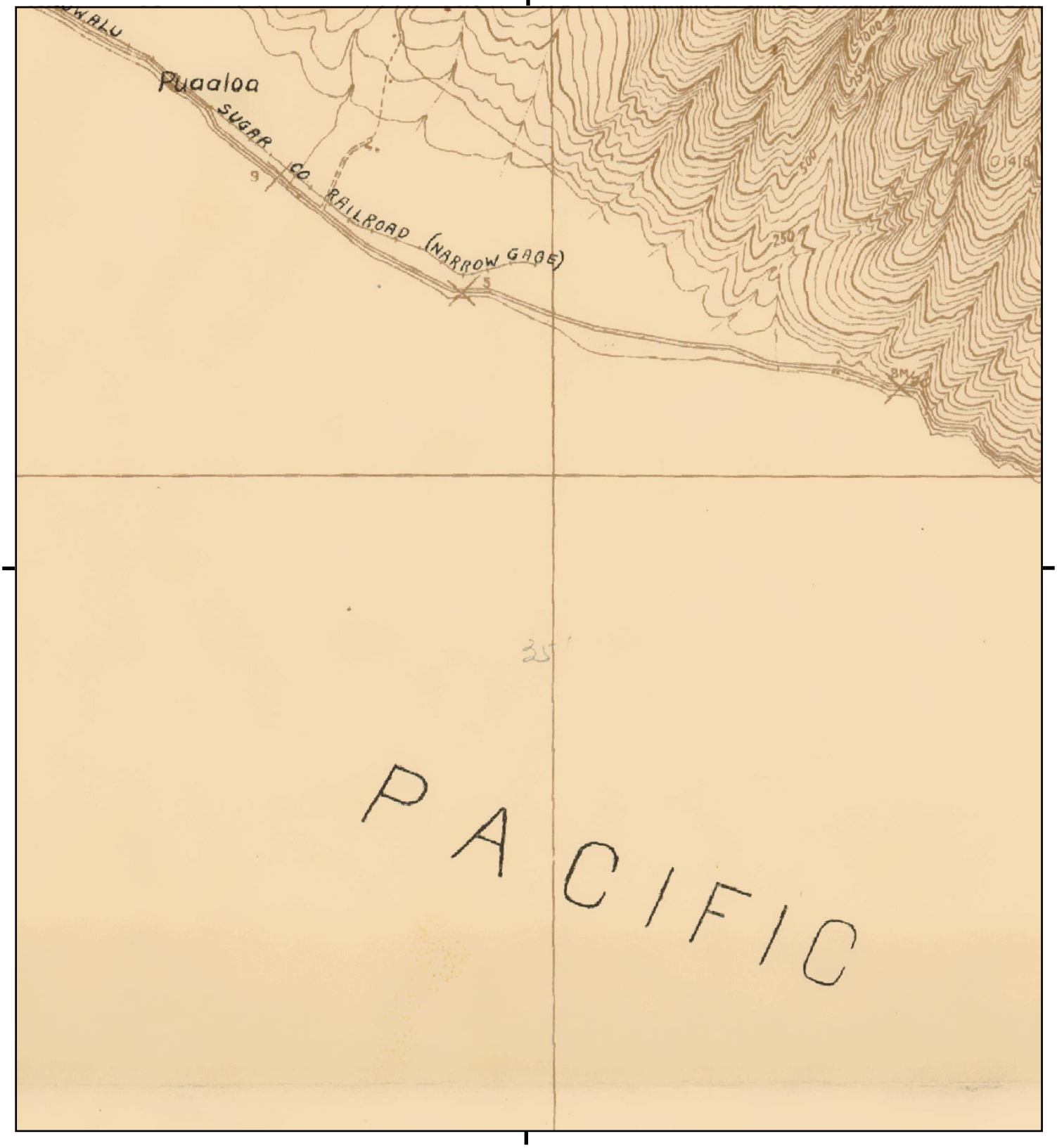
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, LAUNIUPOKO, 1923, 7.5-minute
NE, MAALAEA, 1923, 7.5-minute

SITE NAME: HDOT Honoapiilani Hwy Improvements
ADDRESS: HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761
CLIENT: WSP

N



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, MAALAEA, 1923, 7.5-minute

SITE NAME: HDOT Honoapiilani Hwy Improvements
ADDRESS: HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761
CLIENT: WSP

N

EDR
Area/Corridor Report

HDOT Honoapiilani Hwy Improvements
HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761

Inquiry Number: 7324924.8s
May 02, 2023

EDR Area / Corridor Report

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

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Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E1527-21), the ASTM Standard Practice for Environmental Site Assessments for Forestland or Rural Property (E 2247-16), the ASTM Standard Practice for Limited Environmental Due Diligence: Transaction Screen Process (E 1528-14) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

SUBJECT PROPERTY INFORMATION

ADDRESS

HDOT HONOAPIILANI HWY IMPROVEMENTS
LAHAINA, HI 96761

TARGET PROPERTY SEARCH RESULTS

The Target Property was identified in the following databases.

Page Numbers and Map Identifcations refer to the EDR Area/Corridor Report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Page Numbers and Map Identifcations refer to the EDR Area/Corridor Report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

Lists of state- and tribal hazardous waste facilities

SHWS: Sites List

A review of the SHWS list, as provided by EDR, and dated 10/20/2022 has revealed that there are 5 SHWS sites within approximately1 mile of the requested target property.

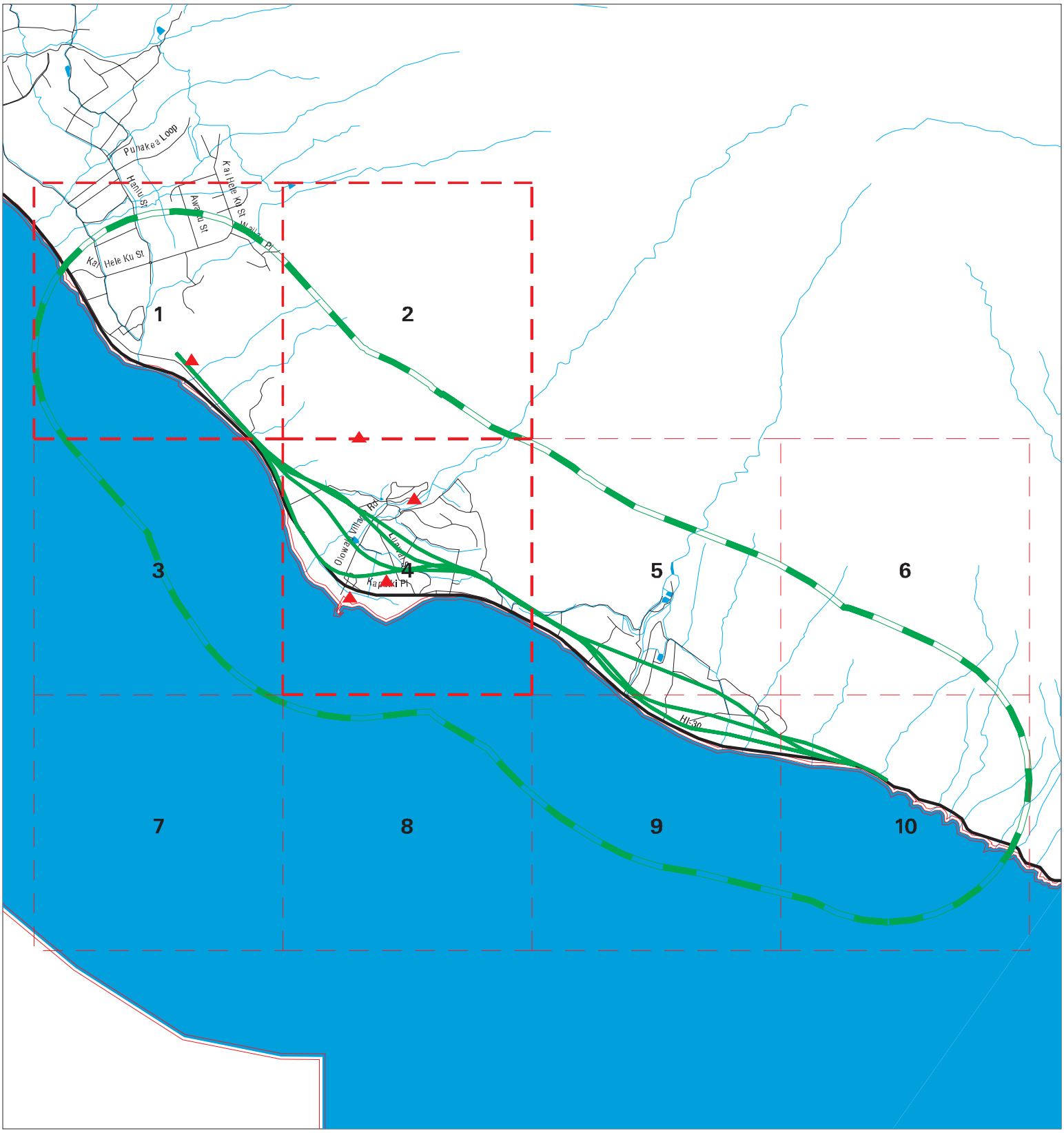
Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
HIARNG OLOWALU RIFLE		NE 0 - 1/8 (0.050 mi.)	1 / 1	26
LUAWAI ROAD TRANSFOR	LUAWAI RD	S 0 - 1/8 (0.053 mi.)	2 / 4	26
OLOWALU COMPANY SUGA	11-485 HONOAPIILANI	S 1/8 - 1/4 (0.148 mi.)	3 / 4	27
OLOWALU SHAFT TRANSF	OLOWALU VALLEY RD	NE 1/4 - 1/2 (0.277 mi.)	4 / 4	28
OLOWALU TRANSFER STA	HONOAPIILANI HWY	NNE 1/4 - 1/2 (0.421 mi.)	5 / 2	29

MAPPED SITES SUMMARY

Target Property:
HDOT HONOAPIILANI HWY IMPROVEMENTS
LAHAINA, HI 96761

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION
1 / 1	HIARNG OLOWALU RIFLE		SHWS	264 0.050 NE
2 / 4	LUAWAI ROAD TRANSFOR	LUAWAI RD	SHWS	282 0.053 South
3 / 4	OLOWALU COMPANY SUGA	11-485 HONOAPIILANI	SHWS	780 0.148 South
4 / 4	OLOWALU SHAFT TRANSF	OLOWALU VALLEY RD	SHWS	1465 0.277 NE
5 / 2	OLOWALU TRANSFER STA	HONOAPIILANI HWY	SHWS	2225 0.421 NNE

Key Map - 7324924.8s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
National Priority List Sites
Dept. Defense Sites
Indian Reservations BIA

0 1/2 1 Miles

SITE NAME: HDOT Honoapiilani Hwy Improvements	CLIENT: WSP
ADDRESS: HDOT Honoapiilani Hwy Improvements	CONTACT: April Ryckman
CITY/STATE: Lahaina HI	INQUIRY #: 7324924.8s
ZIP: 96761	DATE: 05/02/23 2:33 PM

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MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Lists of Federal NPL (Superfund) sites								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	1.000		0	0	0	0	NR	0
Lists of Federal Delisted NPL sites								
Delisted NPL	1.000		0	0	0	0	NR	0
Lists of Federal sites subject to CERCLA removals and CERCLA orders								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
SEMS	0.500		0	0	0	NR	NR	0
Lists of Federal CERCLA sites with NFRAP								
SEMS-ARCHIVE	0.500		0	0	0	NR	NR	0
Lists of Federal RCRA facilities undergoing Corrective Action								
CORRACTS	1.000		0	0	0	0	NR	0
Lists of Federal RCRA TSD facilities								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Lists of Federal RCRA generators								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		0	0	NR	NR	NR	0
RCRA-VSQG	0.250		0	0	NR	NR	NR	0
Federal institutional controls / engineering controls registries								
LUCIS	0.500		0	0	0	NR	NR	0
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROLS	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	TP		NR	NR	NR	NR	NR	0
Lists of state- and tribal hazardous waste facilities								
SHWS	1.000		2	1	2	0	NR	5
Lists of state and tribal landfills and solid waste disposal facilities								
SWF/LF	0.500		0	0	0	NR	NR	0
Lists of state and tribal leaking storage tanks								
LUST	0.500		0	0	0	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
INDIAN LUST	0.500		0	0	0	NR	NR	0
Lists of state and tribal registered storage tanks								
FEMA UST	0.250		0	0	NR	NR	NR	0
UST	0.250		0	0	NR	NR	NR	0
INDIAN UST	0.250		0	0	NR	NR	NR	0
State and tribal institutional control / engineering control registries								
ENG CONTROLS	0.500		0	0	0	NR	NR	0
INST CONTROL	0.500		0	0	0	NR	NR	0
Lists of state and tribal voluntary cleanup sites								
VCP	0.500		0	0	0	NR	NR	0
INDIAN VCP	0.500		0	0	0	NR	NR	0
Lists of state and tribal brownfield sites								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
SWRCY	0.500		0	0	0	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
IHS OPEN DUMPS	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US HIST CDL	TP		NR	NR	NR	NR	NR	0
CDL	TP		NR	NR	NR	NR	NR	0
US CDL	TP		NR	NR	NR	NR	NR	0
Local Land Records								
LIENS 2	TP		NR	NR	NR	NR	NR	0
Records of Emergency Release Reports								
HMIRS	TP		NR	NR	NR	NR	NR	0
SPILLS	TP		NR	NR	NR	NR	NR	0
SPILLS 90	TP		NR	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		0	0	NR	NR	NR	0
FUDS	1.000		0	0	0	0	NR	0
DOD	1.000		0	0	0	0	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
US FIN ASSUR	TP		NR	NR	NR	NR	NR	0
EPA WATCH LIST	TP		NR	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	TP		NR	NR	NR	NR	NR	0
TRIS	TP		NR	NR	NR	NR	NR	0
SSTS	TP		NR	NR	NR	NR	NR	0
ROD	1.000		0	0	0	0	NR	0
RMP	TP		NR	NR	NR	NR	NR	0
RAATS	TP		NR	NR	NR	NR	NR	0
PRP	TP		NR	NR	NR	NR	NR	0
PADS	TP		NR	NR	NR	NR	NR	0
ICIS	TP		NR	NR	NR	NR	NR	0
FTTS	TP		NR	NR	NR	NR	NR	0
MLTS	TP		NR	NR	NR	NR	NR	0
COAL ASH DOE	TP		NR	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	TP		NR	NR	NR	NR	NR	0
RADINFO	TP		NR	NR	NR	NR	NR	0
HIST FTTS	TP		NR	NR	NR	NR	NR	0
DOT OPS	TP		NR	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	1.000		0	0	0	0	NR	0
FUSRAP	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	TP		NR	NR	NR	NR	NR	0
US AIRS	TP		NR	NR	NR	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
ABANDONED MINES	0.250		0	0	NR	NR	NR	0
FINDS	TP		NR	NR	NR	NR	NR	0
DOCKET HWC	TP		NR	NR	NR	NR	NR	0
ECHO	TP		NR	NR	NR	NR	NR	0
UXO	1.000		0	0	0	0	NR	0
FUELS PROGRAM	0.250		0	0	NR	NR	NR	0
PFAS NPL	0.250		0	0	NR	NR	NR	0
PFAS FEDERAL SITES	0.250		0	0	NR	NR	NR	0
PFAS TSCA	0.250		0	0	NR	NR	NR	0
PFAS RCRA MANIFEST	0.250		0	0	NR	NR	NR	0
PFAS ATSDR	0.250		0	0	NR	NR	NR	0
PFAS WQP	0.250		0	0	NR	NR	NR	0
PFAS NPDES	0.250		0	0	NR	NR	NR	0
PFAS ECHO	0.250		0	0	NR	NR	NR	0
PFAS ECHO FIRE TRAINING	0.250		0	0	NR	NR	NR	0
PFAS PART 139 AIRPORT	0.250		0	0	NR	NR	NR	0
AQUEOUS FOAM NRC	0.250		0	0	NR	NR	NR	0
PFAS	0.250		0	0	NR	NR	NR	0
AIRS	TP		NR	NR	NR	NR	NR	0
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
Financial Assurance	TP		NR	NR	NR	NR	NR	0
LEAD	TP		NR	NR	NR	NR	NR	0
UIC	TP		NR	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
PFAS TRIS	0.250		0	0	NR	NR	NR	0
MINES MRDS	0.250		0	0	NR	NR	NR	0
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.000		0	0	0	0	NR	0
EDR Hist Auto	0.125		0	NR	NR	NR	NR	0
EDR Hist Cleaner	0.125		0	NR	NR	NR	NR	0
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
RGA HWS	TP		NR	NR	NR	NR	NR	0
RGA LF	TP		NR	NR	NR	NR	NR	0
RGA LUST	TP		NR	NR	NR	NR	NR	0
- Totals --		0	2	1	2	0	0	5

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

Focus Map - 1 - 7324924.8s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
National Priority List Sites
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME: HDOT Honoapiilani Hwy Improvements	CLIENT: WSP
ADDRESS: HDOT Honoapiilani Hwy Improvements	CONTACT: April Ryckman
CITY/STATE: Lahaina HI	INQUIRY #: 7324924.8s
ZIP: 96761	DATE: 05/02/23

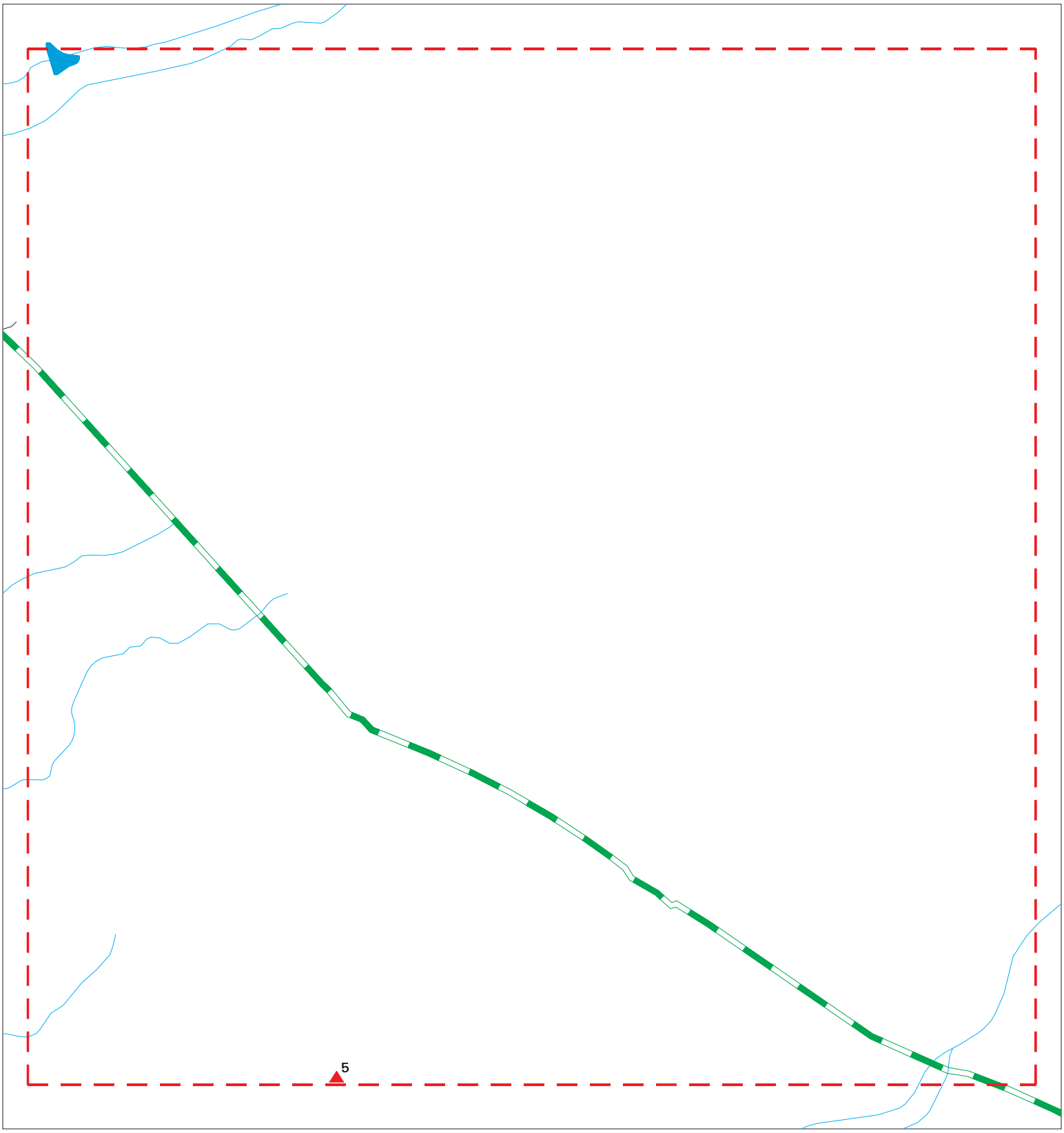
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MAPPED SITES SUMMARY - FOCUS MAP 1

Target Property:
HDOT HONOAPIILANI HWY IMPROVEMENTS
LAHAINA, HI 96761

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION
1 / 1	HIARNG OLOWALU RIFLE		SHWS	264 0.050 NE

Focus Map - 2 - 7324924.8s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
National Priority List Sites
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME: HDOT Honoapiilani Hwy Improvements	CLIENT: WSP
ADDRESS: HDOT Honoapiilani Hwy Improvements	CONTACT: April Ryckman
CITY/STATE: Lahaina HI	INQUIRY #: 7324924.8s
ZIP: 96761	DATE: 05/02/23

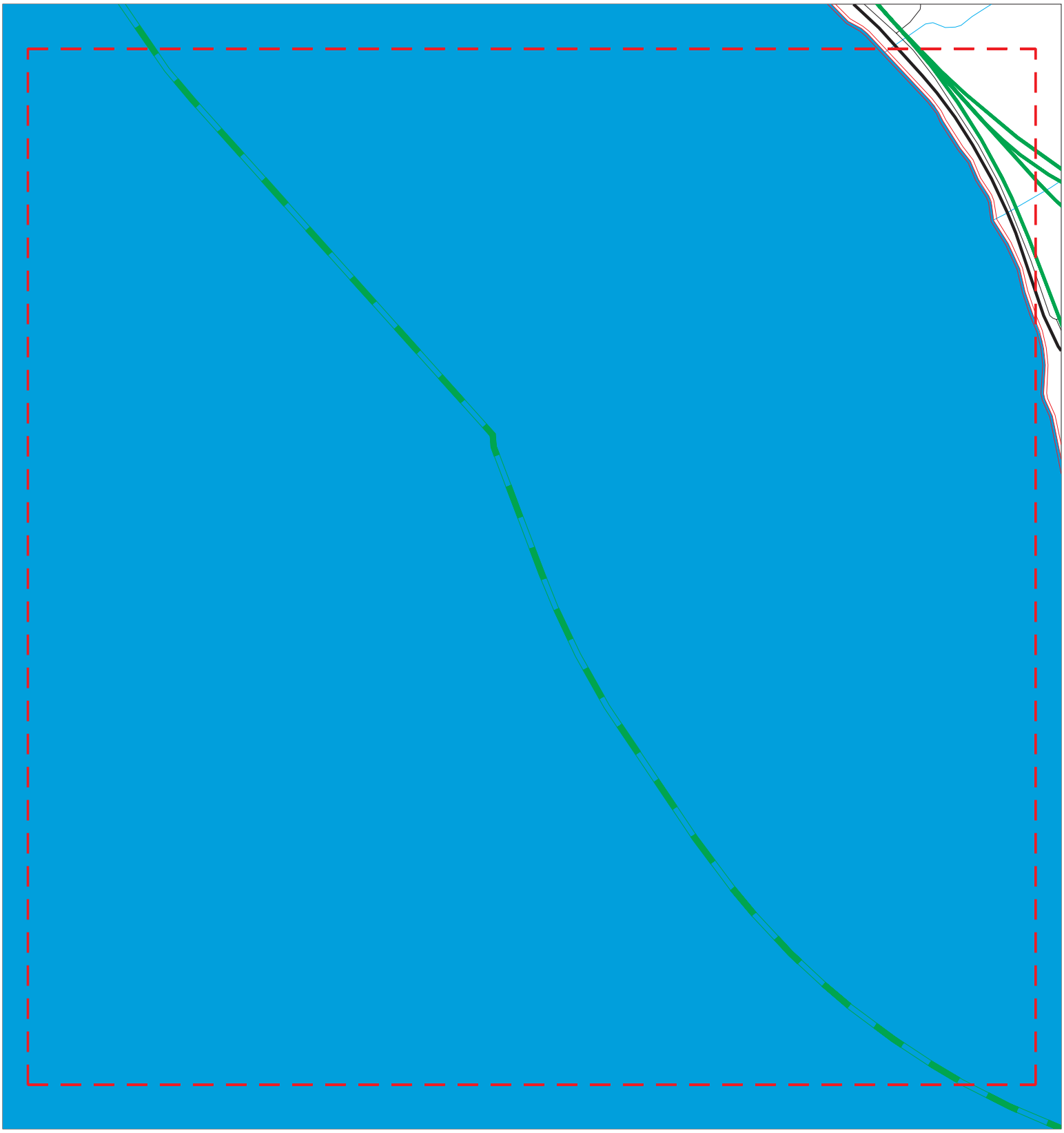
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MAPPED SITES SUMMARY - FOCUS MAP 2

Target Property:
HDOT HONOAPIILANI HWY IMPROVEMENTS
LAHAINA, HI 96761

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION
5 / 2	OLOWALU TRANSFER STA	HONOAPIILANI HWY	SHWS	2225 0.421 NNE

Focus Map - 3 - 7324924.8s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
National Priority List Sites
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME: HDOT Honoapiilani Hwy Improvements	CLIENT: WSP
ADDRESS: HDOT Honoapiilani Hwy Improvements	CONTACT: April Ryckman
CITY/STATE: Lahaina HI	INQUIRY #: 7324924.8s
ZIP: 96761	DATE: 05/02/23

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MAPPED SITES SUMMARY - FOCUS MAP 3

Target Property:
HDOT HONOAPIILANI HWY IMPROVEMENTS
LAHAINA, HI 96761

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION

NO MAPPED SITES FOUND

Focus Map - 4 - 7324924.8s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
National Priority List Sites
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME: HDOT Honoapiilani Hwy Improvements	CLIENT: WSP
ADDRESS: HDOT Honoapiilani Hwy Improvements	CONTACT: April Ryckman
CITY/STATE: Lahaina HI	INQUIRY #: 7324924.8s
ZIP: 96761	DATE: 05/02/23

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MAPPED SITES SUMMARY - FOCUS MAP 4

Target Property:
HDOT HONOAPIILANI HWY IMPROVEMENTS
LAHAINA, HI 96761

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION
2 / 4	LUAWAI ROAD TRANSFOR	LUAWAI RD	SHWS	282 0.053 South
3 / 4	OLOWALU COMPANY SUGA	11-485 HONOAPIILANI	SHWS	780 0.148 South
4 / 4	OLOWALU SHAFT TRANSF	OLOWALU VALLEY RD	SHWS	1465 0.277 NE

Focus Map - 5 - 7324924.8s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
National Priority List Sites
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME: HDOT Honoapiilani Hwy Improvements	CLIENT: WSP
ADDRESS: HDOT Honoapiilani Hwy Improvements	CONTACT: April Ryckman
CITY/STATE: Lahaina HI	INQUIRY #: 7324924.8s
ZIP: 96761	DATE: 05/02/23

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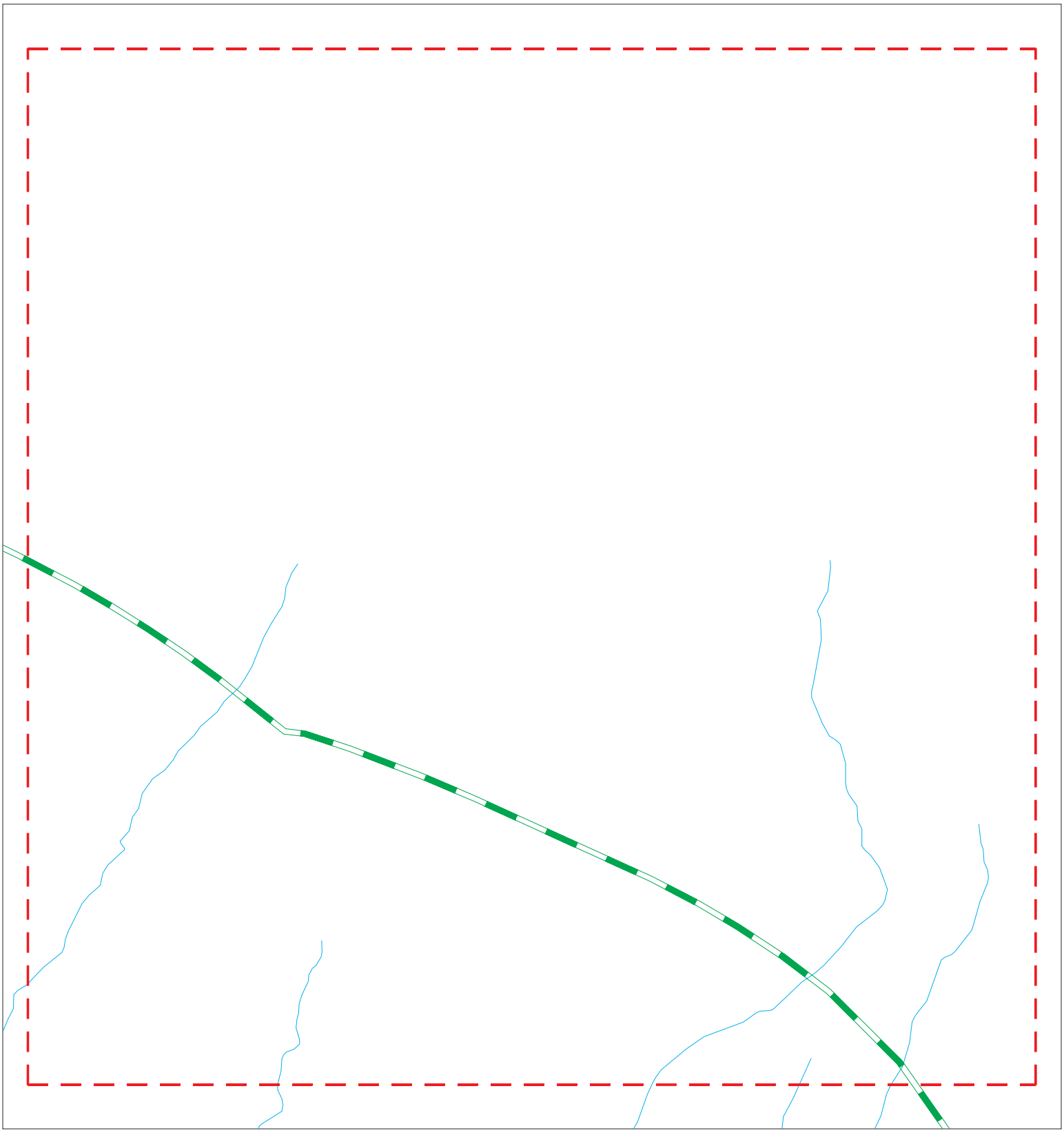
MAPPED SITES SUMMARY - FOCUS MAP 5

Target Property:
HDOT HONOAPIILANI HWY IMPROVEMENTS
LAHAINA, HI 96761

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION

NO MAPPED SITES FOUND

Focus Map - 6 - 7324924.8s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
National Priority List Sites
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME: HDOT Honoapiilani Hwy Improvements	CLIENT: WSP
ADDRESS: HDOT Honoapiilani Hwy Improvements	CONTACT: April Ryckman
CITY/STATE: Lahaina HI	INQUIRY #: 7324924.8s
ZIP: 96761	DATE: 05/02/23

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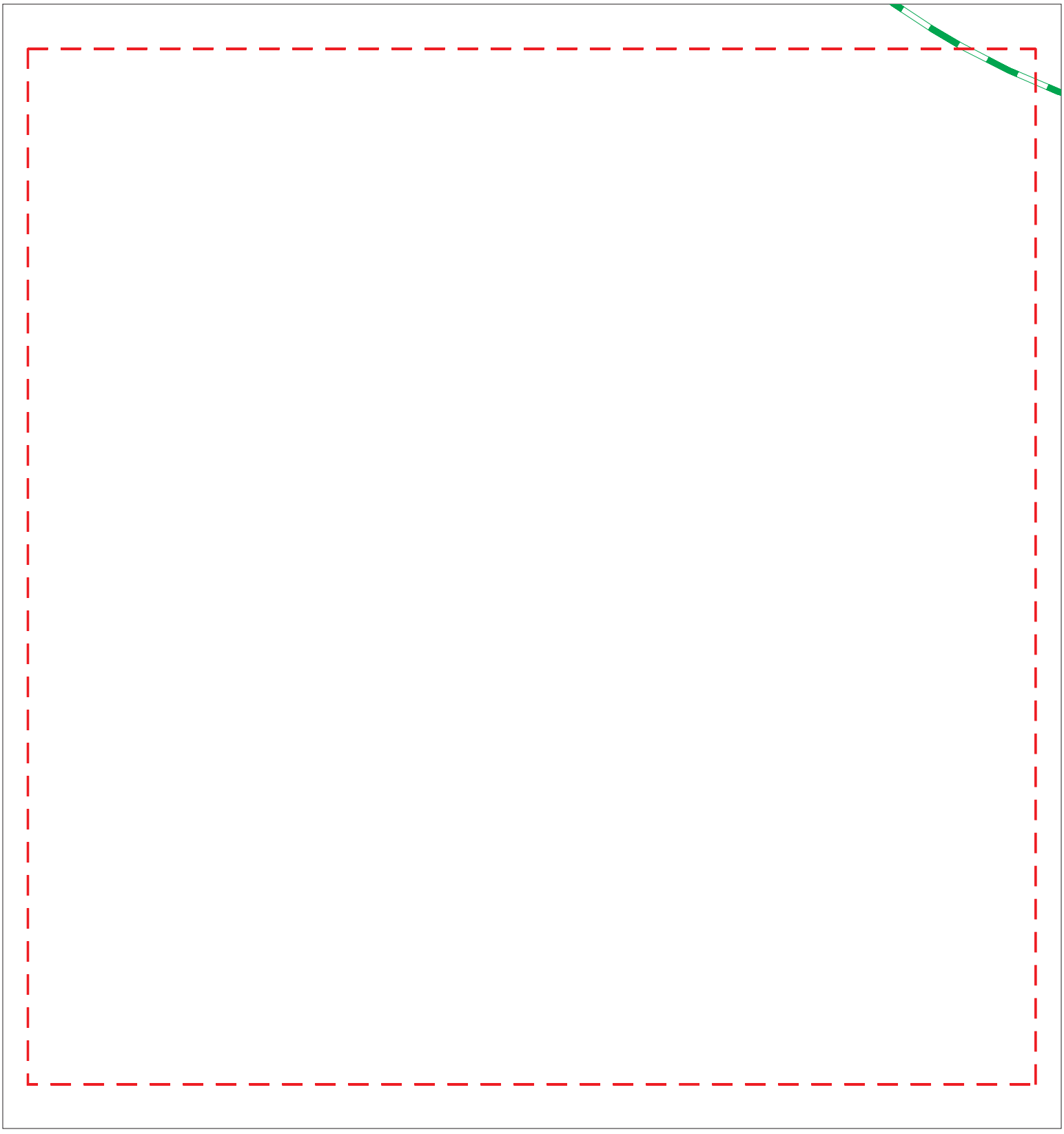
MAPPED SITES SUMMARY - FOCUS MAP 6

Target Property:
HDOT HONOAPIILANI HWY IMPROVEMENTS
LAHAINA, HI 96761

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION

NO MAPPED SITES FOUND

Focus Map - 7 - 7324924.8s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
National Priority List Sites
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME: HDOT Honoapiilani Hwy Improvements	CLIENT: WSP
ADDRESS: HDOT Honoapiilani Hwy Improvements	CONTACT: April Ryckman
CITY/STATE: Lahaina HI	INQUIRY #: 7324924.8s
ZIP: 96761	DATE: 05/02/23

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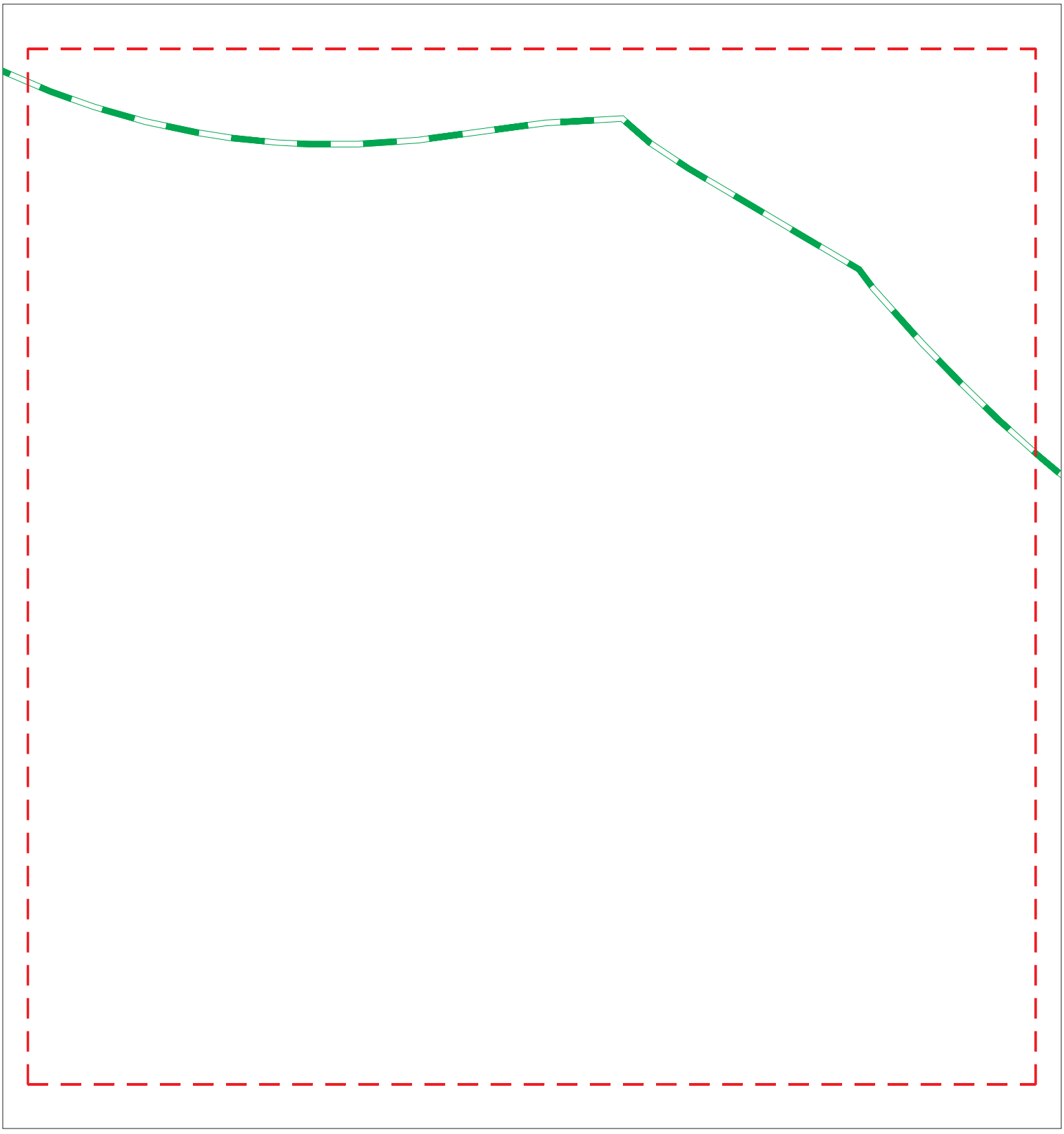
MAPPED SITES SUMMARY - FOCUS MAP 7

Target Property:
HDOT HONOAPIILANI HWY IMPROVEMENTS
LAHAINA, HI 96761

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION

NO MAPPED SITES FOUND

Focus Map - 8 - 7324924.8s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
National Priority List Sites
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME: HDOT Honoapiilani Hwy Improvements	CLIENT: WSP
ADDRESS: HDOT Honoapiilani Hwy Improvements	CONTACT: April Ryckman
CITY/STATE: Lahaina HI	INQUIRY #: 7324924.8s
ZIP: 96761	DATE: 05/02/23

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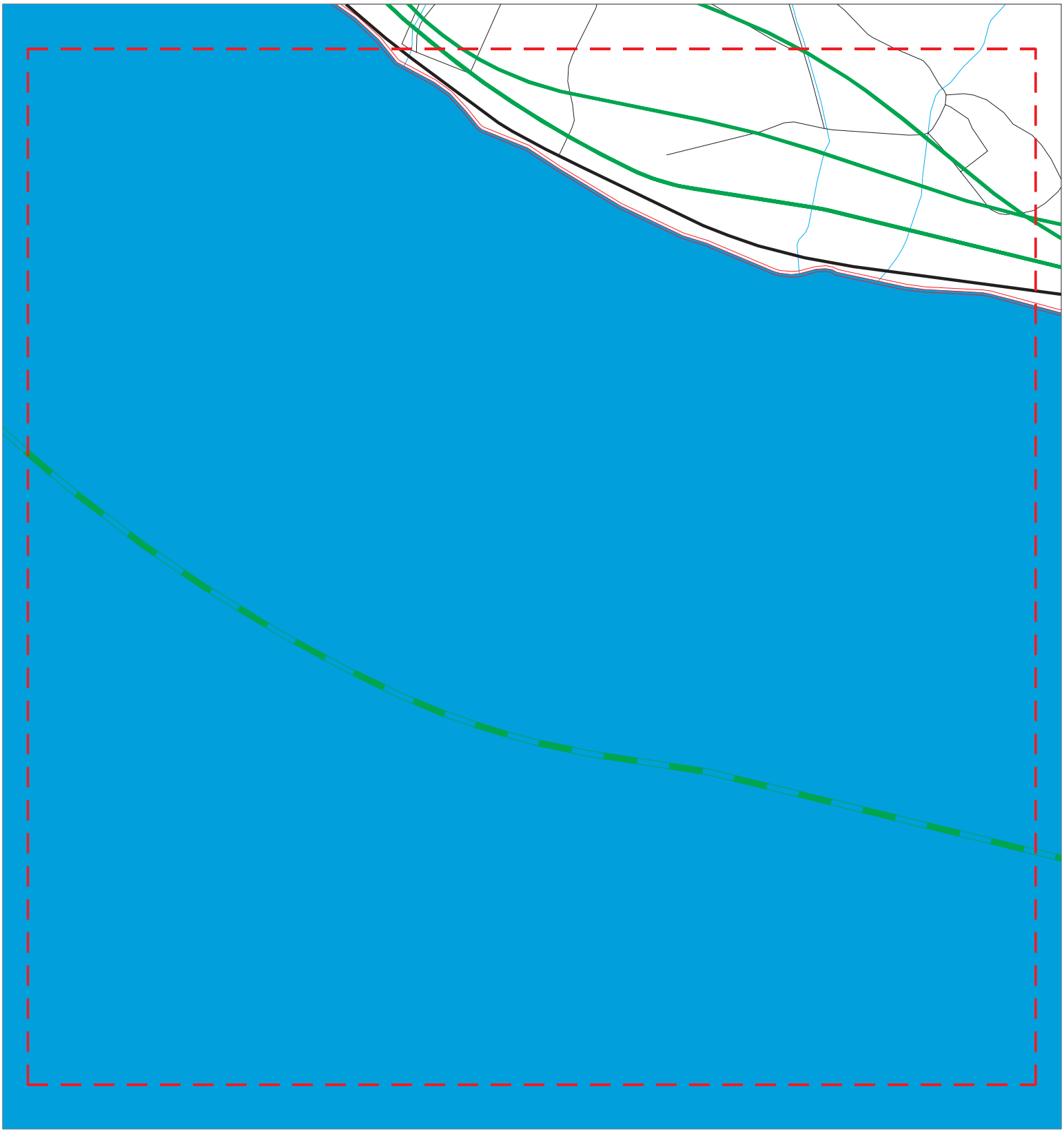
MAPPED SITES SUMMARY - FOCUS MAP 8

Target Property:
HDOT HONOAPIILANI HWY IMPROVEMENTS
LAHAINA, HI 96761

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION

NO MAPPED SITES FOUND

Focus Map - 9 - 7324924.8s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
National Priority List Sites
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME: HDOT Honoapiilani Hwy Improvements	CLIENT: WSP
ADDRESS: HDOT Honoapiilani Hwy Improvements	CONTACT: April Ryckman
CITY/STATE: Lahaina HI	INQUIRY #: 7324924.8s
ZIP: 96761	DATE: 05/02/23

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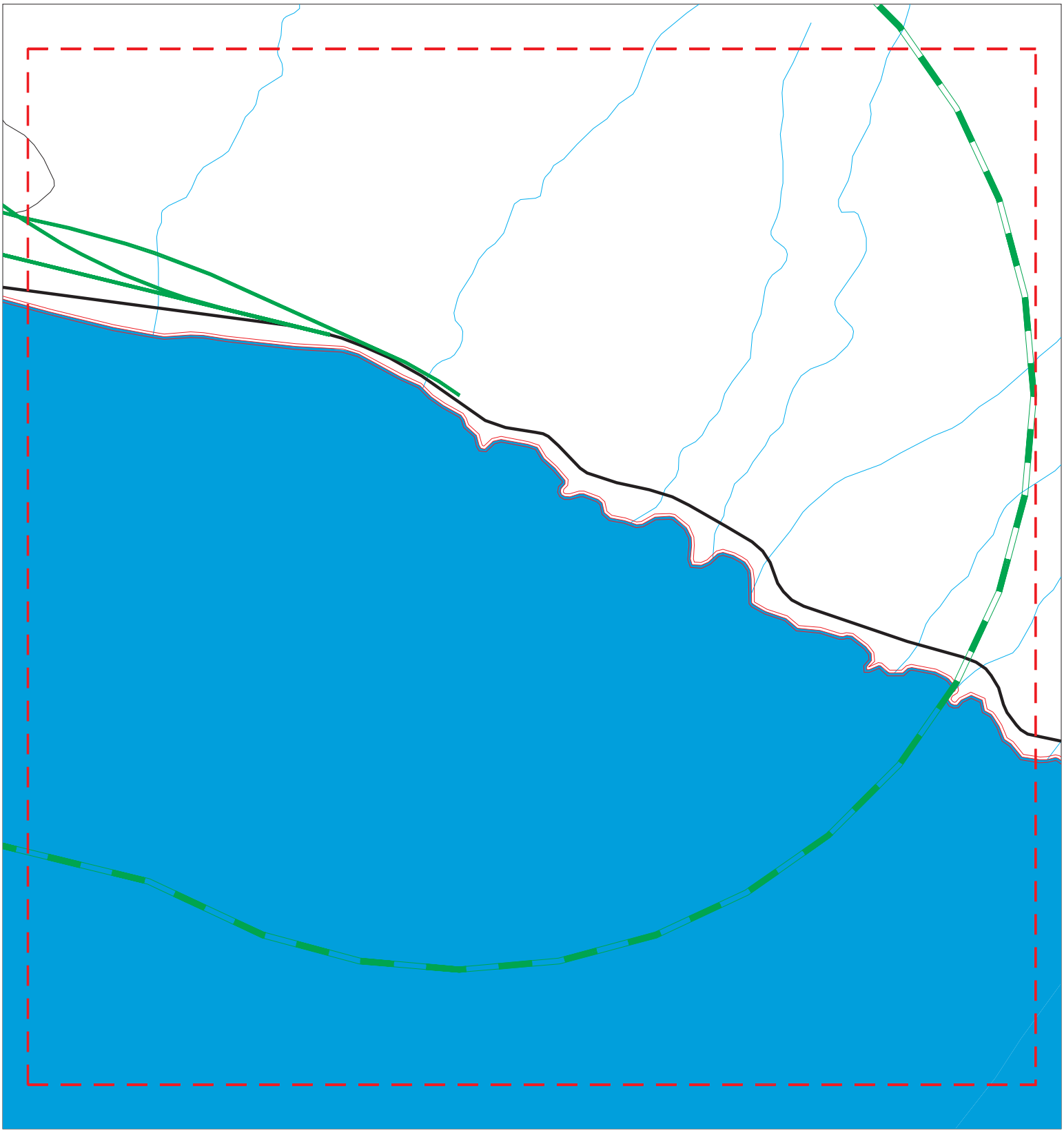
MAPPED SITES SUMMARY - FOCUS MAP 9

Target Property:
HDOT HONOAPIILANI HWY IMPROVEMENTS
LAHAINA, HI 96761

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION

NO MAPPED SITES FOUND

Focus Map - 10 - 7324924.8s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
National Priority List Sites
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME: HDOT Honoapiilani Hwy Improvements ADDRESS: HDOT Honoapiilani Hwy Improvements CITY/STATE: Lahaina HI ZIP: 96761	CLIENT: WSP CONTACT: April Ryckman INQUIRY #: 7324924.8s DATE: 05/02/23

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MAPPED SITES SUMMARY - FOCUS MAP 10

Target Property:
HDOT HONOAPIILANI HWY IMPROVEMENTS
LAHAINA, HI 96761

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION

NO MAPPED SITES FOUND

1
NE
< 1/8
0.050 mi.
264 ft.

HIARNG OLOWALU RIFLE RANGE
MAUI (County), HI

SHWS **S111704729**
N/A

Actual:
18 ft.

Focus Map:
1

SHWS:

Name:	HIARNG OLOWALU RIFLE RANGE
Address:	Not reported
City,State,Zip:	HI
Supplemental Location:	Not reported
Island:	Maui
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	DOD-MMRP
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Maui
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	1750
Location Description:	Not reported
Is Public:	True
Update On:	44466.631331018521
Latitude:	20.834536
Longitude:	-156.639247

2
South
< 1/8
0.053 mi.
282 ft.

LUAWAI ROAD TRANSFORMER
LUAWAI RD
OLOWALU, HI 96761

SHWS **S110061635**
N/A

Actual:
3 ft.

Focus Map:
4

SHWS:

Name:	LUAWAI ROAD TRANSFORMER
Address:	LUAWAI RD
City,State,Zip:	OLOWALU, HI 96761
Supplemental Location:	Not reported

LUAWAI ROAD TRANSFORMER (Continued) **S110061635**

Island:	Maui
Environmental Interest:	Luawai Road Transformer
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	PA/SI
Project Manager:	Laura Young
Hazard Priority:	NFA
Potential Hazards And Controls:	No Hazard
Island:	Maui
SDAR Environmental Interest Name:	Luawai Road Transformer
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	No Hazard
Priority:	NFA
Assessment:	Response Not Necessary
Response:	Not reported
Nature of Contamination:	Presumed: PCB from transformers.
Nature of Residual Contamination:	No PCB contamination found in soil samples.
Use Restrictions:	No Hazard Present For Unrestricted Residential Use
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	None - Site Discovery Clearance Only
Document Date:	09/22/2008
Document Number:	Not reported
Document Subject:	Site Screening Sheet for Olowalu Shaft Transformer Substation
Project Manager:	Laura Young
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	2758
Location Description:	Luawai Rd
Is Public:	True
Update On:	43615.858113425929
Latitude:	20.8119
Longitude:	-156.618

---

3 **OLOWALU COMPANY SUGAR MILL** **SHWS** **S111704826**
South **11-485 HONOAPIILANI HWY** **N/A**
1/8-1/4 **LAHAINA, HI 96761**
0.148 mi.
780 ft.

Actual:
3 ft.

Focus Map:
4

SHWS:

Name:	OLOWALU COMPANY SUGAR MILL
Address:	11-485 HONOAPIILANI HWY
City,State,Zip:	LAHAINA, HI 96761
Supplemental Location:	Not reported
Island:	Maui
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	PA/SI
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported

OLOWALU COMPANY SUGAR MILL (Continued) **S111704826**

Island:	Maui
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	610
Location Description:	11-485 Honoapiilani Hwy, Lahaina, HI 96761
Is Public:	True
Update On:	44182.585879629631
Latitude:	20.8102
Longitude:	-156.622

4
NE
1/4-1/2
0.277 mi.
1465 ft.

OLOWALU SHAFT TRANSFORMER SUBSTATION **SHWS** **S110061730**
OLOWALU VALLEY RD **N/A**
OLOWALU, HI 96761

Actual:
164 ft.

Focus Map:
4

SHWS:

Name:	OLOWALU SHAFT TRANSFORMER SUBSTATION
Address:	OLOWALU VALLEY RD
City,State,Zip:	OLOWALU, HI 96761
Supplemental Location:	Not reported
Island:	Maui
Environmental Interest:	Olowalu Shaft Transformer Substation
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	PA/SI
Project Manager:	Laura Young
Hazard Priority:	NFA
Potential Hazards And Controls:	No Hazard
Island:	Maui
SDAR Environmental Interest Name:	Olowalu Shaft Transformer Substation
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	No Hazard
Priority:	NFA
Assessment:	Response Not Necessary
Response:	Not reported

OLOWALU SHAFT TRANSFORMER SUBSTATION (Continued) **S110061730**

Nature of Contamination:	Presumed: PCB investigation.
Nature of Residual Contamination:	Not reported
Use Restrictions:	No Hazard Present for Unrestricted Residential Use
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	None - Site Discovery Clearance Only
Document Date:	09/22/2008
Document Number:	Not reported
Document Subject:	Site Screening Sheet for Olowalu Shaft Transformer Substation
Project Manager:	Laura Young
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	2776
Location Description:	Olowalu Valley Rd
Is Public:	True
Update On:	43615.858113425929
Latitude:	20.8203
Longitude:	-156.615

---

5 **OLOWALU TRANSFER STATION (HID980497283)** **SHWS** **S126283053**
NNE **HONOAPIILANI HWY** **N/A**
1/4-1/2 **OLOWALU, HI 96793**
0.421 mi.
2225 ft.

Actual:
401 ft.

Focus Map:
2

SHWS:

Name:	OLOWALU TRANSFER STATION (HID980497283)
Address:	HONOAPIILANI HWY
City,State,Zip:	OLOWALU, HI 96793
Supplemental Location:	Not reported
Island:	Maui
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Maui
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported

OLOWALU TRANSFER STATION (HID980497283) (Continued) **S126283053**

Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2204
Location Description:	Honoapiilani Highway
Is Public:	True
Update On:	43684.447476851848
Latitude:	20.83583
Longitude:	-156.6317
Name:	OLOWALU TRANSFER STATION (HID980497283)
Address:	HONOAPIILANI HWY
City,State,Zip:	OLOWALU, HI 96793
Supplemental Location:	Not reported
Island:	Maui
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Maui
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2204
Location Description:	Honoapiilani Highway
Is Public:	True
Update On:	43684.447476851848
Latitude:	20.84444
Longitude:	-156.6408
Name:	OLOWALU TRANSFER STATION (HID980497283)
Address:	HONOAPIILANI HWY
City,State,Zip:	OLOWALU, HI 96793
Supplemental Location:	Not reported

OLOWALU TRANSFER STATION (HID980497283) (Continued) **S126283053**

Island:	Maui
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Maui
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2204
Location Description:	Honoapiilani Highway
Is Public:	True
Update On:	43684.447476851848
Latitude:	20.8266
Longitude:	-156.621

Count: 21 records

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
KAANAPALI	1018362341	WEST MAUI HOSPITAL AND MEDICAL CENTER	FROM THE INTERSECTION OF HONOAPIILANI HWY/KAKAALAN	96761	FINDS, ECHO
KAPALUA	1010166538	KAPALUA MAUKA PD2	MAUKA OF THE HONOAPIILANI HIGHWAY, DIRECTLY SOUTH	96761	FINDS, ECHO
LAHAINA	1026171884	HONOKOWAI READY-MIX	HONOAPIILANI HWY. TMK 44001108000	96761	RCRA-VSQG
LAHAINA	1010316489	ONE HOUR MARTINIZING	3350 L HONOAPIILANI RD	96761	RCRA-VSQG
LAHAINA	S107025075	HONOAPIILANI HIGHWAY, TRUCK OFF CLIFF/GAS SPILL	HONOAPIILANI HWY	96761	SPILLS
LAHAINA	S117391954	UKUMEHAME PUNCTURED FUEL TANK	HONOAPIILANI HIGHWAY		SPILLS
LAHAINA	1017742384	WEST MAUI VILLAGE OFF-SITE ROADWAY IMPROVEMENTS	INTERSECTION OF HONOAPIILANI HIGHWAY AND NAPILIHAU	96761	FINDS, ECHO
LAHAINA	1017380561	KAHOMA VILLAGE	TMK (2) 4-5-08: 01 AND PORTIONS OF HONOAPIILANI HI	96761	FINDS, ECHO
LAHAINA	1008919203	HONOLUA RIDGE - PHASE II	SOUTHERLY SIDE OF HONOAPIILANI	96761	FINDS, ECHO
LAHAINA	1011444910	HONOAPIILANI HIGHWAY WIDENING, LAHAINALUNA ROAD TO 'AHOLO ROAD	HONOAPIILANI HIGHWAY, MILE POST 19.9 TO MILE POST	96761	FINDS, ECHO
LAHAINA	1016342612	KAMEHAMEHA HIGHWAY, REPLACEMENT OF SOUTH PUNALUU BRIDGE	MAUKA OF HONOAPIILANI HIGHWAY, DIRECTLY SOUTH OF T	96761	FINDS, ECHO
LAHAINA	1022966220	KAIAULU AT KAANAPALI	NEAR HONOAPIILANI HIGHWAY AND KUALAPA LOOP	96761	FINDS, ECHO
LAHAINA	1023643686	EXCESS EARTHEN STOCKPILE REMOVAL AND LAND RESTORATION	NORTH OF HONOAPIILANI HWY BETWEEN KAI HELE ST, HOK	96761	FINDS, ECHO
LAHAINA	1026440127	HONOKOWAI READY-MIX	HONOAPIILANI HWY. TMK 44001108000	96761	FINDS
LAHAINA	1015914246	OLOWALU MAUKA PROPERTIES - DRIVEWAY	HONOAPIILANI HWY @ OLOWALU APPR 1/2 M E OF OLOWALU	96761	FINDS, ECHO
LAHAINA	1015930563	HONOAPIILANI HIGHWAY SHORELINE PROTECTION FOR TSUNAMI DAMAGE IN UKUMEHAME	HONOAPIILANI HIGHWAY, MILE POST 11.52 TO 12.28	96761	FINDS, ECHO
LAHAINA	1026971345	OLOWALU ELUA LLC	11493 HONOAPIILANI HIGHWAY	96761	FINDS
LAHAINA	1010426779	SANDWICH ISLES COMMUNICATIONS, INC SUBMARINE FIBER-OPTIC CABLE NETWORK	MAUKA SIDE OF HONOAPIILANI HWY	96761	FINDS, ECHO
LAHAINA	1009403737	VILLAGES OF LEIALI'I, PHASE 1A	EAST OF HONOAPIILANI HIGHWAY	96761	FINDS, ECHO
LAHAINA	1023393832	KAHANA NUI BRIDGE REPLACEMENT (1)	KAHANA NUI BRIDGE ALONG LOWER HONOAPIILANI ROAD	96761	FINDS
LAHAINA	1026841342	OLOWALU ELUA LLC	11493 HONOAPIILANI HIGHWAY	96761	ECHO

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Lists of Federal NPL (Superfund) sites

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 01/25/2023
Date Data Arrived at EDR: 02/03/2023
Date Made Active in Reports: 02/28/2023
Number of Days to Update: 25

Source: EPA
Telephone: N/A
Last EDR Contact: 04/03/2023
Next Scheduled EDR Contact: 07/10/2023
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 3
Telephone 215-814-5418

EPA Region 4
Telephone 404-562-8033

EPA Region 5
Telephone 312-886-6686

EPA Region 10
Telephone 206-553-8665

EPA Region 6
Telephone: 214-655-6659

EPA Region 7
Telephone: 913-551-7247

EPA Region 8
Telephone: 303-312-6774

EPA Region 9
Telephone: 415-947-4246

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 01/25/2023
Date Data Arrived at EDR: 02/02/2023
Date Made Active in Reports: 02/28/2023
Number of Days to Update: 26

Source: EPA
Telephone: N/A
Last EDR Contact: 04/03/2023
Next Scheduled EDR Contact: 07/10/2023
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

Lists of Federal Delisted NPL sites

Delisted NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 01/25/2023
Date Data Arrived at EDR: 02/02/2023
Date Made Active in Reports: 02/28/2023
Number of Days to Update: 26

Source: EPA
Telephone: N/A
Last EDR Contact: 04/03/2023
Next Scheduled EDR Contact: 07/10/2023
Data Release Frequency: Quarterly

Lists of Federal sites subject to CERCLA removals and CERCLA orders

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 12/20/2022
Date Data Arrived at EDR: 12/21/2022
Date Made Active in Reports: 03/10/2023
Number of Days to Update: 79

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 03/28/2023
Next Scheduled EDR Contact: 07/10/2023
Data Release Frequency: Varies

SEMS: Superfund Enterprise Management System

SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program across the United States. The list was formerly know as CERCLIS, renamed to SEMS by the EPA in 2015. The list contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This dataset also contains sites which are either proposed to or on the National Priorities List (NPL) and the sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 01/25/2023
Date Data Arrived at EDR: 02/02/2023
Date Made Active in Reports: 02/28/2023
Number of Days to Update: 26

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 04/03/2023
Next Scheduled EDR Contact: 07/24/2023
Data Release Frequency: Quarterly

Lists of Federal CERCLA sites with NFRAP

SEMS-ARCHIVE: Superfund Enterprise Management System Archive

SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, renamed to SEMS ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. Archived sites have been removed and archived from the inventory of SEMS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list the site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. The decision does not necessarily mean that there is no hazard associated with a given site; it only means that. based upon available information, the location is not judged to be potential NPL site.

Date of Government Version: 01/25/2023
Date Data Arrived at EDR: 02/02/2023
Date Made Active in Reports: 02/28/2023
Number of Days to Update: 26

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 04/03/2023
Next Scheduled EDR Contact: 07/24/2023
Data Release Frequency: Quarterly

Lists of Federal RCRA facilities undergoing Corrective Action

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 03/06/2023
Date Data Arrived at EDR: 03/09/2023
Date Made Active in Reports: 03/20/2023
Number of Days to Update: 11

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 03/09/2023
Next Scheduled EDR Contact: 07/03/2023
Data Release Frequency: Quarterly

Lists of Federal RCRA TSD facilities

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 03/06/2023
Date Data Arrived at EDR: 03/09/2023
Date Made Active in Reports: 03/20/2023
Number of Days to Update: 11

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 03/09/2023
Next Scheduled EDR Contact: 07/03/2023
Data Release Frequency: Quarterly

Lists of Federal RCRA generators

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 03/06/2023
Date Data Arrived at EDR: 03/09/2023
Date Made Active in Reports: 03/20/2023
Number of Days to Update: 11

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 03/09/2023
Next Scheduled EDR Contact: 07/03/2023
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 03/06/2023
Date Data Arrived at EDR: 03/09/2023
Date Made Active in Reports: 03/20/2023
Number of Days to Update: 11

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 03/09/2023
Next Scheduled EDR Contact: 07/03/2023
Data Release Frequency: Quarterly

RCRA-VSQG: RCRA - Very Small Quantity Generators (Formerly Conditionally Exempt Small Quantity Generators)

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Very small quantity generators (VSQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 03/06/2023
Date Data Arrived at EDR: 03/09/2023
Date Made Active in Reports: 03/20/2023
Number of Days to Update: 11

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 03/09/2023
Next Scheduled EDR Contact: 07/03/2023
Data Release Frequency: Quarterly

Federal institutional controls / engineering controls registries

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 11/02/2022
Date Data Arrived at EDR: 11/08/2022
Date Made Active in Reports: 01/10/2023
Number of Days to Update: 63

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 02/03/2023
Next Scheduled EDR Contact: 05/22/2023
Data Release Frequency: Varies

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 10/27/2022
Date Data Arrived at EDR: 11/16/2022
Date Made Active in Reports: 02/09/2023
Number of Days to Update: 85

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 02/21/2023
Next Scheduled EDR Contact: 06/05/2023
Data Release Frequency: Varies

US INST CONTROLS: Institutional Controls Sites List

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 10/27/2022
Date Data Arrived at EDR: 11/16/2022
Date Made Active in Reports: 02/09/2023
Number of Days to Update: 85

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 02/21/2023
Next Scheduled EDR Contact: 06/05/2023
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 12/12/2022
Date Data Arrived at EDR: 12/14/2022
Date Made Active in Reports: 12/19/2022
Number of Days to Update: 5

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 03/21/2023
Next Scheduled EDR Contact: 07/03/2023
Data Release Frequency: Quarterly

Lists of state- and tribal hazardous waste facilities

SHWS: Sites List

Facilities, sites or areas in which the Office of Hazard Evaluation and Emergency Response has an interest, has investigated or may investigate under HRS 128D (includes CERCLIS sites).

Date of Government Version: 10/20/2022
Date Data Arrived at EDR: 12/02/2022
Date Made Active in Reports: 02/22/2023
Number of Days to Update: 82

Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 03/07/2023
Next Scheduled EDR Contact: 06/19/2023
Data Release Frequency: Semi-Annually

Lists of state and tribal landfills and solid waste disposal facilities

SWF/LF: Permitted Landfills in the State of Hawaii

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 09/14/2022
Date Data Arrived at EDR: 09/28/2022
Date Made Active in Reports: 10/12/2022
Number of Days to Update: 14

Source: Department of Health
Telephone: 808-586-4245
Last EDR Contact: 03/16/2023
Next Scheduled EDR Contact: 07/03/2023
Data Release Frequency: Varies

Lists of state and tribal leaking storage tanks

LUST: Leaking Underground Storage Tank Database

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 11/21/2022
Date Data Arrived at EDR: 11/22/2022
Date Made Active in Reports: 02/07/2023
Number of Days to Update: 77

Source: Department of Health
Telephone: 808-586-4228
Last EDR Contact: 11/22/2023
Next Scheduled EDR Contact: 06/05/2023
Data Release Frequency: Semi-Annually

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 11/23/2022
Date Data Arrived at EDR: 12/06/2022
Date Made Active in Reports: 03/03/2023
Number of Days to Update: 87

Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 04/20/2023
Next Scheduled EDR Contact: 07/31/2023
Data Release Frequency: Varies

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land
Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 10/14/2022
Date Data Arrived at EDR: 12/06/2022
Date Made Active in Reports: 03/03/2023
Number of Days to Update: 87
Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 04/20/2023
Next Scheduled EDR Contact: 07/31/2023
Data Release Frequency: Varies

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 11/23/2022
Date Data Arrived at EDR: 12/06/2022
Date Made Active in Reports: 03/03/2023
Number of Days to Update: 87
Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 04/20/2023
Next Scheduled EDR Contact: 07/31/2023
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 11/23/2022
Date Data Arrived at EDR: 12/06/2022
Date Made Active in Reports: 03/03/2023
Number of Days to Update: 87
Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 04/20/2023
Next Scheduled EDR Contact: 07/31/2023
Data Release Frequency: Varies

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 10/14/2022
Date Data Arrived at EDR: 12/06/2022
Date Made Active in Reports: 03/03/2023
Number of Days to Update: 87
Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 04/20/2023
Next Scheduled EDR Contact: 07/31/2023
Data Release Frequency: Varies

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 10/19/2022
Date Data Arrived at EDR: 12/06/2022
Date Made Active in Reports: 03/03/2023
Number of Days to Update: 87
Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 04/20/2023
Next Scheduled EDR Contact: 07/31/2023
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 11/26/2022
Date Data Arrived at EDR: 12/06/2022
Date Made Active in Reports: 03/03/2023
Number of Days to Update: 87
Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 04/20/2023
Next Scheduled EDR Contact: 07/31/2023
Data Release Frequency: Varies

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 11/23/2022
Date Data Arrived at EDR: 12/06/2022
Date Made Active in Reports: 04/19/2023
Number of Days to Update: 134
Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 04/20/2023
Next Scheduled EDR Contact: 07/31/2023
Data Release Frequency: Varies

Lists of state and tribal registered storage tanks

FEMA UST: Underground Storage Tank Listing
A listing of all FEMA owned underground storage tanks.

Date of Government Version: 10/14/2021
Date Data Arrived at EDR: 11/05/2021
Date Made Active in Reports: 02/01/2022
Number of Days to Update: 88

Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 03/29/2023
Next Scheduled EDR Contact: 07/17/2023
Data Release Frequency: Varies

UST: Underground Storage Tank Database
Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 11/21/2022
Date Data Arrived at EDR: 11/22/2022
Date Made Active in Reports: 02/07/2023
Number of Days to Update: 77

Source: Department of Health
Telephone: 808-586-4228
Last EDR Contact: 02/21/2023
Next Scheduled EDR Contact: 06/05/2023
Data Release Frequency: Semi-Annually

INDIAN UST R10: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 11/23/2022
Date Data Arrived at EDR: 12/06/2022
Date Made Active in Reports: 04/19/2023
Number of Days to Update: 134

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 04/20/2023
Next Scheduled EDR Contact: 07/31/2023
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 11/23/2022
Date Data Arrived at EDR: 12/06/2022
Date Made Active in Reports: 03/03/2023
Number of Days to Update: 87

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 04/20/2023
Next Scheduled EDR Contact: 07/31/2023
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 11/23/2022
Date Data Arrived at EDR: 12/06/2022
Date Made Active in Reports: 03/03/2023
Number of Days to Update: 87

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 04/20/2023
Next Scheduled EDR Contact: 07/31/2023
Data Release Frequency: Varies

INDIAN UST R5: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 10/14/2022
Date Data Arrived at EDR: 12/06/2022
Date Made Active in Reports: 03/03/2023
Number of Days to Update: 87

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 04/20/2023
Next Scheduled EDR Contact: 07/31/2023
Data Release Frequency: Varies

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 10/19/2022
Date Data Arrived at EDR: 12/06/2022
Date Made Active in Reports: 03/03/2023
Number of Days to Update: 87

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 04/20/2023
Next Scheduled EDR Contact: 07/31/2023
Data Release Frequency: Varies

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 10/14/2022
Date Data Arrived at EDR: 12/06/2022
Date Made Active in Reports: 03/03/2023
Number of Days to Update: 87

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 04/20/2023
Next Scheduled EDR Contact: 07/31/2023
Data Release Frequency: Varies

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 11/23/2022
Date Data Arrived at EDR: 12/06/2022
Date Made Active in Reports: 03/03/2023
Number of Days to Update: 87

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 04/20/2023
Next Scheduled EDR Contact: 07/31/2023
Data Release Frequency: Varies

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 11/23/2022
Date Data Arrived at EDR: 12/06/2022
Date Made Active in Reports: 03/03/2023
Number of Days to Update: 87

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 04/20/2023
Next Scheduled EDR Contact: 07/31/2023
Data Release Frequency: Varies

State and tribal institutional control / engineering control registries

ENG CONTROLS: Engineering Control Sites

A listing of sites with engineering controls in place.

Date of Government Version: 04/17/2019
Date Data Arrived at EDR: 05/21/2019
Date Made Active in Reports: 05/30/2019
Number of Days to Update: 9

Source: Department of Health
Telephone: 404-586-4249
Last EDR Contact: 03/07/2023
Next Scheduled EDR Contact: 06/19/2023
Data Release Frequency: Varies

INST CONTROL: Sites with Institutional Controls

Voluntary Remediation Program and Brownfields sites with institutional controls in place.

Date of Government Version: 04/17/2019
Date Data Arrived at EDR: 05/21/2019
Date Made Active in Reports: 05/30/2019
Number of Days to Update: 9

Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 03/07/2023
Next Scheduled EDR Contact: 06/19/2023
Data Release Frequency: Varies

Lists of state and tribal voluntary cleanup sites

INDIAN VCP R1: Voluntary Cleanup Priority Listing
A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 07/27/2015
Date Data Arrived at EDR: 09/29/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 142
Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 03/17/2023
Next Scheduled EDR Contact: 07/03/2023
Data Release Frequency: Varies

VCP: Voluntary Response Program Sites
Sites participating in the Voluntary Response Program. The purpose of the VRP is to streamline the cleanup process in a way that will encourage prospective developers, lenders, and purchasers to voluntarily cleanup properties.

Date of Government Version: 10/20/2022
Date Data Arrived at EDR: 12/02/2022
Date Made Active in Reports: 02/22/2023
Number of Days to Update: 82
Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 03/07/2023
Next Scheduled EDR Contact: 06/19/2023
Data Release Frequency: Varies

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng
A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27
Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 07/08/2021
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

Lists of state and tribal brownfield sites

BROWNFIELDS: Brownfields Sites
With certain legal exclusions and additions, the term 'brownfield site' means real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.

Date of Government Version: 10/20/2022
Date Data Arrived at EDR: 12/02/2022
Date Made Active in Reports: 02/22/2023
Number of Days to Update: 82
Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 03/07/2023
Next Scheduled EDR Contact: 06/19/2023
Data Release Frequency: Varies

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites
Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 04/06/2023
Date Data Arrived at EDR: 04/13/2023
Date Made Active in Reports: 04/19/2023
Number of Days to Update: 6
Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 04/06/2023
Next Scheduled EDR Contact: 06/26/2023
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

SWRCY: SWRCY
A listing of recycling and drop-off facilities located in Hawaii.

Date of Government Version: 09/14/2022
Date Data Arrived at EDR: 09/28/2022
Date Made Active in Reports: 10/05/2022
Number of Days to Update: 7
Source: Department of Health
Telephone: 808-586-4226
Last EDR Contact: 03/16/2023
Next Scheduled EDR Contact: 07/03/2023
Data Release Frequency: Varies

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52
Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 04/19/2023
Next Scheduled EDR Contact: 08/07/2023
Data Release Frequency: Varies

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations
A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137
Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 04/12/2023
Next Scheduled EDR Contact: 07/31/2023
Data Release Frequency: No Update Planned

ODI: Open Dump Inventory
An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39
Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

IHS OPEN DUMPS: Open Dumps on Indian Land
A listing of all open dumps located on Indian Land in the United States.

Date of Government Version: 04/01/2014
Date Data Arrived at EDR: 08/06/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 176
Source: Department of Health & Human Serivces, Indian Health Service
Telephone: 301-443-1452
Last EDR Contact: 04/27/2023
Next Scheduled EDR Contact: 08/07/2023
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL: National Clandestine Laboratory Register
A listing of clandestine drug lab locations that have been removed from the DEAs National Clandestine Laboratory Register.

Date of Government Version: 01/06/2023
Date Data Arrived at EDR: 02/02/2023
Date Made Active in Reports: 02/10/2023
Number of Days to Update: 8
Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 02/02/2023
Next Scheduled EDR Contact: 06/05/2023
Data Release Frequency: No Update Planned

CDL: Clandestine Drug Lab Listing
A listing of clandestine drug lab site locations.

Date of Government Version: 08/04/2010
Date Data Arrived at EDR: 09/10/2010
Date Made Active in Reports: 10/22/2010
Number of Days to Update: 42
Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 03/02/2023
Next Scheduled EDR Contact: 06/19/2023
Data Release Frequency: No Update Planned

US CDL: Clandestine Drug Labs
A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 01/06/2023
Date Data Arrived at EDR: 02/02/2023
Date Made Active in Reports: 02/10/2023
Number of Days to Update: 8
Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 02/02/2023
Next Scheduled EDR Contact: 06/05/2023
Data Release Frequency: Quarterly

Local Land Records

LIENS 2: CERCLA Lien Information
A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 01/25/2023
Date Data Arrived at EDR: 02/02/2023
Date Made Active in Reports: 02/28/2023
Number of Days to Update: 26
Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 04/03/2023
Next Scheduled EDR Contact: 07/10/2023
Data Release Frequency: Semi-Annually

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System
Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 12/13/2022
Date Data Arrived at EDR: 12/14/2022
Date Made Active in Reports: 03/10/2023
Number of Days to Update: 86
Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 03/21/2023
Next Scheduled EDR Contact: 07/03/2023
Data Release Frequency: Quarterly

SPILLS: Release Notifications
Releases of hazardous substances to the environment reported to the Office of Hazard Evaluation and Emergency Response since 1988.

Date of Government Version: 11/16/2022
Date Data Arrived at EDR: 11/16/2022
Date Made Active in Reports: 02/07/2023
Number of Days to Update: 83
Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 02/09/2023
Next Scheduled EDR Contact: 05/29/2023
Data Release Frequency: Varies

SPILLS 90: SPILLS90 data from FirstSearch
Spills 90 includes those spill and release records available exclusively from FirstSearch databases. Typically, they may include chemical, oil and/or hazardous substance spills recorded after 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 90.

Date of Government Version: 03/10/2012
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 02/11/2013
Number of Days to Update: 39

Source: FirstSearch
Telephone: N/A
Last EDR Contact: 01/03/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators / No Longer Regulated

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 03/06/2023
Date Data Arrived at EDR: 03/09/2023
Date Made Active in Reports: 03/20/2023
Number of Days to Update: 11

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 03/09/2023
Next Scheduled EDR Contact: 07/03/2023
Data Release Frequency: Quarterly

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 11/01/2022
Date Data Arrived at EDR: 11/10/2022
Date Made Active in Reports: 02/09/2023
Number of Days to Update: 91

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 02/14/2023
Next Scheduled EDR Contact: 05/29/2023
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 06/07/2021
Date Data Arrived at EDR: 07/13/2021
Date Made Active in Reports: 03/09/2022
Number of Days to Update: 239

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 04/11/2023
Next Scheduled EDR Contact: 07/24/2023
Data Release Frequency: Varies

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 04/02/2018
Date Data Arrived at EDR: 04/11/2018
Date Made Active in Reports: 11/06/2019
Number of Days to Update: 574

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 04/03/2023
Next Scheduled EDR Contact: 07/17/2023
Data Release Frequency: N/A

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 07/30/2021
Date Data Arrived at EDR: 02/03/2023
Date Made Active in Reports: 02/10/2023
Number of Days to Update: 7

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 02/02/2023
Next Scheduled EDR Contact: 05/22/2023
Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 12/13/2022
Date Data Arrived at EDR: 12/14/2022
Date Made Active in Reports: 03/10/2023
Number of Days to Update: 86

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 03/21/2023
Next Scheduled EDR Contact: 07/03/2023
Data Release Frequency: Quarterly

EPA WATCH LIST: EPA WATCH LIST

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013
Date Data Arrived at EDR: 03/21/2014
Date Made Active in Reports: 06/17/2014
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 05/01/2023
Next Scheduled EDR Contact: 08/14/2023
Data Release Frequency: Quarterly

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 09/30/2017
Date Data Arrived at EDR: 05/08/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 73

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 02/03/2023
Next Scheduled EDR Contact: 05/15/2023
Data Release Frequency: Varies

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2020
Date Data Arrived at EDR: 06/14/2022
Date Made Active in Reports: 03/24/2023
Number of Days to Update: 283

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 03/13/2023
Next Scheduled EDR Contact: 06/26/2023
Data Release Frequency: Every 4 Years

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2021
Date Data Arrived at EDR: 11/01/2022
Date Made Active in Reports: 02/09/2023
Number of Days to Update: 100

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 02/16/2023
Next Scheduled EDR Contact: 05/29/2023
Data Release Frequency: Annually

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 01/17/2023
Date Data Arrived at EDR: 01/18/2023
Date Made Active in Reports: 04/19/2023
Number of Days to Update: 91

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 04/18/2023
Next Scheduled EDR Contact: 07/31/2023
Data Release Frequency: Annually

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 01/25/2023
Date Data Arrived at EDR: 02/02/2023
Date Made Active in Reports: 02/28/2023
Number of Days to Update: 26

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 04/03/2023
Next Scheduled EDR Contact: 06/12/2023
Data Release Frequency: Annually

RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 04/27/2022
Date Data Arrived at EDR: 05/04/2022
Date Made Active in Reports: 05/10/2022
Number of Days to Update: 6

Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 04/13/2023
Next Scheduled EDR Contact: 07/31/2023
Data Release Frequency: Varies

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

PRP: Potentially Responsible Parties
A listing of verified Potentially Responsible Parties

Date of Government Version: 10/27/2022
Date Data Arrived at EDR: 11/01/2022
Date Made Active in Reports: 11/15/2022
Number of Days to Update: 14

Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 04/03/2023
Next Scheduled EDR Contact: 05/15/2023
Data Release Frequency: Quarterly

PADS: PCB Activity Database System
PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 11/03/2022
Date Data Arrived at EDR: 01/04/2023
Date Made Active in Reports: 04/03/2023
Number of Days to Update: 89

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 04/04/2023
Next Scheduled EDR Contact: 07/17/2023
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System
The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 11/18/2016
Date Data Arrived at EDR: 11/23/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 79

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 03/29/2023
Next Scheduled EDR Contact: 07/17/2023
Data Release Frequency: Quarterly

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: No Update Planned

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: No Update Planned

MLTS: Material Licensing Tracking System
MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 10/26/2022
Date Data Arrived at EDR: 11/22/2022
Date Made Active in Reports: 12/05/2022
Number of Days to Update: 13

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 04/13/2023
Next Scheduled EDR Contact: 07/31/2023
Data Release Frequency: Quarterly

COAL ASH DOE: Steam-Electric Plant Operation Data
A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2020
Date Data Arrived at EDR: 11/30/2021
Date Made Active in Reports: 02/22/2022
Number of Days to Update: 84
Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 03/03/2023
Next Scheduled EDR Contact: 06/12/2023
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List
A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 01/12/2017
Date Data Arrived at EDR: 03/05/2019
Date Made Active in Reports: 11/11/2019
Number of Days to Update: 251
Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 02/27/2023
Next Scheduled EDR Contact: 06/12/2023
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database
The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 09/13/2019
Date Data Arrived at EDR: 11/06/2019
Date Made Active in Reports: 02/10/2020
Number of Days to Update: 96
Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 02/03/2023
Next Scheduled EDR Contact: 05/15/2023
Data Release Frequency: Varies

RADINFO: Radiation Information Database
The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 07/01/2019
Date Data Arrived at EDR: 07/01/2019
Date Made Active in Reports: 09/23/2019
Number of Days to Update: 84
Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 03/23/2023
Next Scheduled EDR Contact: 07/10/2023
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing
A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing
A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 01/02/2020
Date Data Arrived at EDR: 01/28/2020
Date Made Active in Reports: 04/17/2020
Number of Days to Update: 80

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 04/25/2023
Next Scheduled EDR Contact: 08/07/2023
Data Release Frequency: Quarterly

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 12/31/2022
Date Data Arrived at EDR: 01/12/2023
Date Made Active in Reports: 04/07/2023
Number of Days to Update: 85

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 04/03/2023
Next Scheduled EDR Contact: 07/17/2023
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2021
Date Data Arrived at EDR: 03/09/2023
Date Made Active in Reports: 03/20/2023
Number of Days to Update: 11

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 03/09/2023
Next Scheduled EDR Contact: 07/03/2023
Data Release Frequency: Biennially

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 07/14/2015
Date Made Active in Reports: 01/10/2017
Number of Days to Update: 546

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 04/06/2023
Next Scheduled EDR Contact: 07/17/2023
Data Release Frequency: Semi-Annually

FUSRAP: Formerly Utilized Sites Remedial Action Program

DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations.

Date of Government Version: 07/26/2021
Date Data Arrived at EDR: 07/27/2021
Date Made Active in Reports: 10/22/2021
Number of Days to Update: 87

Source: Department of Energy
Telephone: 202-586-3559
Last EDR Contact: 04/26/2023
Next Scheduled EDR Contact: 08/14/2023
Data Release Frequency: Varies

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 08/30/2019
Date Data Arrived at EDR: 11/15/2019
Date Made Active in Reports: 01/28/2020
Number of Days to Update: 74

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 02/13/2023
Next Scheduled EDR Contact: 05/29/2023
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 01/25/2023
Date Data Arrived at EDR: 02/02/2023
Date Made Active in Reports: 02/28/2023
Number of Days to Update: 26

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 04/03/2023
Next Scheduled EDR Contact: 07/10/2023
Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36

Source: American Journal of Public Health
Telephone: 703-305-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data

A listing of minor source facilities.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

MINES VIOLATIONS: MSHA Violation Assessment Data

Mines violation and assessment information. Department of Labor, Mine Safety & Health Administration.

Date of Government Version: 02/27/2023
Date Data Arrived at EDR: 03/01/2023
Date Made Active in Reports: 03/24/2023
Number of Days to Update: 23

Source: DOL, Mine Safety & Health Admi
Telephone: 202-693-9424
Last EDR Contact: 04/04/2023
Next Scheduled EDR Contact: 06/12/2023
Data Release Frequency: Quarterly

US MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 11/07/2022
Date Data Arrived at EDR: 11/17/2022
Date Made Active in Reports: 02/10/2023
Number of Days to Update: 85

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 02/22/2023
Next Scheduled EDR Contact: 06/05/2023
Data Release Frequency: Semi-Annually

US MINES 2: Ferrous and Nonferrous Metal Mines Database Listing

This map layer includes ferrous (ferrous metal mines are facilities that extract ferrous metals, such as iron ore or molybdenum) and nonferrous (Nonferrous metal mines are facilities that extract nonferrous metals, such as gold, silver, copper, zinc, and lead) metal mines in the United States.

Date of Government Version: 05/06/2020
Date Data Arrived at EDR: 05/27/2020
Date Made Active in Reports: 08/13/2020
Number of Days to Update: 78

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 02/24/2023
Next Scheduled EDR Contact: 06/05/2023
Data Release Frequency: Varies

US MINES 3: Active Mines & Mineral Plants Database Listing

Active Mines and Mineral Processing Plant operations for commodities monitored by the Minerals Information Team of the USGS.

Date of Government Version: 04/14/2011
Date Data Arrived at EDR: 06/08/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 97

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 02/24/2023
Next Scheduled EDR Contact: 06/05/2023
Data Release Frequency: Varies

ABANDONED MINES: Abandoned Mines

An inventory of land and water impacted by past mining (primarily coal mining) is maintained by OSMRE to provide information needed to implement the Surface Mining Control and Reclamation Act of 1977 (SMCRA). The inventory contains information on the location, type, and extent of AML impacts, as well as, information on the cost associated with the reclamation of those problems. The inventory is based upon field surveys by State, Tribal, and OSMRE program officials. It is dynamic to the extent that it is modified as new problems are identified and existing problems are reclaimed.

Date of Government Version: 12/20/2022
Date Data Arrived at EDR: 12/20/2022
Date Made Active in Reports: 03/10/2023
Number of Days to Update: 80

Source: Department of Interior
Telephone: 202-208-2609
Last EDR Contact: 03/16/2023
Next Scheduled EDR Contact: 06/19/2023
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 02/02/2023
Date Data Arrived at EDR: 02/28/2023
Date Made Active in Reports: 03/24/2023
Number of Days to Update: 24

Source: EPA
Telephone: (415) 947-8000
Last EDR Contact: 02/28/2023
Next Scheduled EDR Contact: 06/12/2023
Data Release Frequency: Quarterly

DOCKET HWC: Hazardous Waste Compliance Docket Listing

A complete list of the Federal Agency Hazardous Waste Compliance Docket Facilities.

Date of Government Version: 05/06/2021
Date Data Arrived at EDR: 05/21/2021
Date Made Active in Reports: 08/11/2021
Number of Days to Update: 82

Source: Environmental Protection Agency
Telephone: 202-564-0527
Last EDR Contact: 02/24/2023
Next Scheduled EDR Contact: 06/05/2023
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

ECHO: Enforcement & Compliance History Information

ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

Date of Government Version: 01/01/2023
Date Data Arrived at EDR: 01/04/2023
Date Made Active in Reports: 04/03/2023
Number of Days to Update: 89

Source: Environmental Protection Agency
Telephone: 202-564-2280
Last EDR Contact: 03/31/2023
Next Scheduled EDR Contact: 07/17/2023
Data Release Frequency: Quarterly

UXO: Unexploded Ordnance Sites

A listing of unexploded ordnance site locations

Date of Government Version: 11/09/2021
Date Data Arrived at EDR: 10/20/2022
Date Made Active in Reports: 01/10/2023
Number of Days to Update: 82

Source: Department of Defense
Telephone: 703-704-1564
Last EDR Contact: 04/27/2023
Next Scheduled EDR Contact: 07/24/2023
Data Release Frequency: Varies

FUELS PROGRAM: EPA Fuels Program Registered Listing

This listing includes facilities that are registered under the Part 80 (Code of Federal Regulations) EPA Fuels Programs. All companies now are required to submit new and updated registrations.

Date of Government Version: 02/13/2023
Date Data Arrived at EDR: 02/14/2023
Date Made Active in Reports: 04/19/2023
Number of Days to Update: 64

Source: EPA
Telephone: 800-385-6164
Last EDR Contact: 02/14/2023
Next Scheduled EDR Contact: 05/29/2023
Data Release Frequency: Quarterly

PFAS NPL: Superfund Sites with PFAS Detections Information

EPA's Office of Land and Emergency Management and EPA Regional Offices maintain data describing what is known about site investigations, contamination, and remedial actions under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) where PFAS is present in the environment.

Date of Government Version: 02/23/2022
Date Data Arrived at EDR: 07/08/2022
Date Made Active in Reports: 11/08/2022
Number of Days to Update: 123

Source: Environmental Protection Agency
Telephone: 703-603-8895
Last EDR Contact: 04/04/2023
Next Scheduled EDR Contact: 07/17/2023
Data Release Frequency: Varies

PFAS FEDERAL SITES: Federal Sites PFAS Information

Several federal entities, such as the federal Superfund program, Department of Defense, National Aeronautics and Space Administration, Department of Transportation, and Department of Energy provided information for sites with known or suspected detections at federal facilities.

Date of Government Version: 03/30/2023
Date Data Arrived at EDR: 03/30/2023
Date Made Active in Reports: 04/07/2023
Number of Days to Update: 8

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 03/30/2023
Next Scheduled EDR Contact: 07/17/2023
Data Release Frequency: Varies

PFAS TSCA: PFAS Manufacture and Imports Information

EPA issued the Chemical Data Reporting (CDR) Rule under the Toxic Substances Control Act (TSCA) and requires chemical manufacturers and facilities that manufacture or import chemical substances to report data to EPA. EPA publishes non-confidential business information (non-CBI) and includes descriptive information about each site, corporate parent, production volume, other manufacturing information, and processing and use information.

Date of Government Version: 01/03/2022
Date Data Arrived at EDR: 03/31/2022
Date Made Active in Reports: 11/08/2022
Number of Days to Update: 222

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 03/30/2023
Next Scheduled EDR Contact: 07/17/2023
Data Release Frequency: Varies

PFAS RCRA MANIFEST: PFAS Transfers Identified In the RCRA Database Listing

To work around the lack of PFAS waste codes in the RCRA database, EPA developed the PFAS Transfers dataset by mining e-Manifest records containing at least one of these common PFAS keywords: PFAS, PFOA, PFOS, PERFL, AFFF, GENX, GEN-X (plus the VT waste codes). These keywords were searched for in the following text fields: Manifest handling instructions (MANIFEST_HANDLING_INSTR), Non-hazardous waste description (NON_HAZ_WASTE_DESCRIPTION), DOT printed information (DOT_PRINTED_INFORMATION), Waste line handling instructions (WASTE_LINE_HANDLING_INSTR), Waste residue comments (WASTE_RESIDUE_COMMENTS).

Date of Government Version: 01/03/2022
Date Data Arrived at EDR: 03/31/2022
Date Made Active in Reports: 11/08/2022
Number of Days to Update: 222

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 03/30/2023
Next Scheduled EDR Contact: 07/17/2023
Data Release Frequency: Varies

PFAS ATSDR: PFAS Contamination Site Location Listing

PFAS contamination site locations from the Department of Health & Human Services, Center for Disease Control & Prevention. ATSDR is involved at a number of PFAS-related sites, either directly or through assisting state and federal partners. As of now, most sites are related to drinking water contamination connected with PFAS production facilities or fire training areas where aqueous film-forming firefighting foam (AFFF) was regularly used.

Date of Government Version: 06/24/2020
Date Data Arrived at EDR: 03/17/2021
Date Made Active in Reports: 11/08/2022
Number of Days to Update: 601

Source: Department of Health & Human Services
Telephone: 202-741-5770
Last EDR Contact: 04/20/2023
Next Scheduled EDR Contact: 08/07/2023
Data Release Frequency: Varies

PFAS WQP: Ambient Environmental Sampling for PFAS

The Water Quality Portal (WQP) is a part of a modernized repository storing ambient sampling data for all environmental media and tissue samples. A wide range of federal, state, tribal and local governments, academic and non-governmental organizations and individuals submit project details and sampling results to this public repository. The information is commonly used for research and assessments of environmental quality.

Date of Government Version: 01/03/2022
Date Data Arrived at EDR: 03/31/2022
Date Made Active in Reports: 11/08/2022
Number of Days to Update: 222

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 03/30/2023
Next Scheduled EDR Contact: 07/17/2023
Data Release Frequency: Varies

PFAS NPDES: Clean Water Act Discharge Monitoring Information

Any discharger of pollutants to waters of the United States from a point source must have a National Pollutant Discharge Elimination System (NPDES) permit. The process for obtaining limits involves the regulated entity (permittee) disclosing releases in a NPDES permit application and the permitting authority (typically the state but sometimes EPA) deciding whether to require monitoring or monitoring with limits.

Date of Government Version: 03/30/2023
Date Data Arrived at EDR: 03/30/2023
Date Made Active in Reports: 04/07/2023
Number of Days to Update: 8

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 03/30/2023
Next Scheduled EDR Contact: 07/17/2023
Data Release Frequency: Varies

PFAS ECHO: Facilities in Industries that May Be Handling PFAS Listing

Regulators and the public have expressed interest in knowing which regulated entities may be using PFAS. EPA has developed a dataset from various sources that show which industries may be handling PFAS. Approximately 120,000 facilities subject to federal environmental programs have operated or currently operate in industry sectors with processes that may involve handling and/or release of PFAS.

Date of Government Version: 03/30/2023
Date Data Arrived at EDR: 03/30/2023
Date Made Active in Reports: 04/03/2023
Number of Days to Update: 4

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 03/30/2023
Next Scheduled EDR Contact: 07/17/2023
Data Release Frequency: Varies

PFAS ECHO FIRE TRAINING: Facilities in Industries that May Be Handling PFAS Listing

A list of fire training sites was added to the Industry Sectors dataset using a keyword search on the permitted facilitys name to identify sites where fire-fighting foam may have been used in training exercises. Additionally, you may view an example spreadsheet of the subset of fire training facility data, as well as the keywords used in selecting or deselecting a facility for the subset. as well as the keywords used in selecting or deselecting a facility for the subset. These keywords were tested to maximize accuracy in selecting facilities that may use fire-fighting foam in training exercises, however, due to the lack of a required reporting field in the data systems for designating fire training sites, this methodology may not identify all fire training sites or may potentially misidentify them.

Date of Government Version: 03/30/2023
Date Data Arrived at EDR: 03/30/2023
Date Made Active in Reports: 04/03/2023
Number of Days to Update: 4

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 03/30/2023
Next Scheduled EDR Contact: 07/17/2023
Data Release Frequency: Varies

PFAS PART 139 AIRPORT: All Certified Part 139 Airports PFAS Information Listing

Since July 1, 2006, all certified part 139 airports are required to have fire-fighting foam onsite that meet military specifications (MIL-F-24385) (14 CFR 139.317). To date, these military specification fire-fighting foams are fluorinated and have been historically used for training and extinguishing. The 2018 FAA Reauthorization Act has a provision stating that no later than October 2021, FAA shall not require the use of fluorinated AFFF. This provision does not prohibit the use of fluorinated AFFF at Part 139 civilian airports; it only prohibits FAA from mandating its use. The Federal Aviation Administration?s document AC 150/5210-6D - Aircraft Fire Extinguishing Agents provides guidance on Aircraft Fire Extinguishing Agents, which includes Aqueous Film Forming Foam (AFFF).

Date of Government Version: 03/30/2023
Date Data Arrived at EDR: 03/30/2023
Date Made Active in Reports: 04/03/2023
Number of Days to Update: 4

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 03/30/2023
Next Scheduled EDR Contact: 07/17/2023
Data Release Frequency: Varies

AQUEOUS FOAM NRC: Aqueous Foam Related Incidents Listing

The National Response Center (NRC) serves as an emergency call center that fields initial reports for pollution and railroad incidents and forwards that information to appropriate federal/state agencies for response. The spreadsheets posted to the NRC website contain initial incident data that has not been validated or investigated by a federal/state response agency. Response center calls from 1990 to the most recent complete calendar year where there was indication of Aqueous Film Forming Foam (AFFF) usage are included in this dataset. NRC calls may reference AFFF usage in the ?Material Involved? or ?Incident Description? fields.

Date of Government Version: 01/02/2023
Date Data Arrived at EDR: 01/05/2023
Date Made Active in Reports: 04/03/2023
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 04/27/2023
Next Scheduled EDR Contact: 07/17/2023
Data Release Frequency: Varies

PFAS: PFAS Contamination Site Listing

A listing of sites where "Potential PFAS" were found. The listing includes sites with "PFAs" and "fluoro", and site names that include "firefight", fire fight", "fire train".

Date of Government Version: 02/25/2022
Date Data Arrived at EDR: 02/28/2022
Date Made Active in Reports: 03/10/2022
Number of Days to Update: 10

Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 03/29/2023
Next Scheduled EDR Contact: 06/19/2023
Data Release Frequency: Varies

AIRS: List of Permitted Facilities

A listing of permitted facilities in the state.

Date of Government Version: 06/28/2022
Date Data Arrived at EDR: 06/30/2022
Date Made Active in Reports: 09/14/2022
Number of Days to Update: 76

Source: Department of Health
Telephone: 808-586-4200
Last EDR Contact: 03/23/2023
Next Scheduled EDR Contact: 07/10/2023
Data Release Frequency: Varies

DRYCLEANERS: Permitted Drycleaner Facility Listing
A listing of permitted drycleaner facilities in the state.

Date of Government Version: 06/28/2022
Date Data Arrived at EDR: 06/30/2022
Date Made Active in Reports: 10/04/2022
Number of Days to Update: 96
Source: Department of Health
Telephone: 808-586-4200
Last EDR Contact: 03/23/2023
Next Scheduled EDR Contact: 07/10/2023
Data Release Frequency: Varies

Financial Assurance: Financial Assurance Information Listing
A listing of financial assurance information for underground storage tank facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 12/02/2022
Date Data Arrived at EDR: 12/07/2022
Date Made Active in Reports: 02/28/2023
Number of Days to Update: 83
Source: Department of Health
Telephone: 808-586-4226
Last EDR Contact: 03/29/2023
Next Scheduled EDR Contact: 06/19/2023
Data Release Frequency: Varies

LEAD: Lead Inspection Listing
Lead inspections

Date of Government Version: 12/06/2022
Date Data Arrived at EDR: 12/07/2022
Date Made Active in Reports: 03/01/2023
Number of Days to Update: 84
Source: Department of Health
Telephone: 808-586-5800
Last EDR Contact: 03/02/2023
Next Scheduled EDR Contact: 06/19/2023
Data Release Frequency: Varies

UIC: Underground Injection Wells Listing
A listing of underground injection well locations.

Date of Government Version: 02/07/2013
Date Data Arrived at EDR: 02/12/2013
Date Made Active in Reports: 04/09/2013
Number of Days to Update: 56
Source: Department of Health
Telephone: 808-586-4258
Last EDR Contact: 02/15/2023
Next Scheduled EDR Contact: 06/05/2023
Data Release Frequency: Varies

PCS ENF: Enforcement data
No description is available for this data

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 02/05/2015
Date Made Active in Reports: 03/06/2015
Number of Days to Update: 29
Source: EPA
Telephone: 202-564-2497
Last EDR Contact: 03/30/2023
Next Scheduled EDR Contact: 07/17/2023
Data Release Frequency: Varies

MINES MRDS: Mineral Resources Data System
Mineral Resources Data System

Date of Government Version: 08/23/2022
Date Data Arrived at EDR: 11/22/2022
Date Made Active in Reports: 02/28/2023
Number of Days to Update: 98
Source: USGS
Telephone: 703-648-6533
Last EDR Contact: 02/24/2023
Next Scheduled EDR Contact: 06/05/2023
Data Release Frequency: Varies

PFAS TRIS: List of PFAS Added to the TRI
Section 7321 of the National Defense Authorization Act for Fiscal Year 2020 (NDAA) immediately added certain per- and polyfluoroalkyl substances (PFAS) to the list of chemicals covered by the Toxics Release Inventory (TRI) under Section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA) and provided a framework for additional PFAS to be added to TRI on an annual basis.

Date of Government Version: 03/07/2023
Date Data Arrived at EDR: 03/07/2023
Date Made Active in Reports: 03/24/2023
Number of Days to Update: 17

Source: Environmental Protection Agency
Telephone: 202-566-0250
Last EDR Contact: 03/30/2023
Next Scheduled EDR Contact: 07/17/2023
Data Release Frequency: Varies

PCS: Permit Compliance System

PCS is a computerized management information system that contains data on National Pollutant Discharge Elimination System (NPDES) permit holding facilities. PCS tracks the permit, compliance, and enforcement status of NPDES facilities.

Date of Government Version: 07/14/2011
Date Data Arrived at EDR: 08/05/2011
Date Made Active in Reports: 09/29/2011
Number of Days to Update: 55

Source: EPA, Office of Water
Telephone: 202-564-2496
Last EDR Contact: 03/30/2023
Next Scheduled EDR Contact: 07/17/2023
Data Release Frequency: No Update Planned

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

EDR Hist Auto: EDR Exclusive Historical Auto Stations

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR Hist Cleaner: EDR Exclusive Historical Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA HWS: Recovered Government Archive State Hazardous Waste Facilities List

The EDR Recovered Government Archive State Hazardous Waste database provides a list of SHWS incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Health in Hawaii.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/08/2014
Number of Days to Update: 191

Source: Department of Health
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LF: Recovered Government Archive Solid Waste Facilities List

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Health in Hawaii.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/17/2014
Number of Days to Update: 200

Source: Department of Health
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LUST: Recovered Government Archive Leaking Underground Storage Tank

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Health in Hawaii.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/03/2014
Number of Days to Update: 186

Source: Department of Health
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

Oil/Gas Pipelines

Source: Endeavor Business Media

Petroleum Bundle (Crude Oil, Refined Products, Petrochemicals, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)) N = Natural Gas Bundle (Natural Gas, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)). This map includes information copyrighted by Endeavor Business Media. This information is provided on a best effort basis and Endeavor Business Media does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of Endeavor Business Media.

Electric Power Transmission Line Data

Source: Endeavor Business Media

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Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005, 2010 and 2015 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetlands Inventory
Source: Office of Planning
Telephone: 808-587-2895

STREET AND ADDRESS INFORMATION

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EDR
Database Report: Well Search Report and Map

HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761

Inquiry Number: 7324924.8w
May 03, 2023

EDR DataMap™ Well Search Report

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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GEOCHECK VERSION 2.1
SUMMARY

FEDERAL DATABASE WELL INFORMATION

MAP ID	WELL ID
1	USGS40000269032

STATE WATER WELL INFORMATION

MAP ID	WELL ID
1	HI1300000003406
2	HI1300000003408
3	HI1300000003407
4	HI1300000003378
5	HI1300000003374
6	HI1300000003375
7	HI1300000003376
7	HI1300000003377
8	HI1300000003373

PUBLIC WATER SUPPLY SYSTEM INFORMATION

NO WELLS FOUND

USGS TOPOGRAPHIC MAP(S)

20156-G5 LAHAINA, HI
20156-G6 ISLAND OF LANAI OE NE, HI

AREA RADON INFORMATION

Federal Area Radon Information for Zip Code: 96761

Number of sites tested: 10

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	0.030 pCi/L	100%	0%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	Not Reported	Not Reported	Not Reported	Not Reported

Federal EPA Radon Zone for MAUI County: 3

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for MAUI COUNTY, HI

Number of sites tested: 70

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	0.057 pCi/L	100%	0%	0%
Living Area - 2nd Floor	0.000 pCi/L	100%	0%	0%
Basement	0.150 pCi/L	100%	0%	0%

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Water Well Information:

Map ID:	1		
Organization ID:	USGS-HI		
Organization Name:	USGS Hawaii Water Science Center		
Monitor Location:	6-4936-01 Olowalu Elua, Maui, HI		
Type:	Well	Description:	Not Reported
HUC:	20020000	Drainage Area:	Not Reported
Drainage Area Units:	Not Reported	Contrib Drainage Area:	Not Reported
Contrib Drainage Area Unts:	Not Reported	Aquifer:	Not Reported
Formation Type:	Not Reported	Aquifer Type:	Not Reported
Construction Date:	Not Reported	Well Depth:	Not Reported
Well Depth Units:	Not Reported	Well Hole Depth:	Not Reported
Well Hole Depth Units:	Not Reported		

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

State Well Information:

Map ID:	1		
Well #:	6-4936-001	Well Name:	Olowalu Elua
Original Name:	Not Reported	Aquifer Type:	Basal
Year Drilled:	1999		
Driller:	Wailani Drilling Services Inc		
Well Depth (ft):	230		
Land Owner:	Lot 1 Olowalu Mauka Condo - Condo Master		
Pump Installer:	Not Reported	Well Construction Type:	Rotary
Casing Diameter (in):	10	Ground Elevation (ft):	205
Solid Casing Depth (ft):	200	Perf Casing Depth (ft):	220
Major Well Use:	Landscape/ Water Features		
Initial Water Level (ft):	4.79	Water Level After Drilling (ft):	Not Reported
Chloride Content (mg/l):	25	Date Tested:	13-JUN-99
Test Pump Rate (g/m):	250	Test Drawdown Rate (ft):	2.83
Test Chloride Content (mg/l):	20	Test Water Temp:	21.7
Test Unit:	C	Pump GPM:	250
Max Chloride Level:	Not Reported	Min Chloride Level:	Not Reported
Pump Installed:	1999	Draft Year:	Not Reported
Hole Bottom Elevation:	-25	Solid Casing Bot Elevation:	5
Perf Casing Bot Elevation:	-15	Pump Capacity (MM gal/day):	.36
Pump Intake Depth (ft):	210	Latest WCR1 Report:	Not Reported
Latest WCR2 Report:	Not Reported	Transmissivity:	107728

Map ID:	2		
Well #:	6-4937-001	Well Name:	Olowalu Pump N
Original Name:	Not Reported	Aquifer Type:	Basal
Year Drilled:	1933	Driller:	Not Reported
Well Depth (ft):	300		
Land Owner:	Olowalu Elua Associates, LLC		
Pump Installer:	Not Reported	Well Construction Type:	Shaft
Casing Diameter (in):	Not Reported	Ground Elevation (ft):	165
Solid Casing Depth (ft):	Not Reported	Perf Casing Depth (ft):	Not Reported
Major Well Use:	Agriculture-Livestock and Processing, and Pasture		
Initial Water Level (ft):	3.5	Water Level After Drilling (ft):	Not Reported
Chloride Content (mg/l):	513	Date Tested:	Not Reported
Test Pump Rate (g/m):	Not Reported	Test Drawdown Rate (ft):	Not Reported
Test Chloride Content (mg/l):	Not Reported	Test Water Temp:	Not Reported
Test Unit:	Not Reported	Pump GPM:	3610
Max Chloride Level:	Not Reported	Min Chloride Level:	Not Reported
Pump Installed:	Not Reported	Draft Year:	Not Reported
Hole Bottom Elevation:	-135	Solid Casing Bot Elevation:	Not Reported
Perf Casing Bot Elevation:	Not Reported	Pump Capacity (MM gal/day):	5.198
Pump Intake Depth (ft):	Not Reported	Latest WCR1 Report:	01-JAN-33
Latest WCR2 Report:	Not Reported	Transmissivity:	Not Reported

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Map ID:	3		
Well #:	6-4936-003	Well Name:	McGee
Original Name:	Not Reported	Aquifer Type:	Basal
Year Drilled:	2021	Driller:	Not Reported
Well Depth (ft):	240		
Land Owner:	James B. & Nancy E. McGee		
Pump Installer:	Not Reported	Well Construction Type:	Rotary
Casing Diameter (in):	6	Ground Elevation (ft):	219
Solid Casing Depth (ft):	220	Perf Casing Depth (ft):	240

Major Well Use:	Landscape/ Water Features		
Initial Water Level (ft):	9	Water Level After Drilling (ft):	9
Chloride Content (mg/l):	30	Date Tested:	Not Reported
Test Pump Rate (g/m):	Not Reported	Test Drawdown Rate (ft):	Not Reported
Test Chloride Content (mg/l):	Not Reported	Test Water Temp:	Not Reported
Test Unit:	F	Pump GPM:	45
Max Chloride Level:	Not Reported	Min Chloride Level:	Not Reported
Pump Installed:	2021	Draft Year:	Not Reported
Hole Bottom Elevation:	-21	Solid Casing Bot Elevation:	-1
Perf Casing Bot Elevation:	-21	Pump Capacity (MM gal/day):	.065
Pump Intake Depth (ft):	Not Reported	Latest WCR1 Report:	03-SEP-21
Latest WCR2 Report:	03-SEP-21	Transmissivity:	Not Reported

Map ID:	4		
Well #:	6-4837-001	Well Name:	Olowalu Pump O
Original Name:	Not Reported	Aquifer Type:	Basal
Year Drilled:	1905	Driller:	Not Reported
Well Depth (ft):	20	Land Owner:	Lihauula LLC
Pump Installer:	Not Reported	Well Construction Type:	Shaft
Casing Diameter (in):	Not Reported	Ground Elevation (ft):	20
Solid Casing Depth (ft):	Not Reported	Perf Casing Depth (ft):	Not Reported
Major Well Use:	Unused	Initial Water Level (ft):	2
Water Level After Drilling (ft):	Not Reported	Chloride Content (mg/l):	308
Date Tested:	Not Reported	Test Pump Rate (g/m):	Not Reported
Test Drawdown Rate (ft):	Not Reported	Test Chloride Content (mg/l):	187
Test Water Temp:	Not Reported	Test Unit:	Not Reported
Pump GPM:	2080	Max Chloride Level:	Not Reported
Min Chloride Level:	Not Reported	Pump Installed:	Not Reported
Draft Year:	Not Reported	Hole Bottom Elevation:	0
Solid Casing Bot Elevation:	Not Reported	Perf Casing Bot Elevation:	Not Reported
Pump Capacity (MM gal/day):	2.995	Pump Intake Depth (ft):	Not Reported
Latest WCR1 Report:	01-JAN-05	Latest WCR2 Report:	Not Reported
Transmissivity:	Not Reported		

Map ID:	5		
Well #:	6-4835-001	Well Name:	Ukumehame-Pump P
Original Name:	Not Reported	Aquifer Type:	Basal
Year Drilled:	1934	Driller:	Not Reported
Well Depth (ft):	143	Land Owner:	State of Hawaii
Pump Installer:	Not Reported	Well Construction Type:	Shaft
Casing Diameter (in):	Not Reported	Ground Elevation (ft):	79
Solid Casing Depth (ft):	Not Reported	Perf Casing Depth (ft):	Not Reported
Major Well Use:	Unused	Initial Water Level (ft):	Not Reported
Water Level After Drilling (ft):	Not Reported	Chloride Content (mg/l):	Not Reported
Date Tested:	Not Reported	Test Pump Rate (g/m):	Not Reported
Test Drawdown Rate (ft):	Not Reported	Test Chloride Content (mg/l):	467
Test Water Temp:	Not Reported	Test Unit:	Not Reported
Pump GPM:	3260	Max Chloride Level:	Not Reported
Min Chloride Level:	Not Reported	Pump Installed:	1942
Draft Year:	Not Reported	Hole Bottom Elevation:	-64
Solid Casing Bot Elevation:	Not Reported	Perf Casing Bot Elevation:	Not Reported
Pump Capacity (MM gal/day):	4.694	Pump Intake Depth (ft):	Not Reported
Latest WCR1 Report:	01-JAN-34	Latest WCR2 Report:	Not Reported
Transmissivity:	Not Reported		

Map ID: 6

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Well #:	6-4835-002	Well Name:	Sugar Way 1
Original Name:	Not Reported	Aquifer Type:	Basal
Year Drilled:	2003		
Driller:	Michael H. Robertson (Wailani Drilling Services Inc)		
Well Depth (ft):	152	Land Owner:	Uka LLC
Pump Installer:	Not Reported	Well Construction Type:	Rotary
Casing Diameter (in):	6	Ground Elevation (ft):	141
Solid Casing Depth (ft):	132	Perf Casing Depth (ft):	152
Major Well Use:	Unused	Initial Water Level (ft):	4.86
Water Level After Drilling (ft):	Not Reported	Chloride Content (mg/l):	380
Date Tested:	07-MAY-03	Test Pump Rate (g/m):	25
Test Drawdown Rate (ft):	.1	Test Chloride Content (mg/l):	380
Test Water Temp:	90	Test Unit:	Not Reported
Pump GPM:	25	Max Chloride Level:	Not Reported
Min Chloride Level:	Not Reported	Pump Installed:	2003
Draft Year:	Not Reported	Hole Bottom Elevation:	-11
Solid Casing Bot Elevation:	9	Perf Casing Bot Elevation:	-11
Pump Capacity (MM gal/day):	.036	Pump Intake Depth (ft):	145
Latest WCR1 Report:	30-JUN-03	Latest WCR2 Report:	Not Reported
Transmissivity:	Not Reported		

Map ID:	7		
Well #:	6-4835-003		
Well Name:	Ukumehame-Sugar Way 2		
Original Name:	Sugar Way 2	Aquifer Type:	Basal
Year Drilled:	2004		
Driller:	Michael H. Robertson (Wailani Drilling Services Inc)		
Well Depth (ft):	90	Land Owner:	Uka LLC
Pump Installer:	Alpha, Inc.	Well Construction Type:	Rotary
Casing Diameter (in):	6	Ground Elevation (ft):	63.51
Solid Casing Depth (ft):	65	Perf Casing Depth (ft):	75
Major Well Use:	Private (but Public-DOH definition)		
Initial Water Level (ft):	2.98	Water Level After Drilling (ft):	Not Reported
Chloride Content (mg/l):	20	Date Tested:	11-MAR-04
Test Pump Rate (g/m):	50	Test Drawdown Rate (ft):	13.26
Test Chloride Content (mg/l):	20	Test Water Temp:	78.5
Test Unit:	F	Pump GPM:	45
Max Chloride Level:	Not Reported	Min Chloride Level:	Not Reported
Pump Installed:	2007	Draft Year:	Not Reported
Hole Bottom Elevation:	-26.49	Solid Casing Bot Elevation:	-1.49
Perf Casing Bot Elevation:	-11.49	Pump Capacity (MM gal/day):	.065
Pump Intake Depth (ft):	Not Reported	Latest WCR1 Report:	05-MAY-04
Latest WCR2 Report:	18-NOV-20	Transmissivity:	1026

Map ID:	7		
Well #:	6-4835-004	Well Name:	Ukumehame 3
Original Name:	Not Reported	Aquifer Type:	Basal
Year Drilled:	2005		
Driller:	Michael H. Robertson (Wailani Drilling Services Inc)		
Well Depth (ft):	73	Land Owner:	Uka LLC
Pump Installer:	Alpha, Inc.	Well Construction Type:	Rotary
Casing Diameter (in):	6	Ground Elevation (ft):	61.97
Solid Casing Depth (ft):	63	Perf Casing Depth (ft):	73
Major Well Use:	Private (but Public-DOH definition)		
Initial Water Level (ft):	2.73	Water Level After Drilling (ft):	Not Reported
Chloride Content (mg/l):	21	Date Tested:	08-FEB-05

Test Pump Rate (g/m):	69	Test Drawdown Rate (ft):	8.2
Test Chloride Content (mg/l):	Not Reported	Test Water Temp:	78.6
Test Unit:	F	Pump GPM:	45
Max Chloride Level:	Not Reported	Min Chloride Level:	Not Reported
Pump Installed:	2007	Draft Year:	Not Reported
Hole Bottom Elevation:	-11.03	Solid Casing Bot Elevation:	-1.03
Perf Casing Bot Elevation:	-11.03	Pump Capacity (MM gal/day):	.065
Pump Intake Depth (ft):	67	Latest WCR1 Report:	23-MAR-05
Latest WCR2 Report:	18-NOV-20	Transmissivity:	1727

Map ID: 8

Well #:	6-4834-001	Well Name:	Environmental
Original Name:	Not Reported	Aquifer Type:	Not Reported
Year Drilled:	2003		
Driller:	Michael H. Robertson (Wailani Drilling Services Inc)		
Well Depth (ft):	35	Land Owner:	State of Hawaii
Pump Installer:	Not Reported	Well Construction Type:	Rotary
Casing Diameter (in):	6	Ground Elevation (ft):	27
Solid Casing Depth (ft):	25	Perf Casing Depth (ft):	35
Major Well Use:	Unused	Initial Water Level (ft):	2.07
Water Level After Drilling (ft):	Not Reported	Chloride Content (mg/l):	Not Reported
Date Tested:	03-JUN-03	Test Pump Rate (g/m):	70
Test Drawdown Rate (ft):	.18	Test Chloride Content (mg/l):	Not Reported
Test Water Temp:	80	Test Unit:	F
Pump GPM:	70	Max Chloride Level:	Not Reported
Min Chloride Level:	Not Reported	Pump Installed:	2003
Draft Year:	Not Reported	Hole Bottom Elevation:	-8
Solid Casing Bot Elevation:	2	Perf Casing Bot Elevation:	-8
Pump Capacity (MM gal/day):	.101	Pump Intake Depth (ft):	30
Latest WCR1 Report:	Not Reported	Latest WCR2 Report:	Not Reported
Transmissivity:	Not Reported		

HAWAII GOVERNMENT WELL RECORDS SEARCHED

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

State Wetlands Data: Wetlands Inventory
Source: Office of Planning
Telephone: 808-587-2895

Well Index Database
Source: Commission on Water Resource Management
Telephone: 808-587-0214
CWRM maintains a Well Index Database to track specific information pertaining to the construction and installation of production wells in Hawaii.

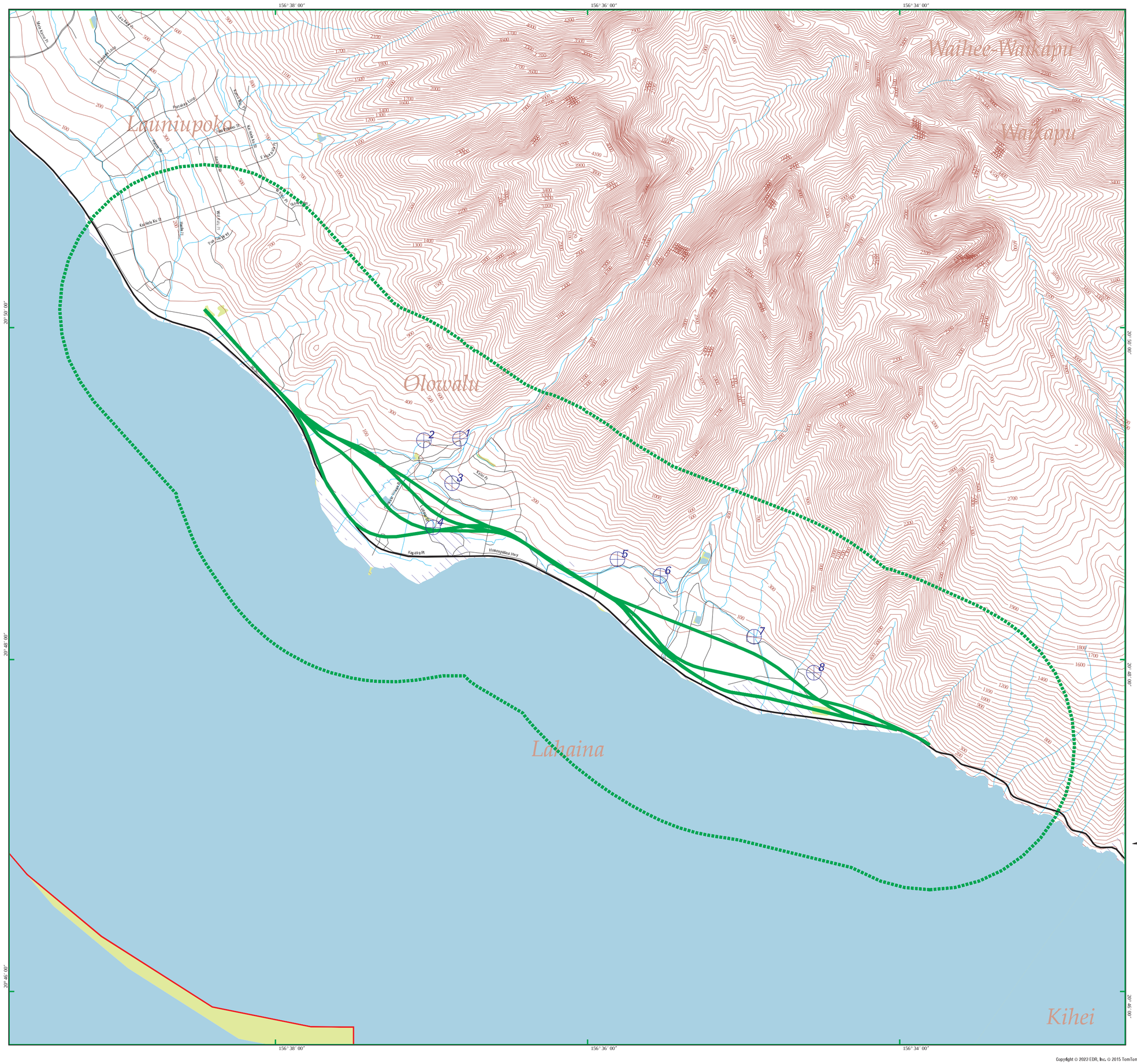
STREET AND ADDRESS INFORMATION

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EDR DataMap®
Well Search

HDOT Honoapiilani Hwy Improvements

- Listed Water Wells
- Study Boundary
- Roads
- Major Roads
- Waterways
- Railroads
- Contour Lines
- Fault Lines
- Water
- Superfund Sites
- 100-Yr Flood Zones
- Wetlands



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Lahaina, HI

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Scale in Miles

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EDR
City Directory Image Report

HDOT Honoapiilani Hwy Improvements
HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761

Inquiry Number: 7324924.5
May 04, 2023

The EDR-City Directory Image Report

Environmental Data Resources Inc

6 Armstrong Road
Shelton, CT 06484
800.352.0050
www.edrnet.com

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with any questions or comments.

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EXECUTIVE SUMMARY

DESCRIPTION

Environmental Data Resources, Inc.'s (EDR) City Directory Report is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's City Directory Report includes a search of available business directory data at approximately five year intervals.

RECORD SOURCES

The EDR City Directory Report accesses a variety of business directory sources, including Haines, InfoUSA, Polk, Cole, Bresser, and Stewart. Listings marked as EDR Digital Archive access Cole and InfoUSA records. The various directory sources enhance and complement each other to provide a more thorough and accurate report.

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RESEARCH SUMMARY

The following research sources were consulted in the preparation of this report. A check mark indicates where information was identified in the source and provided in this report.

Year	*Target Street*	*Cross Street*	*Source*
2020	☑	☑	EDR Digital Archive
2017	☑	☑	Cole Information
2014	☑	☑	Cole Information
2010	☑	☑	Cole Information
2005	☑	☑	Cole Information
2000	☑	☑	Cole Information
1995	☑	☑	Cole Information
1992	☑	☑	Cole Information

FINDINGS

TARGET PROPERTY STREET

HDOT Honoapiilani Hwy Improvements
Lahaina, HI 96761

Year	*CD Image*	*Source*

HONOAPIILANI HWY

2020	pg A2	EDR Digital Archive
2017	pg A8	Cole Information
2014	pg A12	Cole Information
2010	pg A18	Cole Information
2005	pg A24	Cole Information
2000	pg A30	Cole Information
1995	pg A35	Cole Information
1992	pg A38	Cole Information

FINDINGS

CROSS STREETS

Year	*CD Image*	*Source*
OLOWALU VILLAGE RD		
2020	pg. A7	EDR Digital Archive
2017	pg. A11	Cole Information
2014	pg. A17	Cole Information
2010	pg. A23	Cole Information
2005	pg. A29	Cole Information
2000	pg. A34	Cole Information
1995	pg. A37	Cole Information
1992	pg. A70	Cole Information

City Directory Images

Target Street	Cross Street	Source
✓	-	EDR Digital Archive

HONOAPIILANI HWY 2020

550	MAUI SOD
615	ALEJANDRO NIEVES
	BRIANDA GONZALEZ
	JEFFREY WALTON
	JESUS LOPEZ
	JUAN HERNANDEZ
	JUAN PEREZ
	LILIANA ISLAS
	LUZ VEGO
	NICOLE KOENEN
	RACHEL SILVA
	RICHARD DOW
	SALINAS AWAI
	SHARON GONZALEZ
	SUZANNE MEDCALF
	SYDNEY THOMPSON
	TAMI MELLO
910	ALII DRY CLEANERS
	AMY'S BEAUTY SALON
	BIRKENSTOCK NATURALLY
	EMBOSSED PUBLISHING
	ERNIE ABARRA
	FIRST HAWAIIAN MORTGAGE
	FRAN P MITSUMURA
	GALEN COLLEY
	H&R BLOCK
	HAWAIIAN PARADISE SPAS LLC
	HULA MOVERS
	JOHANNA BASKINS
	KAANAPALII BEACH MINISTRY
	KADOSH GROUP COSMETICS LLC
	KEY TO LIFE CHIROPRACTIC
	KOHOLA BREWERY
	LAHAINA AIR CONDITIONING LTD
	LAHAINA GALLERIES
	LAHAINA MUSIC
	LAHAINA OUTLET STORE
	LAHAINA VETERINARY CLINIC
	LILIKOI CONCIERGE
	LINDA FRIZXLL
	MAIN SAIL VENTURES INC
	MAUI AIR CONDITIONING
	MAUI AIRPORT RENTAL LLC
	MAUI COFFEE CO
	MAUI DREAM TECH LLC
	MAUI PHONE REPAIR LLC
	MERMAID MOVEMENT HAWAII LLC
	PEOPLE WHO CLEAN
	PWC THE PEOPLE WHO CLEAN
	ROCK & ROLL DIRT WORK INC

Target Street	Cross Street	Source
✓	-	EDR Digital Archive

HONOAPIILANI HWY 2020 (Cont'd)

910	ROSIE STAPLES
	RUBYSTARR ENTERPRISES LLC
	SHERWIN-WILLIAMS
	SKYLANI MANAGEMENT CORP
	SUBWAY
	TROPIC WATER
	UPS STORE
	VESTA HOME BUYER LLC
	WEST MAUI SAFETY CHECK
1000	VELADA SARITA
1010	SHARLEE FUNAI
1221	ABC STORES
	ADVANTAGE VACATIONS
	ANGELINA BUNCH
	ART A LA CARTE
	ATM
	BILLIE YAP
	BLISS VACATION RENTALS
	BOB GOODE
	BOSS FROG'S DIVE SHOP
	CAN SHARON
	CBRE
	COINSTAR
	COREY SARANILLIO
	CRAZY SHIRTS
	DAVID MARAN
	DUSTY REYNON
	EDWARD D SULTAN CO LTD
	EMERALD AGPAOA
	GAVIN CAMPBELL
	HANA RAWLINGS
	HAWAIIAN ISLAND CREATIONS
	HDQ
	JAY CHEN
	JEANS WAREHOUSE
	JEFF BLAYER
	JEFFERY JULIA
	JERRY DOWNER
	KAIOLOHIA MAUI LLC
	KYLE KANESHINA
	LAHAINA CANNERY MALL
	LINETTE STEFANO
	LONGS DRUGS
	LORNA GRACE
	MAKA SECRETARIO
	MASON AMI
	MAUI BELLES BEACH LLC
	MAUI CLOTHING CO
	MAUI WATERWEAR
	MICHAEL PHAN

Target Street	Cross Street	Source
✓	-	EDR Digital Archive

HONOAPIILANI HWY 2020 (Cont'd)

1221	NA HOKU-HAWAII'S FINEST JWLR
	PATRICK MEHRING
	PRETTY WAHINE
	REDBOX
	SAFEWAY
	SARA CHAMOUN
	STARBUCKS
	T-SHIRT FACTORY
	THREE CROWNS JEWELRY
	TOM DIMITRAKOPOULOS
	VENESSA SARME
1760	CKC LLC
	CLAYTON BAYBAYAN
	RICK CABRERA
1830	JOAN COSTELLO
1840	LAHAINA CIVIC CTR
	MAUI COUNTY PARKS & RECREATION
1850	LAHAINA POLICE DEPT
1870	DISTRICT COURT
	FEADORA ALCOMINDRAS
2010	HAWAII PACIFIC SOLAR LLC
	HAWAII WATER SVC
	LANDTEC INC
3300	MAUI COUNTY RECLAMATION FCLTS
3310	MAUI COUNTY HIGHWAY DIV GARAGE
3350	A HAPPY MAUI WEDDING
	ALOHA SALON
	COSMO MEDICAL SPA
	TRICIA SCHILLING
3445	ATM
3481	ONO KAU KAU
4007	JOHN EWING
4050	DALENA DUONG
	DEBRA ARELLANO
	EDDIE KANOHOKULA
	FELIZABEL VALENCIA
	HERTZ
	JASMINE BASQUES
	JHM AIRPORT
	KANANI PUOU
	KIMBERLY MOORE
	MALI BUACHA
	MOKULELE FLIGHT SVC
	TINA DOAN
	UAKEA PALI
	WILSON KAINOA
4095	GAIL BETHELL
4403	ATM
	MC DONALD'S
4405	ANDREW NELSON

Target Street	Cross Street	Source
✓	-	EDR Digital Archive

HONOAPIILANI HWY 2020 (Cont'd)

4405	ATM
	AUMAKUA HOLDINGS INC
	BANK OF HAWAII
	CARRIE ADELMANN
	CHRISTOPHER THIBAUT
	CLUB MAUI
	DAN BROWN CONDO CARE
	ELECTRIC CHARGING STATION
	ESTHER CORTEZ
	FIRST HAWAIIAN BANK
	GARRETT MARRERO
	HAWAIIAN VILLAGE COFFEE
	JUSTIN ZECHES
	KAHANA GATEWAY SHOPPING CTR
	KENT HUTTON
	LIBERTY DIALYSIS-HAWAII LLC
	MARSHA HANSEN
	MAUI BREWING CO
	MELANIE OXLEY
	MICHELLE WATSON
	OSI RESTAURANT PARTNERS INC
	REDBOX
	ROY'S KAHANA BAR & GRILL
	RUSSELL ADKINS
	SMILE NAIL SALON & MASSAGE
	TIMOTHY REGAN
	WHALERS GENERAL STORE
4435	CHRISTINE PULLMAN
	ERIN PAQUETTE
	RENA ROBINETT
	SETH SCHOMMER
4465	AN HUA
	CAMRON LABORTE
	DELORES WYSE
	DIANA LENE
	ELDA IRIGOYEN
	J BAR LLC
	JANAY BRASH
	JOHN CONNERS
	KAANAPALI TAXI
	KAHANA GATEWAY LLC
	LEAH SAKAMOTO
	LIFE INSURANCE MAUI-ELIZABETH
	LOI HUA
	MICHAEL CARBA
	NICHOLAS LISOTTO
	ROBERT COONS
	ROBERT QUINE
	ROBIN FIGUEROA
	SUSAN FLAHERTY

Target Street	Cross Street	Source
✓	-	EDR Digital Archive

HONOAPIILANI HWY 2020 (Cont'd)

4465	TODD KNIGHT
4471	CATHERINE HAMPTON
	LEO LUGLIANI
	ROBERT WEBB
4910	ANDREW ORIORDAN
	JENNIFER FORD
	JENNY WORTH
	JONATHAN SILVER
	LORI FLEUTER
	MAUI PREPARATORY ACADEMY
	PATRICIA GABBARD
4920	ROBIN WARREN
	SHANNON MCNAMARA
	TANYA WARREN
5315	ATM
5400	FIPE PALE
6501	CHARLES WALLASCH
11485	ROBERT AGUIAR

Target Street	Cross Street	Source
-	✓	EDR Digital Archive

OLOWALU VILLAGE RD 2020

800	CAMP OLOWALU
	KAYAK OLOWALU
	PATRICIA TUPOU
	SHARLYN ETCHECHOURY
801	ALEXANDER DREHER
804	LINDA SANTOS
	ROBERT SANTOS
805	JACQUELYN KAAHUI
	WILLIAM KAAHUI
806	JILL LABRAM
810	DOUGLAS POSELEY
	RENZO GONZALEZ
811	OBED NAHOOKAIKA
818	ALEXANDER DREHER
820	ATM
	LEODA'S KITCHEN & PIE SHOP
	MALAMA KAHALAWAI INC
	OLOWALU GENERAL STORE
	OLOWALU WOODWORKS LLC
832	RUSS FLOREK
	TIMOTHY LAWS
844	BRANDEN HAZLET

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 2017

615 AWAI, SALINAS
BALLESTEROS, ROSIE
BAUTISTA, MARIA
BIGGS, KATHY M
CARBAJAL, SANTOS T
CARDENAS, HUMBERTO
CARDENAS, LOUIS H
CARRISOSA, SOLEDAD
DICKERSON, MIKE A
FILIKITONGA, HEATHER
FLEIX, VALENTIN
FLORES, DULCE
GILLETTE, KENNETH L
GONZALEZ, ANGIE
HERNANDEZ, JUAN M
HIROUJI, JAMESCY M
ISLAS, LILIANA R
KENNEDY, TENAYA
KING, TARA
LIMON, O
MALACAS, PABLO G
MELLO, TAMI L
MOLINA, MARIA
MORROW, DOROTHY M
MURILLO, BRIANDA
QUINABO, HERMAN K
SHIM, WILLY
SILVA, D
SWEENEY, MICHAEL R
VILLALOBOS, JOEL
WALTON, JEFFREY D
WATANABE, TATSUY
WEINBERG HARRY & JEANETTE COURT APTS
WEINBERG, HARRY
WINGER, JASON E
YOSHIMOTO, GALE H

910 ALII DRY CLEANERS
BIRKENSTOCK NATURALLY
FIRST HAWAIIAN MORTGAGE
H&R BLOCK
HUIKAINANI FINE ART & FRAMING
KEY TO LIFE CHIROPRACTIC
KOHALA BREWERY
LAHAINA AIR CONDITIONING LTD
LAHAINA MUSIC
LAHAINA OUTLET STORE
LAHAINA VETERINARY CLINIC
MAUI AIR CONDITIONING CO & REFRIGERA
METROPOLITAN FINE ART & FRAMING
MURAKAMI LEO S DVM

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 2017 (Cont'd)

910	PEOPLE WHO CLEAN
	SHERWINWILLIAMS
	SUBWAY
	THE UPS STORE
	THE WATER STORE
	YEN BEAUTIFUL SALON
1221	BANANA WIND
	CASA MAYA MEXICAN RESTAURANT LLC
	FOR YOUR EYES ONLY INC
	FUKUDA, KUNIZO T
	GAMESTOP
	GNC
	HONOLUA SURF CO
	JASMINES @
	JEANS WAREHOUSE
	L&L HAWAIIAN BARBECUE
	LAHAINA CANNERY MALL
	LULUS LAHAINA SURF CLUB & GRILL
	MAUI ISLAND CREATIONS
	MAUI OHANA JEWELRY
	MAUI SHOWCASE PROPERTIES
	MAUI TREASURES
	MAUI WATER WEAR
	STARBUCKS
	STARBUCKS COFFEE
	WYNDHAM HOTELS & RESORTS
1840	KEMPERLESNIK COMMUNICATIONS
2010	HAWAII WATER SERVICE COMPANY
3350	ASHLEY, KAY
	MAUI SUNGLASS
4048	A CUT ABOVE ROOFING
4095	SARUBA, VLADIMIR
4403	MCDONALDS
4405	ALOHA CLEAN PRO
	DAN BROWN CONDO CARE INC
	DBCC
	FIRST HAWAIIAN BANK
	HAWAIIAN VILLAGE COFFEE
	LESLIES FAMILY FUNWEAR
	MAUI BREWING CO
	MAUI BREWING COMPANY
	MAUI DIVE SHOP
	SMILE NAIL SALON & MASSAGE
	VACATION INTERNATIONALE
4435	STEBBINS, RONALD S
4465	ANTONUCCI, CLAUDIA
	BACALSO, JANET
	BERGH, MATTHEW
	BLACK ANGUS STEAKHOUSE
	BRIDGES, SHANE

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 2017 (Cont'd)

4465	BUCKLER, BENJAMIN J
	COBB, GARTH C
	COIMBRA, CINTIA
	COONS, BOB B
	FINK, SHAWNA M
	GROOM, JEFF
	HUA, LOI T
	JANOWIAK, MARIE W
	KAAIHUE, HERMAN
	KAANAPALI TAXI
	KAHANA GATEWAY LLC
	KENNEDY, DONALD M
	KOSTRICK, JOHN
	MARSH, JEFFREY
	MARTINEZ, DAVID
	MOORE, BROOKE
	NEIBERT, CAROL
	OANA, FRANCIS M
	PADILLA, LYNN A
	PARMELEE, VALERIE A
	QUINE, ROBERT S
	STOHLMANN, JOE
	WEST MAUI ELECTRIC LLC
	WYSE, DELORES A
4471	HOOVER, WILLIAM F
4495	SADANG, CORAZON L
4910	MAUI PREPARATORY ACADEMY
4920	MAUI PREPARATORY ACADEMY
5432	AUSTIN, KIMBERLY L
6501	WALLASCH, CHARLES

Target Street	Cross Street	Source
-	✓	Cole Information

OLOWALU VILLAGE RD 2017

700	AGAWA, ALVIN I
800	CAMP OLOWALU
	KAYAK OLOWALU
802	KAAHUI, THELMA P
803	NGO, JIMMY
804	SANTOS, ROBERT R
805	KAAHUI, JACKIE M
806	BALMACEDA, JENNIFER
	BIRKHOLZ, JASON M
808	JACKSON, DAVID
810	POSELEY, DOUGLAS J
811	NAHOOIKAIKA, OBED K
812	JONES, EDGAR W
818	DREHER, ALEX
820	LEODAS KITCHEN & PIE SHOP
	OLOWALU GENERAL STORE
832	BLACK-LAWS, MELISSA
	FLOREK, RUSS
	HICKEY, ANN E
846	HAZLET, BRANDEN M
1810	OLOWALU MAKAI KOMOHANA HOMEOWNERS AS

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 2014

210	HAWAII PACIFIC SOLAR LLC
615	ACKER, TERESA L
	AWAI, SALINAS
	BIGGS, KATHY M
	CABUYADAO, RHODA B
	CARDENAS, LOUIS H
	CARRISOSA, SOLEDAD
	CHAPITAL, JUAN C
	CRUZ, JAVIER
	DELANEY, SKY T
	DELOS, SANTOS
	DELOSANTOS, GINA
	FUJII, JIMMY H
	HERNANDEZ, RUBEN G
	HIROUJI, EILEEN M
	HOGAN, ED
	KENNEDY, TENAYA
	KING, TARA
	MACIAS, MARTHA L
	MEDCALF, RICHARD J
	MELLO, TAMMY
	MIYAMOTO, ERWIN
	MORALES, NATIVIDAD
	MORROW, DOROTHY M
	MUNLLO, BRIANDA
	NEWMAN, JESSE
	PENNYS PLACE IN PARADISE
	PRADO, MONSERRAT
	QUINABO, HERMAN K
	RAMIREZ, MARIA
	SANDOVAL, MIRIAM
	SING, MICHAEL A
	SONOMURA, DORI R
	SWEENEY, MICHAEL R
	THOMPSON, IAN G
	VILLALOBOS, TEHANI
	WATANABE, TATSUY
	WEINBERG HARRY & JEANETTE COURT APTS
	WEINBERG, HARRY
	WILMOTH, DANIEL P
	WINGER, JASON E
910	ALII DRY CLEANERS
	BIRKENSTOCK NATURALLY
	BREANAS POLYNESIAN WEAR
	EXPEDIA
	FIRST HAWAIIAN MORTGAGE
	H&R BLOCK
	KEY TO LIFE CHIROPRACTIC
	LAHAINA AIR CONDITIONING LTD
	LAHAINA MUSIC

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 2014 (Cont'd)

910	LAHAINA OUTLET STORE
	LAHAINA VETERINARY CLINIC
	MAUI AIR CONDITIONING CO & REFRIGERA
	METROPOLITAN FINE ART & FRAMING
	OWENS GREGORY DC
	PEOPLE WHO CLEAN
	SHERWINWILLIAMS PAINT STORE
	SINGH, SARA K
	SUBWAY SANDWICHES
	THE WATER STORE
	UNTALAN WIL JR DC
	VIRTUE, DOREEN F
	YEN BEAUTIFUL SALON
1221	ABC STORES
	ART A LA CARTE
	BALE SANDWICHES
	BANANA WIND
	BOSS FROGS DIVE SHOP
	CASA MAYA MEXICAN RESTAURANT LLC
	CRAZY SHIRTS
	FOR YOUR EYES ONLY INC
	FUKUDA, KUNIZO
	GAMESTOP
	GNC
	HATS GALORE & MORE
	HAWAIIAN ISLAND CREATIONS
	HONOLUA SURF CO
	JASMINES @ LAHAINA CANNERY MALL
	JEANS WAREHOUSE
	KITE FANTASY
	L&L HAWAIIAN BARBECUE
	LAHAINA CANNERY MALL
	LANIS
	LOGOWEAR MAUI
	LONGS DRUG STORE
	LULUS LAHAINA SURF CLUB & GRILL
	MAUI ISLAND CREATIONS
	MAUI SHOWCASE PROPERTIES
	MAUI TOY WORKS
	MAUI TREASURES
	MAUI WATER WEAR
	NA HOKU
	NATURES TRAIL
	OHANA JEWELRY
	ORANGE JULIUS
	PRETTY WAHINE
	SERENDIPITY
	STARBUCKS COFFEE
	SUNGLASS HUT
	THREE CROWNS JEWELRY

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 2014 (Cont'd)

1221	WYNDHAM
1840	KEMPERLESNIK COMMUNICATIONS
1850	POLICE
2010	HAWAII WATER SERVICE COMPANY
2805	FEUERSTEIN, ELLIOT
	MERTINS, FRANCENE
	POLLITT, F
	STEARNS, SIDNEY
	YOUNG, WILLIAM
3350	ASHLEY, KAY
	BAKER, VIRGINIA E
	BREFELD, RICHARD
	GONZALES, BUD
	HOLT, LAURA
	JONES, EMILY
	KANAHA, ANNA
	NELSON, MARSHA
	SACAY, ANTHONY
	SMART, KAREEN
	VIZTHUM, JASON M
	YERZY, TINA M
3445	HARR, DOUGLAS S
4007	CHANG, DOROTHY
	LEIS, JULIA M
	SCHWARTZ, JOHN R
4010	ROYER, STEVEN J
4050	TSR INC
4057	GRAMIT, EDWARD P
4095	AGRESTA, DOMINICK
	BRESLIN, GLENN
	LEWIS, RONALD C
	MACCARTHY, ALAN W
	ONG, MELINDA J
	PURL, REGINA M
	SARUBA, VLADIMIR
	TEUBER, ALFRED
	WARD, WILLIAM H
	WYATT, KENT
4401	WILSON, HEIDI C
4403	MCDONALDS
4405	ALOHA CLEAN PRO
	BANK OF HAWAII
	DAN BROWN CONDO CARE INC
	DBCC
	HAWAIIAN VILLAGE COFFEE
	KAHANA SANDS RESTAURANT & BAR
	LESLIES FAMILY FUNWEAR
	MAUI BREWING CO
	ROYS KAHANA BAR & GRILL
	SMILE NAIL SALON & MASSAGE

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 2014 (Cont'd)

4435	BARNES, LESLIE
	DECAIRE, MICHELLE
	JENKINS, SHEILA
	LESWICK, RONALD
	ORME, M J
	PULLMAN, CHRISTINE
	SCHOMMER, SETH
	SNYDER, JOE
	WELSH, MICHAEL
4465	BIANCO, LINDA R
	BUCKLER, BENJAMIN J
	CARBA, MICHAEL A
	CONNERS, JOHN M
	CRABBE, KIONI K
	CURTIN, ANDREW S
	GHEBREAB, HAILOM G
	GILES, JOLENE
	JANOWIAK, MARIE W
	KAANAPALI TAXI
	KAHANA GATEWAY LLC
	KENNEDY, DONALD M
	KOSTRICK, J
	LAM, THAI
	LYNCH, KRYSTAL
	NEIBERT, CAROL
	OWENS, JANICE
	PAGE, ADAM
	PARMELEE, VALERIE A
	POWELL, HAROLD
	PUAA-COX, CHARMAINE
	QUINE, ROBERT S
	R B BLACK ANGUS STEAK HOUSE
	SEARS, FRANCIS
	SMITH, GLEN C
	SZYDLOWSKI, NICOLE M
	WYSE, DELORES A
	ZAPATA, DEANNA R
4471	BOCEK, KAREN
	CERUTI, MARION G
	DAVIS, MARK S
	GALLAGHER, ANDREW S
	MERRILL, MIKE
	WEBB, ROBERT N
4495	RICKARD, DOREEN
4909	SHARPE, PAMELA J
4920	MAUI PREPARATORY ACADEMY
	WARREN, ROBIN
4950	RICH, MICHAEL
5400	PLANOS, GARY M
5432	AUSTIN, ALEC W

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 2014 (Cont'd)

5432	BUCKLER, REBECCA R
	WILSON, DAVID
5440	KALUA, A
5444	BACALSO, JOHN K
	PICO, EDWIN
5452	PERLOW, ROBERT M
6245	OCCUPANT UNKNOWN,
6291	LEE, CHU Y

Target Street	Cross Street	Source
-	✓	Cole Information

OLOWALU VILLAGE RD 2014

700	AGAWA, ALVIN I
800	KAYAK OLOWALU
801	DREHER, ALEXANDER T
	GIDDENS, LEA
	KEMPER, CHARLES
802	KAAHUI, T P
803	NGO, BAO Q
804	SANTOS, ROBERT R
806	BALMACEDA, JENNIFER
	OCCUPANT UNKNOWN,
807	OCCUPANT UNKNOWN,
808	OCCUPANT UNKNOWN,
809	OCCUPANT UNKNOWN,
810	POSELEY, DOUGLAS J
811	NAHOOIKAIKA, OBED K
812	JONES, EDGAR W
814	OCCUPANT UNKNOWN,
820	LEODAS KITCHEN & PIE SHOP
	OLOWALU GENERAL STORE
832	HICKEY, ANN E
844	DU GUILLAUME PRODUCTIONS
	KAAHUI, WILLIAM K
846	HAZLET, BRANDEN M
	READER, CARLA L

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 2010

615 ACKER, TERESA L
AMARAL, JOSEPH
BIGGS, KATHY M
CABUYADAO, RHODA
CAMPOS, MARIA
CARBAJAL, SANTOS T
CARDENAS, LOUIS H
CARRISOSA, SOLEDAD
CHAPITAL, JUAN C
DELOS, SANTOS
FUJII, JIMMY H
HALNES, ANTON D
HIROUJI, JAMES M
ISLAS, LILIANA R
MADRIGAL-RAMOS, JONATHAN E
MALACAS, MARIE A
MEDCALF, RICHARD J
MELLO, TAMMY
MORROW, DOROTHY M
MURILLO, BRIANDA
NEWMAN, ROBERT E
NIEVES, ALEX
PEREZ, JUAN M
QUILLAYEN, JOSEPHINE
RODRIQUES, MARTINEZ
SINCLAIR, ANNABELLE
SULLIVAN, LILLIAN P
THOMPSON, IAN G
TONE, SALOTE
VALDEZ, EDUARDO
VERNOY, MONICA J
WATANABE, TATSUY
WEINBERG & WEINBERG COURT APTS
WILMOTH, DANIEL P

910 ALII DRY CLEANERS
BUILDERS HOME SUPPLY
CABLEVISION ADVERTISING SALES
EXPEDIA LOCAL EXPERT
FIRST HAWAIIAN MORTGAGE
H&R BLOCK
ISANA OCEAN SPORTS INC
KAANAPALI BEACH MINISTRY
LAHAINA AIR CONDITIONING
LAHAINA MUSIC
LAHAINA OUTLET STORE
LAHAINA VETERINARY CLINIC
MAUI AIR CONDITIONING
MAUI BREWING CO
METROPOLITAN FINE ART & FRMNG
NATURALLYBIRKENSTOCK

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 2010 (Cont'd)

910	REMAX MAUI LLC
	ROCK & ROLL DIRT WORK INC
	SEA SHORE TREASURES
	SHERWINWILLIAMS
	SKYLANI MANAGEMENT CORP
	SUBWAY
	VAN BEAUTY SALON
	WATER STORE
	WEST MAUI SAFETY CHECK
1221	ABC STORES
	ATHENS GREEK RESTAURANT
	BALE SANDWICH SHOP
	BANANA WIND
	BIG DADDY SURF
	BOSS FROGS DIVE SHOP
	CLASSIQUE DESIGNS OF MAUI
	CRAZY SHIRTS INC
	DAIRY QUEEN
	DANTES LLC
	EDO JAPAN
	ESCAPE TO MAUI PANAMA JACKS
	GAMESTOP
	GNC
	HATS GALORE & MORE
	HAWAIIAN ISLAND CREATIONS
	HKR ENTERPRISES INC
	HONOLUA SURF CO
	JEANS WAREHOUSE INC
	L & L DRIVEINN
	LAHAINA CANNERY MALL
	LANIS
	LOGOWEAR MAUI
	LONGS DRUGS
	LOS PELONES RESTAURANT
	LULUS LAHAINA SURF CLUB
	MAUI ISLAND CREATIONS
	MAUI SHOWCASE PROPERTIES
	MAUI TOY WORKS
	MAUI TREASURES
	MAUI WATER WEAR
	MAUIGO WIRELESS
	NA HOKU
	NAPILI PLAZA
	OCEAN ACTIVITIES CTR
	ORANGE JULIUS
	PRETZELMAKER
	PROFESSIONAIL
	SAFEWAY
	SERENDIPITY
	SHADES OF HAWAII

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 2010 (Cont'd)

1221	STARBUCKS
	STERLING OF MAUI
	TOTALLY HAWAIIAN GIFT GALLERY
	TSHIRT FACTORY
	VICKY CS
	VICKY, C
1840	LAHAINA CIVIC CTR
	MAUI COUNTY PARKS & RECREATION
1850	LAHAINA POLICE DEPT
1860	LAHAINA FIRE DEPT
1870	DISTRICT COURT
2805	FEUERSTEIN, ELLIOT
	KARINEN, LARRY
	MERTINS, FRANCENE
	POLLITT, F
	SIMPSON, TIMOTHY
	STEARNS, SIDNEY
	YOUNG, WILLIAM
2920	MAUI ISLE REALTY
3300	MAUI COUNTY RECLAMATION FCLTS
3310	MAUI COUNTY HIGHWAY DIV GARAGE
	PUBLIC WORKS DEPT HIGHWAY DIV
3350	MARTIN, CHRIS
	MAUI DIVE SHOP
3445	HARR, DOUGLAS S
3615	PARK, S
4004	WILSON, NANCY
4007	EWING, JOHN
	LEIS, JULIA M
	MCNATT, SUSAN A
4040	MIHCBAUET, JAMIE
4048	WELCH, JOHN
4050	KAPALUA AIRPORT FIRE DEPT
4057	FRANCIS, DAN
4095	BRESLIN, GLENN
	LEWIS, RONALD
	MACCARTHY, ALAN W
	ONG, MELINDA J
	PURL, REGINA M
	ROBBINS, EMERSON
	SARUBA, VLADIMIR
	TEUBER, ALFRED
	WARD, WILLIAM H
	WYATT, GAIL
4401	CURTIS, TOM A
	KEEN, VIRGINIA M
	LENELL, DAVE
	MCKINNEY, WALTER V
4403	MC DONALDS
4405	HAWAIIAN VILLAGE COFFEE

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 2010 (Cont'd)

4405	HUTTONS FINE JEWELERS
	IMAGINE MAUI
	ISLAND SWIMWEAR
	LESLIES FAMILY FUNWEAR
	MAUI BREWING CO
	OUTBACK STEAKHOUSE
	ROYS
	SMILE NAIL SALON & MASSAGE
	WHALERS GENERAL STORE
4435	BATSON, MIKE
	BUNELL, DARREN
	REILLYS, MARY M
	SROUJI, NADEEN
	WAGGONER, BRYAN K
	WHITE, STUART A
4465	ARIEMMA, ROSEMARY
	BALL, INDIGO
	BARBIETO, LOURDES C
	BIANCO, LINDA R
	BRAND, JOHANNA
	BRUNEL, JOSEPH J
	BUCKLER, BENJAMIN J
	DELUNA, MELECIA
	EBELING, ALEXIS M
	HARTSELL, JAMES
	KAANAPALI TAXI
	KAHANA GATEWAY APTS
	KELLER, CHARLES
	KITAGUCHI, THOMAS
	MAY, ELIZABETH H
	OWENS, MICHEAL D
	PANLASIGUI, AMELITO
	PAUL, JASMIN E
	R B BLACK ANGUS STEAK HOUSE
	SCHAEFER, ASHLEY
	SHEKER, BRIAN
	SJOLANDER, KENT D
	VEJAR, LISA
	WARDWELL, HOWARD D
4471	BOCEK, KAREN
	GALLAGHER, ANDREW S
	MERRILL, MIKE
	MOLER, PRISCILLA L
	WEBB, ROBERT N
4495	RICKARD, DOREEN
4809	DREAM TEAM MEDIA
	MC DERMOTT HOMES INC
	OYSTER SEAFOOD
	STUART RAGAN ATTY AT LAW
4909	POWERS, VIRGINIA L

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 2010 (Cont'd)

4920	MAUI PREPARATORY ACADEMY
	MCQUEEN, MAKO M
4946	LUND, THOMAS G
4948	MILLER, LINDSAY
4950	RICH, MICHAEL
5400	PLANOS, GARY M
5425	HEAD TO TOE BEAUTY SALON
5444	BACALSO, JOHN K
	PICO, EDWIN
5452	PERLOW, ROBERT M
6245	PUCK, D A
6291	BRENNAN, JOHN

Target Street	Cross Street	Source
-	✓	Cole Information

OLOWALU VILLAGE RD 2010

652 WEITZEL, PATRICIA
800 CAMP OLOWALU
KAYAK OLOWALU
801 KEMPER, CHARLES
802 KAAHUI, T P
803 HILL, LESLIE M
804 SANTOS, L
805 DU GUILLAUME PRODUCTIONS
KAAHUI, WILLIAM K
806 CAPTAIN BONDOS CHEAP PAINT
CATES, KIM R
OCCUPANT UNKNOWN,
807 OCCUPANT UNKNOWN,
808 DEAN, JOSHUA I
809 CLEMENTS, MICHAEL
810 ISLAND ESSENCE INTERIORS INC
POSELEY, DOUGLAS J
811 NAHOOIKAIKA, OBED K
812 JONES, EDGAR W
814 OCCUPANT UNKNOWN,
820 CHEZ PAUL FRENCH RESTAURANT
OLOWALU GENERAL STORE
832 HICKEY, EDWARD A
846 READER, CARLA L

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 2005

615 AMARAL, JOSEPH
BROWN, UILANI E
CAMPOS, HIRLANDO
CARBAJAL, SANTOS
CARDENAS, LOUIS
CORONA, VICTOR
DUTRO, JENNIFER M
FLETCHER, ROB
FUJII, AMPARO A
GARCIA, VICTOR
GONZALEZ, ARNULFO
GUILLERMO, MIRANDA
HAWAIIAN WEDDINGS
HERNANDEZ, RUBEN G
HOLLAND, MARY E
KEAWE-AIKO, VICTORIA A
LANSE, JULIE
MADRIGAL, JOSE O
MARTINEZ, ADELINA V
MEDCALF, RICHARD J
MELLO, TAMMY
MEYERS, LUKELA
MIRANDA, JUAN
MORROW, DOROTHY M
NAHOOIKAIKA, BARBARA
NEWMAN, ROBERT E
PAYNE, JON
PENA, MARIA J
PEREZ, JUAN M
PULU, VAIHOI
QUILLAYEN, JOSEPHINE
RAMIREZ, JOSE
SONOMURA, DORI R
TAKETA, L
THOMPSON, IAN G
TONE, SALOTE
VALDEZ, CONNIE
VASQUEZ, J K
WEINBERG COURT APARTMENTS
616 WELLS, MARK A
724 STRANG, V
910 ACTIVITY WORLD
ALII DRY CLEANERS
CENTRAL PACIFIC MARINE INC
CHARTER FUNDING OF HAWAII
CHINA BOAT INC
FIRST HAWAIIAN MORTGAGE
FOR YOUR EYES ONLY
GALERIE, LASSEN
HISTORIC TW INC

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 2005 (Cont'd)

910	LAHAINA MUSIC
	LAHAINA TIRE CENTER
	MARINE PLANNING INTERNATIONAL
	MATTHEWS, SONIA
	METROPOLITAN FINE ART & FRAMING
	MURAKAMI LEO S DVM
	OFFICE MART
	PACIFIC COFFEE INC
	PARADISE GYMNASTICS LLC
	PWC HAWAII CORP
	SHEVELAND, JOHN
	SKYLANI MANAGEMENT CORP
	STANDARD MOTORS & MARIN SPS
	TIME WARNER
	TIME WARNER ENTERTAINMENT CO LP
1221	AFTERTHOUGHTS
	CLAIRES BOUTIQUES INC
	COMPADRES BAR & GRILL
	DAIRY QUEEN ORANGE JULIUS
	DIVERSITY INC
	EDO JAPAN
	EDWARD D SULTAN CO LTD
	ELEGANT ILLUSIONS
	ESCAPE TO MAUI / PANAMA JACKS
	FOOT LOCKER
	GREEN LEAF GRILLE AND SOUTH PHILLY S
	HATS GALORE & MORE
	HONOLUA SURF CO
	JEANS WAREHO
	KITE FANTASY
	KLAHANI RESORTS CORP
	KLAHANI TRAVEL
	KLAHANI TRAVEL CARLSON WAGONLIT TRAV
	L AND L DRIVE INN LAHAINA CANNNERY
	LAHAINA CANNERY MALL SURF CO
	LONGS DRUG PHARMACY # 237
	MAUI ART A LA CARTE
	MAUI CLOTHING CO
	MAUI ISLAND CREATIONS
	MAUI TOY WORKS
	MAUI TREASURES
	MCCARTHY, LINDA
	MNS LTD
	ONLY THE BEST INC
	PHAM, BACH L
	PRETZELMAKER
	PROFESSIONAL
	SAFEWAY
	STARBUCKS COFFEE
	STERLINGS OF MAUI

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 2005 (Cont'd)

1221	THAI, PHAT M
	TOTALLY HAWAIIAN GIFT GALLERY
	VICKI C S
1760	UNITED STATES POSTAL SERVICE
1850	LAHAINA POLICE DEPARTMENT
3350	CENTURY 21 ALL ISLANDS
	IMAGINE PHOTO INC
3400	TRUONG, MINH
3418	RVN DELI KITCHEN CATERING
3445	ALLOWITZ, DONALD
3500	ARD, JAMES G
3543	HAYMAN, JOANN
3559	HARTLEY, JOHN G
3615	DEAN, ROBERT A
3676	KODAMA, DAVE
3723	ELIOFF, RONALD
3785	STERLING, JAMES I
3788	VIANO, CHRISTINE E
3823	ROBINSON, KEITH
4004	WILSON, NANCY
4007	CHRISTIANSON, LEE
	DAHLQUIST, CHAD
	LEIS, JULIA M
4009	DEMELLO, RAYMOND D
4045	BOWMAN, JAMES W
4048	MARINO, MARIANELA
4050	KAPALUA AIRPORT FIRE DEPARTMENT
4057	FRANCIS, DAN
	LAING, JOHN
	METAGUE, STEPHEN
4095	AGRESTA, DOMINICK
	BRESLIN, GLENN
	LEWIS, RONALD
	MACCARTHY, ALAN W
	NICHOLS, STEPHEN P
	PURL, REGINA M
	SARUBA, VLADIMIR
	TEUBER, ALFRED
	WARD, WILLIAM H
	WYATT, GAIL
	ZAPPELLA, SALVADOR
4310	UEMURA, NAOKI
4401	CERTO, RICHARD
	HOLOLANI RESORT
	WELDON, LINDA J
4403	MCDONALDS RESTAURANT
4405	BANK OF HAWAII
	BEHL MILLER FINE ART INC
	BREWING CO & ROTISSERI
	FISH & GAME BREWING CO

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 2005 (Cont'd)

4405	GALLERIE HAWAII
	HUTTONS FINE JEWELERS
	KAHANA GATEWAY SHOPPING CENTER
	LESLIES FAMILY FUNWEAR
	OUTBACK STEAK HO
	REILLEYS STEAK & SEAFOOD
	ROYS KAHANA BAR & GRILL
	ROYS NICOLINA RESTAURANT
	TROPICAL GIFTS
4435	ALVAREZ, BACILIO
	LAHAINA BOAT CO
	LAHAINA BOAT CO LLC
	MAUI KAILANI TIME SHARE
	POHAILANI MAUI AOAO CO
	ROEDER CO LLC
	SWENSON, LILLIAN V
	VANEPPS, CRAIG
4465	BATCHELOR, KATE
	BORGEMEYER, NEAL
	BROVELLI, NATHAN V
	CAMPBELL, DOYLE
	CARRISOZA, JOSE R
	CENDANA, MANUEL F
	DELUNA, M
	DEVER, DANNY
	DORN, JENNIFER
	DOYLE, SCOTT
	EBELING, ALEXIS M
	FANCHER, S
	FLEMING, MATTHEW
	HARRELL, KEVIN
	HOPPER, STEPHANIE E
	IGLESIA-SPEREZ, MARIO
	ISLAND SWIMWEAR
	ITO, CAROLYN M
	KELLEY, P
	KURIYAMA, TOMOHIRE
	LACHINE, JUSTIN
	LYONS, ROGER D
	MAUI COAST PROPERTIES
	MIDDLETON, SANDRA
	MYERS, JERRY
	MYSTIC MOON PRINTS
	NEVIUS, DAVID
	OANA, FRANCIS M
	ORTEGA, RACHEL
	OSTERBACK, STEVEN
	PATE, AARON
	PHELPS, JAMIE A
	SEDOR, MATTHEW C

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 2005 (Cont'd)

4465	SHEKER, BRIAN
	SINGER, MARNI L
	SINGER, SHELLEY L
	SJOLANDER, KENT D
	SLUSSER, DENNIS T
	SMITH, GLEN
	SOCHOR, JOHN A
	SPLAT
	STERLING, CHARLES
	SUTHERLAND, LEITH
	TIDWELL, ROBERT C
	TORRES, CHERYL R
	VANHOOSE, EDIE
	VU, VUONG
	WRIGHT, CHAD
	YAMAZAKI, IKUO
4471	ARCHER, SOLEDAD A
	BOCEK, KAREN
	ESKENAZI, LOREN
	MERRILL, MIKE
	WHITELY, ELIABET M
4521	LIAL, ED
4531	SALMONSON, RICHARD
4900	KALUA LEEANN
4909	KING, JOHN W
	PITCHER, E
4910	OCCUPANT UNKNOWN,
4920	GALAXY INC
	MCQUEEN, MAKO M
4946	LUND, THOMAS G
4948	MILLER, LINDSAY
4950	CLOER, KEITH D
5190	MATHIAS, ELWARD K
5315	STRAWLEY, LINDA L
5400	GLENNA AND ASSOCIATES LTD
	PLANOS, GARY M
5432	ANDERSON, DOUGLAS D
5452	PERLOW, ROBERT M
5456	MEDEIROS, DARREN K

Target Street	Cross Street	Source
-	✓	Cole Information

OLOWALU VILLAGE RD 2005

800 CAMP PECUSA
802 OCCUPANT UNKNOWN,
803 OCCUPANT UNKNOWN,
804 SANTOS, L
805 DU GUILLAUME PRODUCTIONS
KAAHUI, WILLIAM K
807 MARTIN, PETER K
809 CLEMENTS, MICHAEL
810 ISLAND ESSENCE INTERIORS INC
POSELEY, DOUGLAS J
811 NAHOOLKAIKA, JESSICA
812 OCCUPANT UNKNOWN,
814 OCCUPANT UNKNOWN,
818 PECK, DARRELL R
820 OCCUPANT UNKNOWN,
832 HICKEY, EDWARD A

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 2000

615	ACKER, EVA M
	CARDENAS, LOUIS
	CHING, C
	CORTES, AMPARO A
	FUJIYOSHI, BETH M
	HERNANDEZ, G
	HERNANDEZ, RUBEN G
	HOLLAND, MARY E
	KEAWE AIKO VICTORIA ANN
	KEAWE-AIKO, V A
	MAGNO, MELANIE M
	MATIAS, ALEX
	MIRANDA, JUAN
	NEWMAN, ROBERT E
	ORDONEZ, MARBEL L
	PAYNE, JON
	QUILLAYEN, J
	QUINABO, HERMAN
	RICO, R
	THOMPSON, IAN G
	VO, CHUNG
724	STRANG, V
910	AUTO VALUE PARTS STORES LAHAINA
	CENTRAL PACIFIC MARINE COMPANY INCORPORATED
	COCONUT ACTIVITY CENTER
	DESTINATION MAUI INCORPORATED
	FIRST HAWAIIAN MORTGAGE
	KAWAHARA RONALD A & COMPANY CPAS INCORPORATED LAHAINA
	LAHAINA NEWS
	RONALD A KAWAHARA REALTY
	STANDARD MOTORS & MARINE SUPPLIES INCORPORATED
1221	ATHENS GREEK RESTAURANT
	HAWAII OMORI CORPORATION
	KITE FANTASY
	LAHAINA CANNERY MALL ABC DISCOUNT STORES
	LAHAINA CANNERY MALL AFTERTHOUGHTS
	LAHAINA CANNERY MALL ALOHASHELLS HAWAII
	LAHAINA CANNERY MALL ATHENS GREEK RESTAURANT
	LAHAINA CANNERY MALL BLUE GINGER DESIGNS
	LAHAINA CANNERY MALL BURGER KING
	LAHAINA CANNERY MALL CHENS MCCONNELLS ICE CREAM
	LAHAINA CANNERY MALL COMPADRES MEXICAN BAR & GRILL
	LAHAINA CANNERY MALL CRAZY SHIRTS INCORPORATED
	LAHAINA CANNERY MALL ESCAPE TO MAUI PANAMA JACKS
	LAHAINA CANNERY MALL FOOT LOCKER
	LAHAINA CANNERY MALL FOX PHOTO
	LAHAINA CANNERY MALL GROOVE 2 MUSIC
	LAHAINA CANNERY MALL GUY BUFFET COLLECTION
	LAHAINA CANNERY MALL HAWAIIAN ISLAND GEMS
	LAHAINA CANNERY MALL HONOLUA SURF COMPANY

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 2000 (Cont'd)

1221	LAHAINA CANNERY MALL IDAS FLOWERS & WEDDINGS
	LAHAINA CANNERY MALL KITE FANTASY
	LAHAINA CANNERY MALL LAHAINA PRINTSELLERS LIMITED
	LAHAINA CANNERY MALL LONGS STORES
	LAHAINA CANNERY MALL MANAGEMENT OFFICE
	LAHAINA CANNERY MALL MANGO CAFE & PIE SHOP
	LAHAINA CANNERY MALL MAUI CLOTHING COMPANY
	LAHAINA WATCH COMPANY
	MANGO CAFE & PIE SHOP
	MAUI CLOTHING COMPANY
	SAFEWAY FOOD & DRUG LAHAINA
1870	HAWAII STAT GOVERNMENT PLAN PUB SAFETY DEPARTMENT OF
2395	KAANAPALI PIZZA
3500	ARD, JAMES
	KUBLER, ALAN
3511	ABC DISCOUNT STORES NO 47
3535	AHUNA, C
3543	LOREN, JOEL C
3559	HARTLEY, JOHN G
3575	OMURA, HIROMI
3676	KODAMA, DAVE
3702	MCCOY, BRIAN
3732	LYNN, JOHN
3788	FISLER, FRANK T
	HALE ROYALE CONDOMINIUM
	VIANO, CHRISTI
3823	ROBINSON, KEITH
3975	BERRY, ED J
4007	CHRISTIANSON, LEE
	MAHINAHINA BEACH CONDOMINIUM
	PULMANO, LEILANI
4039	OCCUPANT UNKNOWN,
4048	OCCUPANT UNKNOWN,
4057	FRANCIS, DAN
	MULLEN, KEVIN
	PETERSON, JAMES O
4064	OCCUPANT UNKNOWN,
4095	COWLES, MACON
	HORN, PETER M
	LEWIS, RONALD
	MACCARTHY, ALAN W
	MCVAY, W H
	PURL, REGINA M
	SARUBA, V
	TEUBER, ALFRED
	WARD, WILLIAM H
	WYATT, GAIL
	ZAPPELLA, S
4242	ARTS OASIS
	KAHANA VILLA

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 2000 (Cont'd)

4310	LOCKHART, YUN
	NAKAYAMA, MACHIKO
4403	MCDONALDS RESTAURANTS KAHANA
4405	BANK OF HAWAII KAHANA BRANCH
	FISH & GAME BREWING COMPANY & ROTISSERIE
	GALLERIE HAWAII
	KAHANA ART & FRAME
	LAHAINA TICKET COMPANY EXECUTIVE OFFICE
	OUTBACK STEAK HOUSE
	ROYS KAHANA BAR & GRILL
4435	HAMMACK, CHERYL
	JAMES, BRANDON W
	MAUI KAILANI TIME SHARE
	MAYO, DON
	SANCHEZ, DIANA T
4465	BAME, JEFF S
	BORGEMEYER, NEAL
	BROVELLI, NATHAN V
	CARBA, MICHAEL A
	CARRISOZA, JOSE R
	GANTT, BARBARA L
	GARRETT, BRYAN L
	HEPBURN, RICHARD A
	IMOKAWA, MICHELE S
	KAHANA KOIN OP LAUNDROMAT
	KATELY, DAVE
	KIMLEY, KARLA W
	LARSEN, STACEY
	MAHALO TAXI & TOURS
	MENDOZA, D
	MIGURA, K A
	MORFIN, CARLOS M
	ROSALES, MANUEL C
	SHEAR, DEBRA
	SLUSSER, D
	SOLLEY, M D
	STANLEY, KIRK
	SUCHER, HANS
	SWART, GLORIA
	THOMPSON, LETIZIA M
	TOLOSKO, GLEN R
	VISCONTI, JOSHUA C
	ZINGSHEIM, HEIDI L
4471	BORNGRAVER, MELVIN N
	JUDSON, THOMAS G
	KRAMER, DONALD
	MCLELLAN, BRUCE A
4474	TAY, SIMON S
4482	BENTO, JOSEPH
4531	SALMONSON, RICHARD

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 2000 (Cont'd)

4900	FLORES, DELIA
4909	LANDRY, LESLIE E
4920	MCQUEEN, CLIFF
4950	LUND, MAE P
	PADGETT, MARY L
5184	HARADA, TOSHIO
5190	MATHIAS, EDWARD K
5315	NAPILI TOURS & ACTIVITIES
	STRAWLEY, LINDA L
5400	GLENNA AND ASSOCIATES LIMITED
5500	GARDENS AT WEST MAUI THE VACATION RESIDENCE
5900	MILLAR, DOROTHY
	TROPIC TEMPTATIONS N K B C INCORPORATED

Target Street	Cross Street	Source
-	✓	Cole Information

OLOWALU VILLAGE RD 2000

803 OCCUPANT UNKNOWN,
804 OCCUPANT UNKNOWN,
805 DUGUILLAUME PRODUCTIONS
KAAHUI, WILLIAM
806 HENNESSEY, THOMAS
807 MARTIN, PETER K
809 MULCARE, K A
810 POSELEY, DOUG
812 OCCUPANT UNKNOWN,

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 1995

910	AMERITONE PAINT CTR
	CENTRAL PACIFIC MARINE CO
	DESTINATION MAUI INC
	HAMAI APPLIANCES
	HAWAIIAN CABLE VISION CO
	HIGHWORK UNLIMITED
	LAHAINA VETERINARY CLINIC
	MAUI REALTY CO
	MIMI SJ HU INC
	ONE DAY SIGNS
	PLANET, MAUI
	RMS ELECTRIC
	RONALD A KAWAHARA & CO
	SLUSS AIR CHARTERS
	STANDARD MOTORS & MARINE SUPLS
	STORE & LOCK
	TRADEWIND SUPPLY CO
1121	MAUI DIVE SHOP
	TROPICAL BEACHWEAR
1221	ABC DISCOUNT STORES
	ALEXIA NATURAL FASHIONS INC
	ATHENS GREEK RESTAURANT
	BENETTON
	BURGER KING
	CRAZY SHIRTS INC
	FOR YOUR EYES ONLY INC
	HAWAIIAN ISLAND GEMS
	HOBIE SPORTS
	ISLAND OPTICS
	KITE FANTASY
	LAHAINA CANNERY MALL
	LONGS DRUG STORE
	MARIE CALLENDERS RESTAURANT
	MAUI ON MY MIND
	MC CONNELLS ICE CREAM
	OCEAN ACTIVITIES CTR
	PANAMA JACKS
	PEARL FACTORY
	POI
	REYNS
	ROCKY MOUNTAIN CHOCOLATE
	ROLANDS SHOES
	ROYAL HAWAIIAN HERITAGE JWLRY
	SAFEWAY STORES INC
	VILLAGE GALLERY AT THE CANNERY
	WAIKIKI ALOE OF MAUI
	WALDENBOOKS
1327	BING, RICHARD
1760	US POST OFFICE
1860	LAHAINA FIRE DEPT

1870	DISTRICT COURT
2605	GEVING, DAVID
2805	AMERICAN EXPRESS
	DAVIDSON, NORMAN JR
	GEVING, DAVID
	HAY, TOBY
	KARINEN, LARRY
	NELSON, GEORGE
	POLLITT, F W
	POSSEHL, CHESTER
	ROCKEY, DEAN M
	SIEGEL, HERMAN S
	STEARNS, SIDNEY
	THOMPSON, BOB
	YOUNG, WILLIAM E JR
3359	HUTCHISON, MICHAEL
3445	AMERICAN EDUCATIONAL INSTITUTE
3511	ABC DISCOUNT STORES
3788	HALE ROYALE CONDOMINIUM
4050	SGT LEISURE INC
4242	KAHANA VILLA
4403	MC DONALDS
4405	AEROBIC CO STUDIO & SPORTSWEAR
	BANK OF HAWAII
	DLR CORP
	MUSICLAND & TV
	OROUKES TOURIST TRAP
	POSTERS UNLIMITED
	R JS RANCH HOUSE
	ROXANAS HAIR AFFAIR
	ROYS KAHANA BAR & GRILL MAUI
4435	MAUI KAILANI TIME SHARE
4465	KAHANA GATEWAY
5001	GARDENERS GUILD
5315	ORIENT EXPRESS
5500	KAHILI

Target Street	Cross Street	Source
-	✓	Cole Information

OLOWALU VILLAGE RD 1995

800	CAMP PECUSA
802	KAAHUI, ABRAHAM H
803	OCCUPANT UNKNOWNN
804	OCCUPANT UNKNOWNN
805	KAAHUI, WILLIAM
806	BONE, SHERMAN
	HICKEY, ED
807	ROCHE, DAVID M
809	ORNELLAS, ALAN
810	BAILEY, JAMES M
	KIELTY, M
811	NAHOOIKAIKA, OBED K
820	CHEZ PAUL FRENCH RESTAURANT
	FUJII, HISAO
	GIATTINI, TED
	MILLER, LORI
	OLOWALU GENERAL STORE

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 1992

272	HALA, TANIELA
362	LOW, SINCERI
2740	SHELTON, SCOTT
2805	BEASTON, G
	DAVIDSON, NORMAN JR
	DEWOLFE, C L
	HAY, TOBY
	KARINEN, LARRY
	NELSON, GEORGE
	POLLITT, F W
	POSSEHL, CHESTER
	ROCKEY, DEAN M
	SIEGEL, HERMAN S
	STEARNS, SIDNEY
	THOMPSON, BOB
	WINNIE, DENNIS J
	YOUNG, WILLIAM E JR
2883	GARROW, ROBERT
3445	HATHAWAY, A
	LESHKO, DARRYL
	MICKOWSKI, TED
3488	CUMMINS, RANDY
3500	ALEXANDER, LINDA P
	ALVARADO, C J
	ARAKAWA, DOUGLAS J
	BACALSO, JOHN
	BERMUDEZ, HECTOR
	BONE, SHERMAN
	BULARON, C M
	BURNETT, BRENDA
	CARDOZA, MICHAEL
	CASEY, PAM J
	CATUGAL, D
	CLEMENTS, THOMAS F
	COFFMAN, R
	COSTANZO, J
	CUNNINGHAM, DONNA
	CURIMAO, DONNA
	DAUENHAUER, MATHEW
	DEAN, JASON K
	DONOHOE, H M
	DURAN, K
	FELICILDA, B JR
	FLEMING, P
	FLETCHER, SKIP
	GAGLIANO, DIANE M
	GALLAFENT, B A
	GILES, PAUL B
	GILL, ROY
	GREEN, WILLIAM

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 1992 (Cont'd)

3500	GUTHRIE, MICHAEL
	HARVEY, BRUCE
	HARVEY, MARK
	HAYEK, LESLIE
	HENDRICKSON, G
	HIGUCHI, BARBARA
	HOOPAI, FRANK
	HOSHINO, R
	KAHAIALII, C K
	KAHAIALII, J
	KAIA, N
	KALANI, W K
	KIEK, E
	KING, JAMES
	KUBOTA, J
	LEAL, MATEO
	LISK, WILLIAM F
	MANIAGO, E
	MANNING, MICHAEL
	MANTIA, WAYNE
	MATHAKUL, P V
	MATTSON, PETER R
	MILLER, SHERRIE
	MOGHADDAM, HESHMAT
	MORIKAWA, C N
	MORROW, NICOLE
	MURRAY, JULIE M
	NAHA, JAMES K
	NAKOOKA, ISAAC
	NUSHIDA, GARY
	OKADA, WAYNE M
	ORTIZ, ANDREW A
	OSBORNE, TIM
	POPP, C
	POWELL, S
	RAMOS, VIRGIL
	REINHARDT, MICHAEL
	ROCHIEN, MARK
	RODRIGUES, E
	ROSELIUS, MARK
	ROSELLE, DAVID
	SANA, V N
	SANTOS, STEPHEN
	SCOTT, MICKEY
	SEVELO, S N
	SIMROCK, K
	SKROTZKI, J
	SMITH, BETTY D
	STEPHENS, PHILLIP
	STESSEL, C

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 1992 (Cont'd)

3500	TAUFA, SOSEFO L
	TEANGLUM, BUNDIT
	THOMPSON, L
	TIMMINS, H
	TUIPUOLTU, TANIELA
	VICKERY, S C
	WATSON, P
	WICKHAM, MICHAEL
	WONG, RICHARD
	WRIGHT, DEBORAH S
	YANAGAWA, DENISE
3510	BAILEY, GABRIEL
	BIBY, RUSS
	BUCK, ALICIA
	BURGOS, T K
	CATE, J K
	DUSHANE, R A
	FLINCHUM, STUART
	GRADY, R
	HERSCHENSOHN, DAVID
	JONES, C
	KOZAWA, TODD
	NICE, CAMERON
	NINER, CHRIS
	SCHMID, NORMA
	SOTO, ERIC
	TOMEI, TAMMY
	VAZQUEZ, F
	VILLEGAS, JESUS
3530	YABO, ANIANO B
3535	BARKER, ELOUISE
	CARTER, KENNY
	CLEARY, G
	CONARROE, C J
	DUTRO, MELVIN JR
	ELLIS, DARRYL
	GRECO, RAE
	GUEDES, ELISA
	HAZEN, T
	KIM, CHAESUN
	LOTT, RICHARD
	MASTERSON, ED
	MASTERSON, M
	MORTON, SHERY
	MURPHY, J M
	NEALSON, S
	OMORI, ARNOLD
	PAYSON, D
	PUTNAM, MARIA
	REDONA, LENORE

3535	ROSS, C B
	SHIMIZU, CURTIS M
	SIPIORA, THOMAS
	SOUZA, C
	STEWART, ELSIE
	STUART, DAVID
	WERY, SCOTT J
3543	ALLEN, GARLAND
	BISCHLE, HERBERT
	CARR, JAMES
	CRAIG, MARIE
	CRUCHLEY, TEDD
	FREELAND, E J
	FREMMERLID, BRENT
	HENDERSON, JAMES
	HOOD, JEFF
	HOWELLS, SUSAN L
	HURLEY, ALICE
	HURLEY, LOUISE
	JUAREZ, STEPHEN
	KIRKEDY, MARK O
	LEMIRE, P
	LEWIS, FRANK J
	MATTAL, MURRAY
	MCCOLL, HUGH
	MITCHELL, EDMUND J
	NEWLAND, C G
	NICHOLS, E C
	PAGEL, PHYLLIS
	PAK, IN H
	PEET, K
	PETERSON, DENNIS
	PETERSON, LELAND J
	REA, LARRY D
	SHOCKEY, HAROLD
	STEVENSON, KENNETH
	TENNYSON, P
	THURMOND, JOHN
3550	PAOA, GEORGE JR
3559	BAILIE, KEN
	BECK, STEVE
	BEDOYA, DUANE
	BELL, BRIAN C
	COSTELLO, J
	CROSBY, JILL
	DAY, D J
	EZZY, SUZANNE
	GOAN, DAVID
	HALSEY, WALTER W
	HANNIGAN, M

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 1992 (Cont'd)

3559	HARTLEY, JOHN G
	KELSO, GEORGE V
	LAGERQUIST, GEORGE A
	LOPEZ, D L
	MASLIN, ALBERT C
	MCCARTHY, KELLY
	MORRIS, VINCENT P
	NELSEN, L
	NICKELS, D
	OBERBILIG, J M
	ROHDE, K
	SARIS, CATHY
	SEIDL, BILL
	SENESE, LEONARD S
	SMITHFREITAS, LOIS
	STOLZ, S A
	TAYLOR, JASON
	TERRY, MARK D
	VIANO, JAMES
	VIERRA, RICHARD
	VONKLEINSMID, WALTER
	WARDMAN, RICHARD L
	WHITE, DONALD
	WILSON, FRANK
	WORCESTER, PETE
3575	OMURA, HIROMI
3600	CAMPBELL, JAY T
	STROCK, ARDEN
3614	LAWSON, REX G
	SAKAMOTO, TADASHI
3615	ALLISON, KENNETH T
	BAIRD, L
	BENNETT, KEN
	BENNETT, SHIRLEY
	BIERCE, A
	BRINGHURST, MICHAEL
	BROWN, KEITH
	CABLE, KENNETH M
	CLARK, EDGAR T
	COMAFORD, CARTER M
	COMAFORD, N
	CONTE, BRIAN
	CORDOLA, AMEDEO
	DALECIO, ALFRED
	DALECIO, ALFRED J
	DAMORE, C M
	DEAN, ROBERT A
	DOW, RAYMOND W
	EMIGH, DON
	FAULKNER, ROBERT

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 1992 (Cont'd)

3615	FLEMING, DONALD
	FLEMING, DONALD D
	FUJISAWA, SINJI
	GAHL, JOHN
	GALLAGHER, JOHN
	GRAY, DON
	HAVESON, A R
	HEAL, RANDY
	HOLMES, LESTER T
	HUNTER, WILLIAM
	ISHAM, BOB
	JACKSON, HERBERT D
	JONES, HANDEL H
	JONES, P
	KERN, HOWARD
	LUCCHETTI, F
	MAESTRI, FRANK
	MALONEY, ROBERT
	MCCOLLISTER, WILLIAM
	MORRIS, MICHAEL
	MUNDY, JOHN E
	NAGY, BRYANNE E
	NONAKA, MITSURU
	OLENDER, BEN
	OSBORNE, LYLE E
	PARK, M W
	PARK, S W
	PETERSEN, WARREN
	PONCE, DANILO
	PRIEDHORSKY, PETER
	PURCHARD, PAUL R
	RATTO, MELVIN
	READ, CHARLES B
	REYNOLDS, CHRIS
	SAKURAI, YUJI
	SANO, AMY K
	SCHMID, LARRY
	SCOTT, C L
	SORENSEN, ROY
	SOUDAN, GARY
	STERGION, DENNIS L
	STOVALL, EDWIN L
	TAYLOR, LEONARD
	TOLER, STEVEN
	TROYER, LEROY
	VANCE, M B
	WARING, P D
	WHITE, EDWARD
	ZORRILLA, JORGE
3626	ARTER, WILLIAM

3626	BERTON, JAN
	BROWN, J M
	FRANZ, STEFFEN
	GARCIA, NOEL
	GEORGE, DAVID
	GRAVES, M
3636	ILNICKI, A N
3660	ALBORO, RICARDO
	ARBELLO, BARNEY
	BAYNE, RODNEY R
	BILLINI, LARA
	BRAINARD, KIRSTEN
	BYRNES, LAURA
	CARROLL, MICHAEL
	COLLINS, J
	FISCHER, J C
	GONZALES, NEPHI
	HAFOKA, VILIAMI
	HAYSELDEN, HENRY JR
	JUESTEL, KONRAD
	KAIMIMOKU, J
	KASPRZYCKI, PAUL
	KOLSTAD, HUGH
	MCGLYNN, K
	PRICE, C
	ROBERTS, N
	SAUREY, WAYNE
	SCARLATOS, T
	SCHINZING, GEORGE
	SKINNER, JOSEPH W
	VOGUE, KEVIN
3666	BEEMAN, MINDY
	BENSON, BRENT
	BROWN, BRIAN
	CORPUZ, A
	CORPUZ, A R
	CORWIN, NORMAN R
	DELATORI, TRACY
	DOWNER, JERRY
	DRAHEIM, P
	DUKES, J
	FRANZ, D
	FRANZ, DONALD
	HAWLEY, DAVID S
	JACOB, L
	JOUBERT, ART
	MINIUM, JO A
	SIEGEL, YVONNE
	SMYTHE, EDWINA
3676	ALMY, K

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 1992 (Cont'd)

3676	BANG, CHONG
	BENTO, L
	BRADEN, RICHARD
	BUSHER, DAVID
	CASTRO, MIGUEL
	CORNISH, ROBERT
	CRANE, R
	DALGLEISH, TED
	DEW, DON
	DOMINGO, BENITO S
	DUNOSKOVIC, ROMAN
	EGAN, ROBERT
	ELAM, CHAD
	ELAM, L
	FORD, SCOTT
	GILLETTE, KEN
	HARVEY, MICHAEL
	HONECKER, T M
	JIMENEZ, MIGUEL
	KESTERMAN, S
	KINSE, L
	KOLOI, U
	LOPEZ, JUAN M
	LOWNDES, C
	NITA, LUSI
	OVER, TAU
	REYESGOMEZ, ANGEL
	SADANG, S
	TEVAGA, GATAI
	TILTON, TRACY
	TRUJILLO, JOSE L
	URIOSTEGUI, JOSE
3691	AMES, C H
	ASHFIELD, STEVEN
	BANCROFT, CAROLYN
	BAUER, AL
	COMISKEY, JOHN
	COWAN, JACK
	CROWE, J E
	GAGNE, JANE
	HEIN, DAVID
	JENSEN, HAROLD
	JOHNSON, STEVE
	KEHLOR, ROBERT R
	KENNEDY, JOHN R
	LIDDIE, DONALD F
	LONG, TERRY
	MANNON, CLYDE E
	MATTHEW, C J
	NAGAO, EDMUND M

3691	NEWTON, DONALD B
	NISWANDER, T H
	PAUKER, EWA
	PETERSON, M
	RADOCCHIA, EMIL
	RICHARDS, EMIL
	SAILER, J F
	SCHENKAR, DAVID L
	SCHMIDT, HOWARD H
	SHAPIRO, DANIEL
	SMITH, JOSEPH C
	SORM, J
	TAGGART, JAY
	ZIMMERMAN, ALAN
3701	CAMPBELL, ALEX S
	CANT, E
	CANT, ERIC
	DAKE, BILL
	GRIFFIN, FLOYD
	KNIGHT, KAY
	PONCE, D E
	WALLER, SYLVIA M
3702	KEKONA, ANTHONY
	KITAMURA, AKIO
	MCCOY, BRIAN
	NIHON, ANZEN K
3711	BOHANON, E J
3722	LOPPACKER, C
3723	ARNOLD, CLAY
	BURSON, ROBERT W
	DECLERCQ, ARNOLD A
	FICKEL, LESTER
	FRIEND, V M
	MADDEN, RUDY
	MCCOY, TED
	PONCE, DANILO E
	SIEGRIST, WILLIAM A
	STEVENSON, M H
	TETTENSOR, DAVID G
	VANSTEEN, M
	WYCKOFF, BOB
3732	GERLOFS, S R
	KIKUYAMA, ICHIRO
	LYNN, JOHN
3735	LORGE, L
3740	AMENDOLA, K
	ASHTON, LORETTA
	BALKE, R G
	BELL, JOHN S
	BELL, THOMAS

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HONOAPIILANI HWY 1992 (Cont'd)

3740	BENHAM, Y
	BERKLEY, THOMAS
	BINGHAM, GREG
	BRADLEY, KAREN
	BROOKS, ROBERT
	BROWN, DON
	CALDERON, PETER
	CAMERON, T
	CHANDLER, STEVEN A
	CHOE, YOUNG H
	COLE, MARY A
	COLON, LAURA K
	CONTE, C
	COTTON, G
	CURRY, ROBIN
	DEATHERAGE, MICHAEL R
	DUNCAN, LISA
	FLOREA, GWEN
	GLEN, CHARLES T
	GODFREY, DAVID J
	GOPPERT, C D
	HARMON, DEE C
	HERNANDEZ, D
	HORNER, KYLE J
	HUNG, H S
	HUTHSING, HENRY W
	JUSKEVICH, MICHAEL P
	KAMEKONA, W S
	KELLY, MICHAEL
	KIRBY, JOHN R
	KNOWLTON, KEN
	KOSTERA, J
	KOVACH, PAUL M JR
	LEE, EDDIE E
	MARTIN, MYRTLE P
	MARUMOTO, BOYD
	MASON, DOUG
	MATHE, G
	MELNIK, A
	MILLER, DAN
	NISOTIS, GREGORY
	ODREN, MICHAEL E
	OLIVAREZ, PAUL
	OWENS, L
	PETERSON, M
	RAMER, ERIC
	RANDAZZO, ANTHONY
	RANSOM, K L
	REPOLLO, CHARLES
	RIFFEL, TODD

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HONOAPIILANI HWY 1992 (Cont'd)

3740	ROUTH, C
	SAMPSIDIS, ALEX
	SANCHEZ, CLAIRE
	SCHROEDER, ROBERT D
	SHAY, GEORGE
	SORENSEN, MARC
	STARK, S
	TAGGART, EDWARD W
	TERRILL, KELLIE
	TIERNEY, THOMAS
	TORII, RYOKO
	WACYNSKI, JAY
	WACYNSKI, N R
	WATABAYASHI, BRIAN Y
	WEAR, MICHAEL W
	WEBSTER, D
	WENDLING, TIMOTHY
	WOLFF, DAVID
	WOOLLEN, JOSHUA D
	YOUNG, CURTIS
3741	ADAM, R W
	ARIAN, JACK
	BACON, ROBERT
	BESTIC, EDWARD
	BRONKEN, PAUL
	BROOKS, HOWARD
	CALLAGHAN, JOSEPH F
	DANKAS, WALTER
	DIAMANTIDES, JACK D
	GETCHELL, D W
	GIBSON, WILLIAM
	GOLDMAN, LEONARD
	GOLDMAN, ROBERT
	HAWLEY, JEROME C
	HERR, KENNETH C
	JOHNSON, SCOTT
	KAMATH, M L
	KEMP, HAROLD
	KIPLE, ROBERT R
	KROGSTAD, BARBARA G
	KUGLER, WILLIAM E
	LANGLEY, DAVID
	LOCKE, CAROLE
	MANNING, DAVID
	MARTIN, WILLIAM T
	MOORE, ROBERT W
	OHNO, YUKALI
	PARNELL, MARVIN
	SNYDER, E J
	STAHL, DON G

Target Street	Cross Street	Source
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HONOAPIILANI HWY 1992 (Cont'd)

3741	SWITZER, ARTHWR K
	TAKAGI, Y
	WILLIAMS, DON
	WORTHY, PAUL
3750	BACCAR, TAHAR
	BARTLETT, JESSE
	CARDENAS, MARTIN
	CHING, DAVID M
	DAMPF, C M
	DEGREGORIO, PETE
	DILL, STEPHEN P
	GILMORE, THOMAS
	HENARE, T
	HENARE, TRACY
	JONES, JUDY
	MORENO, D E
	REILLY, E
	ROWELL, GEORGE
	SAULUS, PHIL W
	TERLUIN, JAN
	WOODS, PETER
3765	ANDERSON, DICK
	BEER, JIM
	BUCHANAN, K L
	CARR, ROBERT
	CHIRICOTTI, LOUIS J
	DEANGELO, MIKE
	DOSS, ROBERT
	DOWNS, A P
	ERHARDT, RICHARD J
	FEIST, GORDON
	GIORDANO, JOSEPH S JR
	GUSTAFSON, RUSSELL F
	KRATZ, RICHARD P
	LEWIS, WILLIAM B
	NICHOLSON, MICHAEL
	OLSEN, ART
	REYNOLDS, RON B
	ROLLINS, SANFORD
	SPURLOCK, E M
	TORRE, J E
3785	ALLMER, TED JR
	ASHDOWN, ANGUS P
	AYERS, JUDY
	BATEMAN, ROBERT R
	BEAMER, RICHARD S
	BORENSTEIN, STEVE
	CAPODANNO, A
	COOPER, AL
	DEMMITT, THOMAS

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 1992 (Cont'd)

3785	DETTWYLER, WILLIAM
	DILL, ROBERT J
	FINDLEY, NORM
	FISCHER, ROBERT
	FRIEDMAN, R L
	GABBAY, S
	HART, BRIGG
	ISAAK, H
	ISAAK, HARVARD
	KAUFFMAN, SAMUEL L
	LATON, L A
	LEIS, WILLIAM
	LENIHAN, TODD W
	LINDSEY, GEORGE G
	LUKE, KELLY
	MAHUNA, DAVID B
	MATTOCKS, GAIL
	MCANLY, BILL
	MCGLOCKLIN, GERALD W
	MCINTYRE, JULIE
	MCKISSOCK, SHERMAN
	MILKE, A
	NELSON, JOHN
	PAWL, MARK F
	QUISENG, BEN
	RAE, DAVID
	RAMOS, P I
	ROBINSON, WILFORD B
	SAMPAGA, J
	SMITH, LEE
	SMITH, SOMCHAI
	STERLING, CLIFF
	STERLING, JAMES I
	STOCKHAUSEN, LLOYD
	SULLIVAN, R
	VOTH, BENJ
	WEAVER, WARREN L
	WHIPPLE, DARLENE
	WHITE, ANNA D
	WILSON, LORIN
3788	ARAKAWA, WESLEY
	ARCHER, V
	BARTHOLOMEW, G E
	BATARSER, COETIA
	BELBOT, CHARLES J
	CHASE, J
	CUTLER, RON
	DARIOTES, HARRY
	DEYOUNG, BRET
	FEIST, B A

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HONOAPIILANI HWY 1992 (Cont'd)

3788	HAPPEL, W R
	HAZEN, FRIEDA
	HORTON, C L
	IWASA, J
	JABER, CLAYTON
	KAMAI, DAVID K SR
	KING, TIMOTHY
	KLEVEN, L
	KNIGHT, STEVEN
	KOHLMAN, TERRY
	LACLOCHE, THOMAS P
	LONG, ANDREW
	LUKUE, EDUARDO P
	MALLET, BRUNO
	MARTIN, GORDON
	MATOS, K
	MAYNARD, CHARLES
	MCASKIN, STEVE
	MCDOWELL, THOMAS
	MESEDAHL, DAVID
	MILLIKIN, AARON
	MITCHELL, DONALD
	NAKAMURA, DAVID
	NIEPORTE, WILLIAM
	ODOM, PAUL
	OHANLON, D
	OLSON, MICHAEL J
	PANTE, LARRY
	PENNA, P
	PINNEY, SUSAN
	PISCATELLI, J
	RODDEN, MARK
	ROMAN, G E
	RYALS, DAVE G
	RYCKOFF, RICHARD
	SPOCK, B
	SULLIVAN, MICHAEL
	THORSBY, SUE
	VALENCIA, MIRNA
	WILLIAMS, MARTY
	WOOD, K
	WOODS, REBECCA
3801	APO, GEORGE
3806	MACDOUGALL, KEN
3816	MIYAMOTO, T
3823	AITKEN, JOHN R
	ALFAROUK, JASMINE
	BALLENTINE, BARBARA
	BLODGETT, BERT L
	CAFER, LARRY

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HONOAPIILANI HWY 1992 (Cont'd)

3823	CHADSEY, JOHN H
	CHENEY, L K
	CHENEY, LEROY K
	CLEMENTS, C
	CODY, JACK
	HAWKES, KENNETH S
	HERSEY, N L
	HILL, E E
	HULLIN, ALBERT L
	JOHNSTON, WILLIAM H
	KAY, NORMAN
	KLEPPER, ROY W
	LEE, MONICA
	LOO, CYRUS
	MCKINNEY, ERIN
	MEYERS, CARL SR
	MOCNY, RICHARD T
	MORRIS, RICHARD
	MUDD, S
	NAGLE, SCOTT A
	NOCELLA, ALEX
	ORTMEIER, RODNEY
	RALSTON, DAVID A
	RICHARDS, EDMUND
	ROBERTS, ISABELL
	ROBERTS, JEFFREY B
	ROBINSON, KEITH
	RONSMAN, WAYNE
	SANDERS, RICHARD
	STEPHENS, RUSSELL H
	TOLLISEN, H L
	TRIMINGHAM, H L
	VELLETRI, ANDREW
	WILSON, DONALD
	WORLEY, GREG
3826	FIGUERRES, CIRILO A
3828	NOCELLA, FRANK
3833	BARRINGTON, JAMES
	BRIEGLEB, BRAD
	CHASE, K E
	DALPIAZ, GREGORY
	DELPIZZO, WILSON
	FERGUSON, JAMES R
	FLATEN, JAMES
	GOLDMAN, LOWELL
	GOODYEAR, CLYDE
	GRIGGS, B W
	HEARD, J L
	HEISE, MICHAEL
	HILBERT, LYNDA

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 1992 (Cont'd)

3833	HILE, GARY
	JACKS, RICHARD W
	KJER, KEN
	LEE, L
	LELAND, JOHN D JR
	LICHTENHAHN, EDWARD C
	LIEBSCH, DON
	MEHNERT, JOHN
	OPENSHAW, VENEDA
	OWEN, JAMES D
	RAICHE, LEO G
	SOLIE, RICHARD
	SPRINGER, CLARK
	VANOTTEREN, WILBER
3843	GALLAGER, MICHAEL
	THOMAS, P
3856	NAKAMURA, KAME
3862	TANIGUCHI, TAKEO
3875	AKOL, HALUK
	BAILES, DON
	BENDER, RANDY
	BRIDGES, RORY D
	BROWN, BARRY L
	CERF, MILTON
	CRITCHER, JACK
	DAEHNKE, SIGURD
	DEAN, ELMER
	DUZ, V
	EBERT, ROBERT O
	FOSTER, KENT
	FRY, J H
	GELHAUS, LINN
	GOLDSMITH, FREDDIE
	GOMEZ, PAUL
	GRAD, JEFFREY
	HITCINGS, JON
	IANNELLO, CHARLES J
	LENHEIM, STEVEN
	LIPPOLD, GREGORY T
	MADSEN, JERRY S
	MALENCHEK, D R
	MATTSON, NORMAN
	MAYES, G
	MCHALE, TED
	MINATOYA, CARL
	RODDEWIG, H E
	SCHANZ, BERNARD A
	THEROS, JAMES
	VANDERHOOF, RICHARD A
3901	BRADBURY, DAVID

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✓	-	Cole Information

HONOAPIILANI HWY 1992 (Cont'd)

3901	BUNYAN, LEONARD
	BURKE, MICHAEL J
	BUTTERLEY, RON
	CAMERON, DON
	CANEPA, WILLIAM
	DAVIES, GEORGE H
	HAWKINS, ROBERT
	MOSS, KEN
	SEARFOSS, EUGENE
	SHIELD, DUANE
	STURSBERG, A L
	STURSBERG, R
3923	ZAGORSKI, FRANK J
3959	ABUT, ANTONIO
	ADAMS, M
	BELIN, JEAN M
	BENGERNO, L
	BERTRAM, LYNN
	BROWN, RONALD D
	BURROW, C R
	BUSS, NICKI
	CARLIN, BRENDAN J
	CARSON, EDWIN
	CARTE, TOM
	CARVER, ROY
	CERUTTI, M
	CLIFFS, WILLIAM R
	COSTA, JEFF
	DACIER, SHANTAL
	DAVIDSON, RICHARD
	DECOLIBUS, MARK
	DRYSDALE, D
	EITEL, PAUL
	ERSKINE, JOHN
	FISCHER, M
	FLORIAN, R D
	HEILSCHER, EDWIN
	HORTON, ROBERT A
	HOSTETTER, CHARLES L
	HUBBELL, PAULA S
	JACKSON, LORI
	JARDINE, DONALD M
	JUELL, JEFFREY
	KEOHO, CHAZ
	KRESGE, DALE
	LACHMAN, DREW
	LANDRETH, ROY F
	LOUDERBACK, LUCY L
	MACDONALD, PETER
	MAHONEY, DONALD

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HONOAPIILANI HWY 1992 (Cont'd)

3959 MISKE, DOUG
MIURA, C K
MONTGOMERY, S
MORGAN, CRAIG
MORROW, L
NAVIA, ART
OWENS, MILDRED A
PENA, DAVE
POTTORFF, FRANK
RAY, MAURICE O
RICHARDS, MARION H
RIGGS, RONALD G
RITZWOLLER, J
ROBERTSON, D
STILE, TRACY
SULLIVAN, R
SUTHERLAND, RICHARD R
WARWICK, RONALD
WATT, MARCIA
WHITACRE, V L
WOLTERS, S
ZAVALA, LOUIS

3975 AARO, DONALD E
ALVES, LARRY
ARNOLD, WILLIAM R
ATKARI, F
BROCKETT, JACK B
BROWN, SHARON A
BURBANK, J
BUTTON, CARY
BUTTON, RON
CIABURRI, MARK
GALE, C A
GOUDZWAARD, MAURICE
HOFMANN, HOPE
JOHNSTON, DAVID
JOHNSTON, T
JONES, WILBUR
KNIGHT, K
KNUDSEN, BETTY
KUEHL, WILLIAM
LEW, BRIAN D
LOZANO, JOHN
MACKENZIE, DONALD
MANES, J D
MANES, W A
MARKS, GERALD
MARKS, GERALD E
MITCHELL, E R
NEUMEYER, J D

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HONOAPIILANI HWY 1992 (Cont'd)

3975	OGDEN, BILL
	OMURA, NEIDE S
	PIERCE, L
	RIGDON, KATHRYN
	RUFFNER, RICHARD F
	SAGON, AL
	SELLERS, CARL JR
	STANISLAW, ALEX
	STRATTON, PAGE
	SUSINA, EMIL JR
	WYNNE, G
4007	ASSATOURIAN, NEJDEH
	BROZ, JERRY
	BUCHANAN, OWEN
	CHRISTIANSON, LEE
	DUCEY, KIM
	GRASHUIS, JAMES D
	HARRIS, K
	IMLER, GORDON
	JAMES, FRANK
	KELLY, D
	MCCABE, M
	MERRILL, PENNY
	MORSE, GORDON K
	NOECKER, RICK L
	PALMIERI, VINCENT
	SERGI, JOHN
	TOMS, RANDY
	VAALER, DAVID A
	VILANDRE, CASEY A
4025	SHISHIDO, ROBERT Y
	STEARMAN, D
4046	CASTILLO, RON
	FINK, ROLAND
4048	AUSTIN, BILL
4057	ANDERSON, CHARLES
	BARRETT, B
	BRIDGES, WALTER
	CAVANAUGH, BLYTHE B
	CROSS, BIRD
	DUBIL, DICK
	FRANCIS, DAN
	GAMBLE, M
	GARDNER, LOUISE
	HOPE, BRUCE
	HORRELL, ROBERT
	JENSEN, ARTHUR
	JEWELL, DENNIS J
	JONES, OSCAR
	KALJIAN, THOMAS

HONOAPIILANI HWY 1992 (Cont'd)

4057	KERNAHAN, EARL
	LACHMAN, ALAN
	MCCLOSKEY, C R
	MCGARREY, THOMAS
	ONEILL, M D
	OPPENHEIMER, PEER
	ORTNER, JOY
	SANDFORT, JACK
	SOARES, FRANK
	THOMPSON, JAMES G
	WATERMAN, RICHARD P
	WERUM, LINCOLN
	WESSELY, JAMES
	YOUNG, JIM
4058	CAZEL, STEVE
	LOMBARDI, MICHAEL
	PEARSON, PAULA
4064	KADOHIRO, GLENN
4095	ALDERS, K E
	AMBROSE, STANLEY
	BEDARD, BARBARA
	BELLOWS, LOGAN
	BETHELL, WORDEN
	CARROLL, PAT
	CARTER, F B
	CHASE, CHARLES
	COUDRAY, JOHN
	DEZZANI, L
	FINN, C
	FRANK, JAMES A
	GILLETTE, GLENN A
	GRAY, GARDNER
	HAMPTON, ORVILLE H
	HENDERSON, DREXEL H
	HORN, PETER M
	KING, CLAUDIA
	KRAGE, JAMES
	LEWIS, RONALD
	MACCARTHY, ALAN W JR
	MCVAY, W H
	PURL, REGINA M
	RASMUSSEN, JOHN M
	REID, PHILIP
	ROGERS, M
	ROTH, MCKIE W
	SARUBA, V
	STERN, V
	STEWART, RICHARD
	SUNDEEN, SYEVE
	TEUBER, ALFRED

4095	WARD, WILLIAM H
	WEICHE, WILLIAM J
	WURLF, ROBERT L
	WYATT, GAIL
	ZAPPELLA, S
4221	SMITH, JEFF
4242	ALLAIRE, DAVID
	BOYLE, MATT
	COMSTOCK, JIM
	FITKIN, BRAD
	FRANKS, J R
	GAUDET, CAM
	HARVEY, JOHN I
	HEINRICHS, TRACY
	HENDERSON, TERRY
	HULL, FOSTER
	JOBE, BETSY
	KIM, DZOE
	KNOCH, VANCE
	ROBBINS, R W
	ROYCE, LINDA J
	SCHAWALDER, PETER
	SCHUPPERT, DON
	SNICALE, JOHN S
	THOMAS, R A
	UENO, OWEN
	VASQUEZ, DAN
	WILL, JUERGEN
4260	WALKER, ROBERT C
4299	ABRAMS, M
	BOOTHELOWTHER, DAVID
	GARRAHAN, ART A
	KITTS, CHARLES
	RIELLY, THOMAS J
	ROTHMAN, KEN
	WALKLATE, V
4310	BACORO, SIMEON
	BAYBAYAN, KEITH
	BIGGS, DAVID
	BORLAND, ANTHONY
	BOUCHARD, STEVE
	BRODERICK, TOM
	CASINELLI, TIM
	CHAPMAN, LARRY
	CORPION, D
	CUNNINGHAM, J
	CUNNINGHAM, JODY
	DILTS, PAUL
	ELEK, LYNN A
	FELECHNER, JIM

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4310 FRENETTE, ANDREE
GENZ, DUANE
GRAVES, W
GRIFFITH, A
HARRIS, JACK
HILL, DONALD H
HILL, JOHN
HOWARD, GEORGE W
IORI, LARRY
JOLLIFF, BLAIR
JOYCE, KATHRYN
KADOTANI, OWEN
KEARNEY, POLLY
KIM, SUK S
KUWAMURA, KAVIN
LEIGH, WAYNE
LYALL, M
MAGNIN, MICHAEL
MAGNO, H
MATTHEWS, DAVID E
MCGREGOR, TIM
MCKENNA, ELLEN
MCKITRICK, ALAN L
MCPHERSON, PATRICK
MITCHELL, KYLE
MOSELEY, N
MURPHY, RICK
NIX, MICHELE
OBERER, KARL R
OSHIELDS, LONNIE
OSPANIK, L
PARKER, A
PASTRANA, PAUL
PENNINGTON, JAMES B
PIETSCH, TRACY
PRICE, DEBRA
PUBANZ, HANS
RESNICK, STEVE
RIFFEL, P
RODRIGUEZ, S
ROVERANA, WILLIAM
RYAN, K
SOARES, GUY H
STEVENS, MARK J
STEVENS, RICK
STRINGFELLOW, KEN
SULLIVAN, M
TAMAYOSE, JOY
TESKE, TODD
TIMKO, RAY

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HONOAPIILANI HWY 1992 (Cont'd)

4310	TRONOLONE, C
	TURNER, J
	VALENCIA, JOHN
	VILLAREAL, B
	WAKATSUKI, D
	WHAN, B
	WIGSTEN, JOHN
	YAMAGUCHI, TORU
	YOSHIDA, N
4327	ASHMORE, ROBERT L
	BARNES, JERRY
	BATEMAN, JOHN R
	BAUMAN, PHIL
	BOETTGER, C L
	BRYANT, VERNON
	BURCHETT, JAMES
	CANTER, NORMAN
	CHUNG, JOHN
	CLANCY, LEONARD
	CLANCY, M
	COLTON, DAVID
	CONTI, JOHN
	COUGHLIN, P M
	CRAIG, JOSEPH
	CURRAN, LEWIS M
	DECAMP, GILBERT E
	DELATORI, JOHN
	FINN, JOHN M
	FRIAS, ROBERT
	FUNT, LIONEL
	GARAT, TOM
	GILLESPIE, SAM
	HALL, GILBERT
	HARVEY, WILLIAM
	HECHTAM, BURT
	HEIDELBACH, BERT A JR
	HELM, DONALD J
	ITANI, MAKOTO
	JUAREZ, FREDDIE
	JUMP, WILLIAM C
	JUSTMAN, C
	KEITHAHN, JAMES
	KELLEY, RICHARD A
	KENDALL, TOM
	KENNEDY, J
	KENNEDY, J P
	KINNEY, RALPH
	KRIEGER, D
	LILLY, HOWARD
	LOGSDON, JAMES

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 1992 (Cont'd)

4327	LOWSON, JAMES M
	MADNANI, VIJAY
	MANRELL, T T
	MCSWEENEY, WILLIAM V
	MERLIC, EDWARD
	MIKITKA, JOHN
	MOFFETT, JOHN
	MOFFETT, WILLIAM
	MOORE, WILLIAM A JR
	MULREANY, PATRICK
	NAYLOR, HOWARD W
	NAZE, JIM
	NEU, JAMES F
	NISBET, JOHN
	NORBY, ROBERT C
	PALMER, JEREMY M
	POHOSKI, GEORGE
	REEVES, ROBERT H
	RICHARDS, BRIAN C
	RICHTER, DON
	SCHMALLEN, PETE
	SIEFKER, DAVID W
	SIEVERS, RAYMOND T
	SMITH, FRANK J
	STRAPP, MICHAEL F
	STUART, A
	SUMMERS, B N
	SURPRENANT, CLEMENT
	SURPRENANT, V
	VENARD, JIM
	VONMARTYNOW, CLAUS
	WADE, BILL
	WELDON, WILLIAM
	WHALEN, MIKE
4365	DELPROPOSTO, ANDREW M
	MACKENZIE, GORDON T
	MILLER, JEFFREY
	MORGON, SCOTT W
	OGDEN, J C
	RATHBUN, EDWARD
	ROVERANA, WILLIAM W
	SHORT, W
	SKENDERIAN, JOHN
	STOUT, C
	THOMSEN, ANN W
	VANDERWEELE, J E
	VANDERWEELE, KENNETH J
4401	ADAMSON, OSCAR C
	ALLEN, FRED
	ALLEN, FRED R

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 1992 (Cont'd)

4401	BARDACH, NORMAN C
	BERRY, JERRY
	CHASE, WEBSTER H
	CRAIG, ANNE
	DUNCAN, WILLIAM F
	DWIGHT, BARBARA
	FLEISCHMANN, CHARLES C
	FOUKS, ARTHUR
	FURUYA, C O
	GLEASON, MICHAEL
	GLENDENNING, S H
	GUNN, ROSS
	HARASAWA, SIRO
	HENDRICKS, CHARLES D
	HICKMAN, NORMA
	HILL, DEAN
	HOUCK, DOUGLAS
	HYDE, PATRICK
	JOHNSON, DENNIS P
	MACK, MICHAEL
	MALLAR, MARY
	MCKELLIPS, ALLEN
	MCKINNEY, WALTER V
	MERRITT, ALAN
	METTER, RAY
	MINER, DICK G
	NEFF, ROBERT D
	OHYA, KIYOSHI
	OWENS, KERMIT J
	PERINE, N
	PETTITT, JACK
	ROATH, SHARON
	SACHS, JOHN
	SCHELIN, C
	STPIERRE, GERALD
	SUTHERLAND, L C
	TERRY, NORMAN
	VANDOREN, GEORGE
4435	BARNES, RONALD
	BENNETT, MARK V
	BENORE, CHARLES
	BROWN, JANET
	CHENEY, JEAN
	CONOVER, N
	CRAIG, JIM
	DEWEY, N K
	ELDER, DIANE E
	FREE, ROBERT
	FUQUA, PAIGE A
	GENTILE, C

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 1992 (Cont'd)

4435	GOLDFARB, STAN
	GROSS, LORAN K
	HIGGINS, KAREN L
	KAYE, D
	KEHOE, MICHAEL C
	KERN, GARY E
	KOTT, HERBERT
	LANE, JUNE F
	LENGKEEK, DAVID
	LEONARD, JOHN C
	MALLOY, PATRICK J
	MANN, J
	MANNING, DONALD S
	MCCABE, JEFF
	MCPEAKE, LEX
	MEADE, JOHN
	MERCIER, SCOTT
	MONTEMAYOR, GARY
	MYERS, RAY
	NABERSCHNIG, CLARK
	NGUYEN, TAY V
	NILSSON, PELLE
	PALEY, MICHAEL D
	PEDROZA, JUAN
	PORTER, GREGORY
	POWERS, DEREK
	PRAY, JOBETH
	PREUSS, C A
	REILLY, J C
	REILLY, JOHN C
	RIVERS, JOSEPH
	ROCCO, N
	ROSE, WAYNE P
	SALVADOR, KEITH
	SHANNON, RANDY
	SMITH, LAURIE
	STOVER, WILLIAM
	TAKATA, ALLAN
	TANJU, T H
	TANNER, SEAN P
	TAYLOR, M
	WEBER, CRAIG S
	WHITE, A
	WHITE, E
	WHITE, T M
	YORK, L
	ZOGHBY, DONNA
	ZYBACK, SEAN
4465	ALVAREZ, G
	BASTIAN, DAVID

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 1992 (Cont'd)

4465	BRACA, DAVID
	BYRNES, FRANK
	CHERNISS, DARRYL
	CRANE, PAMELA
	DALTON, JOHN P
	FERNANDODUMO, MARY A
	FRENCH, J E
	GAGE, JAMES
	GOSLIN, AMOS
	GRAHAM, GLENNA J
	GRIM, SAM J
	HACKBARTH, J
	HINHUMPETCH, K
	HOOVER, DONI
	HUNTER, DAVID L
	HYMAN, TRACY J
	MATSUDA, GRANT M
	MURRAY, MICHAEL
	NAHM, CHRIS
	PALASIGUE, MARIA
	PARRY, TERI
	PEREDMORE, J
	POE, C
	POOLE, S W
	RUSCILLI, DEBORAH K
	SHIMABUKURO, ALLEN
	SNIDER, JOE
	SULLIVAN, D V
	TOBIN, L
	WHITNEY, JOHN J
	YAMAZAKI, IKUO
	ZOPF, PAMELA
4471	BERKOVATZ, FRANCO
	BORNGRAVER, MELVIN N
	CASEY, PATRICK
	CHASE, JAMES G
	NAKOA, B
4482	CROSSLEY, DON
	HANDY, DAVID
	PORTER, L
	SHEPARD, DON
	THOMPSON, DALE
	WILLIS, WILLIAM F JR
4495	SADANG, F
	YAP, RINA
4521	CASEY, ROBERT
	GAARD, MARK M
	GRASSO, N J
	JUTER, HAROLD
	JUTER, S

HONOAPIILANI HWY 1992 (Cont'd)

4521	LIAL, ED
	LOOCK, SCOTT
	MCDONALD, MARK
	MORSE, BEVERLY
	OLIVER, RICHARD B
	PATTERSON, JIM
	TILLEY, JIM R
	VANDERLINDE, RIKA
4531	ALDERSON, RICHARD
	BARNES, JERRY W
	BITTNER, P D
	BONDANZA, ROBERT
	BROWDER, LAVERN C
	BROWN, ROBERT K
	BURNS, MICHAEL
	BYRNE, WILLIAM C
	CAUNT, JOHN
	DAUBMAN, ARTHUR G
	FIRESTONE, JAMES
	GAZECKI, BILL
	HAMAOUI, HALFON
	HAMM, ROGER H
	HARASAWA, SHIRO
	HAVESON, AL
	HELM, DONALD J
	HOLT, JOHN
	HOWARD, ROGER A
	JOHNSON, BURT
	JOHNSON, RICHARD K
	KNUPPE, JAMES
	KREKOW, GORDON T
	LUND, C
	MANLEY, FRANK P
	MARTEL, JOHN
	NEVILLE, ROBERT P
	PETTIT, JAMES
	PRAG, JOHN
	ROSS, WILFRED
	SALMONSON, RICHARD
	SALO, H I
	SEGAR, KATHY
	SISLEY, CAROLYN H
	SMAHLIK, MICHAEL
	STEVENS, ROBERT
	YOUNG, KENNETH
4536	SAGAR, STEVEN M
4594	CARTER, MELANIE
	ROBB, J
4614	DENTON, NELSON
	FRANZ, STEVE

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 1992 (Cont'd)

4614	NELSON, ROBERT
4630	TAKAHASHI, ROBERT S
4740	HARMAN, JOSHUA
	SCHAPER, JIM
4748	FIDOE, SUSAN
4770	IMAMURA, MANABU
4780	PIPPIN, J
	WILLARD, JOHN
4790	NOVAKCLIFFORD, B
4800	JOHNSON, DARLENE
4809	DONAHOE, JOHN
4842	LUM, JOSEPH
4855	EDMUNDSON, CARL
4856	LUM, J F
4869	SCHULZ, UWE
4885	SCHWEITZER, H H
4909	BOEHM, CARTER
	CAYWOOD, K
	HUGHES, PHILLIP
	ISAAC, WALTER G
	LOBLAND, JIM
	LOCHNER, JOHN B
	MAMONE, FRANK
4990	SWEZEY, HILDA F
5000	QUIGLEY, GLENN J
5001	AVILA, JOSE
	CABATO, JOB
5016	JENKINS, SUSAN
5018	HESTER, WALTER
	HOOVER, JERRY
	KAISER, JEFF
	PAGE, J
5025	LEE, TERRY
5027	CAMPISI, R
	GARRAWAY, BRIAN R
5045	BAPTIST, KEVIN
	CHRYSLER, JACK
	LEONARD, L
	SCHATZKIN, GEORJA S
5084	KUROSE, HIDEO
5085	HILL, CRAIG
5092	NETTLESHIP, JOHN N
5094	BALINBIN, JOSEPH
5100	HARADA, YURIKO
5106	JENKINS, BILL
	MURATA, NOBORU
5124	FREEMAN, ODETTE
	PESCHIERA, PAUL
5128	RITCHIE, GLENN
	STARR, JACK

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 1992 (Cont'd)

5131	CARNEY, MARK
	JOHANSSON, W E
	MUEHLBERGER, ROY P
5140	MATSUSHIMA, SHUICHI
5150	CORRIGAN, THOMAS
5157	VALLEY, L
5160	HALAJIAN, M
	JALLES, EDUARDO
5170	CURTIS, BRUCE
5171	BARTO, JERREL C
5177	SCHUMAN, ROBERT C
5184	AKIONA, C H
	ESTIN, NORMAN M
	HARADA, TOSHIO
	SAVAGE, J M
5187	OAKS, A G
5190	MATHIAS, MANUEL F
5204	LUND, BERT
5210	DAVIS, ROGER S
	FREITAS, BEN
	KAMAKA, GLENN
5255	ATKINSON, G
	BAUM, GENE R
	BENNEWITZ, DALLAS
	BINNS, MARCIA L
	BLUROCK, WILLIAM
	BURDETT, NELSON
	CAHEN, DONALD M
	CHALY, GREG
	COLBY, STEVE
	DAANE, JERRY
	DUCA, ROBERT
	DUTTON, DANIEL
	FARRELL, JOHN B
	GOLDMAN, ROBERT
	HALL, MARC
	HALL, MARCUS A
	HARDY, ROBERT
	HILL, NORMAN A
	HUSS, WILLIAM
	JARDINE, JERRY
	KOZLOWSKI, JERRY
	LIPMAN, SHERI
	MCWILLIAMS, WILLIAM A
	MORRELL, FRANK
	MURPHY, RICHARD J
	PIERSON, WENDELL
	REXELLE, JACK A
	ROHRS, MARVIN M
	SAMUELSON, DONALD

HONOAPIILANI HWY 1992 (Cont'd)

5255 STATLER, JOHN
VACHON, WILLIAM A
VARNELL, W R JR
YAMANODA, S J
5295 HASE, YASUO
MEYERS, RUSS
PATTERSON, GAYLON
RICHARDSON, C A
5315 ELIKER, POLLY
FAVORITO, DONALD
LANE, GERALD H
STRAWLEY, MICHAEL J SR
STUMP, A L
5425 BUCHER, BRUCE
FARLEY, J R
HILLDORFER, M C
STRONG, RANDY L
5440 KALUA, BRUCE
5444 AKANA, FRANCIS
5452 DERAGISCH, TOM
MARTIN, N
OVERSTREET, J
5460 KALEIKINI, REINA
5464 KAIAHUA, KALUA
YOUNG, MICHAEL K
5472 DAPITAN, H
REIMANN, EDWARD
5500 WESTON, STEVEN
5900 SMITH, HAROLD A
35002 BURKET, J
35003 CARREIRA, MOANA
35005 JACOBSEN, STEVE M
POWERS, TASHA
43652 HILL, DON H
350010 TILLMAN, MARK
350012 NAMOA, LOLOA
350017 LASCO, RAY
350019 FELICE, JEFFREY
440130 GELDIEN, JIM
453134 BOOT, EDWARD
3543105 WAGNER, ROGER B
3543305 COPELAND, MARVIN
3543408 HENSLEY, JOE H
3660213 MOORE, SUSAN
3676301 SOLDWISCH, SCOTT
3740303 HUTH, JACK A
3750303 GUERRERO, B
3750307 NELSON, MONTY
3785403 VANBUREN, KEVIN
3788109 WETTACH, JON

Target Street	Cross Street	Source
✓	-	Cole Information

HONOAPIILANI HWY 1992 (Cont'd)

3788110 BROWN, KLAYNE
3788111 TOSCANO, A S
3823108 MALMBERG, BRUCE
3823203 HUNT, MELBA L
3823217 ANDERSEN, OLIVE J
3875306 HARRIS, ROBERT
3975204 BERRY, ED J
3975219 VALERA, JOHN A
4007112 JOKOVICH, MICHAEL
4007212 HORNER, ROBERT G
4242305 SPANBERGER, ANDREW M
4310112 RESNICK, MIKE T
4310208 HALL, ROGER D
4310213 WOOD, JAMES
4310309 WILLIAMS, D B
4310412 DEGENNARO, S
4310701 DIRGA, MARK
4365401 WILLCHER, DOROTHY
4365909 MACAROL, JOHN
4465319 EMERY, MATHEW

Target Street	Cross Street	Source
-	✓	Cole Information

OLOWALU VILLAGE RD 1992

802	KAAHUI, ABRAHAM H
805	KAAHUI, WILLIAM
806	MICHALEK, DEBRA
807	ROCHE, DAVID M
809	VORFELD, ROBERT J
820	FUJII, HISAO

HDOT Honoapiilani Hwy Improvements

HDOT Honoapiilani Hwy Improvements

Lahaina, HI 96761

Inquiry Number: 7324924.2

May 04, 2023

Certified Sanborn® Map Report

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

Certified Sanborn® Map Report

05/04/23

Site Name:	Client Name:
HDOT Honoapiilani Hwy Impro	WSP
HDOT Honoapiilani Hwy Impro	999 3rd Avenue
Lahaina, HI 96761	Seattle, WA 98104
EDR Inquiry # 7324924.2	Contact: April Ryckman

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Certified Sanborn Results:

Certification # 5C2B-448C-B7DB

PO # NA

Project 31000290.000

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Sanborn® Library search results

Certification #: 5C2B-448C-B7DB

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- ☑ Library of Congress
- ☑ University Publications of America
- ☑ EDR Private Collection

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EDR
City Directory Image Report

Photographic Documentation

SITES IDENTIFIED DURING FIELD OBSERVATIONS

Olowalu Recycling and Refuse Convenience Center



Photo 1: View facing northeast of entrance to Olowalu Recycling Center.



Photo 2: View facing northwest of materials transfer bays and storage containers at Olowalu Recycling Center.



Photo 3: View facing northeast of materials transfer bays and storage containers at Olowalu Recycling Center.



Photo 4: View facing east of building likely used as tipping station for Olowalu Recycling Center or former landfill located further east.

Ukumehame Firing Range



Photo 1: View facing east from driveway to Ukumehame Firing Range. Additional photographs of site conditions not available at the time of site reconnaissance.



Photo 2: View facing northwest toward Ukumehame Firing Range. Additional photographs of site conditions not available at the time of site reconnaissance.

Olowalu Recycling and Refuse Convenience Center



Photo 1: View facing west of 5-gallon and 55-gallon containers located on the east side of property. This was the only publicly accessible viewpoint of the east side of the property.

Olowalu Village Road



Photo 1: View facing north of pole-mounted transformers located along Olowalu Village Road.



Photo 2: View facing northwest of pole-mounted transformers located along Olowalu Village Road.



Photo 3: View facing west of pole-mounted transformers located along Olowalu Village Road.



Photo 4: View facing northwest of pole-mounted transformers located along Olowalu Village Road.

814 Olowalu Village Road



Photo 1: View facing east of vehicle and materials storage lot located at 814 Olowalu Village Road. This was the only publicly accessible viewpoint of the property.

PHOTOGRAPHIC DOCUMENTATION OF SITES IDENTIFIED IN EDR DATABASE REPORT

EDR Site 1: Olowalu Rifle Range (Hawaii Army National Guard)



Photo 1: View facing southeast of area identified in EDR Report as HIARNG **Rifle Range (Site #1), formerly located east of** Honoapi‘ilani **Highway.**



Photo 2: View facing northeast of area identified in EDR Report as HIARNG Rifle Range (Site #1), formerly located east of Honoapi‘ilani Highway.

EDR Site 2: Luawai Road Transformer



Photo 1: View facing south of EDR Database Listing #2 located along near Honoapiʻilani **Highway and Luawai Road.**



Photo 2: View facing east of EDR Database Listing #2 located along near Honoapiʻilani Highway and Luawai Road.

EDR Site 3: Olowalu Company Sugar Mill



Photo 1: View facing west to remaining structures from former Olowalu Company Sugar Mill (EDR Site #3) located at Olowalu Landing.



Photo 2: View facing northwest to remaining structures from former Olowalu Company Sugar Mill (EDR Site #3) located at Olowalu Landing.



Photo 3: View facing southeast to rock wall from former Olowalu Company Sugar Mill (EDR Site #3) located at Olowalu Landing.



Photo 4: View facing southwest of land formerly occupied by Olowalu Company Sugar Mill (EDR Site #3) located at Olowalu Landing.

EDR Site 4: Olowalu Shaft Transformer Substation

EDR SITE 4: OLOWALU SHAFT TRANSFORMER SUBSTATION



Photo 1: View facing southwest of EDR Database Listing #4 located along Ehehene Street.

EDR SITE 4: OLOWALU SHAFT TRANSFORMER SUBSTATION



Photo 2: View facing southeast of EDR Database Listing #4 located along Ehehene Street.

EDR Site 5: Olowalu Transfer Station



Photo 1: View facing east of EDR Database Listing #5 located east of the Olowalu Recycling and Refuse Convenience Center at the current gravel mine in the area.



Photo 2: View facing southeast of EDR Database Listing #5 located east of the Olowalu Recycling and Refuse Convenience Center at the current gravel mine in the area.



Photo 3: View facing northeast of EDR Database Listing #5 located east of the Olowalu Recycling and Refuse Convenience Center at the former landfill in the area.



Photo 4: View facing northwest of EDR Database Listing #5 located east of the Olowalu Recycling and Refuse Convenience Center at the former landfill in the area.

PHOTOGRAPHIC DOCUMENTATION OF HAWAII HAZARD EVALUATION AND EMERGENCY RESPONSE (HEER) SITES

HEER Site: Olowalu General Store



Photo 1: View facing east to Olowalu General Store entrance.



Photo 2: View facing southwest to east side of Olowalu General Store.



Photo 3: View facing northwest to east side of Olowalu General Store.



Photo 4: View facing west to east side of Olowalu General Store.

HEER Site: Meco Pad-Mounted Transformer



Photo 1: View facing southwest near eastern terminus of Pohaku Aeko Street. Location of Meco Pad-Mounted Transformer site listed within HEER database records.



Photo 2: View facing northwest near eastern terminus of Pohaku Aeko Street. Location of Meco Pad-Mounted Transformer site listed within HEER database records.

HONOAPIʻILANI HIGHWAY IMPROVEMENTS PROJECT,
WEST MAUI: UKUMEHAME TO LAUNIUPOKO

Appendix 4.0 Section 4(f) – Supplemental Information

November 2025

Prepared for

Honoapiʻilani Highway Improvements

Contents

Joint Development of Planned Forest Reserve Expansion Letter from Hawai‘i Board of Land and Natural Resources (Department of Land and Natural Resources)

Joint Development of Planned Beachside Greenbelt Park Letter from County of Maui Parks Department

Section 4(f) Notification of Intent to Make *de minimis* Impact Determination - Ukumehame Firing Range

DOT/FHWA 4(f) *de minimis* Determination Form - Ukumehame Firing Range

Section 4(f) Notification of Intent to Make *de minimis* Impact Determination - Olowalu Sugar Plantation Historic District

DOT/FHWA 4(f) *de minimis* Determination Form - Olowalu Sugar Plantation Historic District

SHPO “No Adverse Effect” Concurrence Letter to FHWA, August 13, 2025

Programmatic Agreement for the Honoapi‘ilani Highway Improvements Project

Joint Development of Planned Forest Reserve Expansion Letter

Hawai‘i Board of Land and Natural Resources (Department of Land and Natural Resources)

November 2025

JOSH GREEN, M.D.
GOVERNOR | KE KIA'ĀINA

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIA'ĀINA

STATE OF HAWAI'I | KA MOKU'ĀINA 'O HAWAI'I
DEPARTMENT OF LAND AND NATURAL RESOURCES
KA 'OIHANA KUMUWAIWAI 'ĀINA

P.O. BOX 621
HONOLULU, HAWAII 96809

DAWN N.S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RYAN K.P. KANAKA'OLE
FIRST DEPUTY

DEAN D. UYENO
ACTING DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

March 27, 2024

TO: EDWIN SNIFFEN, DIRECTOR
DEPARTMENT OF TRANSPORTATION

ATTN: GENEVIEVE SULLIVAN, PROJECT MANAGER
DOT HIGHWAYS DIVISION

FROM: DAWN N. S. CHANG, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

SUBJECT: JOINT DEVELOPMENT OF PLANNED FOREST RESERVE EXPANSION
HONOAPIILANI HIGHWAY IMPROVEMENTS,
WEST MAUI, UKUMEHAME TO LAUNIUPOKO
LAHAINA, ISLAND OF MAUI, STATE OF HAWAI'I

The State of Hawai'i Department of Land and Natural Resources (DLNR) is providing this communication to the State of Hawai'i Department of Transportation (HDOT) regarding HDOT's in-progress Environmental Impact Statement for planned improvements to Honoapi'ilani Highway from milepost 11 in Ukumehame to milepost 17 in Launiupoko at the Lāhainā Bypass.

This communication is about the planned West Maui Forest Reserve expansion located mauka of Honoapi'ilani Highway at locations in Olowalu and Ukumehame. On March 24, 2023, as part of a broad state-wide initiative, the Board of Land and Natural Resources (BLNR) conditionally approved additions to the forest reserve in West Maui extending from the mountains towards the coastline exclusive of private lands or public lands with existing active uses, which include areas within Olowalu and Ukumehame. The BLNR affirmed that formal forest reserve designation by a Governor of Hawai'i Executive Order would proceed after HDOT defines and acquires the land it needs for the proposed new highway alignment and that this road right-of-way would be excluded from the newly designated reserve area.

BLNR is planning the forest reserve expansion jointly with HDOT as FHWA/HDOT complete the Honoapi'ilani Highway EIS, as evidenced through prior meetings and hearings. BLNR's planning process is based on designating the highway improvements before finalizing the lands that will be in the forest reserve.

The State supports building a road through the future forest reserve. The BLNR agreed that the land would not be formally converted to forest reserve until the road was complete because BLNR did not wish for the future reserve to be encumbered by Section 4(f) protections triggered by the change in land designation during the EIS development, as joint planning between the agencies is already occurring.

Should you have any questions or need additional information, please don't hesitate to contact Pua Aiu at Pua.Aiu@hawaii.gov.

cc: Ms. Pua Aiu, DLNR
Ms. Lisa Powell, FHWA

Joint Development of Planned Beachside Greenbelt Park Letter

County of Maui Parks Department

November 2025

RICHARD T. BISSEN, JR.
Mayor

JOSIAH K. NISHITA
Managing Director

PATRICK S. MCCALL
Director

SHANE T. DUDOIT
Deputy Director



DEPARTMENT OF PARKS AND RECREATION
COUNTY OF MAUI
700 HALI'A NAKOA STREET, UNIT 2
WAILUKU, MAUI, HAWAI'I 96793
www.mauicounty.gov

September 11, 2024

TO: EDWIN SNIFFEN
DIRECTOR
DEPARTMENT OF TRANSPORTATION
ALIIAIMOKU BUILDING
(VIA E-MAIL)

ATTN: GENEVIEVE SULLIVAN
PROJECT MANAGER
HIGHWAYS DIVISION
(VIA E-MAIL)

FROM: PATRICK MCCALL
DIRECTOR
COUNTY OF MAUI – PARKS AND RECREATION

SUBJECT: JOINT DEVELOPMENT OF PLANNED BEACHSIDE GREEN BELT PARKS
HONOAPIILANI HIGHWAY IMPROVEMENTS, WEST MAUI, UKUMEHAME TO LAUNIUPOKO
LAHAINA, ISLAND OF MAUI, STATE OF HAWAII

The County of Maui Parks and Recreation Department is providing this communication to the State of Hawaii Department of Transportation (HDOT) regarding the Department of Transportation's in-progress Environmental Impact Statement for planned improvements to Honoapiilani Highway from milepost 11 in Ukumehame to milepost 17 in Launiupoko at the Lāhainā Bypass.

This letter is regarding the County of Maui's planned beachside green belt park in West Maui from Puamana Park to Papalaua Wayside Park. This planned park is identified in the *2022 West Maui Community Plan*[1] which is based on two decades of coordinated planning and initially established in the *2005 Pali to Puamana Master Plan*[2]. The planned beachside park is makai of the proposed Honoapiilani Highway improvements and portions of the planned park will be within the study area for the highway's planned improvements currently being assessed in an Environmental Impact Statement (EIS).

The *West Maui Community Plan* states that the green belt park would be developed in coordination with the Honoapiilani Highway improvements, after the highway work is complete. The plan states "The *Pali To Puamana Master Plan* proposes to realign Honoapiilani Highway mauka of its current position between Papalaua Park and Puamana Park. Once the highway is moved, the land makai of the realigned road will be used for open space and park to buffer against the effects of sea level rise and climate change while providing recreational opportunities."

The County of Maui Parks Department is planning the future beachside green belt parks per the *Pali to Puamana Master Plan* and the *West Maui Community Plan* and is also planning the future parks jointly with HDOT as FHWA/HDOT complete the Honoapiilani Highway EIS. The joint development is reflected in the March 2006 quitclaim deed for properties transferred to the County. The deed states that "the property shall never be used for any purpose other than as a park for public recreation and exclusively for the purposes and uses set forth… provided, however, as to the portion of the property which is not subdivided and dedicated as a public road or highway, the foregoing limitation to use of the property as a park for public recreation shall apply and remain in full force and effect."[3] The County of Maui's planning process is based on working with HDOT to designate the highway improvements and then utilizing the remaining land in this area for the future beachside park areas.

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[1] County of Maui. West Maui Community Plan, 2022. https://www.mauicounty.gov/2476/West-Maui-Community-Plan-Update-2022

[2] County of Maui. Pali to Puamana Master Plan, 2005. https://www.mauicounty.gov/DocumentCenter/View/83453/Pali-to-Puamana-Parkway-Master-Plan-Feb-2005?bidId=

[3] See attached quitclaim deed: State of Hawaii Bureau of Conveyances Recorded, Quitclaim Deed for TMK numbers (2) 4-8-002: 009 (por.), 028, 048 (por.), 068 (por.) and 070 (por.), Document number 2006-041618, 3 March 2006

Section 4(f) Notification of Intent to Make *de minimis* Impact Determination – Ukumehame Firing Range

U.S. Department of Transportation
Federal Highway Administration

Hawaii Federal-Aid Division

300 Ala Moana Blvd, Rm 3-229
Box 50206
Honolulu, Hawaii 96850
Phone: (808) 541-2700
FHWA-Hawaii.Intake@dot.gov

April 9, 2025

In Reply Refer To:
HDA-HI

Mr. Patrick McCall
Director
Maui County Department of Parks and Recreation
PO Box 1405
Wailuku, HI 96793-6405

Subject: Section 4(f) Notification of Intent to Make *De minimis* Impact Determination
Honoapi'ilani Highway Improvements EIS
Federal-aid Project No: RAEM-030-1(059)
Tax Map Key (TMK): 48002046

Dear Mr. McCall:

The Federal Highway Administration (FHWA), in cooperation with the State of Hawai'i Department of Transportation (HDOT) seeks to provide a reliable transportation facility in West Maui by reducing Honopi'ilani Highway's vulnerability to existing coastal erosion and sea level rise. The proposed **Honoapi'ilani Highway Improvements Project** ("the Project") is located on Maui's west coast and extends between milepost 17 in Launiopoko to milepost 11 at the southeastern terminus in Ukumehame. Refer to enclosed Project Location Map. This section of the highway is within the State of Hawaii's modeled Sea Level Rise Exposure Area (SLR-XA) and is currently exposed to coastal events that increases its vulnerability into the future.

The FHWA and HDOT are nearing completion of the Final Environmental Impact Statement (FEIS) for the project. Consistent with the purpose and need identified for the project in the Draft Environmental Impact Statement (DEIS), FHWA and HDOT considered three alternatives and have identified a Preferred Alternative to create a resilient and reliable highway link between West and Central Maui. The Preferred Alternative realigns the highway mauka, away from the impacts of coastal erosion and sea level rise. In the Ukumehame section, the Preferred Alternative will be on viaduct through environmentally sensitive areas. Construction on the project is anticipated to begin in 2027.

Section 4(f) of the U.S. Department of Transportation Act of 1966

Since the project is federally funded, consideration under Section 4(f) of the U.S. Department of Transportation Act of 1966 is required.

Section 4(f) of the U.S. Department of Transportation (DOT) Act of 1966 stipulates that the FHWA and other U.S. DOT agencies cannot approve the use of land from publicly owned parks, recreational areas, wildlife and waterfowl refuges, or public and private historical sites unless the following conditions apply:

- There is no feasible and prudent avoidance alternative to the use of land; and the action includes all possible planning to minimize harm to the property resulting from such use; or
- The Administration determines that the use of the property will have a *de minimis* impact.

The law, now codified in 49 U.S.C. §303 and 23 U.S.C. §138, is implemented by the FHWA through regulations in 23 CFR §774.

Section 4(f) Property

The Ukumehame Firing Range ("the Firing Range") is a public recreational facility (Maui County Department of Parks and Recreation jurisdiction) and therefore is subject to the requirements of Section 4(f).

The firing range is situated on 84 acres of land mauka of the existing Honoapi'ilani Highway. The facility has uses including two pistol ranges, a rifle range, a skeet range, classrooms, and a parking lot. The parking lot does not have any active recreational uses. In addition to public recreational use, the range is also used for police training.

The Preferred Alternative will cross the makai edge of the firing range on a tall viaduct and the existing driveway would pass under the viaduct structure providing access to the firing range. The project would require that northbound travelers use Pōhaku 'Aeko Street to loop back to the firing range via the existing highway and use the existing driveway that would continue to connect to the firing range by passing under the viaduct structure. See enclosed for a layout diagram of the Preferred Alternative in the range's vicinity.

***De Minimis* Impact Determination and *Request* for Concurrence**

Under Section 4(f), the impacts of a transportation project on a park, recreation area, or wildlife and waterfowl refuge that qualifies for Section 4(f) protection may be determined to be *de minimis* if:

1. The transportation use of the Section 4(f) property, together with any avoidance, minimization, and mitigation or enhancement measures incorporated into the project, does not adversely affect the activities, features, or attributes that qualify the resource for protection under Section 4(f);

2. The public has been afforded an opportunity to review and comment on the effects of the project on the protected activities, features, or attributes of the Section 4(f) property; and

3. The official(s) with jurisdiction over the property, after being informed of the public comments and FHWA's intent to make a *de minimis* impact finding, concur in writing

that the project will not adversely affect the activities, features, or attributes that qualify the property for protection under Section 4(f).

The firing range has various use areas, some of which are applicable for Section 4(f) protections and some which are not (as established in 23 CFR 774.11 (d)):

- Applicable for Section 4(f): Portions of the firing range property that have active recreation uses include the two pistol ranges, the rifle range, the skeet range, classrooms, and the parking lot.

- Not applicable for Section 4(f): Makai portions of the firing range property parcel that have no public access or active recreational uses.

The Preferred Alternative minimizes impacts on the active uses of the firing range. As a result, the Preferred Alternative crosses makai of active portions of the firing range and is located generally in the non-active use areas of the site but does cross over the facility's driveway. This project will not affect the active use areas of the firing range and would not adversely affect the activities, features, or attributes that qualify the Ukumehame Firing Range for protection under Section 4(f).

A prior meeting was held with Maui County Parks and Recreation Department on August 5th 2024, where we communicated our intention to determine that the use of the firing range by the project would be *de minimis*.

Project impacts were disclosed to the public through two public hearings held in mid-January 2025. Several comments were received by the public during the hearings or during the general public comment period regarding the Ukumehame firing range. Enclosed is a list ofcomments about the firing range that were received during the public hearings and the general public comment period.

The Draft Environmental Impact Statement (DEIS) prepared under Chapter 343, Hawai'i Revised Statutes (HRS), and Hawaii Administrative Rules (HAR) § 11-200. 1 for the Honoapi'ilani Highway Improvements project was published in The Environmental Notice on January 8, 2025 and the Federal Register on January 10, 2025.

Based on the information above, the FHWA requests concurrence from County of Maui Parks and Recreation Department, as the official with jurisdiction, that the proposed project satisfies the conditions listed above and will not adversely affect the activities, features, and attributes that qualify the Ukumehame Firing Range for Section 4(f) protection. If you concur, please help to facilitate this request by signing the concurrence line below and returning a copy by email to meesa.otani@dot.gov.

If you have any questions, please feel free to contact Meesa Otani, Transportation Engineer, at (808) 541-2316 or by email at meesa.otani@dot.gov. Thank you for your assistance.

Sincerely,

Digitally signed by MEESA T. OTANI
Date: 2025.04.09 11:26:00 -10'00'

for Richelle M. Takara, P.E.
Division Administrator

Enclosures

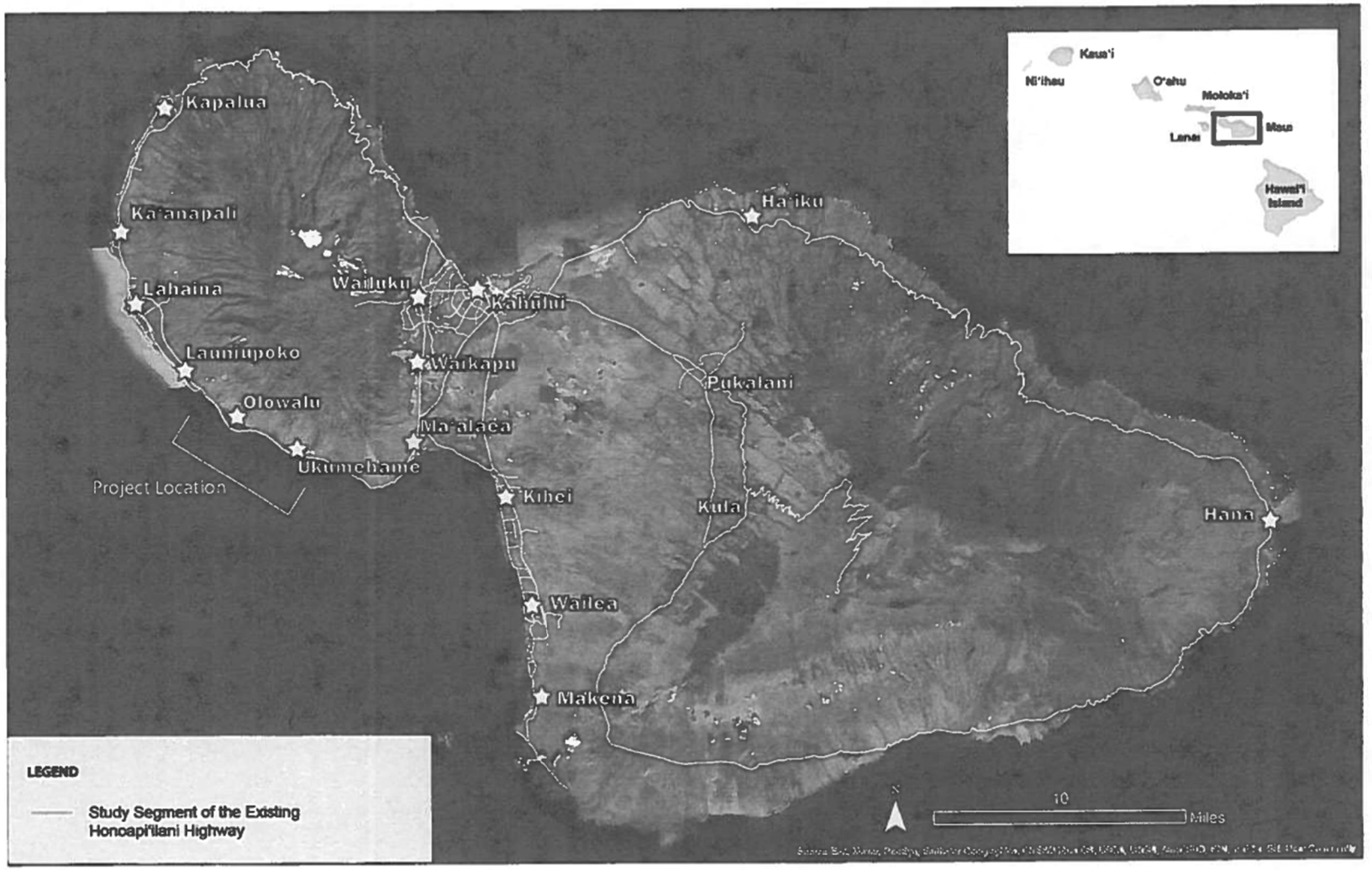
Concur:
The Honoapi'ilani Highway Improvements Project will not adversely affect the activities, features, or attributes that qualify the Ukumehame Firing Range for protection under Section 4(f).

05.15.25

Official with Jurisdiction
Mr. Patrick McCall, Director
Department of Parks and Recreation
County of Maui

Date

FIGURE 1-1. **Vicinity Map**



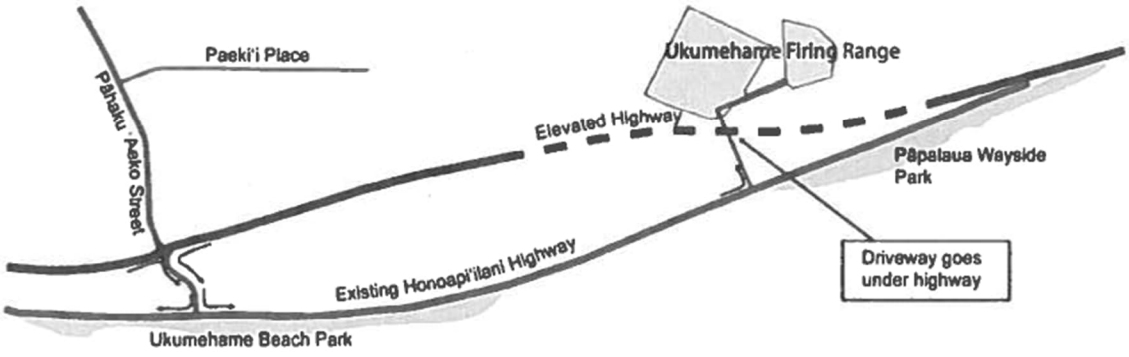
Appendix: Comments Received Related to Ukumehame Firing Range

Commenter	Organization	Comment
Janice and James Revells		The proposed route does not show access to the Ukumehame Firing Range nor beach accesses for the general public. The four ranges are used almost daily by the numerous clubs and MPD. There is also a building used for firearm safety classes. Driving to Laniupoko and then returning toward Kahului to get to access the ranges and the beaches is ludicrous. The majority of the users are local and are coming from Central, Upcountry and South Maui. Driving miles into Lahaina to just turn around to get back to the ranges and beaches is stupid. . Not having reasonable accesses to this area would encourage criminal activity and safety and health hazards. Response time for First Responders would be greatly increased. The general public needs are not being served. This realignment serves to improve drive time into Lahaina and the beauty and use of this area is Lost..
Raymond Ishii	Valley Isle Sports Shooters Club	Aloha I am Raymond Ishii the current President of the Valley Isle Sports Shooters Club, which is the oldest and largest user of the Ukumehame Firing range. While I fully support moving the existing highway inland there are a number of concerns I have. The routes appear to run makai of the firing lines which we are grateful although a couple are uncomfortable close to the range. (20) The Ukumehame Firing Range is the only legal firing range on the island and is used by thousands of sportsmen's practicing marksmanship and exercising their 2nd Amendment rights. It is also used by Law Enforcement and the military on a regular basis for Firearms and riot control training. Whenever unexploded ordnance is found on Maui, they take it to the range to blow it up. I have been on the range when EOD had blown up everything from IEDs, hand grenades, live artillery shell to 100 pounds of TNT. The preferred alternative route for the bypass is an elevated viaduct that will run makai of the firing ranges, with access to the range and the beach parks will be via the Ukumehame subdivision and back tracking on the existing highway. That section of highway between Ukumehame Beach Park and Papalaua State Wayside park often has waves breaking over the wall and with sea water covering the road. This is the section that is in most the danger to eventually fall into the ocean. Is the state planning to maintain that section of the highway to it existing standards for eternity or will it abandon that section of highway once the ocean claims it, and we will lose access to the range and beach park. To avoid the above, would it be possible to install a turn lane before the viaduct begins on the Pali side to allow direct access to the range and beach parks, plus a merge lane on to the highway for Maalaea bound traffic. That section of highway is protected from the ocean by the Papalaua State Wayside Park. This will give direct access to the public to these areas and allow Emergency Vehicle responding to the area more direct access and quicker response time. It will also allow the state to simply block off the section of the road between Papalaua Park and Ukumehame park once the road is damaged by the ocean.Another concern is the height of the viaduct, one or more of the routes has the entrance road the to range being under the viaduct. Will the viaduct be high enough to allow fire trucks and heavy equipment to drive under it. Due to the constant threat of brush fires on the Pali, and medical calls to the range, the more access Emergency Services has the better. Lastly during construction, will we be allowed access to the range. Understandably while the viaduct is being constructed, the section under it will be blocked off. Will a temporary road be constructed to allow access under a completed section of the viaduct to ensure access to the public firing range. Thank You for allowing me to comment on this matter. Raymond Ishii, President, Valley Isle Sports Shooters Club
Allen Surbida		Aloha, County/state must keep the Ukumehame Firing Range where it is and provide easy access to the only range we have . This project is great but

		developers should make sure that the range entries are kept open and easy accessible.
John Rafael		The Ukumehame Firing Range is the only public range on Maui. It needs to stay open and be easily accessible to the people.
Jason Wolford	SAST	Good evening. My name's Jason Wolford. I'm with SAST. We're a nonprofit training organization at Ukumehame Firing Range. We're a nonprofit. We teach firearm safety and training. My concern is along with the fires when the range was closed -- people need accesses through that. So during construction are we still going to be able to access that? Because people want to go hunt. They need to be able to sight rifles in for ethical hunting purposes and things like that. If it's shut down another six to eight months during construction of that, you're just going to have people going other places shooting and as well as being able to take firearms, classes, and trainings -- and safety trainings -- which is required by the State of Hawaii. You're basically going to be locking people out of access to these constitutional rights as well if we don't have access to that. And my second question is I understand they're making it three lanes for finances and things like that. What happens when there's an accident on that elevated roadway? Whether there's guardrails and vehicles are stopped there and people need to get through or -- how are you going to get people off of that? If there's a fatality we all know the road shuts down here for six to eight hours. How are people going get off of that elevated roadway at least go one way or other get back somewhere else rather than sitting in their cars for six eight hours?
Dr Marion Ceruti		Aloha Mr Tatsuguchi Mahalo for the opportunity to comment on the EIS. for the proposed road project. In general, the idea is good but care should taken provide sufficient exits and roads in the makai direction for beach access, to include better parking. particularly in the Ukumehame beach park, on the mauka side existing road. Moreover, more and better parking is needed at the Ukumehame Firing Range to keep users having to park their cars in mud puddles. This is a great opportunity to upgrade the parking at Papalaua to do something about the drainage problem that has plagued the area for years. It might necessary relocate the nenes in the area temporarily for their safety. E Hana Kakou, Dr Marion Ceruti West Maui resident
Andrew Viloria*		Aloha, I recognize this may be too late, but as a lifelong citizen I do not want this highway to cut through our only outdoor flat open firing range. It would make the inaccesibility of sport shooting that much more difficult for Hawaii citizens. Please reconsider these changes. Mahalo, Andrew

*This comment was received outside the public comment period.

Appendix: Preferred Alternative Layout in Vicinity of Ukumehame Firing Range



DOT/FHWA 4(f) *de minimis* Determination Form – Ukumehame Firing Range

Section 4(f) De Minimis Impact Determination ***23 CFR § 774***[1]	
Date:	April 11, 2025
Lead Agency:	Hawai'i Department of Transportation (HDOT), Project Sponsor Federal Highway Administration (FHWA), NEPA Lead Agency
Project Number:	RAEM-030-1(59)
Project:	Honoapi'ilani Highway Improvements
Project Description:	As a part of Maui's Belt Road system, Honoapi'ilani Highway is a two-lane principal arterial highway that provides the main access between communities along Maui's west coast and the rest of the island. The southeastern terminus of the Project is at milepost 11 in Ukumehame, within the vicinity of Pāpalaua Wayside Park. The northwestern terminus of the Project is at milepost 17 in Launiupoko, where Honoapi'ilani Highway intersects the southern terminus of Lāhainā Bypass. The project seeks to provide a reliable transportation facility in West Maui and improve Honoapi'ilani Highway's resilience by reducing its vulnerability to existing coastal erosion and projected sea level rise. Much of the current highway is within State of Hawaii's modeled SLR-XA and are currently exposed to coastal events and would be more vulnerable into the future. The project evaluated several alternatives that includes realigning portions of the highway away from the SLR-XA area to mitigate flood and coastal erosion risks.
Section 4(f) Resource:	Ukumehame Firing Range
Type of 4(f) Resource:	Public Park or Recreational Area
Size of the *de minimis* use of the 4(f) Resource (in acres):	The size of the area of disturbance would be less than 0.02 acre of a total site area of 84 acres.
Primary Purpose/Function:	Public Recreational Firing Range
Official with Jurisdiction:	Maui County Department of Parks and Recreation

[1] This section is new for the Final EIS. For ease of reading, the new text is not double underlined

De minimis Documentation

1. *Describe the Section 4(f) property and the attributes and features that qualify it for Section 4(f) protection, attach a map which shows the boundaries of the resource, the locations of key features (for example, ball fields, structures) and the area to be used*

The Ukumehame Firing Range is a public recreational facility situated on 84 acres of land mauka of the existing Honoapi‘ilani Highway. The facility has uses including two pistol ranges, a rifle range, a skeet range, classrooms, and a parking lot. The property qualifies for Section 4(f) protection as it is currently used as a public recreational resource owned by the County of Maui Parks and Recreation Department. It is open for public use six days a week from 9 a.m. to 2 p.m. (closed on Thursdays) and its major purpose is for public recreation as well as police training. The property also includes a parking lot that does not have any active recreational uses but supports the other active recreational use areas. Attachment 1 shows the property and its attributes and features.

2. *Describe the impacts to the Section 4(f) property, and any avoidance, minimization and mitigation or enhancement measures, and why they are considered de minimis as defined in 23 CFR § 774.17*

The firing range has various use areas, some of which are applicable for Section 4(f) protections and some which are not (as established in 23 CFR 774.11 (d)):

- Applicable for Section 4(f): Portions of the firing range property that have active recreation uses include the two pistol ranges, the rifle range, the skeet range, classrooms, and the parking lot.
- Not applicable for Section 4(f): Makai portions of the firing range property parcel that have no public access or active recreational uses.

As identified in the Draft EIS, the Preferred Alternative will cross the parcel containing the firing range but will remain makai of the active portions of the firing range. The roadway would be on a tall viaduct and the existing driveway would pass under the viaduct structure providing access to the firing range. This remains the proposed condition for this Final EIS including modifications and refinements to the overall Preferred Alternative. The recreational use is expected to remain fully intact and operational during construction and when the Project is complete (other than brief closures when the viaduct is installed over the firing range driveway).

The Preferred Alternative would require that northbound travelers use Pōhaku ‘Aeko Street to loop back to the firing range via the existing highway and use the existing driveway that would continue to connect to the firing range by passing under the viaduct structure. Please see Attachment 2 for a layout diagram of the Preferred Alternative in the range’s vicinity.

Based on these considerations, the Project’s impact on the firing range is so minor as to be considered *de minimis.*

3. *For parks, recreational facilities, and wildlife and waterfowl sanctuaries:*

a. *Describe the Public Outreach that has been or is being conducted (leave blank for historic sites)*

The Honoapi‘ilani Highway Improvements Project Draft EIS and Draft Section 4(f) Evaluation was completed on December 20, 2024, which started a public review period that extended to February 24, 2025. Notice of Availability of the Draft EIS was published in the Federal Register on January 10, 2025, and in the State of Hawaii’s *The Environmental Notice* on January 8, 2025.

The public hearings and comment period are part of a continuous public and agency engagement process that was originally presented in the Notice of Intent to prepare an EIS and Coordination Plan for Public & Agency Participation, which was published in November 2022. These documents, as well as the public scoping period and Scoping Report released in May 2023, have guided the FHWA and HDOT throughout the NEPA process. Draft EIS Chapter 8 (incorporated by reference) summarizes the status of public engagement and agency coordination at the date of Draft EIS publication. Final EIS Chapter 4 includes a summary of public comments on the Draft EIS along with FHWA and HDOT responses to substantive comments.

b. Include written concurrence of the official with jurisdiction over to 4(f) resource with the de minimis determination

The FHWA held a prior meeting with Maui County Parks Department on August 5, 2024, where FHWA communicated its likely intention to determine that the use of the firing range would be *de minimis*. For this final determination, Maui County has formally concurred with the FHWA finding as set forth in correspondence dated April 9, 2025 (letter is referenced in prior section of chapter).

4. For historic resources, attach Section 106 Documentation (Include SHPO concurrence in project-level findings (DOEs and or FOEs) and Programmatic Agreement Memos for archaeological resources)

Not Applicable

Request for Approval

Based upon this analysis we request FHWA approval that the use of the Section 4(f) resource described above is *de minimis* as defined in 23 CFR 774.17.

Director of Transportation — 09/02/2025

Name, Position — Date

Hawai'i Department of Transportation

FHWA Approval

Digitally signed by MEESA T. OTANI
Date: 2025.09.03 13:18:05 -10'00'

9/3/25

Name, Title — Date

FHWA Hawaii Division

Section 4(f) Notification of Intent to Make *de minimis* Impact Determination – Olowalu Sugar Plantation Historic District

U.S. Department of Transportation
Federal Highway Administration

Hawaii Federal-Aid Division

300 Ala Moana Blvd, Rm 3-229
Box 50206
Honolulu, Hawaii 96850
Phone: (808) 541-2700
FHWA-Hawaii.Intake@dot.gov

August 8, 2025

In Reply Refer To:
HDA-HI

Ms. Dawn N.S. Chang, Esq.
Chairperson and State Historic Preservation Officer
Department of Land and Natural Resources
601 Kamokila Boulevard, Suite 555
Kapolei, Hawaii 96707

Subject: National Historic Preservation Act Section 106 Consultation
Honoapiʻilani Highway Improvements Project,
West Maui: Ukumehame to Launiupoko
Ahupuaʻa of Launiupoko, Olowalu, and Ukumehame, Island of Maui, State of Hawaii
Federal-aid Project No. RAEM-030-1(59)
HICRIS Project No. 2023PR00135
TMK: (2) 4-7-001, (2) 4-8-001, (2) 4-8-002, (2) 4-8-003, (2) 4-8-004 and
Honoapiʻilani Highway Right-of-Way

Dear Ms. Chang:

The Federal Highway Administration (FHWA), in cooperation with the State of Hawaiʻi Department of Transportation (HDOT), is nearing completion of the Final Environmental Statement (FEIS) for the Honoapiʻilani Highway Improvements Project ("the Project") from Ukumehame to Launiupoko on the island of Maui.

Consultation Background

In accordance with Section 106, the HDOT, on behalf of the FHWA, initiated consultation with the State Historic Preservation Officer (SHPO) and asked for concurrence on the Area of Potential Effects (APE) on January 23, 2023. The letter also included the list of proposed Section 106 consulting parties and asked SHPO for any available information on other potential consulting parties. In a letter dated March 21, 2023, SHPO responded with no objection to the APE as defined and recommended potential consulting parties for the project. On March 25, 2024, FHWA provided SHPO with a Reconnaissance Level Architectural Historic Resource Survey (RLS); SHPO concurred with the determinations of eligibility in that report in a letter dated July 9, 2024.

The report and SHPO response were included in Appendix 3.6 of the project's Draft Environmental Impact Statement (DEIS), which identified a Preferred Alternative and was published in December 2024. Since that time, refinements to the Preferred Alternative resulted in

additional areas requiring survey beyond the previously identified survey corridors. One additional architectural property was identified, documented in an addendum report and submitted to SHPO via HICRIS on June 3, 2025. A Programmatic Agreement was executed for the Project in July 2025.

Architectural Historic Properties within the APE

The RLS and the addendum report identified a total of 41 architectural properties within the APE. Of these, three were determined to be individually eligible for listing in the National Register of Historic Places (NRHP) and ten were determined to be contributing resources to the NRHP-eligible Olowalu Sugar Plantation Historic District, which is an expansion of the previously identified Olowalu Sugar Mill Complex. Identified historic properties are included in the tables below.

Table 1. Identified Eligible Architectural Historic Properties within the APE

SIHP Number 50-50-08- (Survey ID)	Address/Name	Locality	Style/Form	NRHP Status
04758 (AR 1)	Awalua Cemetery[1]	Olowalu	Cemetery	Eligible (Criteria A and D; Criteria Consideration D)
09141 (AR 16)	802 Olowalu Village Road[2]	Olowalu	Plantation/Bungalow	Eligible (Criteria A)
01603 (AR 17)	Lanakila Historic Church (Olowalu Church and Cemetery)	Olowalu	Religious Structure and Cemetery	Eligible (Criteria A and D; Criteria Consideration D)
01602 (AR 8, Expanded)	Olowalu Sugar Plantation Historic District	Olowalu	Sugar Plantation Infrastructure	Eligible (Criteria A, C, and D)

Table 2. Contributing Resources within the Olowalu Sugar Plantation Historic District (AR 8, Expanded)

SIHP Number 50-50-08- (Survey ID)	Address/Name	Locality	Style/Form
04758 (AR 1)	Awalua Cemetery	Olowalu	Cemetery
01602 (AR 4)	807 Olowalu Road	Olowalu	Plantation/Bungalow
01602 (AR 5)	808 Olowalu Road	Olowalu	Plantation/Bungalow
01602 (AR 6)	810 Olowalu Road (Olowalu Plantation House)	Olowalu	Plantation/Bungalow
01602 (AR 7)	810 Olowalu Road	Olowalu	Plantation/Bungalow

[1] Individually eligible and contributing resource to Olowalu Sugar Plantation Historic District.
[2] Individually eligible and contributing resource to Olowalu Sugar Plantation Historic District.

SIHP Number 50-50-08- (Survey ID)	Address/Name	Locality	Style/Form
01602 (AR 8)	Olowalu Sugar Mill Complex Historic District (Olowalu Landing and Wharf)	Olowalu	Agricultural Processing/Industrial Facility
09141 (AR 16)	802 Olowalu Village Road	Olowalu	Plantation/Bungalow
09143 (AR 19)	Water Tower	Olowalu	20th Century Water Control
09144 (AR 20)	Bridge	Olowalu	Early 20th century steel stringer/multibeam bridge
09151 (AR 31)	Reservoir	Olowalu	20th Century Water Control

Effects Assessment for Architectural Historic Properties

The project's preferred alternative is located mauka and away from the majority of identified historic properties. It would avoid direct, physical effects to individual historic properties within the APE as well as all contributing resources within the Olowalu Sugar Plantation Historic District (See enclosed map). Within the historic district, the preferred alternative is located mauka of the majority of contributing resources and in areas identified in the RLS as non-contributing due to the extensive degree of contemporary disturbance including modern road, utility, and residential developments, as well as natural degradation such as soil erosion and vegetation growth. Near AR 31, the reservoir, the preferred alternative alignment follows an existing bicycle path. While the project results in changes to the existing setting, these changes are not adverse in light of development that has occurred in and around the Olowalu Sugar Plantation Historic District. The project will not alter any of the characteristics that qualify the historic district or individual historic properties for inclusion in the NRHP in a manner that would diminish the integrity of the properties' location, design, setting, materials, workmanship, feeling, or association. As a result, the project will have no adverse effect on the historic district and no effect on the individual historic properties.

Table 3. Effects Assessments for Architectural Historic Properties

SIHP Number 50-50-08- (Survey ID)	Address/Name	Locality	Effect Finding
04758 (AR 1)	Awalua Cemetery	Olowalu	No Effect
01602 (AR 4)	807 Olowalu Road	Olowalu	No Effect
01602 (AR 5)	808 Olowalu Road	Olowalu	No Effect
01602 (AR 6)	810 Olowalu Road (Olowalu Plantation House)	Olowalu	No Effect
01602 (AR 7)	810 Olowalu Road	Olowalu	No Effect

SIHP Number 50-50-08- (Survey ID)	Address/Name	Locality	Effect Finding
01602 (AR 8)	Olowalu Sugar Mill Complex Historic District (Olowalu Landing and Wharf)[3]	Olowalu	No Effect
01602 (AR 8, Expanded)	Olowalu Sugar Plantation Historic District[4]	Olowalu	No Adverse Effect
09141 (AR 16)	802 Olowalu Village Road	Olowalu	No Effect
01603 (AR 17)	Lanakila Historic Church (Olowalu Church and Cemetery)	Olowalu	No Effect
09143 (AR 19)	Water Tower	Olowalu	No Effect
09144 (AR 20)	Bridge	Olowalu	No Effect
09151 (AR 31)	Reservoir	Olowalu	No Effect

Section 4(f) of the U.S. Department of Transportation Act of 1966

Section 4(f) of the U.S. Department of Transportation Act of 1966 established the requirement for the consideration of historic sites and publicly owned parks, recreational areas, and wildlife and waterfowl refuges. The law, now codified in 49 U.S.C. §303 and 23 U.S.C. §138, is implemented by the FHWA through 23 CFR 774.

Section 4(f) stipulates that the FHWA and other U.S. DOT agencies cannot approve the use of land from publicly owned parks, recreational areas, wildlife and waterfowl refuges, or public and private historical sites unless the following conditions apply:

- There is no feasible and prudent avoidance alternative to the use of land; and the action includes all possible planning to minimize harm to the property resulting from such use;

or

- The Administration determines that the use of the property will have a *de minimis* impact.

A *de minimis* impact is one that, after taking into account any measures to minimize harm (such as avoidance, minimization, mitigation or enhancement measures), results in either:

1. A Section 106 finding of no adverse effect or no historic properties affected on a historic property; or
2. A determination that the project would not adversely affect the activities, features, or attributes qualifying a park, recreation area, or refuge for protection under Section 4(f).

[3] Refer to page 55-61 of Reconnaissance Level Architectural Historic Resource Survey (RLS) for the Honoapi‘ilani Highway Improvements, October 2024.

[4] Olowalu Sugar Plantation Historic District (AR 8, Expanded) is an expanded district, which includes Olowalu Sugar Mill Complex Historic District (AR 8) as a contributing resource. Refer to page 233-237 of the RLS.

FHWA intends to make a *de minimis* impact determination based on SHPO's concurrence with the No Adverse Effect determination for the Olowalu Sugar Plantation Historic District.

Effect Determination for Architectural Historic Properties

At this time, the FHWA has applied the criteria of adverse effect at 36 C.F.R. § 800.5(a) and determined in accordance with 36 C.F.R. § 800.5(b) that the Project will have No Adverse Effect on architectural historic properties. FHWA is requesting your concurrence with the No Adverse Effect determination for architectural historic properties for the Honoapi'ilani Highway Improvements Project. If the SHPO disagrees with FHWA's finding, please notify us within 30 days of receipt of this letter. In the absence of a SHPO response by this date, the FHWA will assume the SHPO concurs with this determination.

If you have any questions, please feel free to contact Meesa Otani, Transportation Engineer, at (808) 541-2316 or by email at meesa.otani@dot.gov. Thank you for your assistance.

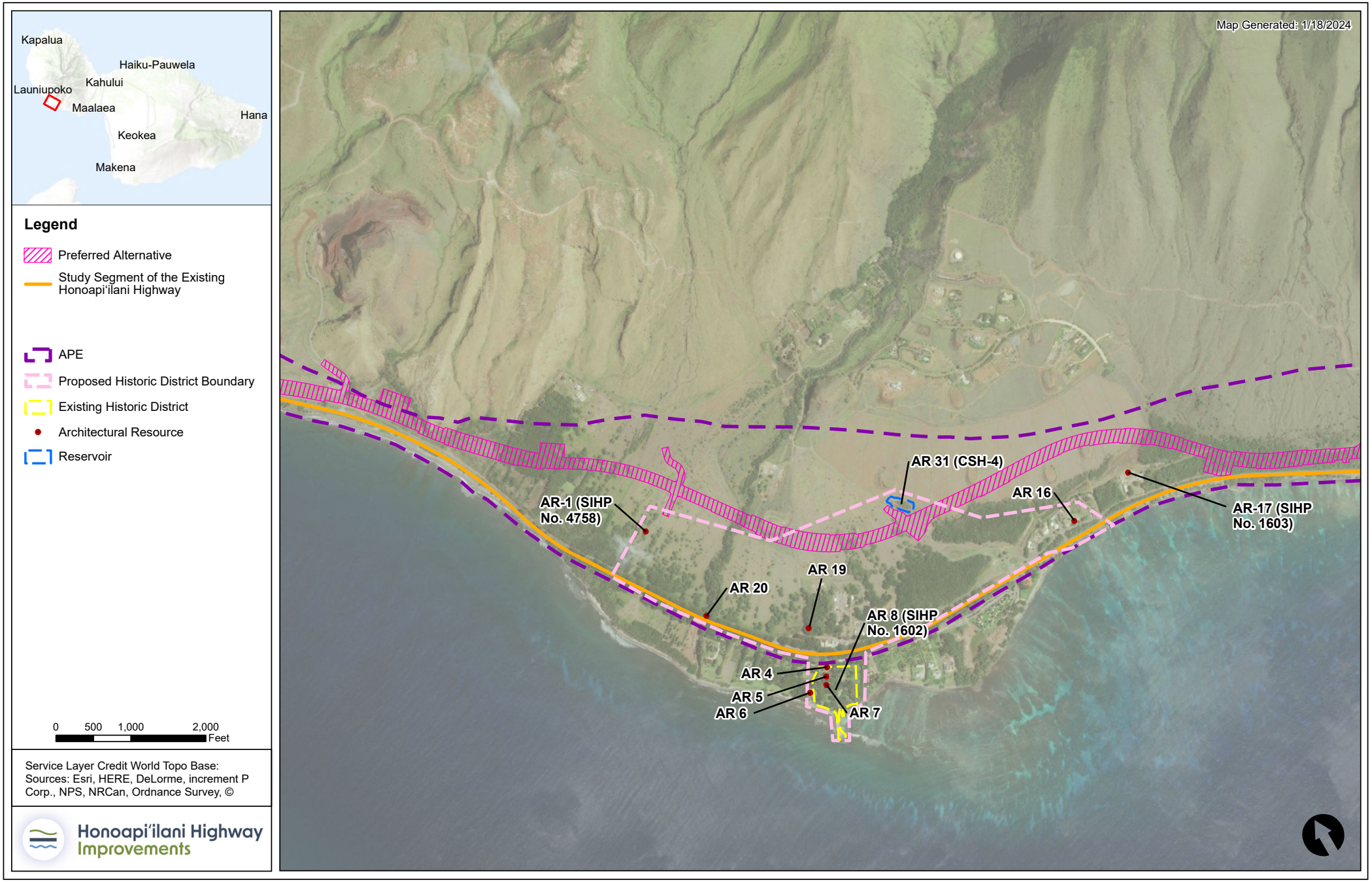
Sincerely,

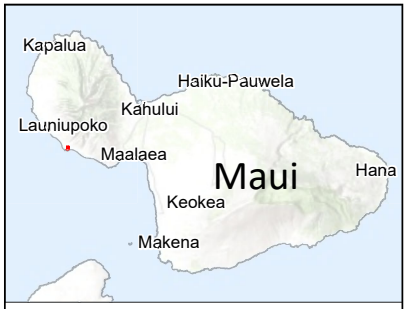
Digitally signed by
MEESA T. OTANI
Date: 2025.08.08
10:47:42 -10'00'

for Richelle M. Takara, P.E.
Division Administrator, FHWA

Enclosures

cc: Pua Aiu, HDOT
Ken Tatsuguchi, HDOT


Kapalua
Haiku-Pauwela
Kahului
Launiupoko
Maalaea
Hana
Keokea
Makena
Legend
Preferred Alternative
Study Segment of the Existing Honoapi'ilani Highway
APE
Proposed Historic District Boundary
Existing Historic District
Architectural Resource
Reservoir
0 500 1,000 2,000
Feet
Service Layer Credit World Topo Base: Sources: Esri, HERE, DeLorme, increment P Corp., NPS, NRCan, Ordnance Survey, ©
Honoapi'ilani Highway Improvements
Map Generated: 1/18/2024
AR-1 (SIHP No. 4758)
AR 31 (CSH-4)
AR 16
AR-17 (SIHP No. 1603)
AR 19
AR 20
AR 8 (SIHP No. 1602)
AR 4
AR 5
AR 6
AR 7



Legend

- Preferred Alignment
- Proposed Historic District Boundary
- Reservoir

Service Layer Credit World Imagery: Resource Mapping Hawaii
World Topo Base: Sources: Esri, HERE, DeLorme, increment P Corp., NPS, NRCan, Ordnance Survey, © OpenStreetMap contributors, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community, Hawaii Statewide GIS Program, WSP USA

0 35 70 140 Feet

Honoapi'ilani Highway Improvements

Map Generated: 8/6/2025

AR31 (SCH-4)

LUAWAI STREET

DOT/FHWA 4(f) *de minimis* Determination Form – Olowalu Sugar Plantation Historic District

November 2025

Section 4(f) De Minimis Impact Determination 23 CFR § 774[2]	
Date:	August 13, 2025
Lead Agency:	Hawai'i Department of Transportation (HDOT), Project Sponsor Federal Highway Administration (FHWA), NEPA Lead Agency
Project Number:	RAEM-030-1(59)
Project:	Honoapi'ilani Highway Improvements
Project Description:	As a part of Maui's Belt Road system, Honoapi'ilani Highway is a two-lane principal arterial highway that provides the main access between communities along Maui's west coast and the rest of the island. The southeastern terminus of the Project is at milepost 11 in Ukumehame, within the vicinity of Pāpalaua Wayside Park. The northwestern terminus of the Project is at milepost 17 in Launiupoko, where Honoapi'ilani Highway intersects the southern terminus of Lāhainā Bypass. The project seeks to provide a reliable transportation facility in West Maui and improve Honoapi'ilani Highway's resilience by reducing its vulnerability to existing coastal erosion and projected sea level rise. Much of the current highway is within State of Hawaii's modeled SLR-XA and are currently exposed to coastal events and would be more vulnerable into the future. The project evaluated several alternatives that includes realigning portions of the highway away from the SLR-XA area to mitigate flood and coastal erosion risks.
Section 4(f) Resource:	Olowalu Sugar Plantation Historic District
Type of 4(f) Resource:	Historic District
Size of the *de minimis* use of the 4(f) Resource (in acres):	The size of the area of disturbance would be 12.05 acres within the proposed Olowalu Sugar Plantation Historic District. No contributing resources or individually eligible properties in the district would be used or disturbed; in an August 13, 2025, letter, the Hawaii SHPO issued concurrence with FHWA's determination of No Adverse Effect to architectural historic properties for the proposed undertaking.
Primary Purpose/Function:	Agricultural land and former plantation infrastructure
Official with Jurisdiction:	State Historic Preservation Officer (SHPO), State Historic Preservation Division – State of Hawaii Division of Land and Natural Resources (SHPD)

[2] This section is new for the Final EIS. For ease of reading, the new text is not double underlined

De minimis Documentation

5. *Describe the Section 4(f) property and the attributes and features that qualify it for Section 4(f) protection, attach a map which shows the boundaries of the resource, the locations of key features (for example, ball fields, structures) and the area to be used*

The Olowalu Sugar Plantation Historic District, which is an expansion of the previously identified Olowalu Sugar Mill Complex, is an NRHP-eligible historic district located mauka and encompassing the existing complex. Ten contributing resources, including the existing Olowalu Sugar Mill Complex, have been identified within the Olowalu Sugar Plantation Historic District. Five contributing resources have been identified within the APE and none will be affected by the Preferred Alternative. These contributing resources reflect the significance of the local sugar industry and the Pioneer Mill Company on the development of Olowalu. The proposed boundary of the historic district encompasses approximately 100 acres, which includes contributing buildings and structures with agricultural, architectural, engineering, and industry themes. All property identified within the historic district is privately owned. The figures in the attached August 8, 2025, letter from FHWA to the SHPO show the Olowalu Sugar Plantation Historic District boundaries, the location of the Preferred Alternative, locations of eligible, listed, and contributing resource resources, and the existing Olowalu Sugar Mill Complex.

6. *Describe the impacts to the Section 4(f) property, and any avoidance, minimization and mitigation or enhancement measures, and why they are considered de minimis as defined in 23 CFR § 774.17*

The Preferred Alternative will require permanent use of areas within the Olowalu Sugar Plantation Historic District. However, the Preferred Alternative is located mauka and away from the majority of contributing resources within the Olowalu Sugar Plantation Historic District. The roadway will cross the mauka side of the historic district and in areas identified during survey as non-contributing. While the project results in changes to the existing setting, these changes are not adverse in light of development that has occurred in and around the Olowalu Sugar Plantation Historic District. The project will not alter any of the characteristics that qualify the historic district or individual historic properties for inclusion in the NRHP in a manner that would diminish the integrity of the properties' location, design, setting, materials, workmanship, feeling, or association.

Based on these considerations and the FHWA's finding and SHPO concurrence of No Adverse Effect on the historic district, the project's impact on the proposed Olowalu Sugar Plantation Historic District is to be considered de minimis.

7. *For parks, recreational facilities, and wildlife and waterfowl sanctuaries:*

   c. *Describe the Public Outreach that has been or is being conducted (leave blank for historic sites)*

Not applicable

   d. *Include written concurrence of the official with jurisdiction over to 4(f) resource with the de minimis determination*

Not applicable

8. For historic resources, attach Section 106 Documentation (Include SHPO concurrence in project-level findings (DOEs and or FOEs) and Programmatic Agreement Memos for archaeological resources)

Section 3.6 Archaeological and Architectural Historic Properties of the Final EIS states there are ten architectural elements identified as contributing resources to the Olowalu Sugar Plantation Historic District; two of these resources are also individually eligible historic properties. These resources include individual buildings and remains of plantation infrastructure. However, none of those resources would be used or affected by the Preferred Alternative.

FHWA transmitted a letter to the SHPD on August 8th, 2025, where FHWA stated that the project would have No Adverse Effect on the historic district and no effect on the individual historic properties identified. The August 8th letter also stated FHWA's intent to make a de minimis impact determination based on SHPO's concurrence with the No Adverse Effect determination for the historic district. In its response letter on August 13, 2025, the SHPO concurred with the FHWA determination of No Adverse Effect for the proposed project. These letters follow this determination form.

The project's executed Programmatic Agreement is also attached.

Request for Approval

Based upon this analysis we request FHWA approval that the use of the Section 4(f) resource described above is *de minimis* as defined in 23 CFR 774.17.

Director of Transportation — 09/02/2025

Name, Position — Date

Hawai'i Department of Transportation

FHWA Approval

Digitally signed by MEESA T. OTANI
Date: 2025.09.03 13:18:29 -10'00'

9/3/25

Meesa Otani, Environmental Engineer — Date

FHWA Hawaii Division

SHPO "No Adverse Effect" Concurrence Letter to FHWA, August 13, 2025

JOSH GREEN, M.D.
GOVERNOR | KE KIAʻĀINA

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIAʻĀINA

STATE OF HAWAIʻI | KA MOKUʻĀINA ʻO HAWAIʻI
DEPARTMENT OF LAND AND NATURAL RESOURCES
KA ʻOIHANA KUMUWAIWAI ʻĀINA

P.O. BOX 621
HONOLULU, HAWAII 96809

DAWN N.S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RYAN K.P. KANAKAʻOLE
FIRST DEPUTY

CIARA W.K. KAHAHANE
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

August 13, 2025

IN REPLY REFER TO:
Project No.: 2023PR00135
Document No.: 2508JLP01

Richelle M. Takara, PE
U.S. Department of Transportation
Federal Highway Administration
300 Ala Moana Blvd, Rm 3-229
Box 50206
Honolulu, HI 96850
c/o FHWA-Hawaii.Intake@dot.gov

Dear Richelle M. Takara, PE,

RE: National Historic Preservation Act Section 106 Consultation
Agency: Federal Highway Administration (FHWA)
Honoapiilani Highway Improvement Project, Federal-Aid Project No. RAEM-030-1(59)
West Maui, Ukumehame to Launiupoko
Ahupuaa of Launiopoko, Olowalu, and Ukumehame, island of Maui, State of Hawaii
TMK: (2) 4-7-001, (2) 4-8-001, (2) 4-8-002, (2) 4-8-003, (2) 4-8-004 and Honoapiilani Highway Right-of-_Way

---

Thank you for the opportunity to comment on this request from the Federal Highways Administration (FHWA) for consultation and concurrence with the determination of **no adverse effect** for the proposed Honoapiilani Highway Improvement Project. FHWA has determined that this project is an undertaking, as defined in 36 CFR § 800.16(y) and has previously consulted with the Hawaii State Historic Preservation Officer (SHPO) on the Area of Potential Effect (APE) and identification of historic properties.

Based on the information provided, the Hawaii State Historic Preservation Officer (SHPO) has reviewed the undertaking, pursuant to 36 CFR § 800.5(c), and the SHPO **concurs** with the determination of FHWA that the effects of the preferred alternative of the proposed undertaking's alignment will result in **no adverse effect** to architectural historic properties. Should the project scope of work or the preferred

alternative of the project alignment change, the SHPO's concurrence may be rescinded as there are historic architectural resources adjacent to the current proposed alignment that could be affected by a change to the project.

FHWA is the office of record for this undertaking. Please maintain a copy of this letter with your environmental review record. If you have any questions about this undertaking or if there is a change to the scope of work, please contact Jessica Puff, SHPD Administrator, at (808) 692-8015 or by email at Jessica.puff@hawaii.gov.

Sincerely,



Dawn Chang
State Historic Preservation Officer
Chairperson, Department of Land and Natural Resources

CC: Meesa Otani, FHWA
Pua Aiu, HDOT
Ken Tatsuguchi, HDOT

Programmatic Agreement for the Honoapi‘ilani Highway Improvements Project

U.S. Department of Transportation
Federal Highway Administration

Hawaii Federal-Aid Division

300 Ala Moana Blvd, Rm 3-229
Box 50206
Honolulu, Hawaii 96850
Phone: (808) 541-2700
FHWA-Hawaii.Intake@dot.gov

August 14, 2025

In Reply Refer To:
HDA-HI

Mr. Reid Nelson
Executive Director
Advisory Council on Historic Preservation
401 F Street NW, Suite 308
Washington, DC 20001

Subject: National Historic Preservation Act Section 106 Programmatic Agreement
Honoapi‘ilani Highway Improvements Project, West Maui: Ukumehame to Launiupoko
Federal-aid Project No. RAEM-030-1(59)
ACHP Case No. 020521

Dear Mr. Nelson:

The Federal Highway Administration (FHWA), in cooperation with the Hawaii Department of Transportation (HDOT), executed the Programmatic Agreement for the Honoapi‘ilani Highway Improvements Project, West Maui: Ukumehame to Launiupoko.

Pursuant to 36 CFR § 800.6(b)(1)(iv), the FHWA is providing a copy of the executed Programmatic Agreement for your records.

If you have any questions, please feel free to contact Meesa Otani, Transportation Engineer, at (808) 541-2316 or by email at meesa.otani@dot.gov. Thank you for your assistance.

Sincerely yours,

Digitally signed by
MEESA T. OTANI
Date: 2025.08.14
10:00:23 -10'00'

for Richelle M. Takara, P.E.
Division Administrator

Enclosure

cc: Pua Aiu, HDOT, HWY-P

PROGRAMMATIC AGREEMENT
AMONG
THE FEDERAL HIGHWAY ADMINISTRATION,
THE STATE OF HAWAIʻI DEPARTMENT OF TRANSPORTATION,
THE STATE OF HAWAIʻI DEPARTMENT OF LAND AND NATURAL RESOURCES,
AND THE
THE HAWAIʻI STATE HISTORIC PRESERVATION OFFICER
REGARDING THE
HONOAPIʻILANI HIGHWAY IMPROVEMENTS PROJECT,
MAUI KOMOHANA, MAUI COUNTY, HAWAIʻI

WHEREAS, the United States Department of Transportation, Federal Highway Administration (FHWA) plans to fund the Honoapiʻilani Highway Improvements Project (Undertaking), which would realign Honoapiʻilani Highway between Ukumehame and Launiupoko in Maui Komohana (West Maui); and

WHEREAS, the State of Hawaiʻi Department of Transportation (HDOT) is the sponsor of the Undertaking, and the FHWA has invited HDOT to become an Invited Signatory to this Programmatic Agreement (PA); and

WHEREAS, the FHWA's action requires review under the National Environmental Policy Act (NEPA) (42 U.S.C. § 4321 et seq.) and is considered an Undertaking as defined by 36 C.F.R. § 800.16(y) and is subject to review under Section 106 of the National Historic Preservation Act of 1966 (NHPA) (54 U.S.C. § 306108) and its implementing regulations, 36 C.F.R. Part 800, *Protection of Historic Properties*, as amended; and

WHEREAS, the Undertaking is intended to address existing coastal erosion and flooding, as well as future coastal erosion and flooding caused by anticipated sea level rise, as delineated by the Hawaiʻi Climate Change Mitigation and Adaptation Commission's (HCCC's) Sea Level Rise Exposure Area (SLR-XA); and

WHEREAS, the FHWA has coordinated NHPA Section 106 compliance with the NEPA process and is preparing an Environmental Impact Statement (EIS); and

WHEREAS, the FHWA, in consultation with the Hawaiʻi State Historic Preservation Officer (SHPO), is entering into this Section 106 PA in accordance with 36 C.F.R. § 800.14(b)(1)(ii) because the Undertaking's effects on historic properties cannot be fully determined prior to approval of the Record of Decision; and

WHEREAS, the FHWA in coordination with HDOT, and in consultation with the SHPO, established an Area of Potential Effects (APE) (**Appendix 2**) in accordance with 36 C.F.R. § 800.4(a)(1) to consider potential direct and indirect effects associated with each of the Undertaking's alternatives evaluated in the Draft EIS; and

WHEREAS, due to the size of the APE, limited access, and number of alternatives under consideration, the FHWA and HDOT, in consultation with the SHPO, agreed to phased identification, pursuant to 36 C.F.R. § 800.4(b)(2), as provided in this PA; and

WHEREAS, HDOT intends to use the historic properties identification efforts and documentation prepared for this Undertaking and as described in this PA (Stipulation III) to comply with Hawai'i Revised Statutes (HRS) § 6E and its administrative provisions at Hawai'i Administrative Rules (HAR) § 13-275, *Rules Governing Procedures for Historic Preservation Review for Governmental Projects Covered Under Sections 6E-7 and 6E-8, HRS*, as described in **Appendix 1.** The State Historic Preservation Division (SHPD) therefore has the authority to determine whether or not any report generated under HRS § 6E and its administrative rules is adequate; and

WHEREAS, the Advisory Council on Historic Preservation (ACHP), was invited to participate in the Section 106 consultation and the development of this PA and has declined to participate; and

WHEREAS, the FHWA in coordination with HDOT has consulted with Native Hawaiian Organizations (NHOs) for which the Ahupua'a of Launiupoko, Olowalu, and/or Ukumehame have religious and/or cultural significance, individuals and organizations with a demonstrated interest in the Undertaking, and the public, and has invited the NHOs, individuals, and organizations included in **Appendix 3** to participate as Consulting Parties; and

WHEREAS, the FHWA in coordination with HDOT and pursuant to 36 C.F.R. § 800.2(c) held multiple Consulting Party meetings (listed in **Appendix 4**), has consulted with the Consulting Parties, including the NHOs, individuals, and organizations listed in **Appendix 3**, regarding the effects of the Undertaking on historic properties and has invited them to sign this PA as Concurring Parties; and

WHEREAS, historic properties were found during an archaeological reconnaissance surface survey located within the State of Hawaii, Department of Land and Natural Resources (DLNR) Lands, and the FHWA has invited DLNR to be an Invited Signatory to this PA.

NOW, **THEREFORE**, the FHWA, HDOT, SHPO, and DLNR agree that the Undertaking shall be implemented in accordance with the following stipulations to take into account the effect of the Undertaking on historic properties.

STIPULATIONS

The FHWA, in coordination with HDOT, shall ensure that the following measures are carried out.

I. Roles and Responsibilities

A. The FHWA is the agency official legally responsible for all Section 106 findings and determinations and shall ensure that the terms of this PA are carried out to complete the Section 106 process. The FHWA shall continue consultation with the NHOs, individuals, and organizations included in Appendix 3 and as described in this PA.

B. HDOT, as the Undertaking sponsor, will assist the FHWA in the implementation of this PA, including the coordination, management, and oversight of the implementation of the SHPO-approved plans and reports including the Archaeological Inventory Survey Plan (AISP) and any necessary mitigation plans (for example, archaeological monitoring plan, burial treatment plan) required by this PA for continuing archaeological investigations of the Preferred

Alternative through final design and construction of the Undertaking with the assistance of individuals meeting the requirements of Stipulation II.

C. The DLNR, as having jurisdiction over land within and adjacent to the Undertaking's alignment, shall respond to requests for permission to access areas identified by HDOT that require investigations pursuant to this PA, and shall provide comments and/or reviews of documentation prepared by HDOT or its staff in fulfillment of this PA.

D. The SHPO, individually or through staff at the SHPD, shall advise the FHWA in carrying out Section 106 responsibilities for the Undertaking. Based on information provided by the FHWA or by HDOT, on behalf of the FHWA, the SHPO, individually or through staff at the SHPD, shall respond to requests for comments and/or review and approval within the specified review periods regarding the FHWA's National Register of Historic Places (NRHP) eligibility evaluations and proposed measures to avoid, minimize, or mitigate any adverse effects on historic properties that may be identified.

II. Qualifications

All investigations carried out pursuant to this PA shall be conducted by or under the supervision of an individual meeting the Secretary of the Interior's (SOI's) Professional Qualifications Standards for Archaeology or Architectural History, as applicable, pursuant to 36 CFR Part 61, Appendix A, and pursuant to HAR § 13-281, "Rules Governing Professional Qualifications," and HAR § 13-282, "Rules Governing Permits for Archaeological Work" in the State of Hawai'i.

III. Identification and Evaluation of Historic Properties

A. The FHWA, in coordination with HDOT, will ensure all historic properties (both above ground and below ground) identified within the APE are assessed for NRHP eligibility in accordance with 36 C.F.R. § 800.4(c). The FHWA will consider information provided by an individual or organization included in Appendix 3 who attaches religious and/or cultural significance to a property within the APE in making determinations of eligibility.

B. HDOT, in coordination with the FHWA, completed the identification and evaluation of architectural historic properties pursuant to 36 C.F.R. § 800.4(b) and (c). A Reconnaissance Level Architectural Inventory Survey (RLS) was completed that identified and assessed 40 architectural properties within the APE. Three architectural properties were determined to be individually eligible for listing in the NRHP and 10 were determined to be contributing resources to a NRHP-eligible historic district, referred to in the RLS as the Olowalu Sugar Plantation Historic District. The SHPO concurred with the RLS eligibility determinations in a letter dated July 9, 2024.

C. HDOT, in coordination with the FHWA, has completed the identification and initial evaluation of archaeological properties pursuant to 36 C.F.R. § 800.4(b) and (c). This identification and evaluation effort involved an archaeological reconnaissance surface survey comprising each of the four proposed alternatives within the APE. The archaeological survey area was defined by a 300-foot-wide corridor along the centerline of each proposed alternative. The archaeological survey area totaled approximately 493 acres and included both pedestrian survey and targeted drone flyovers unless limited by access or vegetation issues. Access to TMKs (2) 4-8-002-068 and

(2) 4-8-002-057 was not provided by the occupant and will be pursued during the Archaeological Inventory Survey (AIS) if part of the Preferred Alternative.

D. The results of the archaeological reconnaissance surface survey were provided in a document titled *Honoapi'ilani Archaeological Complex Site Descriptions and Significance Evaluations*. Twenty-eight (28) archaeological historic properties were identified and evaluated within Ukumehame Ahupua'a, seven (7) in Olowalu Ahupua'a, and three (3) in Launiupoko Ahupua'a..

E. HDOT's archaeologist, on behalf of HDOT and the FHWA, evaluated 38 archaeological historic properties as individually eligible for listing in the NRHP. The SHPO concurred with eleven (11) of these eligibility determinations in a letter dated October 11, 2024, and provided concurrence on the remaining twenty-seven (27) archaeological historic properties in a letter dated May 16, 2025. HDOT's lead archaeologist also noted that the sites in each ahupua'a extended beyond the archaeological survey boundaries. Because the horizontal and vertical extents of a potential historic district could not be determined based on a reconnaissance survey, no historic district has been identified by the FHWA at this time.

F. HDOT, in coordination with the FHWA, will complete an AIS for any areas not previously surveyed within the Preferred Alternative. Additionally, subsurface archaeological testing will proceed through the design of the Preferred Alternative as locations become accessible.

G. HDOT, in coordination with the FHWA, will ensure an AIS Plan (AISP) is prepared and implemented as part of the identification and evaluation of archaeological historic properties pursuant to 36 C.F.R. § 800.4(b) and (c).

H. HDOT intends to use the identification and documentation of historic properties prepared for this Undertaking to meet the requirement of HRS § 6E-8. The SHPD shall have authority to determine the adequacy of the AISP pursuant to HAR § 13-275 and HAR § 13-276. The SHPO's written approval will be provided to all Signatories, Concurring and Consulting Parties.

IV. Archaeological Inventory Survey (Subsurface Testing Component)

The area of investigation for the subsurface testing component of the AIS is defined as the Undertaking's Preferred Alternative and includes the proposed roadway right-of-way (ROW) and areas designated for utility installation, excavation, grading, connector roads, or construction access and laydown areas.

A. Subsurface Testing Component of the AISP

1. The subsurface testing methodology for the AISP will be developed by HDOT's lead archaeologist in consultation with the Engineering Design Team, as well as Signatories, Concurring and Consulting Parties within one year of execution of the NEPA Record of Decision.

2. HDOT will provide the initial draft of the AISP to the SHPO, Signatories, Concurring and Consulting Parties for a 30-calendar-day review and comment period.

3. The written comments on the AISP will be shared with the SHPO for consideration in preparing the SHPD's review comments to HDOT and the FHWA. The SHPO shall have an additional 15-calendar-day review period (total 45-calendar days) upon receipt of all written comments received by HDOT and the FHWA from Signatories, Concurring and Consulting Parties.

4. HDOT will share the SHPO's comments with Signatories, Concurring and Consulting Parties. The comments may be posted to the project website at https://www.honoapiilanihwyimprovements.com.

5. If the SHPO does not respond within the 45-calendar-day review period, HDOT, in coordination with the FHWA, may assume the SHPO's concurrence and move forward accordingly. HDOT, in coordination with the FHWA, will implement the AISP.

6. If the SHPO responds with comments within the 45-day comment period, HDOT will incorporate the changes as appropriate and submit a copy marked Final to SHPO, via HICRIS Project Number 2023PR00135, for a 15-day review. If SHPO requests changes within the 15 days, HDOT shall incorporate the changes and provide a second copy marked Final to SHPO, via HICRIS, with a new date, and the review process will be complete. If SHPO does not request changes within 15 days, then the review will be complete.

7. Subsurface survey fieldwork shall be completed to the extent practicable prior to final design so that any identified subsurface historic properties (that is, archaeological sites or human burials) may be considered in final design and measures be incorporated to avoid and/or minimize potential effects on historic properties and/or human burials.

8. HDOT, in coordination with the FHWA, will provide a written status update to the SHPO, Signatories, Concurring and Consulting Parties of the status of archaeological investigations on a quarterly basis via e-mail and, when requested, via meeting. All status reports will be uploaded to HICRIS Project Number 2023PR00135. Once HDOT's archaeologist sends an end-of-fieldwork letter report to the SHPO, these reports will stop.

B. Archaeological Inventory Survey Report

1. The AIS report will meet the requirements of the SOI's Standards and Guidelines for Archaeological Documentation at 48 Fed. Reg. 44,734 (September 29, 1983), will be submitted to the SHPO for their concurrence on adequacy, and will contain the results of the aboveground archaeological reconnaissance surface survey of the Preferred Alternative and subsurface survey.

2. The draft of the AIS report will be provided to the SHPO, Signatories, Concurring and Consulting Parties for a 30-calendar-day review and comment period. The report may be posted to the project website at https://www.honoapiilanihwyimprovements.com.

3. The written comments received on the draft AIS report will be shared with the SHPO for consideration in preparing the SHPO's review comments to HDOT and the FHWA. The SHPO shall have an additional 15-calendar-day review period (45-calendar days total) upon receipt of all written comments received by HDOT and the FHWA from Signatories, Concurring and Consulting Parties.

4. If the SHPO does not respond within the 45-calendar-day review period, HDOT, in coordination with the FHWA, may assume the SHPO's approval and move forward accordingly.

5. If the SHPO responds with comments within the 45-day comment period, HDOT will incorporate the changes as appropriate and submit a copy marked Final to SHPO, via HICRIS Project Number 2023PR00135, for a 15-day review. If SHPO requests changes within the 15 days, HDOT shall incorporate the changes and provide a second copy marked Final to SHPO, via HICRIS, with a new date, and the review process will be complete. If SHPO does not request changes within 15 days, then the review will be complete.

C. Curation

All collections, consisting of artifacts, notes, and other materials associated with archaeological and architectural investigations, will be curated in accordance with 36 C.F.R. Part 79 *Curation of Federally Owned and Administered Archaeological Collections* and in accordance with applicable State laws, including HAR § 13-275, -276, -277, -278, and -279. HDOT shall consult with public and private institutions to pursue opportunities to provide public access to the recovered materials.

V. Application of the Criteria of Adverse Effect for Historic Properties

A. The FHWA, in coordination with HDOT and in consultation with the SHPO, Signatories, and Concurring and Consulting Parties, will apply the criteria of adverse effect (36 C.F.R. § 800.5(a)(1)) to historic properties within the APE, and document its findings.

B. If, as a result of this analysis, the FHWA determines that the Undertaking may have an adverse effect on any historic property, the FHWA, in coordination with HDOT, will consult with the SHPO, Signatories, and Concurring and Consulting Parties to avoid, minimize, or mitigate adverse effects.

VI. Treatments to Resolve Adverse Effects to Historic Properties

The FHWA, in coordination with HDOT and in consultation with the SHPO, Signatories, and Concurring and Consulting Parties, has determined that the following treatment measures, either singularly or in

combination, may be applied to resolve adverse effects to historic properties if adverse effects occur following analysis described in Stipulation V.

Treatment measures listed below may be selected by FHWA in coordination with HDOT and presented to the SHPO, Signatories, Concurring and Consulting Parties for a 30-calendar-day review and comment period. The SHPO shall have an additional 15-calendar-day review period (total 45 calendar days) upon receipt of all written comments provided in writing by FHWA and HDOT from Signatories and Concurring and Consulting Parties to take comments provided in writing into consideration in preparing the SHPO's written review comments. If the SHPO does not respond within the 45-calendar day review period, HDOT, in coordination with the FHWA, may assume the SHPO's concurrence with the proposed treatment measure and move forward accordingly following written notification to the SHPO, Signatories, Concurring and Consulting Parties.

A. Educational Interpretation. This educational interpretation may include displays, markers, educational pamphlets, brochures or booklets, posters, websites, audio recordings or presentations, or other similar accessible information to educate members of the public on one or more architectural and/or archaeological historic property within the APE. The interpretive element may use images and maps to the extent feasible to convey information to the public.

B. Photogrammetry. HDOT may hire a consultant to conduct historic property documentation through the use of photogrammetry, which requires taking high-resolution digital images to construct 3-D models of aboveground resources including individual structures and buildings or landscape features. Using a high-resolution camera affixed to a drone, digital images will be taken at multiple angles and aligned to extract spatial and visual data to create a digital 3-D model. Data will be extracted from the model, including precise measurements and dimensions, colors, textures, and close-up historic details of the historic property. The model will then be made available for public viewing, if appropriate. A corresponding written or audio recording component will be developed to allow for interpretation and use of the 3-D model. This model may be made available to schools, libraries, or other institutions. In consultation with the NHOs, a final location for the model and agreement with the location will be completed before work on the model is started. If this cannot be accomplished, then only a digital model will be created. If HDOT is required to make contact with a proposed location, two attempts at making contact will be deemed sufficient, after which only a digital model will be created. HDOT, the FHWA, the SHPO, Concurring and Consulting Parties will come to agreement on the parameters for the model before work starts. If there is disagreement, HDOT and the FHWA will make the final decisions.

C. Recordation of Architectural Historic Property. Prior to any substantial alteration or demolition of an individual aboveground architectural historic property, documentation may be undertaken to record the adversely affected property through a National Register of Historic Places registration form, digital photography package, or Historic American Buildings Survey (HABS)/Historic American Engineering Record (HAER)/Historic American Landscapes Survey (HALS) Level III recordation (68 Fed. Reg. 43,159), as appropriate.

D. Recordation of Archaeological Historic Property without Data Recovery. Prior to any substantial alteration or demolition of an individual aboveground archaeological historic property, documentation may be undertaken to record the adversely affected property through digital photography, scaled plan view, profile drawings, acquiring and recording oral information regarding traditional practices, and narrative descriptions meeting the Documentation required in HAR § 13-275-8 for Historical Data Recovery [HAR 13-275-8 (D)] and Ethnographic Documentation [HAR § 13-275-8 (E)].

E. Archaeological Data Recovery. Data recovery excavations may be considered in consultation among the FHWA, HDOT, SHPO, Signatories, Concurring and Consulting Parties. If it is determined by the FHWA through consultation that archaeological data recovery is an appropriate treatment, HDOT will ensure that its archaeologist prepares an archaeological data recovery plan (DRP) that meets the requirements of HAR § 13-278-3 and includes each affected archaeological historic property.

1. If possible, a single DRP will be prepared for the Undertaking and include a section on timing for report completion.

2. HDOT will provide the initial draft of the DRP to the SHPO, Signatories, Concurring and Consulting Parties for a 30-calendar-day review and comment period.

3. The written comments received will be shared with the SHPO for consideration in preparing the SHPD's review comments to HDOT and the FHWA. The SHPO shall have an additional 15-calendar-day review period (45-calendar days total), upon receipt of all written comments received by the FHWA and HDOT from Signatories and Concurring and Consulting Parties, to take comments provided in writing by other Consulting Parties into consideration in preparing the SHPO's written review comments.

4. If the SHPO does not respond in writing within the 45-calendar-day review period, HDOT, in coordination with the FHWA, may assume the SHPD's concurrence with the DRP and move forward accordingly following written notification to the SHPD, Signatories, Concurring and Consulting Parties.

5. HDOT, in coordination with the FHWA, shall ensure the archaeological data recovery fieldwork efforts are carried out in accordance with the DRP.

6. Following receipt of comments, HDOT, in coordination with the FHWA and in consultation with the SHPO, Signatories, Concurring and Consulting Parties listed in Appendix 3, will finalize the DRP. HDOT will incorporate the changes as appropriate and submit a copy marked Final to SHPO, via HICRIS Project Number 2023PR00135, for a 15-day review. If SHPO requests changes within the 15 days, HDOT shall incorporate the changes and provide a second copy marked final to SHPO, via HICRIS, with a new date, and the review process will be complete. If SHPO does not request changes within 15 days, then the review will be complete.

VII. Native Hawaiian and Consulting Parties Section 106 Consultation

A. The FHWA, in coordination with HDOT, shall continue to carry out Section 106 consultation with the Maui Lāna'i Islands Burial Council (MLIBC), Signatories, Concurring and Consulting Parties for the identification, evaluation, and any required mitigation of historic properties identified according to the terms of this PA.

B. The FHWA, in coordination with HDOT, shall carry out consultation with the MLIBC, recognized descendants and NHOs, Signatories, Concurring and Consulting Parties for any unanticipated discoveries. The consultation will include identification, evaluation as to whether a discovery meets the definition of a historic property, and consideration of measures to avoid, minimize, or mitigate adverse effects.

VIII. Applicability of this PA to Changes in Undertaking Scope

This PA satisfies the FHWA's responsibilities under Section 106 and is based on information about this Undertaking as defined in the Final EIS. It is the FHWA's responsibility to notify the SHPO, Signatories, Concurring and Consulting Parties of any changes to the Undertaking's design, scope, or footprint and, through consultation, to determine whether any changes to the design, scope, or footprint invalidate the environmental commitments made in the Final EIS and Record of Decision, including those made in this PA. If the FHWA chooses to reopen Section 106 consultation for this Undertaking, the FHWA shall implement the following measures:

A. If the change is within the current APE, then the FHWA shall notify the SHPO in writing of any changes to design or scope in writing. The SHPO shall respond within 30 calendar days of receipt of the e-mail or letter. Date of receipt is the date received in HICRIS Project No. 2023PR00135.

B. If the change is outside the current APE, the FHWA, in coordination with HDOT and in consultation with the SHPO, shall assess and revise the APE as necessary to incorporate any additional areas not previously considered under this PA.

C. The FHWA shall consult the Signatories to this PA to determine if the provisions of this PA should be applied to the additional areas and, if this PA should be applied, whether this PA needs to be amended in accordance with Stipulation XIII to include those areas.

IX. Post-AIS Discoveries

A. In accordance with 36 C.F.R. § 800.13(b)(3), the FHWA, in coordination with HDOT and in consultation with the SHPO, will apply the NRHP Criteria for Evaluation (36 C.F.R. § 60.4) to evaluate any newly identified historic properties and consider measures to avoid, minimize or mitigate adverse effects on historic properties. Additionally, the FHWA, in coordination with HDOT, will consult pursuant to Stipulation III.

B. The FHWA shall forward their evaluation of the newly identified historic properties, finding of effect on newly identified historic properties found during project construction, or unanticipated effects on identified historic properties to the SHPO for review and concurrence.

C. If the SHPO does not respond in writing within the 30-calendar-day review period, the FHWA may assume the SHPO's concurrence with the eligibility determinations.

D. If evidence of burials, human remains, or potential human remains are encountered during construction, HDOT shall suspend all work within 100 feet and protect the remains from further disturbance. The discovery shall be immediately reported to the FHWA, the SHPO, the DLNR, the Maui County medical examiner or coroner, and the Maui Police Department pursuant to HAR § 13-300-40. The DLNR maintains jurisdiction over any inadvertent discovery of human skeletal remains and is responsible for notifications to the MLIBC chair and the Office of Hawaiian Affairs. Contact information is provided in Appendix 5. HDOT is responsible for updating the contact list. If contact information changes, it is the individual party's responsibility to notify the HDOT contact person identified in Appendix 6.

E. HDOT's initial notification may be via phone but must be followed by written notification via e-mail to SHPO and SHPD staff within 24 hours providing written details include date, time, and identification of all parties who were notified and include a brief description of the find and its location. In addition to e-mail, HDOT's notification to the SHPO will be uploaded to HICRIS Project No. 2023PR00135.

F. Identification, documentation, and treatment of all burials, human remains, or potential human remains encountered during construction will be carried out in accordance with HRS § 6E-43.6 and HAR 13-300 (Appendix 1).

X. Confidentiality

Sensitive information concerning the location, character, or ownership of archaeological resources and properties on which burials, human remains, or potential human remains are identified may be withheld from public disclosure in accordance with Section 304 of the NHPA (54 U.S.C. § 307103).

XI. Monitoring and Reporting

Each year following the execution of this PA until it expires or is terminated, HDOT will submit a written status of each PA stipulation to the FHWA.

The FHWA, in coordination with HDOT, shall provide all parties to this PA a written annual summary report detailing work undertaken pursuant to its terms and associated findings. Such report shall include any scheduling changes proposed or implemented, any issues encountered relating to historic or cultural sites, and any disputes and objections received during the FHWA's efforts to carry out the terms of this PA. Additionally, the annual summary report shall include the status of the PA stipulations provided by HDOT to the FHWA and uploaded to HICRIS Project Number 2023RP00135.

HDOT will provide written notification to the FHWA for concurrence once all stipulations have been completed. Upon the FHWA's concurrence and notification therein to all parties to this PA, the Section 106 process will be deemed completed.

XII. Dispute Resolution

Should any Signatory or Concurring Party to this PA object at any time to any actions proposed or the manner in which the terms of this PA are implemented, the FHWA shall notify all parties and initiate consultation to resolve the objection. If the FHWA determines that such objection cannot be resolved, the FHWA will:

A. Forward all documentation relevant to the dispute, including the resolution proposed by the FHWA, to the ACHP. The ACHP shall provide the FHWA in writing with its advice on the resolution of the objection within 30 calendar days of receiving adequate documentation. Prior to reaching a final decision on the dispute, the FHWA shall prepare a written response that takes into account any timely advice or comments regarding the dispute from ACHP, Signatories, and Concurring Parties and provide them with a copy of this written response. The FHWA will then proceed according to the final decision.

B. If the ACHP does not provide its advice in writing regarding the dispute within the 30-calendar-day review period, the FHWA may make a final decision on the dispute and proceed accordingly. Prior to reaching such a final decision, the FHWA shall prepare a written response that takes into account any timely comments regarding the dispute from the Signatories and Concurring Parties to this PA and provide them and the ACHP with a copy of such written response.

C. The responsibilities of the FHWA to carry out all other actions subject to the terms of this PA that are not the subject of the dispute remain unchanged.

XIII. Amendments

This PA may be amended when such an amendment is agreed to in writing by all Signatories. The amendment will be effective on the date a copy signed by all Signatories is filed with the ACHP.

XIV. Termination

If any Signatory to this PA determines that its terms will not or cannot be carried out, that party shall immediately consult with the other parties to attempt to develop an amendment per Stipulation XIII. If an amendment cannot be reached within 30 calendar days, any Signatory may terminate the PA upon written notification to the other Signatories.

Once the PA is terminated, and prior to work continuing on the Undertaking, the FHWA must either (a) execute an agreement pursuant to 36 C.F.R. § 800.6 or (b) request, take into account, and respond to the comments of the ACHP under 36 C.F.R. § 800.7. The FHWA shall notify the Signatories as to the course of action they will pursue.

XV. Duration

This PA will be null and void if its terms are not carried out within fifteen (15) years from the date of its execution. Prior to such time, the FHWA may consult with the other Signatories to reconsider the terms of the PA and amend it in accordance with Stipulation XIII.

Execution of this agreement by the FHWA, HDOT, DLNR, and SHPO, and the implementation of its terms is evidence that the FHWA has taken into account the effects of this Undertaking on historic properties and has afforded the ACHP an opportunity to comment.

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PROGRAMMATIC AGREEMENT
AMONG
THE FEDERAL HIGHWAY ADMINISTRATION,
THE STATE OF HAWAIʻI DEPARTMENT OF TRANSPORTATION,
THE STATE OF HAWAIʻI DEPARTMENT OF LAND AND NATURAL RESOURCES,
AND THE
THE HAWAIʻI STATE HISTORIC PRESERVATION OFFICER
REGARDING THE
HONOAPIʻILANI HIGHWAY IMPROVEMENTS,
MAUI KOMOHANA, MAUI COUNTY, HAWAIʻI

SIGNATORY

Hawaii State Historic Preservation Officer

By: _____ Date: Jul 9, 2025

Dawn N. S. Chang, Esq.
State Historic Preservation Officer

PROGRAMMATIC AGREEMENT
AMONG
THE FEDERAL HIGHWAY ADMINISTRATION,
THE STATE OF HAWAIʻI DEPARTMENT OF TRANSPORTATION,
THE STATE OF HAWAIʻI DEPARTMENT OF LAND AND NATURAL RESOURCES,
AND THE
THE HAWAIʻI STATE HISTORIC PRESERVATION OFFICER
REGARDING THE
HONOAPIʻILANI HIGHWAY IMPROVEMENTS,
MAUI KOMOHANA, MAUI COUNTY, HAWAIʻI

SIGNATORY

Federal Highway Administration

By: _____ Date: 7/10/2025
Richelle M. Takara, PE
Division Administrator

PROGRAMMATIC AGREEMENT
AMONG
THE FEDERAL HIGHWAY ADMINISTRATION,
THE STATE OF HAWAIʻI DEPARTMENT OF TRANSPORTATION,
THE STATE OF HAWAIʻI DEPARTMENT OF LAND AND NATURAL RESOURCES,
AND THE
THE HAWAIʻI STATE HISTORIC PRESERVATION OFFICER
REGARDING THE
HONOAPIʻILANI HIGHWAY IMPROVEMENTS,
MAUI KOMOHANA, MAUI COUNTY, HAWAIʻI

INVITED SIGNATORY

State of Hawaiʻi Department of Transportation

By: _____ Date: 07/10/2025

Edwin Sniffen, Director

PROGRAMMATIC AGREEMENT
AMONG
THE FEDERAL HIGHWAY ADMINISTRATION,
THE STATE OF HAWAIʻI DEPARTMENT OF TRANSPORTATION,
THE STATE OF HAWAIʻI DEPARTMENT OF LAND AND NATURAL RESOURCES,
AND THE
THE HAWAIʻI STATE HISTORIC PRESERVATION OFFICER
REGARDING THE
HONOAPIʻILANI HIGHWAY IMPROVEMENTS,
MAUI KOMOHANA, MAUI COUNTY, HAWAIʻI

INVITED SIGNATORY

State of Hawaiʻi Department of Land and Natural Resources (DLNR)

By: _____ Date: Jul 9, 2025

Dawn N. S. Chang, Esq.
Chairperson

PROGRAMMATIC AGREEMENT
AMONG
THE FEDERAL HIGHWAY ADMINISTRATION,
THE STATE OF HAWAIʻI DEPARTMENT OF TRANSPORTATION,
THE STATE OF HAWAIʻI DEPARTMENT OF LAND AND NATURAL RESOURCES,
AND THE
THE HAWAIʻI STATE HISTORIC PRESERVATION OFFICER
REGARDING THE
HONOAPIʻILANI HIGHWAY IMPROVEMENTS,
MAUI KOMOHANA, MAUI COUNTY, HAWAIʻI

CONCURRING PARTY

Ka`ahui-Rodrigues `Ohana

Hinano Rodrigues 07/09/2025

By: _____ Date: _____
Hinano Rodrigues]
Ohana Alaka`i

PROGRAMMATIC AGREEMENT
AMONG
THE FEDERAL HIGHWAY ADMINISTRATION,
THE STATE OF HAWAI'I DEPARTMENT OF TRANSPORTATION,
THE STATE OF HAWAI'I DEPARTMENT OF LAND AND NATURAL RESOURCES,
AND THE
THE HAWAI'I STATE HISTORIC PRESERVATION OFFICER
REGARDING THE
HONOAPI'ILANI HIGHWAY IMPROVEMENTS,
MAUI KOMOHANA, MAUI COUNTY, HAWAI'I

CONCURRING PARTY

Historic Hawaii Foundation

By: Kiersten Faulkner Date: 8/7/2025
Kiersten Faulkner
Executive Director

Appendix 1. HDOT's Hawai'i Revised Statutes (HRS) § 6E Compliance

Memorandum

To: All Signatories, Concurring and Consulting Parties, and the Public

From: State of Hawai‘i Department of Transportation (HDOT)

Re: Hawai‘i Revised Statutes (HRS) § 6E Compliance

The Programmatic Agreement (PA) for this project incorporates references to both federal and State laws and regulations to allow these review processes to work in tandem to the extent possible. Should compliance issues arise under federal or State law, HDOT and the FHWA are committed to resolving disputes through the Dispute Resolution stipulation provided in the PA (Stipulation XII).

In a letter dated January 23, 2023, HDOT initiated consultation with the SHPO under Section 106 of the NHPA of 1966 and its implementing regulations at 36 C.F.R. Part 800. In addition, HDOT initiated Hawai‘i Revised Statutes (HRS) § 6E and Hawai‘i Administrative Rules (HAR) § 13-275 historic preservation review with the State Historic Preservation Division (SHPD) for the proposed project. Although the Federal Highway Administration (FHWA) retains approval authority over Section 106, HDOT has jurisdiction over determining the project's effects under HRS § 6E-8 and its administrative provisions in HAR § 13-275.

To reduce redundancy, HDOT intends to combine Section 106 and HRS § 6E-8 compliance where possible. HDOT is solely responsible and liable for compliance and implementation of this memorandum.

Roles and Responsibilities

HDOT, as project sponsor, in coordination with the FHWA, will be responsible for the management and development of the SHPD-approved plans and reports, including the Archaeological Inventory Survey Plan (AISP) and any necessary mitigation plans (for example, archaeological monitoring plan, burial treatment plan), required for continuing archaeological investigations of the Preferred Alternative through final design and construction of the project with the assistance of individuals meeting the requirements of Stipulation II.

The SHPD shall advise HDOT and the FHWA in carrying out its State Historic Preservation Review responsibilities for the project. Based on information provided by HDOT, the SHPD shall respond to requests for comments and/or concurrence within the specified review periods.

The SHPD shall review and accept the reports and plans as required by HRS § 6E and its implementing regulations within the timeframes provided by this PA.

Qualifications

All historic properties investigations and documentation carried out pursuant to this memorandum shall be conducted by or under the supervision of an individual meeting the HAR § 13-281, *Rules Governing Professional Qualifications*, in their respective professional discipline. Historic properties investigations and documentation shall meet the requirements of HAR § 13-275 and the appropriate HAR for specific

types of studies. Archaeologists will have a permit to do archaeological work in Hawaii per HAR § 13-282-3. HDOT, through its contractors, will identify an osteologist who can be available on an as-needed basis in the event the ethnicity of a burial is needed, or if bone fragments cannot be positively identified as human by the on-site archaeologist. The osteologist will follow the standards for analysis and reporting as defined in HAR § 13-283.

Project Area

The HRS § 6E-8 Project Area will coincide with the Preferred Alternative, once selected (see Appendix 2).

Consultation

Consultation for this project will follow the requirements and timetables within this PA. HDOT, with the FHWA, will develop a continued community dialogue plan to address the need for continued community consultation through planning, design, and construction of this project. The plan is in Appendix 6 and addresses communication protocols regarding:

1. Inadvertent effects to known historic properties within the Project Area

In the event there are inadvertent effects to known historic properties, other than burials (see Stipulation IX of this PA and Section 6 below) within the Project Area, the contractor shall contact HDOT immediately. HDOT shall contact the FHWA, Signatories, Concurring and Consulting Parties listed in Appendix 3 within 72 hours and provide:

A. Information about the site affected including site number, site location, and a map of the site and its location including where damage was done and the nature of the damage;

B. Why protections were not enforced, if known;

C. Proposed mitigation and/or protections for the site; and

D. Plans for in-person consultation, if necessary.

2. Identification and Evaluation of Historic Properties

HDOT and the FHWA intend to use the investigations and documentation of historic properties prepared for this project and as described in the PA (Stipulation III) to comply with HRS § 6E and its administrative provisions in HAR § 13-275, *Rules Governing Procedures for Historic Preservation Review for Governmental Projects Covered Under Sections 6E-7 and 6E-8, HRS*. HDOT will evaluate potential historic properties for integrity and significance in accordance with HAR § 13-275-6.

A. Phased Archaeological Inventory Survey

i. HDOT, in coordination with the FHWA, intends to conduct a phased identification and evaluation of archaeological historic properties for this project. The first phase, consisting of an aboveground archaeological reconnaissance surface survey, is described in Stipulation III of the PA, as mentioned above. For the second phase, an AISP will be

developed and implemented as described in the PA, Stipulation IV. HDOT will ensure the AISP is prepared and implemented as part of the identification and evaluation of archaeological historic properties pursuant to HAR § 13-275-5(c) and 5(d) and HAR § 13-276.

ii. A final AIS report will be prepared that includes the results of the archaeological reconnaissance surface survey, the archaeological subsurface survey, and other requirements, as required by HAR § 13-276. The report will be provided to the SHPD for review and acceptance. The report will also be provided to Signatories, Concurring and Consulting Parties listed in Appendix 3 for review and comment as provided in Stipulation IV.B of the PA.

B. Archaeological Monitoring

Per HAR § 13-279-3, Archaeological monitoring may be used as an identification, mitigation, or post-mitigation measure. For this project, on-site archaeological monitoring will be used as an identification measure during construction.

Following completion of the AIS, HDOT, through its contractors, shall oversee the development of an Archaeological Monitoring Plan (AMP) for the SHPD's review prior to project construction. The AMP will be developed pursuant to HAR § 13-279, *Rules Governing Standards for Archaeological Monitoring Studies and Reports*, in consultation with the PA's Signatories, including the SHPD, Concurring and Consulting Parties and submitted for a 30-calendar-day review and comment period. The SHPD shall have an additional 15 calendar days to review the comments of the other parties and take them into account in their own comments.

i. Archaeological monitoring during construction will be implemented by HDOT and under the supervision of an archaeologist meeting the qualifications stated above in the Qualifications section.

ii. HDOT shall contract with an on-call osteologist who can be in the field within 24 hours should additional expertise be needed to identify skeletal remains found in the Project Area. HDOT's lead archaeologist, in consultation with the SHPD, will decide whether an osteologist is needed on-site.

C. Cultural Monitoring

Although not yet required by State or federal law, cultural monitoring is increasingly used in Hawai'i to address Native Hawaiian concerns that archaeologists and developers do not adequately value or protect Native Hawaiians' irreplaceable cultural heritage and iwi kūpuna *(see Bolante, 2007; Cachola Abad and Ayau, 1999; Kawelu 2013).* HDOT and the FHWA are committed to ensuring Native Hawaiian culture is valued and are including cultural monitors as an integral part of the monitoring program for this project.

i. HDOT, through its contractor, will develop a Cultural Monitoring Plan (CMP) that references and utilizes HAR § 13-279, *Rules Governing Standards for Archaeological*

Monitoring Studies and Reports as a guiding framework. The CMP will be completed prior to construction.

ii. Consulting Parties and the NHOs listed on Appendix 3 shall have 30 days to review and comment on the CMP. The SHPD shall be provided the CMP at the same time as the Consulting Parties and NHOs. The SHPD shall have a total of 45 days to review the document and provide recommendations for acceptance, including time to incorporate any comments received from the NHOs and Consulting Parties.

iii. HDOT, through its contractor, will hire cultural monitors to be on site whenever construction activities meet any of the following conditions:

a. Are within 100 feet of an archaeological site to be preserved or avoided.

b. Subsurface excavation is occurring, in which case, one Cultural Monitor will be assigned per machine.

c. Additional duties as specified in the CMP will include but may not be limited to:
    1. Provide independent interpretations where appropriate should traditional cultural resources be encountered in the HRS § 6E Project Area. Such resources may include but not be limited to iwi kūpuna, archaeological finds, or traditional cultural places.
    2. Implement culturally appropriate protocols for access to cultural resources that may include but not be limited to entering traditional cultural spaces, the discovery, care, and handling of iwi kūpuna, and opening and closing protocols where appropriate.
    3. Collection of culturally significant information, where appropriate, during the course of the project.
    4. Coordinate with HDOT and the FHWA to address any cultural protocol or communication matters involving recognized cultural or lineal descendants and/or the NHOs.
    5. Support the maintenance of a culturally sensitive workplace through training and awareness building that ensures that the archaeological crew, construction crew, and project leadership are informed of the traditional significance of the Project Area and community concerns regarding cultural sites.

iv. Cultural monitors will not have the authority to stop work. They will consult and coordinate with the archaeologist on site, who will have the authority to stop work. Conditions for stopping work will be addressed in the AMP and CMP.

v. Cultural monitors will, at a minimum, meet the following:

a. Have knowledge of cultural practices along the project corridor, including appropriate chants and mele for the area.

b. Have knowledge of cultural resources along the project corridor.

c. Have an understanding of the Section 106 and HRS § 6E processes and how they apply to this project.

vi. The Cultural and Archaeological Monitoring are independent but coordinated efforts. The content of the archaeological monitoring report will include a section that summarizes cultural monitoring findings and activities and shall either be written by the Cultural monitors or compiled in close collaboration with them in a manner that ensures their perspectives are represented without duplicating archaeological content.

vii. The relationship between the construction crew and the archaeological and cultural monitors will be defined in the AMP and CMP. For example, if iwi kūpuna are found or a historic site is breached, or a newly identified archaeological site is encountered, work will stop within 100 feet of the find. These procedures will be described in both the CMP and the AMP.

3. Determining Effects to Historic Properties

HDOT, in coordination with the FHWA, will determine the effects to significant historic properties within the Preferred Alternative consistent with HAR § 13-275-7. One of the following effect determinations will be made:

A. No historic properties affected. The project will have no effect on significant historic properties;

B. Effect, with proposed mitigation commitments. The project will affect one or more significant historic properties, and the effects will be potentially harmful. However, the agency has proposed mitigation commitments involving one or more forms of mitigation to reasonably and acceptably mitigate the harmful effects.

The effect determination shall be sent to the SHPD for review and concurrence and posted on https://www.honoapiilanihwyimprovements.com with notification to Signatories, Concurring and Consulting Parties of the PA for their comments. After 30 calendar days, HDOT shall send all comments received to the SHPD. The SHPD shall provide its concurrence, or non-concurrence with HDOT's project effect determination pursuant to HAR § 13-275-7, within 45 calendar days of receipt of an HDOT request for agreement on its effect determinations. Receipt date shall be the date a letter is received in HICRIS Project No. 2023PR00135.

4. Mitigation Options for Effects to Significant Historic Properties

HAR § 13-275-8(2) requires that, for properties evaluated as significant under criterion "e," the agency must consult with ethnic organizations or members of the ethnic group for whom the properties have significance. For this project, all sites significant under criterion "e" are significant to Native Hawaiians. HDOT has consulted with the SHPD, Signatories, Concurring and Consulting Parties listed in Appendix 3 and will continue to seek their views on proposed forms of mitigation as outlined in this PA in the event adverse effects cannot be fully avoided.

A. *Preservation.* If appropriate, as determined through consultation, mitigation of effects on significant historic properties may include preservation per HAR § 13-275-8. This includes

avoidance and protection (conservation), stabilization, rehabilitation, restoration, reconstruction, interpretation, or appropriate cultural use of the significant historic property. Application of this mitigation measure will be made following the SHPD's acceptance of a preservation plan meeting the requirements of HAR § 13-277.

B. *Data Recovery.* In the event that effects cannot be avoided, mitigation is provided in HAR § 13-275-8. Mitigation in the form of data recovery excavations shall occur in accordance with an SHPD-approved Data Recovery Plan (DRP) as defined in HAR § 13-278-3.

C. *Alternative Mitigation*. The FHWA and HDOT, in consultation with the SHPD and NHOs, will continue consultation to determine if alternate mitigation under HAR § 13-275-8(2) is appropriate.

D. *Access and Stewardship.*

i. *DLNR Involvement.* Most of the archaeological sites are located on Department of Land and Natural Resources (DLNR) property. HDOT has invited the DLNR to be an Invited Signatory to this agreement and for the DLNR to develop a stewardship agreement with interested NHOs. Failure to finalize an agreement prior to signing a stewardship agreement will not affect implementation of the PA or this memorandum.

ii. *Permanent access*. HDOT will work with the DLNR to ensure that the NHOs have access to the sites that they would like to steward and are on DLNR properties. HDOT has identified a 10,000-square-foot site and may provide graded, graveled access to the site from the highway. Failure to come to agreement will not affect implementation or completion of this agreement. If no agreement is reached by the time construction is complete, HDOT and the FHWA may be considered to have fulfilled this item. The NHOs and the DLNR may continue to work on a stewardship agreement, but HDOT and the FHWA's commitments will be considered complete.

iii. *Removal of pohaku*. The timing and removal of the pohaku will be a part of the DRP. Removal of pohaku will be overseen by HDOT's lead archaeologist and a cultural monitor and may involve the use of construction equipment, such as a backhoe or excavator. The NHOs will provide HDOT with point-of-contact (POC) information to coordinate this activity. The cultural monitor and archaeologist will consult with the NHOs listed in Appendix 3 regarding the removal of the rocks as a part of the DRP.

5. Pre-Construction Training

A. Prior to construction activities, HDOT, through its contractors, and in coordination with the FHWA, will conduct pre-construction, on-site archaeological and cultural awareness training led by HDOT's lead archaeologist, archaeological monitors, and cultural monitors for anyone with access to the construction site, including all laborers, skilled construction workers, vehicle operators, management, and visitors. The training will explain the cultural significance of the areas in which work is being performed, HDOT's approach to HRS § 6E-8 compliance, conditions and requirements set forth in this PA, procedures to follow if archaeological or cultural remains are found, and roles and responsibilities of HDOT's archaeological and cultural monitors. The training will be repeated when new staff or new

visitors are on site. A training log of everyone who took the training will be maintained in the contractor's field office. HDOT's lead archaeologist and a cultural monitor will sign off on the log. Additional details may be provided in the Archaeological and Cultural Monitoring Plans.

B. HDOT, through its contractors, shall ensure that the cultural and archaeological monitors receive standard safety training provided for all persons accessing a construction site and working in proximity to heavy equipment.

C. HDOT, through its contractors, will provide training participants with contact information for those required to receive discovery and safety incidence notifications. The AMP and CMP will be provided to all parties and a copy will be maintained on site throughout the duration of construction.

6. Burials and Iwi Kūpuna

A. Previously Identified Burial Sites

"Previously identified" is defined at HAR § 13-300-2.

The Maui/Lāna'i Island Burial Council (MLIBC) has the authority to determine treatment and jurisdiction over all requests to preserve or relocate previously identified Native Hawaiian burial sites.

If a previously identified Native Hawaiian burial site will be affected by the project, HDOT, through its contractor, shall follow HAR § 13-300-33, *Request for council determination to preserve or relocate Native Hawaiian Burial sites.*

If a previously identified non-Hawaiian burial site will be affected by the project, HDOT, through its contractor, shall follow HAR § 13-300-34, *Request for department determination to preserve or relocate non-Native Hawaiian burials sites.*

B. Inadvertent Discovery of Human Remains

"Inadvertent discovery" is defined at HAR § 13-300-2.

The SHPD has jurisdiction over any inadvertent discovery of human skeletal remains and any burial good over 50 years old regardless of ethnicity.

If human skeletal remains are newly identified following the acceptance of the AIS, and not previously identified, HDOT, through its contractor, shall follow HAR § 13-300-40, *Inadvertent discovery of human remains*.

C. Cultural Monitors

During working hours, at least one cultural monitor shall remain at the site where burials or iwi kūpuna are found until they are either removed or reburied. Cultural monitors shall have the authority to pause work if protocols need to be observed. Cultural monitors will be

expected to record information that is relevant to their position. In coordination with the on-site archaeologist, they may pause work at the site to gather any necessary information.

Cultural monitors will assist HDOT in contacting the NHOs and any known lineal or cultural descendants provided by the MLIBC or the SHPD. Cultural monitors will assist HDOT in developing meeting agendas and materials for consultation on the treatment of iwi kūpuna.

D. Relocation and Reburial

If avoidance is not possible, and the MLIBC or SHPD determines the burial must be relocated, HDOT shall provide a burial relocation site, if necessary, to be chosen in consultation with the MLIBC, the NHOs in Appendix 3, and recognized descendants. If it is necessary for iwi kūpuna to be moved out of the Project Area, the MLIBC and recognized descendants will work with HDOT on the design, materials, and construction of up to three burial sites, one per ahupua'a. If the land chosen belongs to the DLNR, HDOT will facilitate agreements regarding access and use of the land. The DLNR will have long-term management of the site.

Statement on the Existing Honoapi'ilani Highway

Upon the successful completion of the project, the existing Honoapi'ilani Highway that will be replaced will be transferred to the County of Maui. Consulting Parties have raised concerns that plans for the existing Honoapi'ilani Highway will affect their traditional and cultural gathering rights. Acknowledging these concerns, HDOT took the following actions:

1. The FHWA and HDOT are working with The Nature Conservancy, who is developing a conceptual plan for incorporating nature-based solutions into plans for the existing Honoapi'ilani Highway entitled, "Olowalu, the Road to Resilience." HDOT has shared NHO concerns with The Nature Conservancy. Periodic updates will be provided by HDOT in their annual report to the SHPD, Signatories, Concurring and Consulting Parties.

2. HDOT has notified and consulted with the SHPD regarding the concerns raised by the NHOs identified in Appendix 3 regarding NHO access to the shoreline and ocean along the existing Honoapi'ilani Highway.

REFERENCES

Bolante, Ronna

2007 Bones of Contention. Honolulu Magazine, November 2007. Electronic document, http://www.honolulumagazine.com/Honolulu-Magazine/November-2007/Bonesof-Contention/index.php?cparticle=1&siarticle=0#artanc

Cachola-Abad, Kehaunani and Edward K. Ayau

1999 He Pane Hoʻomālamalama: Setting the Record Straight and a Second Call for Partnership. Hawaiian Archaeology, 7, 73–81.

Kawelu, Kathleen

2014 In Their Own Voices: Contemporary Native Hawaiian and Archaeological Narratives about Hawaiian Archaeology. The Contemporary Pacific, Vol. 26, no. 1.

Appendix 2. Area of Potential Effects Map and Project Area Map

Area of Potential Effects Map
(Section 106)


Map Generated: 5/29/2025
Launiupoko
Wailua Pl
Awalua
Lihau
Ka Puali
Olowalu
Luawai St
Nopua
North Road
Olowalu Cane Haul Rd
Honoapiilani Highway
Kailiili
Ehehene St
Ukumehame
Puu Kauoha
Makiwa Gl
Paekii Pl
Pohaku Aeko St
Hanaula Gl
Papalaua Gl
11
12
13
14
15
16
Legend
Area of Potential Effects
Study Segment of the Existing Honoapi'ilani Highway
Roads
Streams
Mile Marker
0 1,000 2,000 4,000
Feet
Service Layer Credit World Topo Base: Sources: Esri, HERE, DeLorme, increment P Corp., NPS, NRCan, Ordnance Survey, © OpenStreetMap contributors, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat,
Honoapi'ilani Highway
Improvements

Project Area Map
(HRS § 6E)


Map Generated: 5/28/2025
Launiupoko
Awalua
Lihau
Ka Puali
Olowalu
Mopua
Kailiili
Ukumehame
Puu Kaaoha
Makiwa Gl
Hanaula Gl
Papalaua Gl
16
15
14
13
12
11
Legend
Project Area
Study Segment of the Existing Honoapi'ilani Highway
Roads
Streams
Mile Marker
0 1,000 2,000 4,000
Feet
Service Layer Credit World Topo Base: Sources: Esri, HERE, DeLorme, increment P Corp., NPS, NRCan, Ordnance Survey, © OpenStreetMap contributors, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat,
Honoapi'ilani Highway
Improvements

Appendix 3: List of Consulting Parties

Consulting Parties

First Name	Last Name	Organization
Jordan	Calpito	SHPD
Connie	Applegate	Ohana Kaahui
DeSilva	Lance	DLNR-DOFAW
Donora	Kahaialii	Ohana Kahaialii
Earl	Kukahiko	Lahaina Kupuna Council
Felimon	Sedang	Lahaina Kupuna Council
Fretz	Scott	DLNR-DOFAW
Glenn	Gazmen	
hmkingdomofhawaii@gmail.com		Ohana Kaluna Palafox
Houie and Kathy	Kihune	Ohana Kaahui
Jonette	Kaahui Knight	Ohana Kaahui
Kamakana	Ferreira	OHA
Kaweni	Ibarra	OHA
Kawika	Farm	Maui County CRC
Kiersten	Faulkner	Historic Hawaii Foundation
Lanny	Sinkin	Ohana Kaluna Palafox
Susan	Lebo	SHPD
Chris	Nakahashi	SHPD
Daniel L	Ornellas	DLNR-LD
Andrew K.	Philips	SHPD
Pomaikaʻi	Kaniaupio-Crozier	Mauna Halawai Watershed
Puanani	Felicilda	
Jessica	Puff	SHPD
Rina	Sampson	Lahaina Kupuna Council
Hinano	Rodrigues	Ohana Kaahui
Thelma P.	Kaahui	Ohana Kaahui
Tiana	Lewis	Kipuka Olowalu
Ekolu	Lindsey	Kipuka Olowalu/Ohana Lindsey
Foster	Ampong	Ohana Kekahuna and Keaweiwi
George Tosh	Fujita	Ohana Kaluna Palafox
Jessica	Nahoʻoikaika	Ohana Nahoʻoikaika
Jezelyn		
Kai	Nishiki	Community Advocate
Kaulu	Nahoʻoikaika	Ohana Nahoʻoikaika
Nathan	Nahoʻoikaika	Ohana Nahoʻoikaika
Keeaumoku	Kapu	Ohana Kapu

Kaipo	Kekona	Aha Moku o Maui – Kāʻanapali Moku
Ui	Kapu	Ohana Kapu
Leona	Nahoʻoikaika	Ohana Nahoʻoikaika
Linda	Magalianes	Ohana Nahoʻoikaika
Malihini Keahi	Heath	Ohana Haia
Fay	Mcfarlane	Nā ʻAikāne o Maui, Inc. – Kakoʻo Technical
Tiare	Lawrence	Ohana Nahoʻoikaika
Victoria	Kaluna-Palafox	Ohana Kaluna Palafox
Wilmont	Kahaialii	Ohana Kahaialii
Tamara	Farnsworth	The Nature Conservancy, Maui
Kaponoʻai	Molitau	County of Maui Department of ʻŌiwi Resources
Kekai	Robinson	County of Maui Department of ʻŌiwi Resources
Janet	Six	County of Maui Department of ʻŌiwi Resources
April	Greenburg	SHPD
Samantha	Gehrman	SHPD
Leinoa	Wong	SHPD

Appendix 4: List of Section 106 and HRS § 6E Consulting Party Meetings and Dates

Consulting Party Meeting Dates

April 7, 2022, In-person with NHOs from the area, set up by Keeaumoku Kapu
April 7 and 8, 2022, Hinano Rodrigues
April 8, Ekolu Lindsey, Kipuka Olowalu/Olowalu Cultural Reserve
March 29 and 30, 2023, Virtual
May 31, 2023, NHO, FHWA Field Visit
June 1, 2023, Presentation to Maui Cultural Resources Commission
July 27, 2023, Virtual Consulting Party Meeting: Archaeology/Cultural
August 2, 2023, Virtual Consulting Party Meeting: Architecture
November 2, 2023, SHPD, FHWA, HDOT
November 18, 2023, NHO Field Visit
November 20, 2023, Virtual Consulting Party Meeting: Archaeology/Cultural
March 28, 2024, SHPD Field Visit
September 22, 2024, Presentation to Na Kupuna o Lahaina Advisory Board, NHOs, Consulting Parties: Archaeology and Programmatic Agreement
September 26, 2024, NHOs and other Consulting Parties, Virtual: Archaeology and Programmatic Agreement
February 12, 2025, NHOs and other Consulting Parties: Programmatic Agreement
April 4, 2025, NHOs and other Consulting Parties: Programmatic Agreement
May 22, 2025, SHPD and FHWA: Programmatic Agreement
May 28, 2025, SHPD and FHWA: Programmatic Agreement
June 4, 2025, SHPD and FHWA: Programmatic Agreement

Appendix 5: Call Chart and Contact List for Inadvertent Discoveries

If discovery is of suspected human remains

- Osteologist or Physical Anthropologist confirms remains are human.
- Remains covered with unbleached muslin and a minimum 100 ft. protective perimeter from the location of the remains is set.

Archaeological Principal Investigator Contacts
FHWA and HDOT

Archaeological Principal Investigator Contacts
Maui Police Department Non-Emergency Line
(808) 244-6400
Maui Police Department Medical Examiner
(808) 463-3833

HDOT Contacts:
SHPD Burial Sites Specialist for Maui Island
SHPD Maui Archaeologist
MLIBC Lāhainā Representative
County of Maui Department of ʻŌiwi Resources
County of Maui Archaeologist

- See contact list for phone and email contact information.
- No further excavation or investigation unless otherwise directed by SHPD.
- Work may continue outside of the protective buffer with the presence of an archaeological and cultural monitor.

If discovery is of a non-burial related archaeological site

- A minimum 100 ft. protective perimeter from the known extent of the site is set.

Archaeological Principal Investigator Contacts
FHWA and HDOT

Archaeological Principal Investigator Contacts
SHPD Maui Archaeologists
SHPD Archaeology Branch Chief
County of Maui Archaeologist

- See contact list for phone and email contact information.
- Any additional archaeological data recovery and data recovery methods will be determined in consultation with SHPD
- Work may continue outside of the protective buffer with the presence of an archaeological and cultural monitor.

Below is a list of individuals to be notified if an inadvertent discovery occurs. Notification information (names, phone numbers, and e-mails) will be continuously updated during project implementation and may be requested from HDOT.

Agency/Position
FHWA
HDOT
Maui Police Department
Maui Police Department Medical Examiner
SHPD Burial Sites Specialist
SHPD Burial Sites Specialist
MLIBC Council Chair
MLIBC Lahaina Representative
SHPD Maui Lead Archaeologist
SHPD Maui Island Archaeologist
SHPD Archaeology Branch Chief
County of Maui Department of ʻŌiwi Resources Director
County of Maui Department of ʻŌiwi Resources Deputy Director
County of Maui Department of ʻŌiwi Resources Principal Archaeologist

Appendix 6: Continued Community Dialogue Plan

Continued Community Dialogue Plan

1. HDOT will provide the name of the HDOT contact during the planning, design, and construction phases of the project before the design-build contract starts.

At least once per month, on or before the last day of the month, HDOT shall provide both the NHOs listed in Appendix 3 and the SHPD with a project update. The project updates for the SHPD shall be sent to HICRIS Project Number 2023PR00135.

2. The project update shall include activities that occurred in the previous month including:

    - Status of the Design Build Contract, including percent of the phase of project that has been completed, and, if applicable, construction locations.
    - Each phase of the archaeological study is addressed in the PA and includes review times for Consulting Parties. The status of review, major comments on the reviews and the HDOT response, will be included in any monthly reports.
    - Status of Construction Mobilization, including hiring and introducing the Archaeological and Cultural Monitors and regular reports on where construction is located.
    - Status of Archaeological and Cultural Monitoring
    - End of Fieldwork and End of Construction
    - Notification when each of the archaeological reports became (or are) available on the project website.
3. If there is nothing new to report, the update will say, “no new information since last month.”
4. If sites are found during subsurface archaeological surveys, HDOT will consult on the identification and evaluation of the historic properties found. HDOT may hold in person or video meetings to discuss the finds, providing the following information:

    - Location of the find (provide a map, if appropriate)
    - Type and function of site, if known
    - If no map is provided, a written description of the relationship of the site to Project Area
    - HDOT effect determination

5. If burials or subsurface archaeology is found during the subsurface inventory survey, the NHOs in Appendix 3 shall be notified per the requirements in the PA. Burials finds and notification shall be noted in the monthly report.
6. In the event there are inadvertent effects to known historic properties within the Project Area, HDOT shall contact the Consulting Parties within 72 hours and provide:

    - Information about the site affected including site number, site location, and a map of the site and its location including where damage was done;
    - Why protections were not enforced, if known;
    - Proposed mitigation and / or protections for the site; and
    - Plans for in-person consultation, if necessary;
    - NHOs may request a site visit, which HDOT will consider. If a site visit is denied, HDOT will provide clear reasons why the site visit is denied.

7. HDOT shall consult with NHOs on mitigation for subsurface and inadvertently discovered archaeological or archaeological sites. Mitigation options are listed in the PA and Appendix 1. Meetings may be on-line or in person.

8. Either HDOT or the NHOs can ask for a meeting to discuss any archaeological or cultural (burials) finds. The meeting may be on-line or in-person.

9. Any NHO may ask for HDOT to hold an in-person meeting rather than an on-line meeting.

10. NHOs may send questions or concerns about the project to the HDOT contact. Provided that there are five days or more before the end of the month, HDOT shall respond in the monthly report. If HDOT cannot respond in the monthly report, then HDOT will note the question in the monthly report, and that it will respond in the next monthly report. At the request of any NHO, HDOT may respond to the question or concern sooner than the monthly report. If this is the case, HDOT will note in the monthly report the response to the question or concern and the date it was provided.

11. Any NHO may ask for a meeting on a subject or concern not raised by HDOT in their monthly reports, provided they have notified HDOT of the issue per item 7 above.

12. If any of the items in #2 above are provided to the general public, HDOT can reference the general public notice site.

13. Review of reports shall follow the schedule provided in the PA.

14. At the completion of the project HDOT shall provide an end of project report to the NHOs.

15. Individual items that may require more than once monthly meetings to resolve shall schedule meetings as necessary and at the convenience of the majority of participants. Progress shall be reported monthly through this protocol.

HONOAPI‘ILANI HIGHWAY IMPROVEMENTS PROJECT,
WEST MAUI: UKUMEHAME TO LAUNIUPOKO

Appendix 5 – Evaluation of Viaduct and Embankment for Ukumehame Preferred Alternative Alignment

November 2025

Prepared for

Honoapi‘ilani Highway Improvements

Contents

Evaluation of Viaduct and Embankment for Ukumehame Preferred Alternative Alignment

Appendix 5 Evaluation of Viaduct and Embankment for Ukumehame Preferred Alternative Alignment

As part of the identification and refinement of the Preferred Alternative, HDOT considered design options in the area of the Pali connection through the HDOT detention basin and into the Ukumehame Firing Range. This appendix summarizes the consideration of cost, constructability, environmental effects, and overall support of the Project's purpose and need.

As set forth in Chapter 5, Alternative 1 was identified as the Preferred Alternative in Ukumehame, but HDOT determined that there were appropriate refinements to the alignment—primarily to avoid newly identified areas of archaeological resources. To avoid these resources, the refined alignment would be moved makai. This adjustment would result in the Preferred Alternative crossing through the center of the large HDOT detention basin that serves a large upland watershed, allowing for sediment to settle out of the impounded water before its discharge to the ocean.

For this two-lane extension of the new highway from its Pali connection to and through the Ukumehame Firing Range, HDOT has considered two basic options:

- Viaduct structure carrying traffic over the detention basin and portions of the firing range (with a small footprint for piers and columns within the detention basin). FIGURE 5-5 shows this option.

- At grade on a filled embankment through the detention basin and across portions of the firing range (this would eliminate the functional capacity and operation of the detention basin and require a redesign of the system). FIGURE 5-6 shows this option.

Since the embankment scenario is less expensive in a direct comparison of construction costs, this evaluation examined the balancing of reduced cost compared with environmental effects, constructability, and implementation constraints of the two options. Table 5-1 provides a matrix of key findings for this evaluation.

Overall, the viaduct option was seen as the best option despite the higher cost:

- The environmental effects of the embankment option are more pervasive and leave the option less aligned with the Project's purpose and need to avoid hardened infrastructure within the 3.2-foot SLR-XA.

- The viaduct option provides for a more direct connection and the ability to retain the existing firing range driveway, but the embankment option would require new means of access and additional land acquisition.

- The embankment option would be substantially more difficult to implement and construct. It would require a full watershed management evaluation and the redesign a new system to be built mauka and makai of the new highway alignment. Additionally, it would mostly likely require the use of adjacent wetlands on the County-owned firing range and further wetland mitigation.

- Implementing the embankment option would be expected to add substantial time to overall project implementation:

    - The larger upland watershed would need to be modeled and analyzed as the basis for a new management system.

    - There would be extended coordination with resources agencies such that the Draft Environmental Impact Statement would need to be expanded and to be rescoped to allow for public input on the more extensive effect on wetlands and the resulting mitigation plans.

FIGURE 5-1. **Build Alternatives**

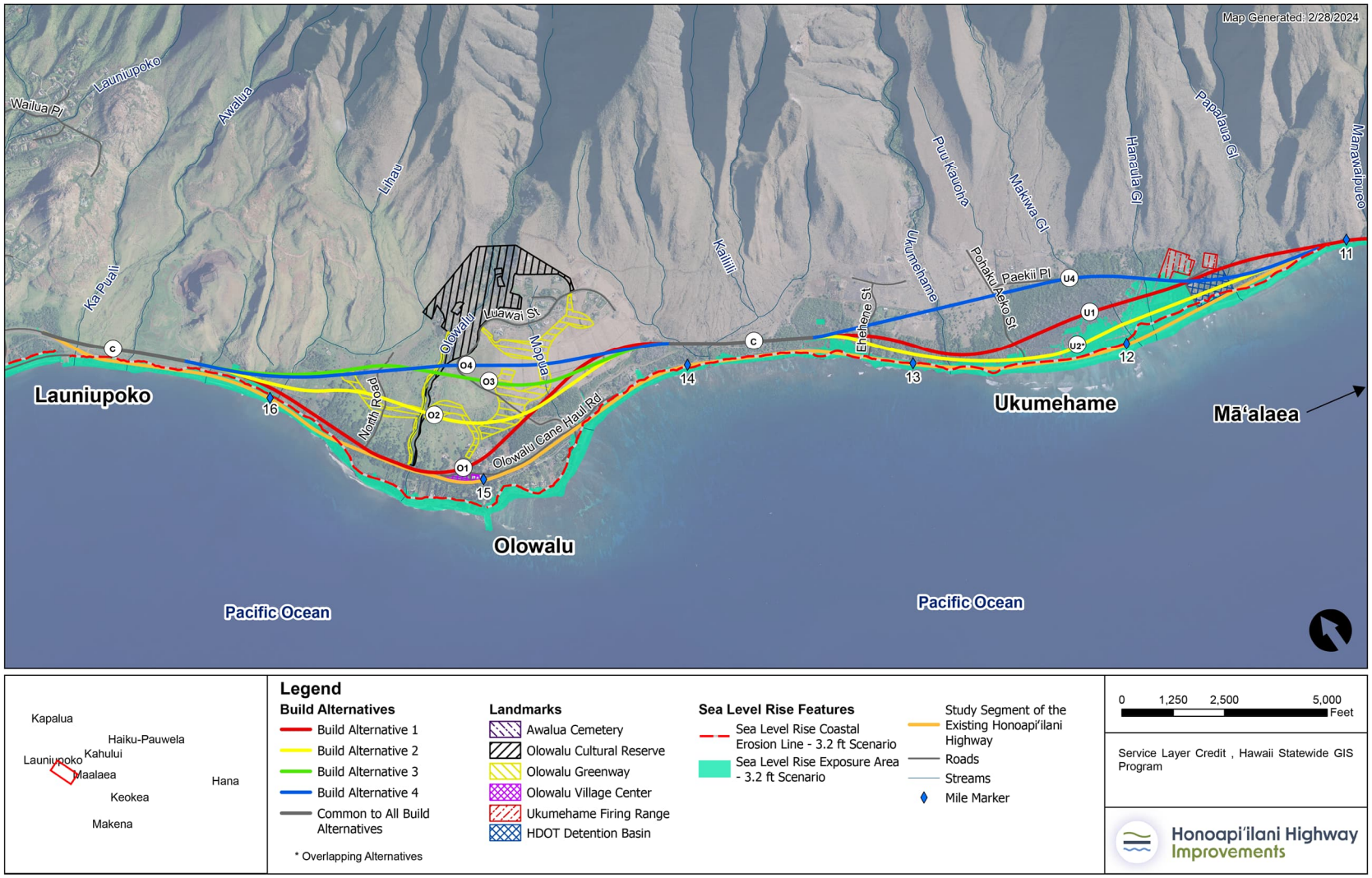


FIGURE 5-2. **Preferred Alternative**

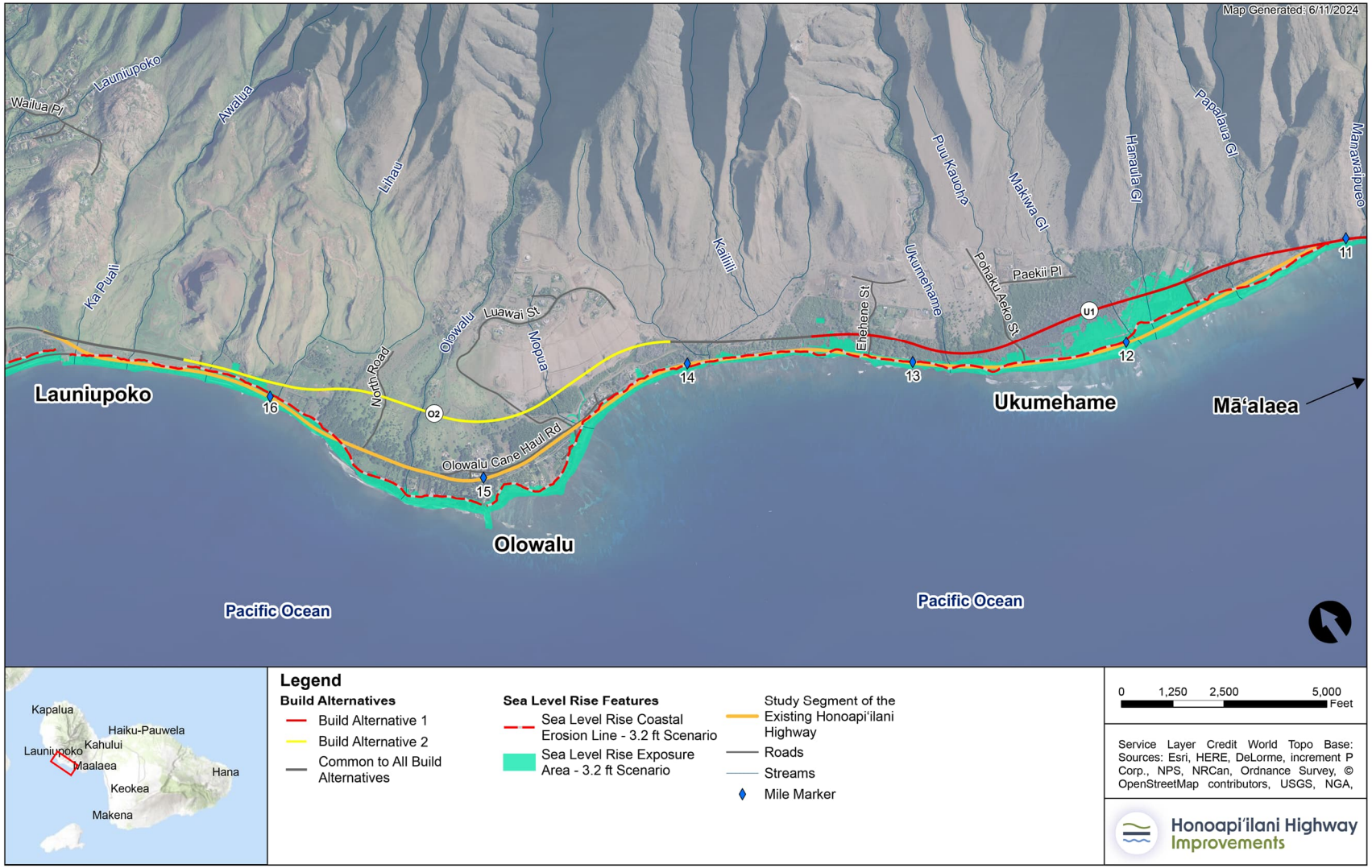


FIGURE 5-3. **Olowalu – Refinement at Northern Connection to Existing Lāhainā Bypass**

a) Original Alignment



b) Refined Alignment



FIGURE 5-4. **Ukumehame – Refinement at Northern Connection to Olowalu**

a) Original Alignment



b) Refined Alignment

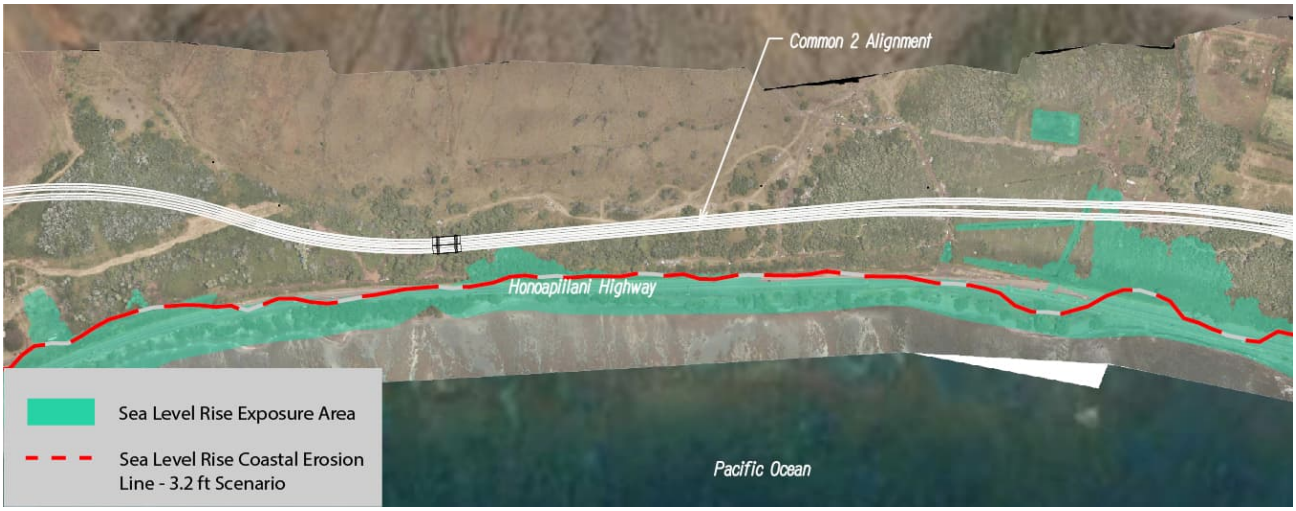


FIGURE 5-5. **Ukumehame – Viaduct Option**

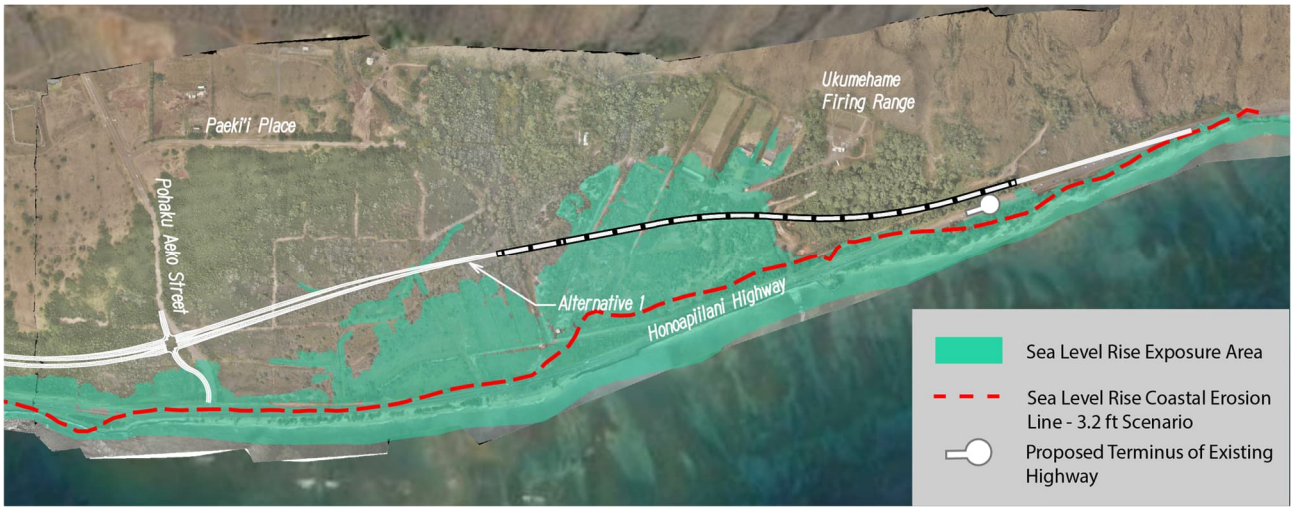


FIGURE 5-6. **Ukumehame – Embankment Option**

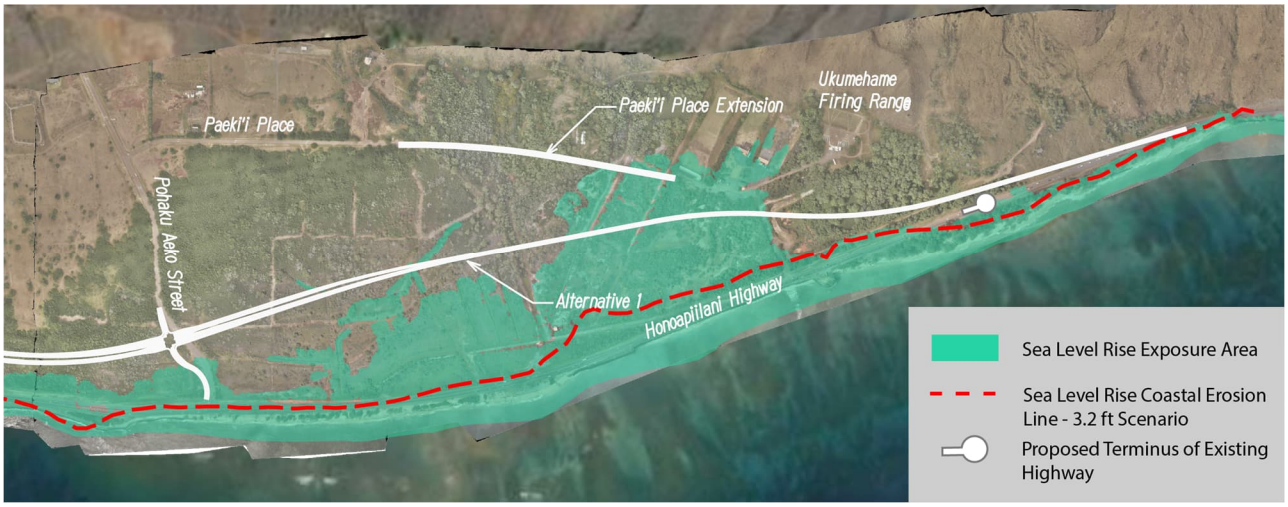


Table 5-1 Evaluation of Viaduct and Embankment Options

TOPIC	MODIFIED BUILD ALTERNATIVE 1 ON EMBANKMENT	MODIFIED BUILD ALTERNATIVE 1 ON VIADUCT
Sediment Basin Displacement	Embankment within sediment basin would displace a significant amount of the basin’s capacity (see FIGURE 5-6). A detailed study of the watersheds contributing to the existing basin would be required to design a new basin that would address the displaced capacity of the basin caused by the additional fill within it. Wetland area west of the sediment basin would be required to be redeveloped for the purpose of replacing the capacity of the basin that is lost due to the embankment fill (see FIGURE 5-6). Design of new basin area would need to account for maintenance activities associated with the periodic removal of sediment that is collected from the upper watersheds. Would likely require a substantially larger area of wetlands mitigation/restoration and rebuilding of ocean connections to fully manage existing watershed flows and changes generated by highway.	Minimal displacement of basin capacity. Viaduct starts on existing embankment and columns are placed within the basin footprint. Column spacing could be maximized to minimize displaced capacity.
Firing Range Access	Embankment for the alternative alignment would be too close to the firing range to support the development of an at-grade driveway from the alternative alignment. Alternate access would be required for the firing range. Since initial segment of new alignment would be two lanes through the firing range area (with no intersections or driveways), the new driveway would need to mauka of the highway and the most logical new access would be a new driveway off of, or an extension of Paeki‘i Place. Additional cost of ROW acquisition and construction costs associated with this road extension would be required.	Existing firing range access road could be retained, and access could be provided via existing Honoapi‘ilani Highway.

TOPIC	MODIFIED BUILD ALTERNATIVE 1 ON EMBANKMENT	MODIFIED BUILD ALTERNATIVE 1 ON VIADUCT
Meets Overall Project Purpose and Need	Not compatible with overall purpose and need (see Constructability below). Displacement of sediment basin volume would result in more wetland disturbance and the development of more infrastructure within the SLR-XA Inundation Zone (the newly developed sediment basin). Embankment would still be within the inundation area between the Ukumehame Firing Range driveway and Pāhaku 'Aeko Street (FIGURE 5-6).	Most compatible with the overall purpose and need. Has the least amount of realigned highway within the SLR-XA. Wave runup within the area in which the viaduct crosses through can be addressed using scour countermeasures around columns or other design considerations such as taking anticipated erosion due to wave runup into account.
Constructability	Entire area on grade would require an embankment elevation above SLR-XA inundation and wave action. Entire linear length of on-grade alignment would require armoring of the makai embankment against wave action inundation. This armoring would interrupt natural coastal processes and has been a consistent point of concern for various stakeholders, including the public. Extended portions of this armoring could be makai of the highway itself to include the existing makai wall of the detention basin as well as the new makai edge of new stormwater management facilities integrated into the wetlands north of the firing range access driveway.	Piers and columns would require less intrusive disturbance.

TOPIC	MODIFIED BUILD ALTERNATIVE 1 ON EMBANKMENT	MODIFIED BUILD ALTERNATIVE 1 ON VIADUCT
Design and Regulatory Considerations	Would require full watershed analysis (volume, sediment loading, water quality) for existing conditions as well as changes created by filling and embankments for new alignment. Water management infrastructure would require extensive use of existing mapped wetlands, including wetlands restoration beyond area specific to new infrastructure. Would likely create need to comprehensively address water flow, sedimentation, and all ocean connections within this larger wetland area. In addition, freshwater impoundment mauka of new alignment would require management and wetland mitigation Embankment would cross through and fill areas of known endangered species activity. Known cultural resource sites crossed by embankment. Given extent of watershed management and wetland mitigation/restoration: • Would likely require a NEPA/HEPA evaluation of the new system either as a rescoping of the current EIS or as an independent action. • Would HDOT be the owner/operator of this new system? Would it be considered a Corps-led project, a DLNR-based State project, or a Maui County project? • Assume a two year or more extension of effort for project approvals, therefore meeting RAISE Grant timeline is infeasible. • Regulatory process not fully defined regarding jurisdictional waters and county-defined wetlands meaning impacts cannot be described with high confidence. • The proposed designs are hot button issue for the public and agency stakeholders, as it relates to outcomes and expectations, and will be scrutinized.	Would require adding replacement capacity by modifying existing detention basin Effects to endangered fauna would be minimized to areas of pier placement. Avoid construction within cultural resource sites to pier placement.

TOPIC	MODIFIED BUILD ALTERNATIVE 1 ON EMBANKMENT	MODIFIED BUILD ALTERNATIVE 1 ON VIADUCT
Cost	Less expensive than a viaduct option but with unknowns in costs. Base Costs: - Roadway on Embankment Construction - $9.4M (3240 ft @ $2,900/ft) - Armoring of embankment within SLR-XA Wave Run-up area – $4.5M (1800 ft @ 2500/ft) - Access to firing range - $5.3M (2200 ft @ $2,400/ft extension of Aeki Place) - Planning and redesign of multiple sedimentation basins. - Property acquisitions - $1.7M (additional acquisition for extension of Aeki'i Place) - New Sediment Basin - $3.8M (assumed, 1500' earth embankment @ $2,200/ft plus ancillaries) - Initial Wetland Mitigation/Restoration - $ To Be Determined Long Term Maintenance Costs - Maintenance of sediment basin system - Restored Wetlands upkeep/maintenance Non-Market Cost - Time (further studies, public meetings) - Project challenges (litigation)	Base costs: - Viaduct Construction - $39M (3240ft @ $12k/ft) - Maintenance Long Term Maintenance Costs - Maintenance of sediment basin - Viaduct maintenance Non-Market Costs - Opportunity cost of large-scale wetlands restoration and extensive basin system redesign project(s)

HONOAPI‘ILANI HIGHWAY IMPROVEMENTS PROJECT,
WEST MAUI: UKUMEHAME TO LAUNIUPOKO

Appendix 8 – Scoping Report

November 2025

Prepared for

Honoapi‘ilani Highway Improvements

Prepared by

wsp

November 2025

Contents

WSP USA, Inc . Scoping Report (May 2023)

WSP USA, Inc .
Scoping Report (May 2023)

Honoapi‘ilani Highway Improvements Project,
West Maui: Ukumehame to Launiupoko

Scoping Report

May 2023



Prepared For
Honoapi‘ilani Highway Improvements

Prepared For
wsp

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Acronyms

ACRONYM	DEFINITION
APE	Area of Potential Effect
CEQ	Council on Environmental Quality
CGG	Coastal Geology Group
CRESI	Coastal Road Erosion Susceptibility Index
CWA	Clean Water Act
CZM	Coastal Zone Management
CZMA	Coastal Zone Management Act
DBEDT	Department of Business Economic Development and Tourism
Draft EIS	Draft Environmental Impact Statement
DLNR	Department of Land and Natural Resources
DOT	Department of Transportation
EIS	Environmental Impact Statement
EISPN	EIS Preparation Notice
Final EIS	Final environmental impact statement
FHWA	Federal Highway Administration
HDOH	Hawai‘i Department of Health
HDOT	Hawai‘i Department of Transportation Highways Division
HEPA	Hawai‘i Environmental Policy Act
LEP	Limited English Proficiency
MMPO	Maui Metropolitan Planning Organization
MPO	Metropolitan Planning Organization
NEPA	National Environmental Policy Act
NHO	Native Hawaiian Organizations
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
OHA	Office of Hawaiian Affairs
ROD	Record of Decision
SHPD	State Historic Preservation Division
SMA	Special Management Area
SOEST	School of Ocean and Earth Science and Technology
USACE	U.S. Army Corps of Engineer
USDOT	U.S. Department of Transportation

1. Overview

1.1 INTRODUCTION

This Scoping Report provides a framework for the Environmental Impact Statement (EIS) being prepared for the proposed Honoapiʻilani Highway Improvements Project (the Project). Pursuant to the National Environmental Policy Act (NEPA) and the Hawaiʻi Environmental Policy Act (HEPA), a Notice of Intent (NOI) to prepare an EIS was published in the Federal Register on November 22, 2022, and a Hawaiʻi EIS Preparation Notice (EISPN) was published in the state's Environmental Notice on November 23, 2022. This started a public scoping comment period that closed on December 31, 2022, and included three public scoping meetings: two virtual meetings held on December 14, 2022 (one afternoon and one evening session) and one in-person meeting held on December 15, 2022, at the Lāhainā Civic Center.

The Federal Highway Administration (FHWA) and the Hawaiʻi Department of Transportation (HDOT) reviewed and considered all comments received, with responses to substantive comments provided in this Scoping Report. This report provides updated information related to the Project, addresses public comments, as appropriate, and summarizes the project's EIS process to date.

This proposed scope also incorporates information obtained during the pre-NEPA/HEPA early scoping period from December 2021 to November 2022. Early scoping included news releases, a public project website (www.honoapiilanihwyimprovements.com), pre-NEPA town hall meetings, pre-EISPN scoping letters, and stakeholder meetings with Native Hawaiian Organizations (NHOs), applicable county, state, and federal agencies, and affected landowners. The Coordination Plan for Public and Agency Participation (the Coordination Plan) describes these outreach activities in greater detail. All the referenced documents supporting this Scoping Report can be found on the Info + Documents page of the project website: https://www.honoapiilanihwyimprovements.com/info-plus-docs/.

For describing locations, this report generally uses the standard cardinal direction terms north, south, east, and west. In addition, this report also uses commonly used local conventions such as mauka/makai (toward the mountains/ocean, which correspond to generally easterly/westerly directions), pali (cliff, but also refers to a specific place of steep topography south of the project area), and West Maui place names, such as Lāhainā (a town to the north of the project area). These terms may be used interchangeably in this report, whenever most clear or convenient to describe a direction or location.

1.2 PROJECT AREA

The Project is located in West Maui, in the area served by the existing Honoapiʻilani Highway between milepost 11 and milepost 17. Honoapiʻilani Highway, which is part of Maui's Belt Road system, is a two-lane principal arterial highway that provides the main access between communities along Maui's west coast and the rest of the island. The proposed southeastern terminus at milepost 11 is in Ukumehame near Pāpalaua Beach Park, and the northwestern terminus of the Project is at milepost 17 in Launiupoko, where Honoapiʻilani Highway intersects the southern terminus of the Lāhainā Bypass. Because highway relocation will be among the alternatives considered, the study area extends mauka-makai (from the mountains to the sea) along this highway corridor, from the base of the West Maui Mountains to the existing highway along the coastline (Figure 1). This approximately 6-mile-long and 3/4-mile-wide project area is composed predominantly of a coastal plain that includes the ahupuaʻa (a traditional land district that typically extends from the top of the mountains to the sea and includes a watershed) of Ukumehame, Olowalu, and Launiupoko.

Figure 1. Project Area



2. Purpose and Need

2.1 PROJECT CONTEXT

Honoapiʻilani Highway is the main travel way for people and goods between West Maui and the rest of the island. It connects West Maui to transportation hubs such as Kahului Airport, Kahului Harbor, hospital and medical services, as well as goods and services not readily available in West Maui. The region hosts about 15% of the island's population and is the second-largest employment center (County of Maui, 2022, and 2018 Department of Business Economic Development and Tourism (DBEDT) Data Book, 2019). As the main access to this part of the island, roadway closures and delays create severe consequences to West Maui residents and the economy.

Honoapiʻilani Highway is a part of the National Highway System and Primary Highway Freight System. The *Hawaii Statewide Freight Plan* (2018) identifies the top-ten truck-count locations on each island. On Maui, Honoapiʻilani Highway is one of the highest ranked routes for freight-truck volumes, and it ranks numbers four, five, six, seven, and eight in the island's top-ten truck-count locations. Because this is the main and most direct route, even slowing traffic along this stretch can have significant effects on the movement of people and freight, including access for emergency vehicles, missed flights, and travel-time delays for motorists.

Over the past 10 years, this stretch of highway has been repaired three times after storm and high-wave events have undermined pavement sections and overtopped the roadway, rendering it impassable. Another independent repair project is in development to address erosion where 4,100 feet of highway fronting Ukumehame and 1,000 feet of highway fronting Olowalu will be shifted 8 to 12 feet inland within the existing roadway right-of-way. These projects are short-term fixes because they address only the most severe locations where the road is already undermined. Federal regulations require that state departments of transportation evaluate locations in the transportation network, like this coastal segment of Honoapiʻilani Highway, that are subject to frequent emergency events and address them in their long-term transportation improvements planning (23 CFR Part 667.1). In addition, the current alignment of Honoapiʻilani Highway lies within the projected Sea Level Rise Exposure Area (SLR-XA), as defined by Hawaiʻi Climate Change Mitigation and Adaptation Commission and the Hawaiʻi Department of Land and Natural Resources (DLNR). Therefore, service disruptions and the need for emergency repairs are expected to increase as the frequency and magnitude of these flood occurrences are exacerbated by climate change and sea level rise.

2.2 PROJECT PURPOSE

The primary purpose of the Project is to provide a reliable transportation facility in West Maui and to improve Honoapiʻilani Highway's resilience by reducing the highway's vulnerability to coastal hazards. Specifically, the Project is intended to address existing coastal erosion and flooding, as well as future coastal erosion and flooding caused by anticipated sea level rise, as delineated by the SLR-XA along the stretch of highway from Ukumehame to Launiupoko, approximately milepost 11 to milepost 17. Areas within the SLR-XA boundary, including Honoapiʻilani Highway, are considered exposed and

potentially vulnerable to sea level rise. The 3.2-foot SLR-XA encroaches on roughly 4 miles out of the 6 miles of the existing highway in the study area. Therefore, the primary purpose of the Project is to reduce the highway's exposure to the SLR-XA, where feasible. Strengthening and reinforcing the highway's reliability will improve the efficiency of not only daily travel demands important to island residents, businesses, and visitors, but also critical emergency response services.

2.3 PROJECT NEED

HDOT has prepared recent reports that document the climate hazards to which its facilities are exposed statewide:

- Hawai'i Highways Climate Adaptation Action Plan (HDOT, May 2021)
- Statewide Coastal Highway Program Report (HDOT, 2019)

The Hawai'i Highways Climate Adaptation Action Plan identifies strategies to create a more resilient transportation system. As part of this plan, exposure assessments were conducted to assess highway infrastructure vulnerability to rockfall and landslides, sea level rise (passive flooding, annual high-wave flooding, coastal erosion), storm surge from category 1 through category 4 hurricanes, tsunami, wildfire, and lava flow. Of these potential hazards, the most urgent need in West Maui is sea level rise (combination of passive flooding, annual high-wave flooding, and coastal erosion) based on the history of storm surge as described in Section 1.2 (Project Area) and the remainder of this section.

The University of Hawai'i School of Ocean and Earth Science and Technology (SOEST) Coastal Geology Group (CGG) has studied shoreline erosion trends across the state by evaluating mosaics of aerial photography that date back to 1912 (SOEST CGG, Historical Mosaics[1]). SOEST CGG's study areas relevant to the Project from north to south are named Launiupoko, Awalua, Olowalu, Hekili, Ukumehame, and Pāpalaua. In general, portions of the shoreline areas abutting the highway near Launiupoko and between Ukumehame Park and Pāpalaua Wayside Park are experiencing significant rates of erosion at an average of -1.4 feet/year and -1.9 feet/year, respectively. For comparison, adjacent transects within the same study areas lose roughly -0.3ft/year and -0.7 ft/year. The eastern portion of SOEST CGG's Hekili study area contains segments of Honoapi'ilani Highway that is "threatened by shoreline change." (SOEST CGG).

Recognizing the effects of climate change across the state, HDOT commissioned a Statewide Coastal Highway Program Report to develop a scientifically rigorous methodology to assess and rank the susceptibility of Hawai'i's coastal roads to erosion and structural degradation caused by multiple ocean hazards such as waves, currents, tides, and sea level rise. The report was published in final form on August 21, 2019 (Francis, et al. 2019). One component of this 2019 report evaluated over 300 discrete coastal highway sites across the state that are threatened by coastal hazards and climate change and prioritized them using a new ranking system called the Coastal Road Erosion Susceptibility Index (CRESI). The report ranked a section of Olowalu, known as Mōpua (located in the northwestern portion of SOEST CGG's Hekili study area), as second in priority statewide with the recommendation

[1] http://www.soest.hawaii.edu/crc/index.php/resources-2/historical-mosaics/; last updated July 2021, accessed November 4, 2022

to harden or relocate the highway. Ukumehame is ranked 11th in priority with a recommendation to elevate or relocate that section of road.

Highway service disruptions are expected to increase as climate change and sea level rise exacerbate the frequency and magnitude of flood occurrences. The Hawai'i Climate Change Mitigation and Adaptation Commission SLR-XA boundary delineates the statewide footprint where passive flooding, annual high-wave flooding, and coastal erosion has been modeled for the 0.5-foot, 1.1-foot, 2.0-foot, and 3.2-foot SLR-XA scenarios. Any references to the SLR-XA boundary throughout project documentation assumes the 3.2-foot SLR scenario unless otherwise noted. Areas and assets, including Honoapiʻilani Highway, within the SLR-XA boundary are considered exposed and potentially vulnerable to sea level rise. Because of this relationship between the SLR-XA boundary and highway reliability, the Project is needed to reduce the highway's exposure to the SLR-XA where feasible, as described in Section 1.3.

2.4 SECONDARY OBJECTIVES

2.4.1 Provide Regional Transportation System Linkages that Support Safe Movement of People and Goods

Over the last decade, the transportation network just north of the Project has been undergoing large changes. HDOT improved a portion of Honoapiʻilani Highway passing through the town of Lāhainā and also constructed a portion of the planned Lāhainā Bypass mauka of Lāhainā:

- In 2012, Lāhainā Bypass Phase 1A from the Keawe Street Extension to Lahainaluna Road Project was completed.
- In 2013, Lāhainā Bypass Phase 1B-1 from Lahainaluna Road to Hokiokio Place was completed.
- In 2018, Lāhainā Bypass Phase 1B-2 from Hokiokio Place to the southern terminus of the Lāhainā Bypass was completed.

These improvements are functioning as a two-lane highway, but grading, drainage, and structures were designed to be fully built out to four lanes if the need arises and funding is available. In considering long-term solutions, consistent roadway system linkages are needed to connect with these recent inland highway improvements, located beyond the SLR-XA and north of the project area. These improvements will also ensure that the new facility meets or exceeds current design standards.

2.4.2 Conform with Regional Land Use and Transportation Plans

Regional land use and transportation plans support improvements to Honoapiʻilani Highway as an opportunity to enhance multimodal transportation and access to recreational resources along the coast. The Maui Metropolitan Planning Organization's (MPO) Hele Mai Maui Long-Range Transportation Plan 2040 (2019) identifies the proposed improvements "as critical to preserve the shoreline for public use." The Maui MPO also completed the West Maui Greenway Plan (September 2022), which includes paths for biking and pedestrian use from Ukumehame to Lipoa Point at the northern tip of West Maui. In addition, the County of Maui's West Maui Community Plan Update

(January, 2022), and the Pali to Puamana Parkway Master Plan (2005) envision improvements to Honoapiʻilani Highway that allow "open space and park to buffer against the effects of sea level rise and climate change while providing recreational opportunities." Therefore, to protect the community's critical transportation network, consideration of how the transportation facility interacts with public access to the shoreline and complies with the regional plans for multimodal transportation uses is also needed.

3. Alternatives

3.1 INTRODUCTION

The identification, consideration, and evaluation of reasonable alternatives are central to the EIS process under NEPA and HEPA. Building on nearly 20 years of planning in this corridor, most notably including Maui County's 2005 Pali to Puamana Parkway Master Plan and HDOT's 2007 proposal for Honoapiʻilani Highway improvements between Maalaea and Launiupoko, FHWA and HDOT have considered a range of alternatives. Based on preliminary screening, the NOI identified four alternatives for consideration during the scoping process and for the Draft EIS.

These four alternatives, along with a description of alternatives considered but not further evaluated, are presented in the FHWA Supplementary Notice of Intent (NOI) and the HDOT Environmental Impact Statement Preparation Notice (EISPN) released in November 22 and available on the project website. This information has been available to interested public and agency stakeholders throughout the scoping comment period and was also summarized during the public scoping meetings held on December 14 and 15, 2022. Recordings of the presentation as well as public comments presented at the public meeting are found on the project website and the presentation slides are included as **Appendix 1** of this Scoping Report.

This section of the Scoping Report explains the upcoming process for evaluating the alternatives advancing into the Draft EIS.

3.2 EVALUATION OF ALTERNATIVES LEADING TO DETERMINATION OF A PREFERRED ALTERANTIVE

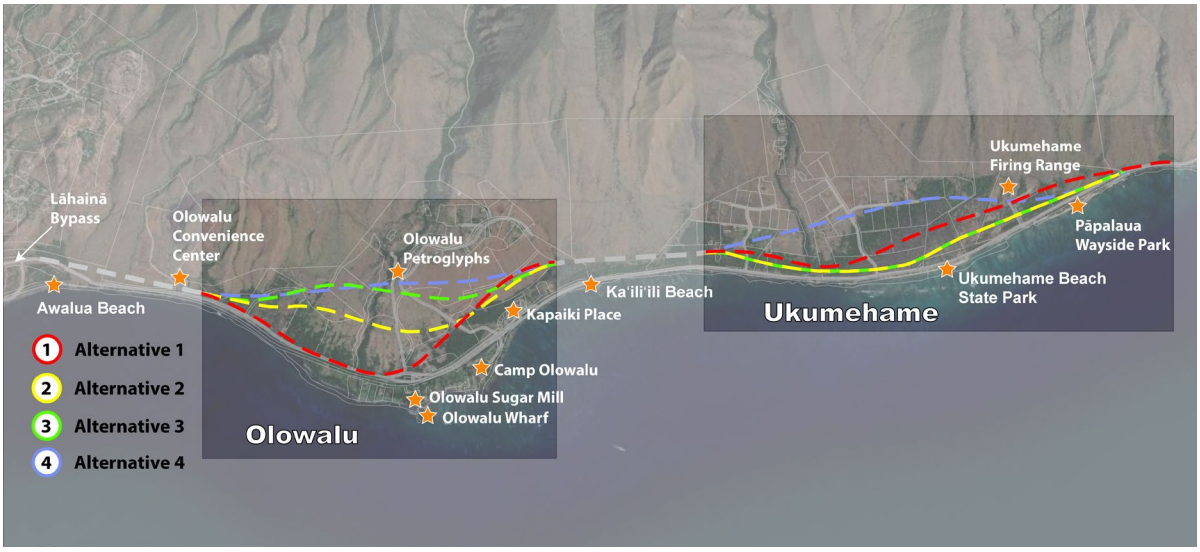
To determine the Preferred Alternative, HDOT and FHWA are using a multiple-phase approach to alternatives development and screening for the Project. The initial steps in this approach facilitate development of the broader concepts for alternatives in the scoping phase of the EIS process and an evaluation to determine whether these alternatives are reasonable. Reasonable alternatives are technically and economically feasible alternatives that meet meet the purpose and need of the Project (see 40 CFR 1508(z)). These steps include:

- *Step 1—Development and Initial Range of Alternatives [COMPLETED]*. As noted above, the initial alternatives were developed based on many years of corridor planning. The preliminary list of potential alternatives developed in Step 1 was screened based on available information. An alternative was advanced for further consideration based primarily on its ability to further the project's purpose and need.
- *Step 2— Scoping Comment Period [COMPLETED]*. The initial screening of the four alternatives anticipated to be carried into the Draft EIS were made public in the NOI and EISPN documents and a summary presentation of the alternatives was included as part of the public scoping meetings.

All documents and presentations were available on the project website throughout the scoping period, which ended on December 31, 2022.

Scoping comments from the public, interested stakeholder organizations, and from cooperating and participating agencies were considered by FHWA and HDOT in determining that all four alternatives would be carried into the Draft EIS with an additional element that the Preferred Alternative could be drawn from a combination of alternative segments on a "mix and match" basis to allow for the optimal single preferred alignment to be established in the Draft EIS and carried into the Final EIS. This is based on the alignments that vary the most in two distinct segments: across Olowalu and across Ukumehame (**Figure 2**). Between these areas and at each end of the project area, the alignments are more tightly defined with less variation.

Figure 2. Alternatives Map



- *Step 3—Refinement of the Alternatives Advanced in the Draft EIS [UNDERWAY]*. The alternatives will be further developed as necessary to allow for evaluation in the Draft EIS. Most broadly, the alternatives will be evaluated based on four high-level or yes/no feasibility considerations:
  - Would the alternative reduce the highway's exposure to the SLR-XA and ocean hazards?
  - Would the alternative meet American Association of State Highway and Transportation Officials design standards?
  - Would the costs for design and construction of this alternative fit within the long-term project funding stream?
  - Would any severe or extraordinary environmental consequences associated with the alternative be mitigated to an extent permissible within regulatory compliance?

  For the alternatives being considered, the potential social, economic, and environmental impacts resulting from implementation of the alternatives, and measures to avoid, minimize, or otherwise mitigate adverse impacts will be presented in the Draft EIS. Agency and stakeholder meetings will continue to be held during preparation of the Draft EIS, and refinements to the alternatives, as

well as the evaluation of the alternatives, potential impacts, and potential mitigation measures, will be presented and discussed at these meetings.

- *Step 4—Evaluation of the Alternatives [UNDERWAY]*. The evaluation of alternatives during development of the Draft EIS will focus on the relative benefits and adverse impacts of each alternative. The analyses conducted during the development of the Draft EIS will consider the social, economic, and environmental impacts that may be realized from the implementation of each alternative, as well as measures to avoid, minimize, or otherwise mitigate adverse effects (see FHWA Supplementary Notice of Intent (NOI): Section 1.6, Alternatives Screening Methodology and Criteria). As noted above, the evaluation will also look specifically at the Olowalu and Ukumehame segments of the four alternatives with the potential to combine segments as part of the Preferred Alternative. Agencies and the public will be provided opportunities to review and comment on the analyses and conclusions presented in the Draft EIS.
- *Step 5—Identification of a Preferred Alternative [TO COME]*. A Preferred Alternative, the alternative that is recommended for construction, will be identified in the Final EIS. In identifying the Preferred Alternative, FHWA and HDOT will consider the social, economic, and environmental benefits, adverse impacts, and mitigation measures, the engineering considerations, and costs identified in the Draft EIS as well as public input received on the information presented in the Draft EIS.

4. Public Involvement and Agency Coordination

As required by NEPA and HEPA, and as established in the project's Coordination Plan, the EIS will be informed and supported by a strategy for communication throughout the preparation of the EIS. The Coordination Plan allows for collaboration with public stakeholders and agencies with the lead agencies, EIS evaluations based on better understanding of specific local needs and concerns that will help to identify and shape alternatives and to avoid or limit adverse effects, and to ensure the Project is compatible and consistent with local and regional plans and policies.

The Coordination Plan also establishes appropriate public and agency outreach and collaboration for additional review and consultation requirements, including the following:

- Section 106 of the National Historic Preservation Act (NHPA) of 1966, which requires that federal agencies carry out consultation with the State Historic Preservation Office, Tribal Nations, and agencies, individuals, and organizations (i.e., Consulting Parties) with a demonstrated interest in a project and its potential effects on properties of historic interest and seek public comment.
- Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," which requires targeted outreach to environmental justice communities that may be impacted by a federal undertaking.
- Executive Order 13166, "Improving Access to Services for Persons with Limited English Proficiency (LEP)," states that people with LEP should have meaningful access to federally conducted and federally funded programs and activities.
- Uniform Relocation and Assistance and Real Property Acquisition Policies Act of 1970, which requires public notification of actions that may result in the condemnation and/or acquisition of property, including targeted outreach to affected property owners.
- Section 4(f) of the U.S. Department of Transportation (USDOT) Act of 1966, which requires coordination with officials of jurisdiction if a transportation project would use properties protected under this act, which include important publicly owned parks, recreation areas, wildlife/waterfowl refuges, and public or private historic resources.

4.1 SUMMARY OF COOPERATING AND PARTICIPATING AGENCIES

Pursuant to Council on Environmental Quality (CEQ) regulations, many federal, state, and county agencies have been invited to participate in the NEPA review of the Project.

4.1.1 Early Coordination

Prior to the NOI publication in November 2022, HDOT and the FHWA conducted early coordination with agency and public stakeholders. In February 2022, the project website was established to begin providing information about the Project and the early outreach effort. A database was developed for stakeholders, partners, and interested parties. Parties were (and continue to be) able to request to be included on the stakeholder list using the "Contact Us" feature of the website, by email, phone request, or in-person at the HDOT Highways Maui District Office.

The initial list contained approximately 334 stakeholders (22 federal, 41 state, 16 county, 26 elected officials, 79 historic and cultural advisers or NHOs, 79 landowners, and 71 other). This list has been updated leading into the formal initiation of NEPA/HEPA and the scoping period. Attendees of scoping meetings, persons submitting their contact information with comments, and individuals requesting to be placed on the mailing list were added to the database for future information updates. The stakeholder database includes the following:

- Elected representatives
- City and county officials
- Community planning groups
- Neighborhood councils
- Residential homeowner and renter associations
- Business organizations
- Developers
- Environmental groups
- Local schools and academic institutions
- Major employers
- Minority organizations
- Accessibility advocates
- Taxpayers groups
- Interested individuals

This list will continue to be updated as the Project proceeds.

In addition to two early scoping meetings (see Section 4.2.2), 12 meetings were held with stakeholders, including NHOs and local ancestral families, Olowalu developers, as well as county, state, and federal agencies. The early involvement with these stakeholders provided FHWA and HDOT with the opportunity to refine proposed alternatives and to understand key environmental and cultural issues of importance for the EIS.

4.1.2 Cooperating Agencies

According to CEQ (40 CFR Part 1508.1(e)), "cooperating agency" means any federal agency, other than a lead agency, that has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposed project or project alternative. A state or local agency of similar qualifications may, by agreement with the lead agencies, also become a cooperating agency. FHWA

and HDOT have contacted the agencies listed in the following sections. Table 1 through Table 3 summarize the responses received to invitations to the agencies to become cooperating agencies. Please note that FHWA and HDOT will still consult with some agencies regardless of their status as a cooperating agency.

Table 1. Cooperating Federal Agencies

COOPERATING FEDERAL AGENCY	ACCEPTED DECLINED NO RESPONSE	PRIMARY ROLE
U.S. Army Corps of Engineers, Regulatory Branch	Accepted	Wetlands and Water Quality
U.S. Federal Emergency Management Agency (FEMA)	No Response	FEMA and HIEMA will be consulted to confirm flood elevations
U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS)	No Response	NRCS has agreed to provide input on Farmland Preservation assessment
U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service	Accepted	Section 7, Essential Fish Habitat
U.S. Department of Interior, U.S. Fish and Wildlife Service	Accepted	Section 7
U.S. Environmental Protection Agency	Accepted	Clean Air Act, Overall NEPA Coordination, Environmental Justice
Department of Homeland Security, U.S. Coast Guard	Declined	Confirmed no bridge permits would be required

Table 2. Cooperating State Agencies

COOPERATING STATE AGENCY	ACCEPTED DECLINED NO RESPONSE	PRIMARY ROLE
Governor, State of Hawaii	Accepted	HEPA
Department of Business, Economic Development and Tourism, Office of Planning and Sustainable Development, Coastal Zone Management Program	Accepted	Coastal Zone Management
Department of Land and Natural Resources, State Historic Preservation Division and the State Historic Preservation Officer	Accepted	Section 106/HI 6E
Department of Land and Natural Resources, Commission on Water Resource Management	No Response	
Department of Health, Disability and Communication Access Board	Declined	
Department of Health, Indoor and Radiological Health Branch	No Response	
Department of Health, Clean Water Branch	Accepted	

Table 3. Cooperating County Agencies

COOPERATING COUNTY AGENCY	ACCEPTED DECLINED NO RESPONSE	PRIMARY ROLE
Department of Planning	Accepted	SMA

4.1.3 Participating Agencies

A participating agency is a federal, state and Native Hawaiian, regional, or local government agency that has an interest in the Project and has agreed to participate in the NEPA/HEPA and scoping processes (40 CFR 1508.1(w)). The standard for participating agency status is more encompassing than the standard for cooperating agency status described in the previous section. Therefore, cooperating agencies are, by definition, participating agencies, but not all participating agencies are cooperating agencies. Table 4 through Table 6 summarize the responses received to invitations to the agencies to become participating agencies. Please note that FHWA and HDOT will still consult with some agencies regardless of their status as a participating agency.

Table 4. Participating Federal Agencies

FEDERAL PARTICIPATING AGENCY	ACCEPTED DECLINED NO RESPONSE
The Advisory Council on Historic Preservation	No Response
Department of Housing and Urban Development	No Response
Department of the Interior, U.S. Geological Survey	No Response
Department of Transportation, Federal Aviation Administration	No Response

Table 5. Participating State Agencies

AGENCY	ACCEPTED DECLINED NO RESPONSE
Department of Accounting and General Services	Declined
Department of Agriculture	No Response
Department of Budget and Finance	No Response
Department of Business, Economic Development and Tourism	No Response
Department of Defense	Accepted
Department of Education	Declined
Department of Hawaii Home Lands	Declined
Department of Health – Clean Air Branch	No Response
Department of Health – Clean Water Branch	Accepted
Department of Health – Environmental Management Branch	Accepted
Department of Health – Health Administration	Accepted
Department of Health – Maui District Health Office	Declined
Department of Health – Solid and Hazardous Waste Branch	Accepted
Department of Natural and Land Resources – Commission on Water Resource Management	No Response
Department of Natural and Land Resources – Division of State Parks	No Response

AGENCY	ACCEPTED DECLINED NO RESPONSE
Department of Natural and Land Resources – Maui Land Division	Accepted
Department of Natural and Land Resources – Division of Aquatic Resources	Accepted
Department of Natural and Land Resources – Division of Forestry and Wildlife	Accepted
Department of Natural and Land Resources – Na Ala Hele and Trails	No Response
Department of Natural and Land Resources – Engineering Division	Accepted
Department of Natural and Land Resources – Office of Conservation and Coastal Lands	Accepted
Department of Natural and Land Resources – Maui/Lanai Burial Council	No Response
Office of Hawaiian Affairs	No Response

Table 6. Participating Agencies: County of Maui

PARTICIPATING AGENCY	ACCEPTED DECLINED NO RESPONSE
Department of Economic Development	No Response
Maui Emergency Management Agency	Accepted
Department of Environmental Management	Accepted
Department of Environmental Management, Solid Waste Division	Accepted
Department of Environmental Management, Wastewater Reclamation Division	Declined
Department of Environmental Management, Environmental Protection and Sustainability Division	Accepted
Maui Fire and Public Safety	Declined
Department of Housing and Human Concerns	Declined
Maui Metropolitan Planning Organization	No Response
Department of Parks and Recreation	Accepted
Maui Police Department	Accepted
Department of Public Works	Accepted
Department of Public Works - Development Services Administration	No Response
Department of Public Works - Engineering Division	Accepted
Department of Public Works - Highways Division	Accepted
Department of Transportation (Bus System)	Accepted
Department of Planning	Accepted
Maui Planning Commission	Accepted
Maui County Cultural Resources Commission	Accepted
Department of Water Supply	Declined

4.2 ENGAGING WITH THE PUBLIC

4.2.1 Project Website

The project website (www.Honoapiilanihwyimprovements.com) went live before early scoping meetings were held in February 2022. This site contains up-to-date project information, reports and other informational materials, a link to sign up to be included in project notices, and a link to a form for submitting comments as well HDOT and FHWA contacts (see contacts below). The project web site address is identified in all written materials, presentations, and other communications.

4.2.2 Early Scoping Meetings

A pair of virtual early scoping meetings were held on the following dates:

- February 22, 12 p.m. – 2 p.m. (46 attendees)
- February 24, 2022, 6 p.m. – 8 p.m. (43 attendees)

The two meetings provided the same presentation and opportunity to ask questions and provide input. The two separate meetings were held at different times of the day—one during midday and one in the evening—to allow people with varying schedules to have an opportunity to attend one or the other.

Information received during these meetings was used to shape the Purpose and Need Statement and to begin framing the Draft EIS. Since the NOI and EISPN had not yet been submitted, these meetings were not held under NEPA regulations, but rather in preparation for the NEPA/HEPA process. The purpose of these meetings was the following:

- Gather input on the Purpose and Need Statement.
- Inform participants of the project development process.
- Initiate discussions of potential alternatives.
- Receive input on resource concerns.
- Gain input on criteria for design and selecting the Preferred Alternative.

During this initial outreach to both agencies, stakeholders, and the general public, there were about 20 comments or inquiries directed to HDOT about the project and the environmental review process. Certain agencies responded with more information on to formally engage once the process is underway, a few agencies indicated that they did not foresee a role in the EIS review process.

Several comments requested more information on process and requests to remain involved and on project mailing lists. Early participants provided considerable interest and information, which helped to develop and refine the project's Purpose and Need Statement as well as the alternatives established in the NOI and EISPN that will be evaluated in the EIS. In summary, the following issues and concerns were communicated to HDOT and FHWA:

- The area is rich with cultural resources and ancestral histories and this needs to be carefully evaluated in the EIS. Existing families in the immediate project area and organizations active in

West Maui provided information on sensitive locations and context that will help guide the scope of work for ʻĀina Archaeology and project consultant team overall. Additional resources and organizations were recommended for consideration.

- Importance of recognizing that ancestral families continue to live and draw their livelihoods from the project area.
- Importance of the transportation linkages within and to and from West Maui and the need for a solution to the problems of the current highway and the coastal erosion and sea level rise issues that make it a less reliable link for regional mobility. At the same time, comments also reminded HDOT and FHWA that multimodal options and consistency with the Maui MPO Greenway Plan for bikeways and greenways are important considerations.
- Importance of project planning in terms of restoring and not further compromising the coastal environment and wetlands of the project area.
- Importance of understanding if there would be regional growth in traffic (and resulting environmental effects such as greenhouse gas emissions) that would be generated by the Project.

4.2.3 Scoping Meetings

A set of three meetings were held during the scoping period:

- December 14, 2022, 12 p.m. – 2 p.m. – Virtual meeting via Zoom (32 participants)
- December 14, 2022, 6 p.m. – 8 p.m. – Virtual meeting via Zoom (16 participants)
- December 15, 2022, 6 p.m. – 8 p.m. – In-person meeting held at the Lāhainā Civic Center (18 Participants)

These scoping meetings were held after the publication of the NEPA NOI and the state EISPN. This set of meetings is a requirement of both the NEPA and HEPA processes. The purpose of these meetings was to present the conceptual project alternatives based on early coordination and consultation. The meetings provided an opportunity for input on the following:

- The preliminary project Purpose and Need Statement
- The alternatives being considered
- The alternative screening criteria
- The scope of environmental studies
- Other relevant project issues

4.3 CONTACT INFORMATION

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5. Response to Comments

5.1 INTRODUCTION

This section of the scoping document provides responses to substantive comments received during the 30-day scoping comment period, including comments provided during the public scoping meetings, comments submitted by email or through the project website, MetroQuest participation, and by written comments submitted by email directly to FHWA or HDOT. **Appendix 2** provides the detailed transcription of comments and letters received, while the substantive questions and comments are summarized in the following sections along with FHWA and HDOT responses. All scoping meetings with the presentation and public comments were recorded and are posted on the project website.

Similar comments have been aggregated together as described under HEPA HAR Chapter 11-201 for ease of reading. Comments are also organized by key EIS assessment areas,:

- Purpose and Need Statement
- Alternatives
- Technical evaluations:
  - Land Use and Consistency with Related Governmental Plans and Policies
  - Land Acquisition, Displacement, and Relocation
  - Parklands and Recreational Resources/Beach Access
  - Archaeological and Historic Resources
  - Cultural Resources and Practices
  - Visual and Scenic Resources
  - Water Resources, Wetlands, and Floodplains
  - Natural Hazards
  - Traffic, Right-of-Way, Pedestrians, Bicycles
  - Construction Effects
  - Section 4(f)
  - Indirect and Cumulative Impacts

This list of speakers and commenters is presented in the following section. The individuals or organizations that contributed to a comment or aggregated comment are shown at the end of the comment in (parentheses). To cross reference a commenter's specific transcript from Appendix 2, the transcript log number is presented along with the name. For example, in Comment 2, the relevant direct transcript text from Albert Perez can be found by referencing Log Numbers 9 and 19 (Albert Perez 9, 19) and from Mark Deakos by referencing Log Number 39 (Mark Deakos 39).

5.1.1 List of Speakers and Commenters

5.1.1.1 Public and Elected Officials (in Attendance)

1. Senator Angus McKelvey, In-person meeting December 15, 2022
2. Representative Elle Cochran, In-person meeting December 15, 2022

5.1.1.2 Organizations

1. Maui Tomorrow (Albert Perez), email letter and midday virtual meeting December 14, 2022
2. Earth Justice (Mahesh Cleveland), email letter and by website
3. Aha moku o Maui Inc. (Keʻeaumoku Kapi), midday virtual meeting December 14 and in-person meeting December 15, 2022

5.1.1.3 Virtual Public Scoping Meeting December 14, 2022, Afternoon Session

1. Michael Downing, P.E.
2. Lucienne Denaie
3. Doug Ballard
4. Wayne Hedani
5. Bob Pure
6. Keʻeaumoku Kapu [Aha moku o Maui Inc.]
7. Albert Perez
8. Jennifer Maydan

5.1.1.4 Virtual Public Scoping Meeting December 14, 2022, Evening Session

1. William Spence
2. Tiare Lawrence
3. Aja Eyre
4. Kai Nishiki

5.1.1.5 In-Person Public Scoping Meeting December 15, 2022, Evening Session

1. Darren McDaniel
2. Alison Wolferd
3. Mark Deakos
4. Art Palaci
5. Jason Wolferd
6. Chris Brown
7. Kahiki Niles
8. Keʻeaumoku Kapu
9. Nameaaea Hoshino

5.1.1.6 Submitted Comments by Email, Mail, Website, MetroQuest Poll

1. Jennifer Maydan
2. Terry Lewison
3. Carter Barto
4. Nikolaus Nielsen
5. Raymond Ishii
6. Lily Villarin
7. Tracy Samio
8. James Revells
9. Bob Schmidt
10. Richard “Dick” Mayer
11. Charles Augustowski

12. Mahesh Cleveland
13. MetroQuest Poll Participants

5.2 PURPOSE AND NEED, EIS PROCESS, GENERAL

Comment 1: I can't tell you guys how much I really appreciate having you start that project. (Michael Downing 1)

Response 1: Comment noted.

Comment 2: I am concerned by the assumption that there's going to be 3.2 feet of sea level rise because it may be inadequate. We're starting to see data that says that it's gonna be probably surpassed and I'm hearing maximum scenarios of 8 or 9 feet. The EIS needs to consider the possibility of under-design and in terms of not being high enough up mauka for the lifetime of the structure. The EIS needs to consider future costs and impacts if sea level rises more than 3.2 feet. Is the EIS going to show different sea level rise projections that maybe are more updated and is a concern if we are going to be in this situation again in possibly 30 years? (Albert Perez 9 and 19 and 86, Mark Deakos 42, Schmidt 79)

Response 2: HDOT will continue to follow advice and information from the Hawai'i Climate Change Mitigation and Adaptation Commission and the State Department of Land and Natural Resources (DLNR) regarding sea level rise predictions. The predictions used will be clearly stated in the EIS.

Comment 3: We need to have some way for bikeways to be involved and alternative transportation modes. The EIS should weigh the costs and impacts of including a bikeway and beach recreational areas, as well as access to both along the highway. (Albert Perez 12 and 88)

Response 3: As noted in the NOI and EISPN, the objectives of the project are to be consistent with regional land use and transportation plans that support improvements to Honoapiʻilani Highway as an opportunity to enhance multimodal transportation and access to recreational resources along the coast. The Maui MPO's Hele Mai Maui Long-Range Transportation Plan 2040 (2019) identifies the proposed improvements "as critical to preserve the shoreline for public use." Separately, the plan seeks to develop West Maui Greenway, which includes paths for biking and pedestrian use from Ukumehame to Lipoa Point. Consistent with the County's West Maui Community Plan Update (January 2022), and the Pali to Puamana Parkway Master Plan (2005), the Project is important to protect the community's critical transportation network and should consider how the highway improvements interact with public access to the shoreline and complies with the regional plans for multimodal transportation uses.

Comment 4: The Sierra Club Maui would like to be a consulted party on this project. (Lucienne Denaie 13)

Response 4: HDOT and FWHA will reach out to the Sierra Club Maui for consultation during development of the EIS.

Comment 5: How many lanes are being proposed? Is the EIS looking at a two-lane highway or a four lane? Or a two lane with the opportunity to expand into a four lane? The Final EIS should include a right-of-way that would permit a highway with two lanes in each direction. Although one of the EISPN's stated objectives is to have "sufficient right-of-way width to accommodate a future four-lane facility throughout the project limits," the EISPN makes no mention of how any of the realignment routes and road widening under consideration could impact growth and development, including in Olowalu Town (Albert Perez 16, Aja Eyre 26, Richard Mayer 80, Mahesh Cleveland 99)

Response 5: The Project would be with one through lane in each direction, but grading, drainage, and structures will be designed to allow for a four-lane configuration (two moving lanes in each direction) if the need arises and funding is available in the future.

Comment 6: I am the CEO for Aha moku o Maui Inc. and would like to be a consulting party to this project. (Keʻeaumoku Kapu [Aha moku o Maui Inc.] 17)

Response 6: Aha moku o Maui, Inc. has been invited to participate in the Section 106 Consultation process. HDOT and FHWA appreciate the input already provided in developing, refining, and assessing project alternatives.

Comment 7: What will be done/who will be responsible for the old highway after it is relocated? The EIS should address what happens to the existing highway. The EIS should not just assess the impact where the new highway is, it should assess the impact of what's being left. (Jennifer Maydan 20, Aja Eyre 35)

Response 7: It is anticipated that the old highway would be deeded to Maui County, which would give the County jurisdiction to implement the 2022 West Maui Community Plan and 2022 West Maui Greenway Plan. HDOT would work with Maui County to provide access to all existing residents and businesses along the existing highway to and from the new alignment.

In addition, The Nature Conservancy received a Fiscal Year 2023 U.S. Department of Transportation grant to facilitate a planning process to identify nature-based solutions for the existing highway, to undertake engineering studies to understand the impacts of removing hardened structures, and to work with the University of Hawaiʻi School of Landscape Architecture to develop plans and drawings to help visualize existing highway improvements.

Comment 8: Was there any consultation with Ohana Hooikaika, one of the last remaining Hawaiian families that live right there [location of proposed alternative alignment]? (Tiare Lawrence 22)

Response 8: Yes, the family was contacted and met with HDOT early in the development of the project alternatives.

Comment 9: Through emergency proclamations, the shoreline was hardened at Ukumehame and it resulted in extensive beach loss in the area. As part of the project, it seems that the loss of beaches due to shoreline hardening should be considered as far as perhaps removing the hardened shoreline in those areas. I would suggest removal of the shoreline hardening and to look at how we can encourage beaches to come back to those areas. Are we going to keep the sea walls in place that are causing all of the erosion exasperation, or will there be a plan for removal of the walls and or partial of the road so that eventually you only have one route going on the mauka and not have two roads? If it's not, and the lower road would remain, what is the game plan for keeping it in use? Is it going to be more sea walls and hardening? Is there any plan for the lower road that you can discuss here or alternative plans for the lower road? (Kai Nishiki 28, 29, and 30, Sen. McKelvey 63, Mark Deakos 67, Perez 89)

Response 9: It is intended that the existing highway right-of-way would be deeded to Maui County for use as a local roadway providing beach access and to continue to provide access to existing homes and businesses. Future use of the roadway as a key element in Maui County parks planning and the proposed Maui County Greenway are also important planning considerations for the future use of the roadway. These future uses could incorporate hardened shoreline removal and partial decommissioning of the roadway based on additional community planning and input.

Comment 10: There are car fires, trash fires, and all kinds of illegal drug activity in the area of Cut Mountain between the bypass and the low road. All along the existing highway and shoreline there are cars and the houseless. I think that it needs to be a huge priority, that consideration and a plan is in place before we just move the highway. A lot of people would rather use the bottom road and come out where it ties in where it merges again so that's kind of a major concern because along the shoreline over there you get a lot of recreational users that just basically jumping over the railing doing whatever they please to do. The EIS should address impacts on the presence of police and conservation officers in the area makai of the highway (Kai Nishiki 34, Kapu 48, Perez 92)

Response 10: The EIS will assess this area of Cut Mountain area between the bypass and the low road and determine opportunities to avoid this outcome in the project area. HDOT will work with Maui County to improve conditions in the Cut Mountain area as well inform the planning of this project. In Olowalu, the project area is more active with residences and businesses so the remaining roadway would be less isolated and less likely to generate the same level of activity. The roadway in and around Ukumehame provides more direct beach access and is a well-used recreational resource.

Comment 11: Are there other purposes besides the primary purpose of moving this because of sea level rise or are there any other purposes that we are not aware of that are involved with this? (Darren McDaniel 40)

Response 11: The purpose and need and primary objectives as described in Section 2.0 are the stated needs and goals of this project. There are no undisclosed goals.

Comment 12: Is there any way we could have a little more landmarks [graphically depicted] to identify exactly where these roads are? Is there a map that you can provide that shows in more detail the potential routes that the State is considering for the highway realignment? (Alison Wolferd 41, Terry Lewison, 69)

Response 12: The maps presented in the NOI and EISPN and as shared with the public during scoping meetings reflect the proposed routes for the alternatives alignments. The graphic representation of the alternatives as analyzed in the EIS will be more detailed and will include more detailed points of reference.

Comment 13: Are the roads are going to be raised roads like on pillars or are they going to be flat roads like how the bypass is? (Kahiki Niles 47)

Response 13: The EIS will describe the anticipated construction choices for each alignment alternative. It is anticipated that based on the location within the project area, any given alignment will have a mix of raised roadways, bridge structures, and at-grade portions.

Comment 14: Is the road [Project] being built for growth? I would really encourage you to think about this project and say how could we build this to make a sustainable community. We've got to address the population growth. How are we going take care of the shoreline if we are going to allow those things [population growth and new business] to happen? Because you get people who feel they have the public right to do whatever they like commercially, so if you are going to address these kinds of things [shoreline concerns], you'll address the population growth. (Darren McDaniel 51, Keʻeaumoku Kapu 57)

Response 14: As noted in the project's purpose and need (see Section 2), the Project is proposed to create a resilient and reliable transportation connection in the critical Honoapiʻilani Highway corridor. Travel demand will be based on long-term growth forecasts as established by the Maui County MPO. There are no non-transportation development actions associated with the Project. Locally and adjacent to the project area, any known projects currently in development or likely to be built by the Project's impact analysis years will be included in the transportation analyses as well as the assessment of indirect and cumulative impacts.

Comment 15: Is the funding from the bypass going to be diverted to this [proposed Project]? (Jason Wolferd 60)

Response 15: Although the funding of other projects is outside of the scope of this EIS, the U.S. Department of Transprotation's $22 million RAISE grant and the $23 million OMNIBUS earmark are federal funds specifically in place for this Project. The EIS will consider the anticipated timing of construction, including the cumulative impacts of other projects that may occur in West Maui.

Comment 16: I think your timeline is highly unrealistic. I don't think you will be doing construction by 2025. Look at all the agencies that you have to consult with, and you are going to have to coordinate with OHA, there's ceded lands on there [within the project area]. (Sen. McKelvey 61)

Response 16: FHWA and HDOT initiated the NEPA and HEPA processes with publication of the NOI and the EISPN in November 2022. Consistent with NEPA guidance, this established a roughly two-year process for completion of NEPA and obligation of the RAISE grant. As part of the project initiation, the agencies have completed an Agency Coordination Plan and are working with supporting resource agencies at federal, state, and county levels. In addition, a concurrent Section 106 of the NHPA consultation process has been initiated to address the OHA lands as well as the potential for historic and archaeological resources in this area.

Comment 17: Why don't you get rid of the purpose of doing it for sea rise and make it 100% about improving the environmental and cultural impact of the lower road. Do it for the environmental and for the cultural impact, not for the sea level rise. The recommended alignment should not be based solely on avoidance of sea level rise, but should take into account land rights, including the interests of the heirs of allodial title holders; cultural sites, cultural access, and cultural practices; and recreational and residential access. (Darren McDaniel 64, Perez 95)

Response 17: The project's purpose and need is tangible and fact-based evidence that a transportation deficiency exists. The secondary objective of creating a highway alignment is compatible with local plans and policies, including the Maui MPO's Hele Mai Maui Long-Range Transportation Plan 2040 (2019) and the West Maui Greenway Plan (September 2022), which includes paths for biking and pedestrian use from Ukumehame to Lipoa Point at the northern tip of West Maui. In addition, the County's West Maui Community Plan Update (January 2022), and the Pali to Puamana Parkway Master Plan (2005) envision improvements to Honoapiʻilani Highway that allow "open space and park to buffer against the effects of sea level rise and climate change while providing recreational opportunities." In addition, cultural and environmental considerations of the Project are critical factors in the evaluation of project benefits and potential adverse effect of the alternatives (including the No Build Alternative, which assumes the existing roadway remains in its current configuration).

Comment 18: Is the EIS just going to assess the realignment or is it going to include the makai portion, like the P2P plan area? (Mark Deakos 66)

Response 18: The EIS will assess the potential environmental effects of the alignment alternatives, including their compatibility and consistency with local and regional plans such as the 2005 Pali to Puamana Parkway Master Plan.

Comment 19: I suggest one correction related to the West Maui Community Plan. It was adopted by the Maui County Council and finalized in January 2022. (Jennifer Maydan 68)

Response 19: Comment noted.

Comment 20: It is imperative that we take action ASAP to move the portion of the highway inland. And please make it two lanes in each direction from the Pali all the way into Lāhainā town, and extend the Bypass north to Kaanapali at least, ideally all the way to the Kapalua Airport. We need to improve our roadways now before the traffic nightmares ensue from the added traffic of new communities are built. I would prefer to see the Lāhainā Bypass road completed prior to this construction beginning in 2025 (Carter Barto 70, Mayer 84, Augustowski 84)

Response 20: Comment noted.

Comment 21: Could you tell me what alternative is furthest away from my property boundary? (Nikolaus Nielsen 71)

Response 21: The potential proximity and potential incursion of each alignment alternative to adjacent private parcels will be identified in the EIS. Additionally, properties can be identified via the project website map to view approximate location of alternative alignments to individual properties.

Comment 22: I think secondary objectives should include: 1) to help preserve and restore the natural shoreline along this stretch of coastline; 2) to help mitigate brownwater events originating from the mauka side of the new highway to help protect and restore the Olowalu Reef; and 3) to support the availability of alternative modes of transportation. (MetroQuest Comment MQ2)

Response 22: These secondary objectives are consistent with the NOI and EISPN that identifies objectives that the Project be consistent with county and community plans (which include compatibility with multimodal transportation options) and that environmental considerations be important screening elements in evaluating proposed alternative alignments.

Comment 23: Reliable transportation is vital. However, so is preserving our natural environment, including our beaches, oceans, mountains. Please also consider the preservation of the original families who reside in these neighborhoods. (MetroQuest Comment MQ3)

Response 23: The Draft EIS will assess a range of potential environmental and cultural effects resulting from the Project and will be used to evaluate the identified project alternatives. The Draft EIS will identify any private properties that would be adversely affected by an alternative alignment.

Comment 24: It is important to look at multiple functions for the new highway so in addition to moving cars safely, it could also slow/soak/spread stormwater on the mauka side of the highway to recharge the aquifer and protect the reef, it can provide a fire break for fire coming from mauka, maybe with fire proof vegetation such as wiliwili trees, and can also facilitate a means of alternative transportation such as bikes and scooters (working in alignment with the West Maui Greenway Project). (MetroQuest Comment MQ4)

Response 24: See response to Comment 58 regarding stormwater management. Fire break benefits of the new alignment will be evaluated in the EIS including best options for using fire resistant

vegetation. Alternative alignments will be assessed for consistency with the West Maui Greenway Plan and furthering goals of multimodal options within the project area.

5.3 ALTERNATIVES

Comment 25: None of the alternative alignments completely avoid the projected sea level rise inundation zones. Is it mostly in the area of Launiupoko where it is not outside of that area? Is there an alignment that would keep us 100% out of the sea level rise area? (Kai Nishiki 32, Wayne Hedani 4)

Response 25: A portion of the highway segments in Launiupoko as well as in Ukumehame are anticipated to remain within the SLX-RA inundation zone based on the limitations of the alignment options at each end of the project area. Opportunities to raise the roadbed within these areas will be assessed in the Draft EIS.

Comment 26: What criteria does the DOT feel, of those four routes, that they will need to make one of them the priority? Could you explain a little bit about like what the process will be and who will guide the ultimately what the preferred alignment proposal will be? Is it all or nothing which each alternative? Or is there a way to combine segments of the alternatives? The EIS should look at the possibility of using some elements from different alignment alternatives. (Bob Pure 6, Kai Nishiki, 38, Aja Eyre 33, Perez 94).

Response 26: As detailed in the NOI Supplement (Section 1.6, Alternatives Screening Methodology and Criteria), the environmental assessment provided in the Draft EIS will be used to evaluate and compare the potential environmental and cultural effects for each alternative. The comparative analysis across the alternatives will be used to identify the Preferred Alternative. As noted in the comment and as described in Section 3.2, there will be a consideration of picking elements of the alignments, most notably with a specific focus on Olowalu and Ukumehame (see Figure 2).

Comment 27: Alternative A is proposed above Ohana Hoʻoikaika house around that area, was there any consideration to continue that road and then veer off past Olowalu town up above Kapāiki? (Tiare Lawrence 27)

Response 27: The alignments as proposed for evaluation in the EIS are based on planning to date and in consultation with stakeholders early in the process, including the Hooikaika family.

Comment 28: I have a solution to the problem of where the water is coming over the highway by Ukumehame, Olowalu, and Launiupoko. The design would be to install stainless steel pipes on top of the wall which would return water back to the ocean. (Art Palaci 43)

Response 28: The design option is noted and will be shared with Maui County. The anticipated transfer of jurisdiction of the existing highway to Maui will be in keeping with the County's West Maui Community Plan Update (January 2022), and the Pali to Puamana Parkway Master Plan (2005). As

noted in the response to other comments, there is also strong public interest in removing coastal hardening for sections of the existing highway.

Comment 29: Mass transit should be seriously examined since this realignment won't do much to reduce existing traffic issues, addressing ways to reduce the number of cars transiting must be evaluated. The EIS should address the possibility of providing 3 travel lanes, with one lane used for mass transit such as buses, and with mass transit vehicles being given priority signaling through the Pali tunnel. It is highly likely that at some point (sooner rather than later) a major investment will be made in establishing a better bus system between Central Maui and West Maui. (MetroQuest Comment MQ7, Perez 90, Mayer 83)

Response 29: Mass transit requires a regional planning basis beyond the limitations of the Project to improve reliability of Honoapiʻilani Highway in this critical area. The Project does not preclude future public transit planning and implementation in the corridor.

5.4 TECHNICAL EVALUATIONS

Comment 30: I'll say upfront that the EIS needs to consider: impacts on flora and fauna; air quality; noise; archaeological resources; cultural resources; scenic resources; population; housing; economic impacts; fiscal impacts; public facilities; traffic; utilities; energy; climate change; drainage, water resources, and wastewater; storm water; run-off into the ocean from the facility, the highway facility. It would also need to discuss, cumulative and secondary impacts, and would need to examine consistency with state and County plans and policies, which it sounds like you're doing. Also, reasonable alternatives, including a no-action alternative. Alternatives that might enhance the quality of the environment in the project Area. That's a very important one. Secondary population and growth impacts resulting from this action, And of course, unresolved issues. (Albert Perez 8)

Response 30: These identified issues are components of the assessment that will be conducted as part of the EIS and in evaluating Project alternatives to determine the Preferred Alternative for the Project.

Comment 31: MetroQuest pin mapping generated the environmental and cultural concerns as set for in Table 2 and Figure 3 (MetroQuest Comment MQ8)

Response 31: See responses within the table.

Comment 32: We have concerns about historic and cultural sites/ continued public access to the shoreline for recreational and cultural use; impacts on wetland areas and native fauna and flora; impacts on kuleana land owners in Ukumehame and planning for sea level rise. (Lucienne Denaie 14)

Response 32: Comment noted. These are all elements in the scope of work of the EIS.

Figure 3. MetroQuest Dropped Point Map

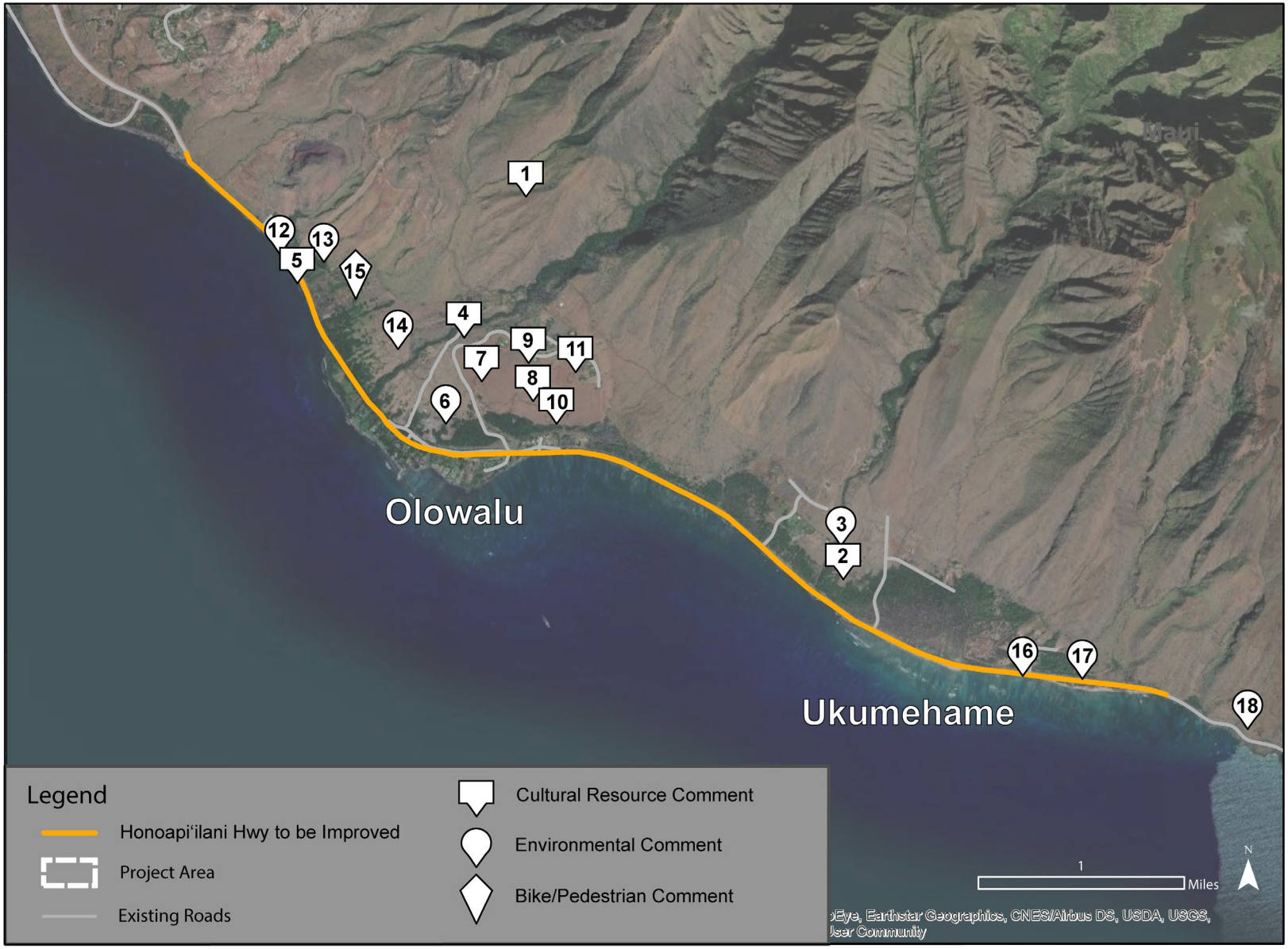


Table 7. MetroQuest Dropped Point Comment List

MAP KEY	MAP TAG	COMMENT	RESPONSE
1	Cultural Resources	Resource noted	This information will be provided to the cultural resource evaluation leads and Section106 participants.
2	Cultural Resources	Existing dwelling and ongoing mauka/makai cultural practice.	This information will be provided to the cultural resource evaluation leads and Section106 participants.
3	Environmental	Ukumehame Stream	Streams and water resources will be identified and included in the EIS.
4	Cultural Resources	Puʻu Kilea. Cultural site with burials.	This information will be provided to the cultural resource evaluation leads and Section106 participants.
5	Cultural Resources	Multiple surf breaks	This information will be provided to the cultural resource evaluation leads and Section106 participants.
6	Environmental	Former streambed is somewhere around here. Floodplain?	Mapped flood plains will be identified and described in the EIS.
7	Cultural Resources	These platforms may contain burials or other cultural material.	This information will be provided to the cultural resource evaluation leads and Section106 participants.
8	Cultural Resources	Resource noted	This information will be provided to the cultural resource evaluation leads and Section106 participants.
9	Cultural Resources	These platforms may contain burials or other cultural material.	This information will be provided to the cultural resource evaluation leads and Section106 participants.
10	Cultural Resources	These platforms may contain burials or other cultural material.	This information will be provided to the cultural resource evaluation leads and Section106 participants.
11	Cultural Resources	These platforms may contain burials or other cultural material.	This information will be provided to the cultural resource evaluation leads and Section106 participants.
12	Environmental	Not much room here in case of sea level rise and/or erosion. Can the road be placed further mauka?	In the Laniaupoko area, the four alternative alignments would merge as they come closer to merging with the existing Lāhainā bypass. The ridgeline of the mountains coming down toward the coast creates considerable constraints further mauka of the existing bypass but opportunities to move the new alignment fartjer above sea level rise elevations will be considered.

MAP KEY	MAP TAG	COMMENT	RESPONSE
13	Environmental	We want to be sure this realignment will be well out of zone of sea level rise. The latest National Oceanic and Atmospheric Administration models predict almost 4 feet of rise as the "moderate" expectation for the end of the century. The worst-case scenario in 2014 was 3.2 feet; today this is 7.9 feet, so we need to be confident another realignment won't be needed for a long time.	See response to Comment 2.
14	Environmental	All the more mauka alignments have the opportunity to capture and move water from the mauka side to that it is slowed and soaked into the ground to prevent brownwater from reaching the ocean while recharging the aquifer. We need to get away from redirecting stormwater into large storm drains that push out into the ocean, smothering the reef, and consider the slow, spread and soak designs.	All alternative alignments will be evaluated for their potential stormwater effects including beneficial opportunities to capture and manage storm flows to avoid and minimize sediment loading to coastal waters.
15	Bike/Ped	The design should always keep in mind alternative modes of transportation—either a much improved mass transit, possibly rail, but most certainly bikes and e-bikes.	See response to Comment 24 and 29.
16	Environmental	Once the new highway is built, there needs to be plans for the eventual removal or all hard armoring along this coastline to allow a natural shoreline to be restored that preserves beaches and natural coastal processes. Who will ultimately be in charge of the old highway and its eventual removal needs to be outlined with a plan of action. Access to the shoreline is critical but people don't need to be able to fish out of their truck window if that is impacting that coastal resource.	See Response to Comment 27.
17	Environmental	There should be a plan for the restoration of wetlands through public/private partnerships. This will greatly enhance the mitigation of brownwater threats to the Olowalu Reef.	See response to Comment 51.
18	Environmental	This is a major source of land-based sediment affecting the reef. If road work is to go this far, there should be some planning around mitigating the sediment in this area.	See response to Comment 51.

5.4.1 Land Use and Consistency with Related Governmental Plans and Policies

Comment 33: Certain developers will be looking to use the infrastructure improvements that are made in the area to push forward development in Olowalu and so I want to know what measures are being taken to disallow development makai of whatever alignment is eventually decided upon. In November 2015, notice of a final environmental impact statement ("FEIS") for the Olowalu Town Master Plan ("Olowalu Plan") was published in The Environmental Notice. The Commission voted 6-to-1 in favor of rejecting the FEIS. The Commission noted that the FEIS's traffic impact assessment report was based on widening the Honoapiʻilani Highway, but it was unclear whether HDOT's and FHWA's highway realignment project would involve widening. (Kai Nishiki 31, Mahesh Cleveland 98)

Response 33: The potential for induced land development will be analyzed in the EIS. However, there are no land use and zoning changes associated with the proposed transportation improvements and much of the land makai of the alignment alternatives is already County-owned.

Comment 34: The hospital should have been talked about because it alleviates all the things that we have here on Maui, we only have one hospital, one hospital, and still, we didn't make the choice of building a hospital in Lāhainā. (Nameaaea Hoshino 53)

Response 34: Hospital services are outside of the scope of this project; however, access to vital services and resources will be considered in the EIS. Improving the reliability of Honoapiʻilani Highway will impove access to such vital services, including medical services.

Comment 35: The impact on land use in the area makai of the new highway needs to be addressed. The degree to which each alternative may induce and/or facilitate development needs to be thoroughly analyzed. The EIS for the Project must analyze the growth-inducing indirect effects of facilitating development or other changes in the pattern of land use caused by increasing traffic capacity through the Project area and realigning the highway mauka. (Perez 91, Cleveland 85).

Response 35: Potential changes in land use and induced growth resulting from the Project will be assessed in the EIS. No non-transportation development actions are associated with the Project.

Comment 36: To what degree are you consulting with the Pali to Puamana plan, it's my understanding that there was a lot of public input given for that plan and it's been there waiting to be enacted for many years. The EIS should address the plan's adherence to the West Maui Community Plan and the Pali-to-Puamana Plan of 2005. (Aja Eyre 23, Perez 97)

Response 36: The Pali to Puamana Parkway Master Plan (2005) was a primary source used in developing the alternatives to be analyzed in the Draft EIS.

5.4.2 Land Acquisition, Displacement, and Relocation

Comment 37: What is the plan for the numerous squatters that have built structures in the right of way? (Nikolaus Nielsen 72)

Response 37: As noted in Section 4.5.2, current activities and users (including potentially illegal users) of land located along the alternative alignments will be identified. Based on the legal status of the activity, acquisition of property and relocation of residents or businesses would be implemented in conformance with the requirements of the Federal Uniform Relocation and Assistance and Real Property Acquisition Policies Act of 1970 (42 U.S.C. 4601) as well as Hawai'i's eminent domain requirements (Hawai'i Revised Statutes Section 101-2).

5.4.3 Parklands and Recreational Resources/Beach Access

Comment 38: Are the study and plans going to include beach access opportunities and open space opportunities? Will the realignment affect beach access in the project area and are there provisions to somehow provide for maybe a major park in the area makai of the Ukumehame portion of the project area or allow for continued public access to the beach at this segment of the project area. There is a great opportunity here to potentially restore approximately 7 miles of shoreline from Puamana to the Pali. (Doug Ballard 3, Wayne Hedani 5, Mark Deakos 45)

Response 38: As noted in the in the Supplementary Notice of Intent, FHWA and HDOT have identified a secondary objective to conform with regional land use and transportation plans. The assessment of parklands and recreational resources will include mapping and describing the current shoreline beach and park resources as well as any short- and long-term planned changes to open space resources in the project area. Several long-term plans, including the 2022 West Maui Community Plan and the 2022 West Maui Greenway Plan, identify objectives to improve recreational access to the shoreline within the project area. The analysis will determine consistency of the Project's alternative alignments with existing and future recreational access.

Comment 39: Will there be beach access during and when the project is finished in 2025? Is the EIS going to address what would be done with the shoreline if the highway moves away? Is there still going to be shoreline access for fisherman? What's going to be done with the old road? There's also the potential for the existing highway to act as a seawall and cause beach loss if is left in place. We want continued to access to our beach, but we don't want the existing road to cause beach loss. How do you take that account in this plan and in the EIS? (Michael S. Downing 15, Albert Perez 11 and 93, Aja Eyre 25)

Response 39: Continued access to the beach and to existing residences and business will be maintained by connections to the new highway alignment and the ultimate configuration and determination of the continued use of the existing roadway.

5.4.4 Archaeological and Historic Resources

Comment 40: Is there going to be additional archaeological survey work? This is a very, very rich area. And although there have been surveys in the past, we have new techniques now, and it would really be good to know more about the areas before we choose the route. (Lucienne Denaie 2)

Response 40: The archaeological and historic resources assessment for the EIS will be conducted in accordance with the requirements of Section 106 and Hawaiʻi Revised Statutes Chapter 6E-8 and will include consultation with the Hawaiʻi State Historic Preservation Division (SHPD), the Advisory Council on Historic Preservation, NHOs, and Consulting Parties. The analysis will establish an Area of Potential Effect (APE) for the assessment of potential direct and indirect effects on both archaeological and historic resources. The assessment of the project alternatives will be based on the completion of an Archaeological Literature Review Study, Ethnographic Study, and a surface-level reconnaissance of the alternative alignments identifying and describing known or potential cultural resources and architectural historic resources. As required, additional Archaeological Investigation Studies will be undertaken for the Preferred Alternative when it is identified on publication of the Draft EIS.

Comment 41: Is there going to be another cultural site survey done before the EIS? It would make more sense if the cultural sites surveys that need to be done are archaeological surveys. (Aja Eyre 24)

Response 41: The Draft EIS will present the findings of above-ground reconnaissance combined with Archaeological Literature Review Study and an Ethnographic Study. This information will be used to evaluate the alignment alternatives and help define the Preferred Alternative, which will be established with publication of the Draft EIS. A Programmatic Agreement will be established to guide archaeological investigation studies for the Preferred Alternative that would be conducted as part of the Final EIS or after completion of NEPA but before construction. The Programmatic Agreement would also frame the mitigation standards that could potentially be required based on the investigation studies.

Comment 42: The project area is rich in cultural history, contains many important archaeological sites, and ongoing cultural practice continues. The project needs to carefully consider these factors, and needs to avoid, minimize and/or mitigate impacts to these important resources and practices. Anywhere from Puamana to Olowalu there are archeological and historical concerns. When you do the feasibility study for this whole area you got to kind of brush this with a fine-tooth comb because all the way through Olowalu you're going to discover a lot of archeological sites, possible burials and all those things. You've got to figure out what kind of anomalies [sites of historic or cultural significance] you're going to hit mauka when you start doing the mauka realignment. (MetroQuest Comment MQ1, Keʻeaumoku Kapu 49, 58)

Response 42: HDOT and FHWA appreciate the local knowledge and concern that has been shared and the continued collaboration in evaluating the alternative alignments as part of the EIS.

Comment 43: Is the project going to be compliant with the Section 106 consultation process? (Keʻeaumoku Kapu 65)

Response 43: A Section 106 consultation process has been initiated with coordination between FHWA, HDOT, and SHPD as well as reaching out to numerous potential consulting parties. Interested lineal descendants and those knowledgeable in historic sites and cultural practices can notify HDOT and FHWA of their interest in participating in the Section 106 consultation for the Project. More Section 106 information including the timeline, proposed programmatic agreement, consulting party meeting recordings, and meeting presentations can be found on the project website.

5.4.5 Cultural Resources and Practices

Comment 44: One of the areas of concern for me is Puamana Park, where throughout the past there has been a lot of erosion and from that erosion a lot of bones, or burials, that entered the ocean from 2017. I think right now, it gives us a great opportunity to be involved in a process from the beginning, especially when it comes to the cultural impact assessment that needs to be done. There's another area that is designated as a grave along the shorelines of Launiupoko and I've seen the studies pertaining to the degraded areas that basically will be part of the ocean within the next 20 to 30 years. My bigger concern is also the Olowalu area, I think it's really important that you continue the process of archaeological data recovery. You'll see that the area is largely clustered with cultural overlays. I really hope that being involved in the process and at the same time having what we know about the area is helpful to address those issues. (Keʻeaumoku Kapu [Aha moku o Maui Inc.] 7).

Response 44: HDOT and FHWA appreciate the local knowledge and concern that has been shared, and in turn, the information has been shared with the project team so that it can be further analyzed in the Ethnographic Study to be completed and presented in the Draft EIS.

Comment 45: My concern is that we need to do a cultural overlay of the entire stretch of this corridor from Puamana to Ukumehame. (Ke'eaumoku Kapu [Aha moku o Maui Inc.] 18)

Response 45: An Archaeological Literature Review Study will be prepared and a field survey will be conducted to understand historical sites in the project area. The mapping of historic properties will be a part of this effort.

Comment 46: I'm really concerned about a big highway impeding on Kawailoa Heiau and the petroglyphs. It doesn't sit well with me that we're going to put a highway near these significant cultural sites that area is very special and so I know for myself and our family and Aha Moku and other Hawaiian Organizations, we are very adamantly opposed to the mauka preferred alignments and so I just wanted to put that on record tonight. The further mauka [you locate the proposed project] there are cultural sites not only in Olowalu, but in other areas of the project as well. (Tiare Lawrence 37, Albert Perez, 10)

Response 46: The Section 106 process, undertaken alongside the NEPA process, will ensure that potential impacts to such historic and cultural resources will be included in the analysis of alternatives evaluated for the Project.

Comment 47: Let's talk about history, let's talk about degradation, let's talk about genocide, let's talk about all those kind of things because we can't just wipe this thing clean and not think that this is important because it is still important to us, the lineal descendants that are still here today. (Keʻeaumoku Kapu 50)

Response 47: The Project will include several studies aimed at understanding the history in the area, the cultural and historic properties present, and cultural practices that occur in the area. In addition to having experts looking at these details, this effort will include gathering information from Kanaka Maoli and lineal descendants in the area.

5.4.6 Visual and Scenic Resources

Comment 48: The following should be located and described in the Final EIS: Scenic pull-outs and parking for viewing, some picnic spots, rest spots with bathrooms (which may need a water supply), etc. (Richard Mayer 82)

Response 48: A viewshed analysis will be conducted as a part of the EIS. This analysis will consider the impacts of the Project on important viewsheds in the area.

5.4.7 Water Resources, Wetlands, and Floodplains

Comment 49: The EIS should address drainage issues and wetlands. I know that is not in the purview of the proposed Project, but there's been talk about restoring the wetlands in Olowalu so those become functional again. I hope that is part of the big picture when either part of the EIS or part of the design process, and those stakeholders that have knowledge, you know, perhaps a private-public partnership so that you can leverage funds in the design so that you can achieve multiple benefits. It's maybe not in the wetland inventory right now but if there is potential for wetland restoration, is that going to trigger potentially additional federal permits or lengthening of the time? (Aja Eyre 36, Mark Deakos 56, Sen. McKelvey, 62, Perez 87)

Response 49: Existing wetlands will be mapped and evaluated in the EIS. The new highway alignment will incorporate appropriate best practices for stormwater management along the corridor and this will be described in the EIS. These measures would not preclude and could be integrated with potential

wetland improvement strategies developed as mitigation for impacts of the Project or based on the work of other initiatives such as the current Nature Conservancy study of sedimentation issues in West Maui. The timing of such potential wetland restoration projects and the relationship to NEPA completion for the Project will be identified in the EIS.

Comment 50: Directly beside there [the firing range], there are protected wetlands. How are you going to accomplish being able to build a highway though wetlands? (Jason Wolferd 44)

Response 50: The wetlands in and near the Ukumehame Firing Range will be mapped and assessed as part of the EIS. The potential effects of any alignment alternative on these wetlands will be identified and be part of the evaluation of alternatives leading to the Preferred Alternative. Mitigation to minimize or avoid any identified adverse impacts on wetlands would be undertaken as part of the EIS analyses.

Comment 51: This is going to be detrimental to our resources, especially how much water that should be coming from Olowalu and Ukumehame. We have families like the Palafox, Tosh ohana's that came to Naiakane and mentioned that their ʻāina is going to be in jeopardy. (Nameaaea Hoshino 52)

Response 51: A Cultural Impact Assessment will be included in the EIS, which will look at cultural practices occurring in the area. Impacts to parcels will be taken into account when evaluating the proposed alternative alignments.

Comment 52: The Olowalu reef, which has been slated as the number one priority for restoration and protection, is in close proximity to the project area. Perhaps covered under water resources but want to make sure the this also includes marine water resources (flora, fauna, and coral reefs) since everything mauka affects makai. With the proposed Project there is an opportunity to intercept stormwater and prevent it from reaching the reefs. There are opportunities to design it [the proposed Project] to where you're slowing, spreading, soaking that stormwater so the sediment is trapped, it then recharges the aquifer which is another huge benefit to that. (Mark Deakos 54, MetroQuest Comment MQ6)

Response 52: The Project will be consulting with National Oceanic and Atmospheric Administration-National Marine Fisheries Service and DLNR-Division of Aquatic Resources in regard to impacts to aquatic species and any mitigation measures needed to protect aquatic species protected under the Endangered Species Act or the Magnuson-Stevens Fishery Conservation and Management Act.

Comment 53: The EIS should explore the opportunity to coordinate with mauka landowners on projects that can mitigate drainage impacts from areas mauka of the highway. The EIS should also address the consequences of failing to undertake such coordination. (Perez 96)

Response 53: The Project will consider drainage and sedimentation impacts. The Project will continue to seek input from landowers and stakeholders in the project area.

Comment 54: There needs to be a provision made for connecting roads between the new mauka highway and the coastal highway and coastline every 3 miles. (Mayer 81)

Response 54: Connector roads will be included in the planning and design of the Project. Connector roads will be spaced to ensure continued access to area properties and beach areas.

5.4.8 Natural Hazards

Comment 55: The proposed Project represents an opportunity to possibly create a fire break. (Mark Deakos 55)

Response 55: Fire break benefits of the new alignment will be evaluated in the EIS, including best options for using fire resistant vegetation.

5.4.9 Traffic, Right-of-Way, Pedestrians/Bicycles

Comment 56: [I am] assuming traffic counts will be done for the Olowalu Transfer Station intersection and that merge lanes might be incorporated as deemed appropriate. (Schmidt 78)

Response 56: A traffic study will be conducted as a part of the Project. This traffic study will be used in conjunction with federal and state design guidelines to determine what intersection configurations would be appropriate.

5.4.10 Construction Effects

Comment 57: Looking at the project timeline, construction is slated to start in 2025. Is construction going to be started after the by-pass, the north end of the bypass is finished? Because we're going to have to deal with construction there, which is supposed to be done, or should have been done long ago. Are we going to have to deal with traffic from Ukumehame all the way to the bypass, and then as we go north to our homes again deal with even more construction and more congestion? (Jason Wolferd 59)

Response 57: The EIS will identify other construction projects that could be underway before, after, or concurrent with the Project. It is anticipated that the cumulative effects of multiple projects occurring in a similar time frame will be primarily a qualitative assessment unless there are directly overlapping or adjacent areas of construction that could have a cumulative environmental effect.

Comment 58: The pros and cons of night work should be discussed. (MetroQuest Comment MQ5)

Response 58: The ability to utilize night work will be considered in the development of the EIS and assessment of potential construction effects.

5.4.11 Section 4(f)

Comment 59: The Ukumehame Shooting range is the only public shooting range on the island. We have heard rumors that the plan might move the highway closer to the mountain and shut down the range, will it be able to stay open or will it have to be closed because of the alignment? This would be very unacceptable to all the sportsmen and women who use the range as that is the only legal public shooting range on the island. Please don't make changes that will jeopardize the only existing state shooting range. Please do not shut down the firing range. The police department of the National Guard, the Department of Public Safety, and I'm told that others also use the firing range for training purposes. (Raymond Ishii 73, Chris Brown 46, Tracy Samio 75, Lily Villarin, 74, William Spence 21, Revells 76 and 77)

Response 59: As currently envisioned, no alternative alignment would displace the Ukumehame Shooting Range, although the entrance driveway to the facility would be relocated to intersect with the new highway alignment. As a public recreational facility, Section 4(f) of the USDOT Transportation Act provides additional level of review and alternative assessment should any proposed transportation use adversely affect the future of the firing range.

5.4.12 Indirect and Cumulative Impacts

Comment 60: Federal and state law require that environmental review for the Project analyze the growth-inducing impacts of realigning and widening Honoapiʻilani Highway, including the potential for the Project to facilitate development along the new transportation corridor. Under NEPA and HEPA, the scope of environmental review for the Project should encompass the indirect effects of realigning and widening Honoapiʻilani Highway, including the potential for the Project to induce growth and facilitate development, for each of HDOT's proposed alternatives. (Mahesh Cleveland, 97, 100)

Response 60: Per applicable NEPA and HEPA regulations and guidance, the Draft EIS will include an assessment of indirect and cumulative effects of the Project. While there are no land use or zoning actions associated with the Project, project-generated changes in capacity or accessibility will be analyzed for potential indirect development.

6. Environmental Considerations

6.1 INTRODUCTION

The purpose of the EIS process is to disclose the anticipated impacts of the subject Project and to identify feasible measures that might be taken to mitigate potential impacts that may result from its implementation and operation. This section of the Scoping Report describes the analysis framework for the NEPA and HEPA EIS as well as a description of the environmental review process and anticipated permits and approvals needed for the Project. This is followed by a framework for the analyses to be included in the EIS.

6.2 ENVIRONMENTAL REVIEW PROCESS

The HDOT as the state project sponsor and lead agency, and FHWA, as federal lead agency, will jointly prepare a single EIS. The EIS will be prepared in accordance with the requirements of NEPA, as amended (42 USC 4321, et seq.), with 23 USC 139 regarding efficient environmental reviews for project decision-making, with CEQ regulations implementing NEPA (40 CFR 1500-1508), with FHWA regulations implementing NEPA (23 CFR 771.101-771.139), and with all applicable federal, state, and local laws and regulations. This EIS will also be prepared pursuant to Hawai'i Revised Statutes Chapter 343, the state's law governing the preparation of an EIS.

The steps in this project's NEPA and HEPA process are described below:

- *Early Public and Agency Outreach.* As part of the initial development of the Project in terms of defining its Purpose and Need Statement as well as preliminary alternatives to be considered, HDOT and FHWA held a public information meeting in February 2022 and sought the input from a variety of federal, state, and county agencies.
- *Notice of Intent.* The NEPA Notice of Intent to prepare an EIS was published on November 22, 2022, and the HEPA EISPN was published in the Hawai'i Environmental Bulletin on November 23, 2022.
- *Scoping.* Scoping introduces the public to a project, including its purpose and need, its goals and objectives, alternatives to be considered, the framework of analysis for the EIS, as well as the public and agency Coordination Plan.

  The NEPA Supplementary Notice of Intent Document as well as in the HEPA EISPN (both published in November 2022) included the public scoping comment period and the schedule for three public scoping meetings. Two virtual meetings were held on December 14 (one midday and one evening session) and one in-person scoping meeting was held the evening of December 15 at the Lāhainā Civic Center. These information documents were posted on the project's website (www.Honoapiʻilanihwyimprovements.com) along with project fact sheets and directions for participation in the public scoping process.

In addition to the scoping meetings where the public was afforded an opportunity to provide verbal comments on the Project, a period for submitting comments extended through December 31, 2022. FHWA and HDOT reviewed and considered all comments received, with responses to substantive comments provided in this Scoping Report. This report provides updated information related to the Project and addresses public comments, as appropriate, and summarizes the project EIS process to date.

- *Draft Environmental Impact Statement.* Following publication of this Scoping Report, a Draft EIS will be prepared to assess the environmental effects of the Project in accordance with NEPA, HEPA and other appropriate regulations and requirements. FHWA and HDOT will coordinate review by the project's cooperating agencies during preparation of the Draft EIS. After FHWA and HDOT approve the Draft EIS, a Notice of Availability will be published in the Federal Register and the Draft EIS will be published in the HEPA Environmental Bulletin, which will begin a 45-day comment period for the Draft EIS.

- *Public Review.* The Draft EIS will be made available to the public at local repositories and on the project website and will be distributed to the cooperating and participating agencies and elected officials. FHWA will establish a public comment period for the Draft EIS. The public comment period will be a minimum of 45 days beginning with the Notice of Availability of the Draft EIS, and a public hearing will be held, at which members of the public can offer oral testimony on the findings of the Draft EIS. Comments will also be accepted in writing during the public comment period.

- *Final Environmental Impact Statement.* After the public comment period on the Draft EIS closes, a Final EIS will be prepared. The Final EIS will include the comments and responses on the Draft EIS and any necessary revisions to the Draft EIS based upon consideration of those comments.

- *NEPA Record of Decision and HEPA Acceptance.* Title 23 U.S.C. 139(n)(2) provides for a combined Final EIS and Record of Decision (ROD) document that is the intent for this EIS so long as the Project meets the conditions outlined in FHWA's January 14, 2013, guidance document on MAP-21 Section 1319 Accelerated Decision-making in Environmental Reviews. For HEPA, the Final EIS will be published and noticed in the HEPA Environmental Bulletin followed by acceptance or nonacceptance of a Final EIS for a state agency action, which is determined by the Governor of Hawai'i. Acceptance must occur before the use of state or county lands or funds in implementing the Project.

6.3 PERMITS AND APPROVALS

The permits, reviews, and approvals required for the Project will depend on the features of the Preferred Alternative. The list of anticipated federal, state, and local permits in Table 8 will be refined as the project alternatives are developed. Input on other approvals that may be necessary is requested from government agencies and other participants as part of this environmental review process. An asterisk (*) is noted next to those permits or approvals that may necessitate Chapter 343 environmental review.

Table 8. List of Anticipated Permits and Approvals

PERMIT / APPROVAL		ISSUING / APPROVING AGENCY
Federal	National Environmental Policy Act	Federal Highway Administration
	Department of Army Permit, Clean Water Act (CWA) Section 404 and Rivers and Harbors Act Section 10	U.S. Army Corps of Engineers
	Department of Transportation Act of 1966, Section 4(f) Evaluation	Federal Highway Administration
	Endangered Species Act, Section 7 consultation	U.S. Fish and Wildlife Service; and National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries)
	Farmland and Conversion Impact Rating, pursuant to the Farmland Protection Policy Act	U.S. Department of Agriculture, Natural Resources Conservation Service
	Magnuson-Stevens Fishery Conservation and Management Act, Essential Fish Habitat coordination	NOAA Fisheries
	National Historic Preservation Act Section 106 Consultation	State Historic Preservation Officer
State of Hawaiʻi	Hawaiʻi Revised Statutes Chapter 343, Environmental Review Compliance*	Governor, State of Hawaiʻi
	Coastal Zone Management Act Consistency Determination	Office of Planning and Sustainable Development, Coastal Zone Management Program
	CWA Section 401, Water Quality Certification	Hawaiʻi Department of Health (HDOH), Clean Water Branch
	CWA Section 402, National Pollutant Discharge Elimination System Permit	HDOH, Clean Water Branch
	Hawaiʻi Revised Statutes Chapter 6E-8, Historic Preservation Review	Department of Land and Natural Resources (DLNR), State Historic Preservation Division
	Stream Channel Alteration Permit	DLNR, Commission on Water Resource Management (CWRM)
	Conservation District Use Permit*	DLNR, Office of Conservation and Coastal Lands
	Americans with Disabilities Act Accessibility Guidelines	HDOH, Disability and Communication Access Board
	Community Noise Permit/Community Noise Variance	HDOH, Indoor and Radiological Health Branch
County of Maui	Special Management Area Permit*	County of Maui Planning Department
	Building and Grading permits	County of Maui Planning Department

* permits or approvals that may necessitate Chapter 343 environmental review

6.4 ENVIRONMENTAL ANALYSIS FRAMEWORK

6.4.1 Project Area

As set forth in Section 1.2, the proposed project area is defined by the existing Honoapiʻilani Highway between milepost 11 and milepost 17. The proposed southeastern terminus at milepost 11 is in Ukumehame in the vicinity of Pāpalaua Beach Park, and the northwestern terminus of the Project is

at milepost 17 in Launiupoko, where Honoapiʻilani Highway intersects the southern terminus of the Lāhainā Bypass.

6.4.2 Transportation Analysis Year

The EIS will utilize a 2045 analysis year to reflect completion of the Project within the context of the Maui MPO's current Maui Travel Demand Model with growth and travel demand projections through 2045. Time frames for indirect and cumulative assessment could vary based on timelines for other projects identified from resource or planning agencies.

6.4.3 Organization of the Environmental Impact Statement

The EIS will be organized in two volumes.

- Volume 1 will consist of the environmental impact analyses with chapters that describe the purpose and need for the Project, reasonable range of alternatives considered and evaluated, environmental considerations, public involvement activities, and supporting studies as required by NEPA and HEPA.
- Volume 2 will comprise appendices that will consist of technical reports supporting the information provided in Volume 1.

The general format of the EIS chapters provided in Volume 1 will be as follows:

- *Affected Environment*, which will describe existing conditions within the study area, as defined above or as defined specifically for each subject area. This will provide the baseline data on which potential project impacts will be determined. In some circumstances the environmental analysis requires the determination of future baseline conditions to evaluate the impacts of the project alternatives. The future baseline condition reflects anticipated changes in the affected environment independent of the Project. Accepted analytical methodologies are used to project population, employment, traffic conditions, noise levels, and air quality concentrations to forecast future conditions in the study area.
- *Environmental Considerations*, which will provide an analysis of potential adverse and beneficial impacts associated with each project alternative. In addition to the "build" alternatives, this section will consider a "no build" alternative, which describes future conditions without the Project.
- *Mitigation*, which will identify proposed measures that would mitigate any adverse impacts that may be realized by the implementation of that action and identified in the "Environmental Considerations" section of the assessment. Mitigation includes the consideration of the avoidance of the impact(s), the minimizing of the impacts that cannot be avoided, the rectifying of the impact by repairing or restoring the affected environment, the reducing or eliminating of impacts, and the compensation for those impacts that would result as the action is implemented or that which would result from the operation of the action.

6.5 ENVIRONMENTAL ANALYSIS APPROACH AND METHODOLOGY

The environmental review will assess potential direct, indirect, and cumulative effects of the Project on the social, economic, and environmental resources within the study area. FHWA and HDOT will use established methodologies and approaches to the impact assessment for each technical impact assessment area. These are described for the key technical chapters of the Draft EIS in **Appendix 3** of this Scoping Report.

HONOAPIʻILANI HIGHWAY IMPROVEMENTS PROJECT,
WEST MAUI: UKUMEHAME TO LAUNIUPOKO

Appendix 9 – Public Comment Period Documents

November 2025

Prepared for

Honoapiʻilani Highway Improvements

Prepared by

wsp

November 2025

Contents

DEIS Public Comments – Comment Log
DEIS Public Comments – Commentor Submissions
DEIS Public Hearing Transcripts
DEIS Public Hearing Presentation

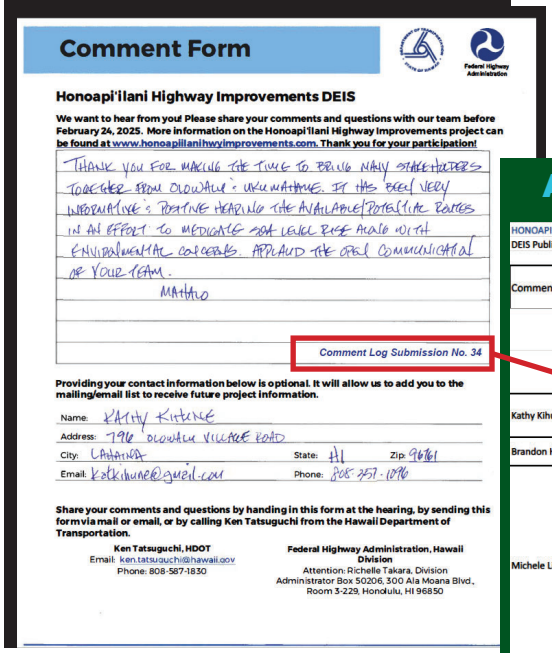
Honoapi‘ilani Highway Improvements

Reponse to Comments / Comment Log Guidance

All comments recieved during the DEIS comment period as well as comments recieved at the public hearings held for the project are included in this Comment Log. In Chapter 9, these comments are organized by topic and batched together with other similar comments. Comments in this Comment Log can be found in Chapter 9 using the number found in the “Ch. 9 Comment No.” column.

Batched comments in Chapter 9 can be found in the Comment Log using the submission number following the commenter’s name found in parethasis after each comment. The comment in Chapter 9 will not necessarily be a quote of any given comment, but rather a generalization of all similar comments recieved.

Individual Comment



Comment Form

Honoapi'ilani Highway Improvements DEIS

We want to hear from you! Please share your comments and questions with our team before February 24, 2025. More information on the Honoapi'ilani Highway Improvements project can be found at www.honoapiilanihwyimprovements.com. Thank you for your participation!

THANK YOU FOR MAKING THE TIME TO BRING MANY STAKEHOLDERS TOGETHER FROM OLOWALU & UKUMEHAME. IT HAS BEEN VERY INFORMATIVE & POSITIVE HEARING THE AVAILABLE/POTENTIAL ROUTES IN AN EFFORT TO MITIGATE SEA LEVEL RISE ALONG WITH ENVIRONMENTAL CONCERNS. APPLAUD THE OPEN COMMUNICATION OF YOUR TEAM.
MAHALO

Comment Log Submission No. 34

Providing your contact information below is optional. It will allow us to add you to the mailing/email list to receive future project information.

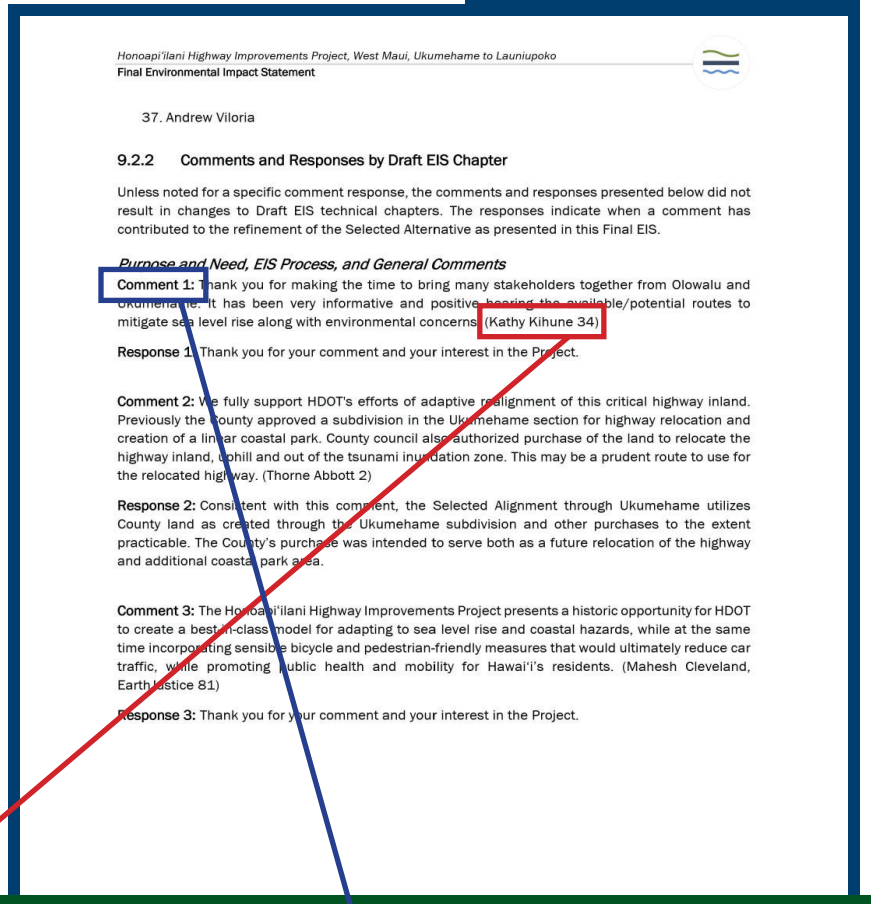
Name: KATHY KIHUNE
Address: 796 OLOWALU VILLAGE ROAD
City: LAHAINA State: HI Zip: 96761
Email: katkihune@gmail.com Phone: 808-357-1896

Share your comments and questions by handing in this form at the hearing, by sending this form via mail or email, or by calling Ken Tatsuguchi from the Hawaii Department of Transportation.

Ken Tatsuguchi, HDOT
Email: ken.tatsuguchi@hawaii.gov
Phone: 808-587-1830

Federal Highway Administration, Hawaii Division
Attention: Richelle Takara, Division Administrator Box 50206, 300 Ala Moana Blvd., Room 3-229, Honolulu, HI 96850

CHAPTER 9



Honoapi'ilani Highway Improvements Project, West Maui, Ukumehame to Launiupoko
Final Environmental Impact Statement

37. Andrew Viloria

9.2.2 Comments and Responses by Draft EIS Chapter

Unless noted for a specific comment response, the comments and responses presented below did not result in changes to Draft EIS technical chapters. The responses indicate when a comment has contributed to the refinement of the Selected Alternative as presented in this Final EIS.

Purpose and Need, EIS Process, and General Comments

Comment 1: Thank you for making the time to bring many stakeholders together from Olowalu and Ukumehame. It has been very informative and positive hearing the available/potential routes to mitigate sea level rise along with environmental concerns. (Kathy Kihune 34)

Response 1: Thank you for your comment and your interest in the Project.

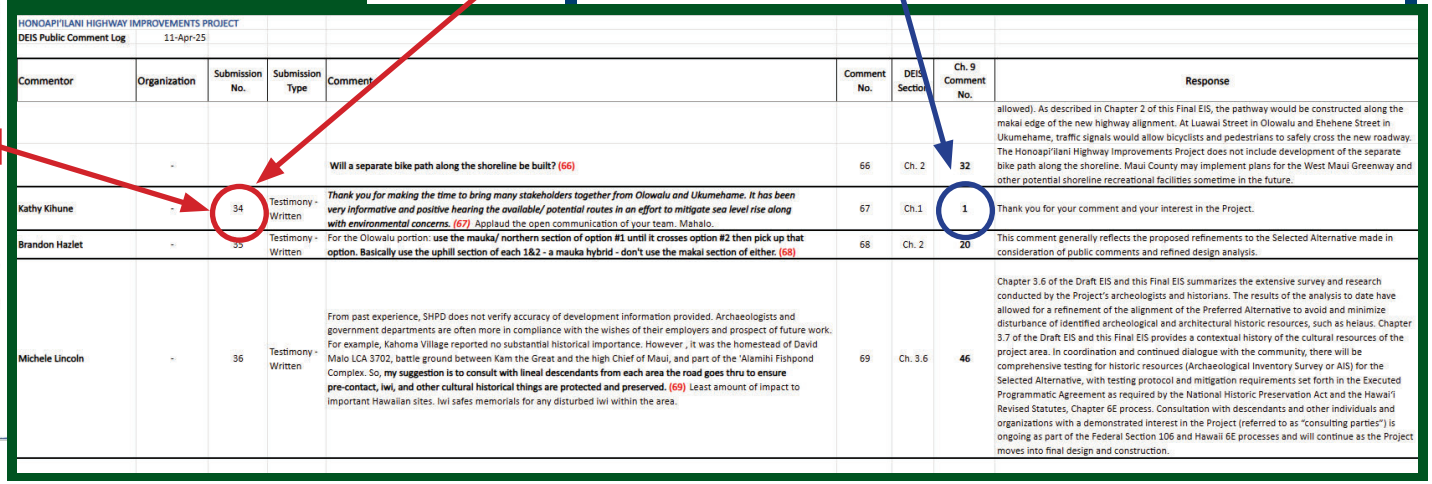
Comment 2: We fully support HDOT's efforts of adaptive realignment of this critical highway inland. Previously the County approved a subdivision in the Ukumehame section for highway relocation and creation of a linear coastal park. County council also authorized purchase of the land to relocate the highway inland, uphill and out of the tsunami inundation zone. This may be a prudent route to use for the relocated highway. (Thorne Abbott 2)

Response 2: Consistent with this comment, the Selected Alignment through Ukumehame utilizes County land as created through the Ukumehame subdivision and other purchases to the extent practicable. The County's purchase was intended to serve both as a future relocation of the highway and additional coastal park area.

Comment 3: The Honoapi'ilani Highway Improvements Project presents a historic opportunity for HDOT to create a best-in-class model for adapting to sea level rise and coastal hazards, while at the same time incorporating sensible bicycle and pedestrian-friendly measures that would ultimately reduce car traffic, while promoting public health and mobility for Hawai'i's residents. (Mahesh Cleveland, Earth Justice 81)

Response 3: Thank you for your comment and your interest in the Project.

Appendix 9



HONOAPI'ILANI HIGHWAY IMPROVEMENTS PROJECT
DEIS Public Comment Log 11-Apr-25

Commentor	Organization	Submission No.	Submission Type	Comment	Comment No.	DEIS Section	Ch. 9 Comment No.	Response
	-			Will a separate bike path along the shoreline be built? (66)	66	Ch. 2	32	allowed). As described in Chapter 2 of this Final EIS, the pathway would be constructed along the makai edge of the new highway alignment. At Luawai Street in Olowalu and Ehehene Street in Ukumehame, traffic signals would allow bicyclists and pedestrians to safely cross the new roadway. The Honoapi'ilani Highway Improvements Project does not include development of the separate bike path along the shoreline. Maui County may implement plans for the West Maui Greenway and other potential shoreline recreational facilities sometime in the future.
Kathy Kihune	-	34	Testimony - Written	*Thank you for making the time to bring many stakeholders together from Olowalu and Ukumehame. It has been very informative and positive hearing the available/ potential routes in an effort to mitigate sea level rise along with environmental concerns.* (67) Applaud the open communication of your team. Mahalo.	67	Ch.1	1	Thank you for your comment and your interest in the Project.
Brandon Hazlet	-	35	Testimony - Written	For the Olowalu portion: **use the mauka/ northern section of option #1 until it crosses option #2 then pick up that option. Basically use the uphill section of each 1&2 - a mauka hybrid - don't use the makai section of either.** (68)	68	Ch. 2	20	This comment generally reflects the proposed refinements to the Selected Alternative made in consideration of public comments and refined design analysis.
Michele Lincoln	-	36	Testimony - Written	From past experience, SHPD does not verify accuracy of development information provided. Archaeologists and government departments are often more in compliance with the wishes of their employers and prospect of future work. For example, Kahoma Village reported no substantial historical importance. However , it was the homestead of David Malo LCA 3702, battle ground between Kam the Great and the high Chief of Maui, and part of the 'Alamihi Fishpond Complex. So, **my suggestion is to consult with lineal descendants from each area the road goes thru to ensure pre-contact, iwi, and other cultural historical things are protected and preserved.** (69) Least amount of impact to important Hawaiian sites. Iwi safes memorials for any disturbed iwi within the area.	69	Ch. 3.6	46	Chapter 3.6 of the Draft EIS and this Final EIS summarizes the extensive survey and research conducted by the Project's archeologists and historians. The results of the analysis to date have allowed for a refinement of the alignment of the Preferred Alternative to avoid and minimize disturbance of identified archeological and architectural historic resources, such as helaus. Chapter 3.7 of the Draft EIS and this Final EIS provides a contextual history of the cultural resources of the project area. In coordination and continued dialogue with the community, there will be comprehensive testing for historic resources (Archaeological Inventory Survey or AIS) for the Selected Alternative, with testing protocol and mitigation requirements set forth in the Executed Programmatic Agreement as required by the National Historic Preservation Act and the Hawai'i Revised Statutes, Chapter 6E process. Consultation with descendants and other individuals and organizations with a demonstrated interest in the Project (referred to as "consulting parties") is ongoing as part of the Federal Section 106 and Hawaii 6E processes and will continue as the Project moves into final design and construction.

Honoapi‘ilani Highway Improvements

Reponse to Comments / Comment Log Guidance

The comment log contained in this appendix includes all comments given during the public comment period including those provided at the public hearings.

Name & organization of Commentor

Text of each comment as provided (Original comments are included after the log table)

This column has the corresponding comment and response number where this comment can be found in the Response to Comments in Chapter 9

The response to each comment is included in this column. This response is the same response given in Chapter 9.

HONO[illegible]'ILANI HIGHWAY IMP[illegible]OVEMENTS PROJECT
DEIS P[illegible]lic Comment Log 11-Apr-25

Commentor	Organization	Submission No.	Submission Type	Comment	Comment No.	DEIS Section	Ch. 9 Comment No.	Response
								allowed). As described in Chapter 2 of this Final EIS, the pathway would be constructed along the makai edge of the new highway alignment. At Luawai Street in Olowalu and Ehehene Street in Ukumehame, traffic signals would allow bicyclists and pedestrians to safely cross the new roadway
	-			**Will a separate bike path along the shoreline be built? (66)**	66	Ch. 2	32	The Honoapi‘ilani Highway Improvements Project does not include development of the separate bike path along the shoreline. Maui County may implement plans for the West Maui Greenway and other potential shoreline recreational facilities sometime in the future.
Kathy Kihune	-	34	Testimony - Written	***Thank you for making the time to bring many stakeholders together from Olowalu and Ukumehame. It has been very informative and positive hearing the available/ potential routes in an effort to mitigate sea level rise along with environmental concerns. (67)*** Applaud the open communication of your team. Mahalo.	67	Ch.1	1	Thank you for your comment and your interest in the Project.
Brandon Hazlet	-	35	Testimony - Written	For the Olowalu portion: **use the mauka/ northern section of option #1 until it crosses option #2 then pick up that option. Basically use the uphill section of each 1&2 - a mauka hybrid - don't use the makai section of either. (68)**	68	Ch. 2	20	This comment generally reflects the proposed refinements to the Selected Alternative made in consideration of public comments and refined design analysis.
Michele Lincoln	-	36	Testimony - Written	From past experience, SHPD does not verify accuracy of development information provided. Archaeologists and government departments are often more in compliance with the wishes of their employers and prospect of future work. For example, Kahoma Village reported no substantial historical importance. However , it was the homestead of David Malo LCA 3702, battle ground between Kam the Great and the high Chief of Maui, and part of the 'Alamihi Fishpond Complex. So, **my suggestion is to consult with lineal descendants from each area the road goes thru to ensure pre-contact, iwi, and other cultural historical things are protected and preserved. (69)** Least amount of impact to important Hawaiian sites. Iwi safes memorials for any disturbed iwi within the area.	69	Ch. 3.6	46	Chapter 3.6 of the Draft EIS and this Final EIS summarizes the extensive survey and research conducted by the Project's archeologists and historians. The results of the analysis to date have allowed for a refinement of the alignment of the Preferred Alternative to avoid and minimize disturbance of identified archeological and architectural historic resources, such as heiaus. Chapter 3.7 of the Draft EIS and this Final EIS provides a contextual history of the cultural resources of the project area. In coordination and continued dialogue with the community, there will be comprehensive testing for historic resources (Archaeological Inventory Survey or AIS) for the Selected Alternative, with testing protocol and mitigation requirements set forth in the Executed Programmatic Agreement as required by the National Historic Preservation Act and the Hawai‘i Revised Statutes, Chapter 6E process. Consultation with descendants and other individuals and organizations with a demonstrated interest in the Project (referred to as "consulting parties") is ongoing as part of the Federal Section 106 and Hawaii 6E processes and will continue as the Project moves into final design and construction.

Unique number Given to each Submission

Submittal Method

Bold text is used to identify substantive elements of the submission. These substantive elements are used to create the consolidated comments in Chapter 9. Bolded text is assigned an individual comment number shown in **(red)** after the bold text.

If the topic of the comment is discussed in the EIS, the section where that discussion can be found is included in the this column

DEIS Public Comments – Comment Log

Commentor	Organization	Submission No.	Submission Type	Comment	Comment No.	DEIS Section	Ch. 9 Comment No.	Response
Lee Chamberlain	Maui Bicycling League	1	Email	I am writing to express strong support for the integration of the West Maui Greenway (WMG) into the Honoapiʻilani Highway realignment project. The WMG, as part of the Hele Mai Maui Legacy Projects, presents a significant opportunity to foster sustainable, multimodal transportation that strengthens resilience and community connectivity in West Maui. (1)	1	Ch. 3.5	31	
				Strategic Implementation of Segment 6. (1)The WMG Final Report (September 2022) identified Segment 6 (Olowalu to Lahaina Pali Trailhead) as a priority due to its potential to repurpose the realigned Honoapiʻilani Highway. Alternative A scored highest in the evaluation due to its scenic views, strong recreational connections, and the minimal need for new right-of-way (ROW). By utilizing the existing highway, this option is both cost-effective and highly feasible, despite its location within the sea-level rise (SLR) exposure area.	1		31	Implementing the West Maui Greenway (by the County) along the existing highway is considered a future condition that is fully compatible with the Honoapiʻilani Highway Improvements Project. The West Maui Greenway is not included in the Project because its ultimate design, funding, approvals and implementation would be a separate process led by Maui County. After the highway is realigned, jurisdiction of the existing Honoapiʻilani Highway would be transferred to the County of Maui, and the roadway would continue to carry vehicular traffic that serves local traffic (business, residences, beaches, parks) but with less volume. As set forth in Chapter 5 of this Final EIS, and based on public comments on the Draft EIS, the new Honoapiʻilani Highway alignment will incorporate a separate and protected shared-use path along the makai side of the new right-of-way (including two locations for protected crosswalks of the new highway). This will add flexibility and provide for integration with the West Maui Greenway, should it be constructed in the future.
				Compliance with the Navahine Settlement Commitments . (1)The WMG supports the Navahine Settlement's mandate to expand multimodal transportation infrastructure, including pedestrian pathways and bikeways, to reduce vehicle miles traveled (VMT) and support decarbonization goals. Public Transit, Pedestrian, and Bikeway Expansion: The WMG aligns with interim goals to integrate alternative transportation options statewide. Specific Deadlines: Planning and budgeting for multimodal infrastructure must begin by April 2025, per the Mid-Range Transportation Plan (MRTP) and the Statewide Transportation Improvement Program (STIP). Budgeting Prioritization: Projects such as the WMG that align with decarbonization and VMT reduction goals are prioritized within a five-year timeline for infrastructure completion.	1		31	
				Integration with Complete Streets Policy (1) . The WMG is a model project for the Complete Streets policy, which requires transportation projects to prioritize safety and accessibility for all users. Policy Integration: The WMG will create safe, separated pathways for cyclists and pedestrians and improve public transit access. Complete Streets Assessment: Beginning in April 2025, all Capital Improvement Projects (CIPs), including the WMG, must undergo assessments to document compliance with Complete Streets principles. Expenditure Prioritization: The WMG's focus on multimodal connectivity positions it for priority funding under the Complete Streets framework, ensuring that resources are allocated to support this vital project.	1		31	
				Alignment with Act 131 and the Hawai'i Bike Plan (1) . The WMG aligns with Act 131's requirement for a multimodal, accessible, and sustainable transportation system and the Hawai'i Bike Plan's vision for a statewide network of protected bike paths. Act 131 emphasizes separated pathways that improve public safety, health, and quality of life.	1		31	
				Current Funding and Federal Support. The WMG has secured significant financial support, including: RAISE Grant: $15 million awarded to the WMG to support development and implementation efforts. Inclusion in STIP (MC28): Ensures that the project is recognized as a priority for state and federal transportation funding allocations. This available funding underscores the importance of expediting the WMG by integrating Segment 6 into the Honoapiʻilani Highway realignment project, ensuring that the funds are utilized effectively and within the required timelines. (2)	2	Ch. 3.5	34	As set forth in the Draft EIS and this Final EIS, the Honoapiʻilani Highway Improvements Project is fully compatible with the ultimate development of the West Maui Greenway (although, as indicated in the comment, it would be a separately funded project). With jurisdiction of the existing Honoapiʻilani Highway being transferred to Maui County as part of the Project, planning elements of the West Maui Greenway that use the existing highway's right-of-way (or adjacent areas) would be more easily integrated with County actions. Due to the funding identified above, separate approvals would be required related to the West Maui Greenway project, and the purpose and need for the West Maui Greenway project would be distinct from the purpose and need for the Honoapiʻilani Highway Improvements Project.
				Environmental and Permitting Benefits. Repurposing the existing highway corridor may qualify for a Categorical Exclusion (CE) under 23 CFR 771.111(f), as the project involves minimal environmental impact. This streamlined approach reduces the need for extensive environmental reviews and accelerates project implementation. Public Health and Emergency Preparedness. The WMG will enhance community health by promoting active transportation and equitable access to safe recreational spaces. Additionally, the greenway can function as a non-motorized evacuation route, supporting emergency response efforts in disaster scenarios.					
				Recommendation: I respectfully urge HDOT and FHWA to incorporate the West Maui Greenway into the Honoapiʻilani Highway realignment plan by repurposing the existing highway for Segment 6. This approach will maximize cost-efficiency, adhere to policy mandates, and support West Maui's resilience, safety, and community connectivity goals. (3) Thank you for your commitment to building a sustainable and resilient transportation future for West Maui.	3	Ch. 3.5	31	Implementing the West Maui Greenway (by the County) along the existing highway is considered a future condition that is fully compatible with the Honoapiʻilani Highway Improvements Project. The West Maui Greenway is not included in the Project because its ultimate design, funding, approvals and implementation would be a separate process led by Maui County. After the highway is realigned, jurisdiction of the existing Honoapiʻilani Highway would be transferred to the County of Maui, and the roadway would continue to carry vehicular traffic that serves local traffic (business, residences, beaches, parks) but with less volume. As set forth in Chapter 5 of this Final EIS, and based on public comments on the Draft EIS, the new Honoapiʻilani Highway alignment will incorporate a separate and protected shared-use path along the makai side of the new right-of-way (including two locations for protected crosswalks of the new highway). This will add flexibility and provide for integration with the West Maui Greenway, should it be constructed in the future.

Commentor	Organization	Submission No.	Submission Type	Comment	Comment No.	DEIS Section	Ch. 9 Comment No.	Response
Thorne Abbott	Coastal Planners LLC	2	Email	We fully support. HDOT's efforts of adaptive realignment of this critical highway inland. Previously the County approved a subdivision in the Ukumehame section for highway relocation and creation of a linear coastal park. County council also authorized purchase of the land to relocate the highway inland, uphill and out of the tsunami inundation zone. This may be a prudent route to use for the relocated highway. (4)	4	Ch. 1	2	Consistent with this comment, the Selected Alignment through Ukumehame utilizes County land as created through the Ukumehame subdivision and other purchases to the extent practicable. The County's purchase was intended to serve both as a future relocation of the highway and additional coastal park area.
Carter Barto	Aloha Self Storage Lahaina	3	Email	I am writing to express my strong support for the proposed project to realign Honoapiilani Highway inland (5) and please also expand it from two lanes to four lanes. (6) As a daily commuter who relies on this highway to travel between my job in West Maui and my home in Pukalani, I have firsthand experience with the challenges posed by the current state of this vital roadway. The most recent alignment proposal makes the most sense for the long term viability of this highway.	5,6	Ch. 1	6,8	Response 6: Response 6: As stated in Chapter 2, Alternatives of the Draft EIS, based on current demand, the proposed highway would be constructed with two lanes but with sufficient right-of-way to accommodate a full four-lanes if and when demand indicates that need and if funding is available. Should HDOT pursue completion of a four-lane configuration in the future, a supplemental NEPA/HEPA environmental assessment would be undertaken. Response 8: As stated in in Chapter 2, Alternatives of the Draft EIS, based on current demand, the proposed highway would be constructed with two lanes but with sufficient right-of-way to accommodate a full four-lanes if and when demand indicates that need and if funding is available. Should HDOT pursue completion of a four-lane configuration in the future, a supplemental NEPA/HEPA environmental assessment would be undertaken. In addition, HDOT will evaluate in the design build process the potential for including a passing lane segment as part of the initial build-out.
				Honoapiilani Highway serves as the sole viable connection between these regions, making it a critical infrastructure for residents, businesses, and visitors alike (7). However, its current alignment and capacity have proven inadequate in meeting the demands of a growing population. Increasing traffic is often caused by whale watchers, high tides washing salt water over the road, and frequent traffic jams or closures due to accidents and brush fires. The need for this project is both urgent and clear, and I urge decision-makers to prioritize its implementation for the following reasons: Safety (7): The existing highway's proximity to the coastline exposes it to flooding, erosion, and other hazards, particularly during extreme weather events. Relocating the highway inland will enhance safety for all users by mitigating these risks. Additionally, the expansion to four lanes will reduce congestion-related accidents by allowing for smoother traffic flow, safer overtaking opportunities, and detour options during unfortunate closures caused by fatal traffic accidents.	7	Ch. 1	6	
				Economic Vitality (7): As the primary route connecting West Maui to Central Maui, Honoapiilani Highway supports the movement of goods, services, and workforce. This need has dramatically increased following the August 2023 fires, which displaced much of the workforce to Central Maui, adding additional daily commuters who still work in West Maui. Delays and disruptions caused by traffic congestion or road closures have a significant economic impact. A four-lane highway moved inland will ensure more reliable and efficient travel, benefiting local businesses and sustaining economic growth. Quality of Life (7): For daily commuters like myself, the current two-lane configuration often results in extended travel times and frustration. On some occasions, I have been unable to return home or make it to work, losing an entire workday or being forced to stay overnight. The proposed re-alignment along with an expansion to four lanes will alleviate congestion, allowing residents to spend less time on the road and more time with their families or engaging in their communities.	7	Ch. 1	6	As stated in Chapter 2, Alternatives of the Draft EIS, based on current demand, the proposed highway would be constructed with two lanes but with sufficient right-of-way to accommodate a full four-lanes if and when demand indicates that need and if funding is available. Should HDOT pursue completion of a four-lane configuration in the future, a supplemental NEPA/HEPA environmental assessment would be undertaken.
				Environmental Considerations (7): While moving the highway inland may raise concerns about environmental and cultural impacts, the current alignment's vulnerability to sea-level rise and coastal erosion poses a long-term environmental threat. A carefully planned realignment can minimize ecological and cultural disruption while safeguarding the highway's longevity.	7	Ch. 1	6	
				Emergency Preparedness (7): In times of natural disasters or emergencies, Honoapiilani Highway serves as a critical evacuation route and access point for emergency services. Expanding the highway's capacity and moving it to a safer location will ensure that it can fulfill this role effectively. I urge the State of Hawaii DOT and County of Maui to act swiftly to approve, fund, and complete this project. The benefits of an inland, four-lane Honoapiilani Highway far outweigh the costs, and its timely completion is essential for the safety, economic stability, and overall well-being of our community. (7) Thank you for considering my comments. I appreciate the opportunity to contribute to this important decision-making process.	7	Ch. 1	6	
Janice and James Revells	-	4	Webform	The proposed route does not show access to the Ukumehame Firing Range nor beach accesses for the general public. The four ranges are used almost daily by the numerous clubs and MPD. There is also a building used for firearm safety classes. Driving to Laniupoko and then returning toward Kahului to get to access the ranges and the beaches is ludicrous. (8) The majority of the users are local and are coming from Central. Upcountry and South Maui. Driving miles into Lahaina to just turn around to get back to the ranges and beaches is stupid. . Not having reasonable accesses to this area would encourage criminal activity and safety and health hazards. Response time for First Responders would be greatly increased. The general public needs are not being served. This realignment serves to improve drive time into Lahaina and the beauty and use of this area is Lost..	8	Ch. 3.5	37	As with all alternatives evaluated in the Draft EIS, the Preferred Alternative would retain access to the Ukumehame Firing Range and County beach parks via the existing Honoapi'ilani Highway. Trips to and from Central Maui would not have to loop as far away as Launiupoko but would use the new highway alignment's intersection with Pōhaku 'Aeko Street, which is located within a mile of the existing driveway. Placing the viaduct over the existing driveway ensures continued access and use of the firing range and also minimizes disturbance to sensitive ecological resources.

Commentor	Organization	Submission No.	Submission Type	Comment	Comment No.	DEIS Section	Ch. 9 Comment No.	Response
Victoria Kaluna-Palafox	-	5	Webform	My concern is to not disturb the true function of Aina. That, can never be repaired, unless we can better protect, what is. (9) Mahalo	9	Ch. 3.7	52	HDOT and the FHWA have worked to maintain an open dialogue with the community and to use this information to minimize disturbance to Aina and to cultural resources found within Ukumehame and Olowalu ahupua'a. The analyses contained within the Draft and Final EIS generally use ahupua'a as a geographic unit for delineation rather than 'ili (a smaller area of land within a ahupua'a); however, in instances where further geographic refinement was warranted (e.g., Chapter 3.7, Cultural Resources) 'ili are discussed.
Kevin Bridges	-	6	Webform	Alternative 1 would be the best alternative as it provides the shortest distance and will provide outstanding views. However, the preferred alternative would adequately address the ocean flooding issue and stand a better chance of not being delayed with nuisance lawsuits. (10)	10	Ch. 2	17	As presented in the Draft EIS and this Final EIS, the various alternatives were evaluated based on the full range of technical environmental analyses conducted as well as roadway design considerations. In addition to the loss of monkeypod trees Build Alternative 1 in Olowalu would have resulted in further potentially adverse effects related to the proximity to existing residences and the intersection of Olowalu village center and the existing highway. All the alternatives are approximately the same length, so alignment length alone was not a primary factor in the comparative impact evaluation. As described in the Draft EIS, the Preferred Alternative is based on Build Alternative 1 in Ukumehame and Build Alternative 2 in Olowalu and is considered the best opportunity to achieve the Project's purpose and need while minimizing and avoiding environmental impacts.
	-			My biggest comment is to speed up the construction timeline. The proposed construction timeline is way too long; this needs to be done now! The federal government just provided $2 billion for Lahaina housing needs so that should free up state and local money to get this project started and finished sooner. The vulnerability threat to west side is only getting worse with time and needs to be fixed sooner rather than later. Get this extremely critical project finished sooner. (11)	11	Ch. 1	9	The Project remains a high priority for HDOT and the approvals and construction implementation schedule are intended to expedite project delivery. The Final EIS/ROD must be completed in summer 2025 as a condition of project funding. HDOT will then move into the final design and construction phases of the Project and will use a design-build approach, where one contractor designs and builds the project, reducing schedule and getting this important project built faster. Construction is expected to start in 2027 and could potentially be complete and operational by 2030.
Carter Barto		7	Webform	I express strong support for the proposed project to realign Honoapiilani Highway inland and please also expand it from two lanes to four lanes. (12) As a daily commuter who relies on this highway to travel between West Maui and Central Maui, I have firsthand experience with the challenges posed by the current state of this vital roadway. Honoapiilani Highway serves as the sole viable connection between these regions, making it a critical infrastructure for residents, businesses, and visitors alike. However, its current alignment and capacity have proven inadequate in meeting the demands of a growing population and increasing traffic. The need for this project is both urgent and clear, and I urge decision-makers to prioritize its implementation. (12)	12	Ch. 1	6	As stated in Chapter 2, Alternatives of the Draft EIS, based on current demand, the proposed highway would be constructed with two lanes but with sufficient right-of-way to accommodate a full four-lanes if and when demand indicates that need and if funding is available. Should HDOT pursue completion of a four-lane configuration in the future, a supplemental NEPA/HEPA environmental assessment would be undertaken.
Darrell Tanaka	-	8	Webform	The homeless situation is getting worse in Olowalu, they are slowly taking over the beach area at Mile Marker 14....when the new highway is built that area will become a derelict destination....we should make it into a state park and manage it to prevent it from being trashed, its a popular tourist and local spot to take kids to the beach and snorkel and fish...in fact, make the area from Ukumehame park all the way to Olowalu general store a state beach park. (13)	13	Ch. 3.5	42	As stated in the Draft EIS and this Final EIS, encampments in the project area are an issue independent of the Honoapi'ilani Highway Improvements Project. HDOT is coordinating with other State and County officials in the ongoing management of encampments. Also discussed in the Draft EIS Chapter 5 presentation of the Preferred Alternative: when the new highway alignment connects with the existing Lāhainā bypass, the old/existing highway would be reconnected with the old highway segment that currently dead ends before the bypass. The isolated nature of the current configuration that contributed to this area's density of homeless encampments would be improved with the Project. Parkland designations are beyond the scope of the Project. However, it is noted that the shoreline is largely accessible along the length of the existing highway (as well as from the Olowalu Beach and the Olowalu Sugar Mill historic site public access and parking) and includes two County parks. This would primarily be in the realm of Maui County because the Project includes transferring the jurisdiction of the existing highway to the County. Further, the final design and potential implementation of the West Maui Greenway, in combination with County-owned recreational lands in Ukumehame, would also be under County jurisdiction.
Benny Martin	-	9	Webform	My family and I, like so many others, were deeply affected by the devastating wildfires in Lahaina. We lost our home and everything we had worked so hard for. In the aftermath, we saved what we could and decided to purchase an agricultural lot in the Ukumehame subdivision, where many other displaced families have also found a place to rebuild. It has been a journey of resilience, and the Ukumehame subdivision offers us a chance to start anew. However, I am deeply concerned about the proposed highway realignment options, especially Alternative 4, which would run directly through many of our homes in the subdivision. (14) This would have a significant and disruptive impact on the families who are already struggling to rebuild their lives. While I truly appreciate the environmental decision to move the highway away from the coastline, I strongly encourage consideration of Alternatives 2 and 3 for our section of the realignment, as they seem to pose less of a threat to the homes and families already established in the area. (14) I would greatly appreciate any information on when and where in-person testimonials or meetings will take place to discuss these important decisions. This is a critical issue for the families in Ukumehame, and we need to have our voices heard as we work toward rebuilding both our homes and our community. Thank you for considering our concerns.	14	Ch. 2	19	In both Ukumehame and Olowalu, Build Alternative 4 was intended to represent the most mauka of alignments (that is, the most separation from the coast and inundation flood zones). The evaluation of this alignment showed that the distance from the coastline resulted in substantially more potential adverse effects on private property and other environmental considerations compared with Build Alternatives 1 and 2. As identified in Chapter 5 of the Draft EIS, the Preferred Alternative was selected based on Build Alternative 1 in Ukumehame and Build Alternative 2 in Olowalu. Build Alternative 4 was not identified as part of the Preferred Alternative, and the Preferred Alternative would not result in potential adverse effects to the referenced heiau. The Preferred Alternative avoids and minimizes effects on existing residences as well as cultural resources and other environmental considerations. The alignment does not create new development opportunities within the project area.

Commentor	Organization	Submission No.	Submission Type	Comment	Comment No.	DEIS Section	Ch. 9 Comment No.	Response
Robert Santos	-	10	Webform	Can I see the details of the work to be done including their staging area? (15)	15	Ch. 2	25	As set forth in the Draft EIS, the proposed alignments are anticipated to largely use delineated right-of-way for staging areas during construction. Further, the key phases and construction activities are summarized in this Final EIS, including the environmental commitments to minimize and avoid potential construction-related impacts. The design-build contractor would make final decisions about specific staging areas, and their decisions would incorporate the environmental commitments identified in the combined Final EIS and ROD.
Tara King	-	11	Webform	I really hope you are going to rebuild Weinberg Court .Between PrisonSt.and Dickenson St. (16). That was the Giant (for Maui) apartment building.I think the address was 161 Honoapiilani Hwy.Naturally offer the original tenants that are still here 1st dibs.I was there since June '08, 15 years.I loved living there.I cared about my neighbors.Irwin Miyamoto was the manager.We had a good relationship with him and his family.My son left a week after the fire,he was so devastated,But I'm still here.I would love to be back in Lahaina,but I couldn't find another apartment.63 apts.altogether.We wait and hope.I still have severe PTSD.I hope you understand.Mahalo,Tara	16	Ch. 2	26	While redeveloping Lāhainā after the devastating wildfire is critically important, it is beyond the scope of this transportation project. Weinberg Court is substantially outside the study area for the Project's Draft and Final EIS.
C-T Folding	-	12	Webform	Can there be a separate biking, walking, golf cart lane, with it's own divider along the side? So many bikers are on Honoapi'ilani Hwy they deserve their own "green lane". (17) Thanks	17	Ch. 2	23	The preliminary design consideration did not include a separate pathway for non-motorized users, and all alternatives would incorporate a standard width shared-use shoulder lane that would accommodate bicyclists. This was intended to provide a direct route to and from the Pali and Lāhainā (including the viaducts and bridges) as a complement and interconnect with the primary bike route served by implementing the West Maui Greenway, which is proposed to be alongside the existing highway. Plans for the West Maui Greenway indicate the greenway is intended to provide a more substantial and integrated shared-use pathway that would be closer to the coastline and away from the main highway. However, based on these and other comments generated during the public review period for the Draft EIS, the Selected Alternative has been refined to incorporate a separated travel way for nonmotorized traffic (golf carts would not be allowed). As described in Chapter 2 of this Final EIS, the pathway would be constructed along the makai edge of the new highway alignment. At Luawai Street in Olowalu and Ehehene Street in Ukumehame, traffic signals would allow bicyclists and pedestrians to safely cross the new roadway.
Kai Kalani	-	13	Webform	The next question is when do we get an escape route, not just a road down from Ulupalakua lookup down exactly 2.2 miles to the road at Makena golf course? (18) Thompson road, aka "Oprah's road" might be a handshake deal for MFD, but what about the rest of us trying to get down the hill for another fire event? (18 cont.)	18	Ch. 2	28	This comment pertains to roadways that are substantially beyond the study area of the Honoapi'ilani Highway Improvements Project and are therefore beyond the scope of the Project's Draft and Final EIS.
Darrell Tanaka	-	14	Webform	when you build the new highway, please ensure there is ample beach access routes periodically along the shoreline...DOT has recently cut off several of our traditional beach accesses from the McGregor's point to Olowalu and we don't appreciate losing our ability to fish and gather. (19) thank you.	19	Ch. 3.5	43	The new alignment of the Honoapi'ilani Highway would be mauka of the existing highway and would not provide direct access to beach areas. The roadway is proposed to be limited access only at intersections, with existing mauka to makai cross-streets. There would be no parking or pull-off areas along the new alignment. Beach access would continue to be available from the existing Honoapi'ilani Highway, which would become a County roadway and is expected to be integrated with the future plans for the Maui County West Maui Greenway. Once under County jurisdiction, the management of parking, access to adjacent beaches, and access to/from the greenway can be integrated into corridor planning.

Commentor	Organization	Submission No.	Submission Type	Comment	Comment No.	DEIS Section	Ch. 9 Comment No.	Response
Raymond Ishii	Valley Isle Sports Shooters Club	15	Webform	Aloha I am Raymond Ishii the current President of the Valley Isle Sports Shooters Club, which is the oldest and largest user of the Ukumehame Firing range. While I fully support moving the existing highway inland there are a number of concerns I have. The routes appear to run makai of the firing lines which we are grateful although a couple are uncomfortable close to the range. (20) The Ukumehame Firing Range is the only legal firing range on the island and is used by thousands of sportsmen's practicing marksmanship and exercising their 2nd Amendment rights. It is also used by Law Enforcement and the military on a regular basis for Firearms and riot control training, Whenever unexploded ordnance is found on Maui, they take it to the range to blow it up. I have been on the range when EOD had blown up everything from IEDs, hand grenades, live artillery shell to 100 pounds of TNT. The preferred alternative route for the bypass is an elevated viaduct that will run makai of the firing ranges, with access to the range and the beach parks will be via the Ukumehame subdivision and back tracking on the existing highway. That section of highway between Ukumehame Beach Park and Papalaua State Wayside park often has waves breaking over the wall and with sea water covering the road. This is the section that is in most the danger to eventually fall into the ocean. Is the state planning to maintain that section of the highway to it existing standards for eternity or will it abandon that section of highway once the ocean claims it, and we will lose access to the range and beach park.	20	Ch. 3.5	36	The Draft EIS and this Final EIS established and evaluated alternatives specifically with the understanding of the importance of the Ukumehame Firing Range to the community. As a public recreational resource, the firing range was further evaluated under the FHWA's obligation pursuant to Section 4(f) of the USDOT Transportation Act. Preservation of the use of the facility contributed to the identification of the Preferred Alternative such that the crossing of the new highway alignment was more makai than the original Build Alternatives 1 and 4 evaluated in the Draft EIS. By placing the alignment on a viaduct over the HDOT detention basin, the elevation of the viaduct will provide for a minimum of 20 feet of clearance for the existing firing range driveway, allowing for enough clearance for most emergency vehicles and trucks that may need to enter the facility.
				To avoid the above, would it be possible to install a turn lane before the viaduct begins on the Pali side to allow direct access to the range and beach parks, plus a merge lane on to the highway for Maalaea bound traffic. (21) That section of highway is protected from the ocean by the Papalaua State Wayside Park. This will give direct access to the public to these areas and allow Emergency Vehicle responding to the area more direct access and quicker response time. It will also allow the state to simply block off the section of the road between Papalaua Park and Ukumehame park once the road is damaged by the ocean.	21	Ch. 3.5	39	The option of having an intersection at the Pali terminus of the Project to maintain access to the old highway was reviewed and evaluated by the conceptual design team. However, the option was determined infeasible due to the angle of departure of the new highway both horizontally and vertically—the new highway must rapidly ascend an existing berm for the detention pond that is makai of the firing range—and the limited space that results from these geometric constraints. In short, the limited geometry leads to the inability to provide a safe intersection in this area.
				Another concern is the height of the viaduct, one or more of the routes has the entrance road the to range being under the viaduct. Will the viaduct be high enough to allow fire trucks and heavy equipment to drive under it. Due to the constant threat of brush fires on the Pali, and medical calls to the range, the more access Emergency Services has the better. (20)	20	Ch. 3.5	36	The Draft EIS and this Final EIS established and evaluated alternatives specifically with the understanding of the importance of the Ukumehame Firing Range to the community. As a public recreational resource, the firing range was further evaluated under the FHWA's obligation pursuant to Section 4(f) of the USDOT Transportation Act. Preservation of the use of the facility contributed to the identification of the Preferred Alternative such that the crossing of the new highway alignment was more makai than the original Build Alternatives 1 and 4 evaluated in the Draft EIS. By placing the alignment on a viaduct over the HDOT detention basin, the elevation of the viaduct will provide for a minimum of 20 feet of clearance for the existing firing range driveway, allowing for enough clearance for most emergency vehicles and trucks that may need to enter the facility.
				Lastly during construction, will we be allowed access to the range. Understandably while the viaduct is being constructed, the section under it will be blocked off. Will a temporary road be constructed to allow access under a completed section of the viaduct to ensure access to the public firing range. (22) Thank You for allowing me to comment on this matter. Raymond Ishii President, Valley Isle Sports Shooter Club	22	Ch. 3.5	40	Because the viaduct would be constructed with piers on either side of the firing range driveway, the construction-related disruption to the driveway itself would be short-term. While the viaduct structures are being placed across the driveway from pier to pier, the driveway could be temporarily closed. The design build contractor would be required to coordinate construction phasing and sequencing in this area with Maui County Parks and Recreation (the owner and operator of the firing range).
Robert Cole	-	16	Webform	Please do everything possible to make this happen. This is so very important for the island, the community, and the planet. (23) Mahalo, Robert.	23	Ch. 1	6	As stated in Chapter 2, Alternatives of the Draft EIS, based on current demand, the proposed highway would be constructed with two lanes but with sufficient right-of-way to accommodate a full four-lanes if and when demand indicates that need and if funding is available. Should HDOT pursue completion of a four-lane configuration in the future, a supplemental NEPA/HEPA environmental assessment would be undertaken.

Commentor	Organization	Submission No.	Submission Type	Comment	Comment No.	DEIS Section	Ch. 9 Comment No.	Response
Dan Dennison	-	17	Email	Testimony in Support of the Realignment of Honoapi‘ilani Highway with Emphasis on West Maui Greenway Connectivity. Aloha members of the committee, I am writing to express my support for the proposed 6.5-mile mauka relocation of the Honoapi**‘ilani Highway. This critical realignment will safeguard a vital transportation corridor that serves as a lifeline for** West Maui residents, workers, and visitors, addressing the escalating risks posed by rising sea levels and climate change. (24)	24	Ch. 1	6	As stated in Chapter 2, Alternatives of the Draft EIS, based on current demand, the proposed highway would be constructed with two lanes but with sufficient right-of-way to accommodate a full four-lanes if and when demand indicates that need and if funding is available. Should HDOT pursue completion of a four-lane configuration in the future, a supplemental NEPA/HEPA environmental assessment would be undertaken.
				As we work toward a more resilient future, this project is a pivotal step in West Maui's recovery, resilience, and sustainability. However, while I support the realignment project, it is essential to highlight a complementary opportunity to strengthen active transportation options and preserve the vision of the West Maui Greenway (WMG). I respectfully urge the Hawai**‘i Department of Transportation (HDOT) to prioritize the following key elements within this project: 1. Utilization** of the Old Highway 30 for West Maui Greenway Segments 6 and 7. (25) The existing coastal highway presents an ideal route for a dedicated bike and pedestrian path. Repurposing this scenic corridor as a multi-use trail is a cost-effective solution that supports safe, non-motorized transportation and recreation. This approach would facilitate the implementation of Segments 6 and 7 of the WMG (as outlined on pages 111 and 51 of the WMG Master Plan), creating a continuous and connected path linking West Maui communities. 2. Alignment with Climate and Community Goals. Incorporating the WMG within the realignment project would align with Maui's commitment to climate resilience, as outlined in the Nā Wahine Climate Settlement Agreement. A multi-modal transportation corridor, featuring pedestrian and bike-friendly infrastructure, supports efforts to reduce emissions, promote healthy lifestyles, and enhance disaster preparedness. 3. Community-Driven Design for Long-Term Benefits. By transforming the former highway into a recreational and commuting pathway, we can create a lasting community asset that bolsters economic recovery, public health, and local tourism. A dedicated bike and pedestrian trail would provide safe, scenic access to key cultural and natural landmarks, fostering community pride and environmental stewardship.	25	Ch 3.5	31	Implementing the West Maui Greenway (by the County) along the existing highway is considered a future condition that is fully compatible with the Honoapi‘ilani Highway Improvements Project. The West Maui Greenway is not included in the Project because its ultimate design, funding, approvals and implementation would be a separate process led by Maui County. After the highway is realigned, jurisdiction of the existing Honoapi‘ilani Highway would be transferred to the County of Maui, and the roadway would continue to carry vehicular traffic that serves local traffic (business, residences, beaches, parks) but with less volume. As set forth in Chapter 5 of this Final EIS, and based on public comments on the Draft EIS, the new Honoapi‘ilani Highway alignment will incorporate a separate and protected shared-use path along the makai side of the new right-of-way (including two locations for protected crosswalks of the new highway). This will add flexibility and provide for integration with the West Maui Greenway, should it be constructed in the future.
				In summary, while I support the current realignment effort, I respectfully request that the HDOT integrates plans for the West Maui Greenway into the redevelopment of the former highway route. By repurposing this space for non-motorized transportation, we can build a legacy of sustainable infrastructure that meets the needs of future generations and supports West Maui's long-term recovery and growth. (25 Cont.) Sincerely, Dan Dennison Honolulu.	25	Ch. 3.5	31	
Donna Clayton	West Maui Greenway Alliance	18	Email	Testimony in Support of the Realignment of Honoapi‘ilani Highway with Emphasis on West Maui Greenway Connectivity. Aloha members of the committee, I am writing to express my support for the proposed 6.5-mile mauka relocation of the Honoapi**‘ilani Highway. This critical realignment will safeguard a vital transportation corridor that serves as a lifeline for** West Maui residents, workers, and visitors, addressing the escalating risks posed by rising sea levels and climate change. (26)	26	Ch. 1	6	As stated in Chapter 2, Alternatives of the Draft EIS, based on current demand, the proposed highway would be constructed with two lanes but with sufficient right-of-way to accommodate a full four-lanes if and when demand indicates that need and if funding is available. Should HDOT pursue completion of a four-lane configuration in the future, a supplemental NEPA/HEPA environmental assessment would be undertaken.
				As we work toward a more resilient future, this project is a pivotal step in West Maui's recovery, resilience, and sustainability. However, while I support the realignment project, it is essential to highlight a complementary opportunity to strengthen active transportation options and preserve the vision of the West Maui Greenway (WMG). I respectfully urge the Hawai**‘i Department of Transportation (HDOT) to prioritize the following key elements within this project: 1. Utilization** of the Old Highway 30 for West Maui Greenway Segments 6 and 7. (27) The existing coastal highway presents an ideal route for a dedicated bike and pedestrian path. Repurposing this scenic corridor as a multi-use trail is a cost-effective solution that supports safe, non-motorized transportation and recreation. This approach would facilitate the implementation of Segments 6 and 7 of the WMG (as outlined on pages 111 and 51 of the WMG Master Plan), creating a continuous and connected path linking West Maui communities. 2. Alignment with Climate and Community Goals. Incorporating the WMG within the realignment project would align with Maui's commitment to climate resilience, as outlined in the Nā Wahine Climate Settlement Agreement. A multi-modal transportation corridor, featuring pedestrian and bike-friendly infrastructure, supports efforts to reduce emissions, promote healthy lifestyles, and enhance disaster preparedness. 3. Community-Driven Design for Long-Term Benefits. By transforming the former highway into a recreational and commuting pathway, we can create a lasting community asset that bolsters economic recovery, public health, and local tourism. A dedicated bike and pedestrian trail would provide safe, scenic access to key cultural and natural landmarks, fostering community pride and environmental stewardship.	27	Ch. 3.5	31	Implementing the West Maui Greenway (by the County) along the existing highway is considered a future condition that is fully compatible with the Honoapi‘ilani Highway Improvements Project. The West Maui Greenway is not included in the Project because its ultimate design, funding, approvals and implementation would be a separate process led by Maui County. After the highway is realigned, jurisdiction of the existing Honoapi‘ilani Highway would be transferred to the County of Maui, and the roadway would continue to carry vehicular traffic that serves local traffic (business, residences, beaches, parks) but with less volume. As set forth in Chapter 5 of this Final EIS, and based on public comments on the Draft EIS, the new Honoapi‘ilani Highway alignment will incorporate a separate and protected shared-use path along the makai side of the new right-of-way (including two locations for protected crosswalks of the new highway). This will add flexibility and provide for integration with the West Maui Greenway, should it be constructed in the future.
				In summary, while I support the current realignment effort, I respectfully request that the HDOT integrates plans for the West Maui Greenway into the redevelopment of the former highway route. By repurposing this space for non-motorized transportation, we can build a legacy of sustainable infrastructure that meets the needs of future generations and supports West Maui's long-term recovery and growth. (27 Cont.) Thank you for the opportunity to provide testimony. I encourage my fellow community members to participate in this process and advocate for an active transportation network that prioritizes safety, sustainability, and connectivity. Mahalo nui loa for your consideration. Donna Clayton/West Maui Greenway Alliance	27	Ch. 3.5	31	

Commentor	Organization	Submission No.	Submission Type	Comment	Comment No.	DEIS Section	Ch. 9 Comment No.	Response
Constantine Mittendorf	-	19	Webform	Testimony in SUPPORT of Honoapi‘ilani Highway Realignment – Connect the West Maui Greenway Aloha committee members, I am writing to support realigning the Honoapi’ilani Hwy and expanding the West Maui Greenway. Specifically, I support the proposed 6.5-mile mauka relocation for starters. This realignment is critical and will safeguard a vital transportation corridor. Realignment will mitigate against risks posed by rising sea levels, wildfire, and climate change. This project is a pivotal step in West Maui’s recovery, resilience, and sustainability. (28)	28	Ch. 1	6	As stated in Chapter 2, Alternatives of the Draft EIS, based on current demand, the proposed highway would be constructed with two lanes but with sufficient right-of-way to accommodate a full four-lanes if and when demand indicates that need and if funding is available. Should HDOT pursue completion of a four-lane configuration in the future, a supplemental NEPA/HEPA environmental assessment would be undertaken.
				I urge the Hawai**‘i Department of Transportation (HDOT) to prioritize the following: Use the Old Highway 30 for West Maui** Greenway. (29) The existing coastal highway presents an ideal route for a dedicated bike and pedestrian path. Further, it would help diversify transportation and options in case of emergency. It would be absolutely fantastic for our keiki and future. Folding the former highway into the West Maui Greenway will create a major community asset that bolsters economic recovery, public health, and local quality of life. Please incorporate the WMG within the realignment project. (29 Cont.) It would align with Maui’s commitment to climate resilience, as outlined in the Nā Wahine Climate Settlement Agreement. Including the West Maui Greenway into this project will likely also help the Maui County and the State of Hawaii in reaching it’s legal obligations regarding climate change and public safety. Mahalo nui loa for your consideration. Constantine Mittendorf January 23, 2025	29	Ch. 3.5	31	Implementing the West Maui Greenway (by the County) along the existing highway is considered a future condition that is fully compatible with the Honoapi‘ilani Highway Improvements Project. The West Maui Greenway is not included in the Project because its ultimate design, funding, approvals and implementation would be a separate process led by Maui County. After the highway is realigned, jurisdiction of the existing Honoapi‘ilani Highway would be transferred to the County of Maui, and the roadway would continue to carry vehicular traffic that serves local traffic (business, residences, beaches, parks) but with less volume. As set forth in Chapter 5 of this Final EIS, and based on public comments on the Draft EIS, the new Honoapi‘ilani Highway alignment will incorporate a separate and protected shared-use path along the makai side of the new right-of-way (including two locations for protected crosswalks of the new highway). This will add flexibility and provide for integration with the West Maui Greenway, should it be constructed in the future.
Jerome Kellner	-	20	Email	Aloha members of the committee, I support the proposed 6.5-mile mauka relocation of the Honoapi‘ilani Highway. (30)	30	Ch. 1	6	As stated in Chapter 2, Alternatives of the Draft EIS, based on current demand, the proposed highway would be constructed with two lanes but with sufficient right-of-way to accommodate a full four-lanes if and when demand indicates that need and if funding is available. Should HDOT pursue completion of a four-lane configuration in the future, a supplemental NEPA/HEPA environmental assessment would be undertaken.
				I urge the Hawai**‘i Department of Transportation to prioritize key elements: Utilization of the Old Highway 30 for West** Maui Greenway Segments 6 and 7. (31) The coastal highway is an ideal route for a dedicated bike and pedestrian path. Repurposing this corridor as a multi-use trail supports safe, non-motorized transportation and recreation.This approach facilitates the implementation of Segments 6 and 7 of the WMG (as outlined on pages 111 and 51 of the WMG Master Plan), creating a continuous and connected path linking West Maui communities. A multi-modal transportation corridor, featuring pedestrian and bike-friendly infrastructure, supports efforts to reduce emissions, promote healthy lifestyles, and enhance disaster preparedness. I support the current realignment effort, and request that the HDOT integrates plans for the West Maui Greenway into the redevelopment of the former highway route. (31 Cont.) Jerome Kellner	31	Ch. 3.5	31	Implementing the West Maui Greenway (by the County) along the existing highway is considered a future condition that is fully compatible with the Honoapi‘ilani Highway Improvements Project. The West Maui Greenway is not included in the Project because its ultimate design, funding, approvals and implementation would be a separate process led by Maui County. After the highway is realigned, jurisdiction of the existing Honoapi‘ilani Highway would be transferred to the County of Maui, and the roadway would continue to carry vehicular traffic that serves local traffic (business, residences, beaches, parks) but with less volume. As set forth in Chapter 5 of this Final EIS, and based on public comments on the Draft EIS, the new Honoapi‘ilani Highway alignment will incorporate a separate and protected shared-use path along the makai side of the new right-of-way (including two locations for protected crosswalks of the new highway). This will add flexibility and provide for integration with the West Maui Greenway, should it be constructed in the future.
Richard Gailey	-	21	Webform	To all concerned, The Island is a cultural Entity, moving the Honoapi’iani Highway is within everyone’s responsibility to protect this sacred place. (32) Mahalo.	32	Ch. 3.7	52	HDOT and the FHWA have worked to maintain an open dialogue with the community and to use this information to minimize disturbance to Aina and to cultural resources found within Ukumehame and Olowalu ahupua‘a. The analyses contained within the Draft and Final EIS generally use ahupua‘a as a geographic unit for delineation rather than ‘ili (a smaller area of land within a ahupua‘a); however, in instances where further geographic refinement was warranted (e.g., Chapter 3.7, Cultural Resources) ‘ili are discussed.

Commentor	Organization	Submission No.	Submission Type	Comment	Comment No.	DEIS Section	Ch. 9 Comment No.	Response
Van Fischer	Olowalu Ranch LLC	22	Email	Aloha, My name is Van Fischer and I am writing to you as the owner of lot 19, CPR Unit C in the Olowalu Mauka subdivision. Our property is located just mauka of the existing highway intersection with Luawai Street and wraps around to the back of the existing homes on Olowalu Village Road. We recently purchased this land and are in the planning stages of implementing a farming operation. The proposed highway location just cuts a small corner of our property and we are relieved that it will not destroy our vision for our farm. (33) That said, we believe there are a number of reasons why a minor adjustment to a small section of the highway moving the route approximately 150-200 feet mauka will improve the safety and **fl**ow of traffic and help to avoid valuable natural resources. (34)	33, 34	Ch. 5	110, 111	Response 110: Thank you for your comment and your interest in the Project. Response 111: These comments have been reviewed and incorporated into the refinements of the Selected Alternative to the extent practicable, most notably with a mauka shift of the roadway. Modifications to the Selected Alternative are summarized in Chapter 5, Selected Alternative, of this Final EIS.
				As you are aware, most of the subdivision lots in this area have been condominiumized. I have attached a map as exhibit A for your reference. INTERSECTION ALIGNMENT & SAFETY: Once the highway is relocated, its intersection with Luawai Street will become the main intersection for access into Olowalu. Due to sea level rise, the existing highway will need to be closed off both north and south of Olowalu so all traffic will come down Luawai Street. Lower Olowalu will become an even more popular designation once the beaches are more secluded and user friendly. As the preferred Highway route is currently designed, it does not cross Luawai Street at a right angle creating an unsafe intersection for vehicles entering the highway from both the subdivision above the new highway and out of the lower Olowalu village (34 Cont.).	34	Ch. 5	111	These comments have been reviewed and incorporated into the refinements of the Selected Alternative to the extent practicable, most notably with a mauka shift of the roadway. Modifications to the Selected Alternative are summarized in Chapter 5, Selected Alternative, of this Final EIS.
				This intersection absolutely must be signalized with right turn lanes. (35) For vehicles driving up Luawai Street to the highway, there is a bend in the road that will prevent drivers from seeing the traffic that is stopped at the light causing a dangerous situation with lack of safe stopping distance. (See exhibit B). If the highway is relocated 150-200 feet mauka in this small section as proposed on exhibit B, the highway will cross Luawai Street at a right angle providing maximum sight distance for vehicles using the intersection and more stopping distance for vehicles approaching the intersection from the lower road. (34 Cont.) It also makes more sense to locate the detention basin next to this intersection as it can be used to collect the water that **fl**ows down Luawai Street in heavy rain events. (34 Cont)	35	Ch. 5	113, 111	Response 113: As indicated in the Draft and Final EIS, this intersection is proposed to be fully signalized. Response 111: These comments have been reviewed and incorporated into the refinements of the Selected Alternative to the extent practicable, most notably with a mauka shift of the roadway. Modifications to the Selected Alternative are summarized in Chapter 5, Selected Alternative, of this Final EIS.
				TOPOGRAPHY: The topography along a section of the mauka lot line of lot 19 CPR Unit C has a very steep 10-12 foot tall cut bank that runs along that property line in the exact area where the proposed highway crosses that property corner. Due to the continued rise up the hill, building the highway in this spot will result in the sloped bank of the highway will be approximately 20 feet high or more. Simply moving the highway mauka 100 feet or so will eliminate this situation. (36) In the area we are proposing the highway be moved to, the cross section topography is reasonable and will not add cost to the construction of the highway. (See exhibit C).	36	Ch. 5	114	These comments have been reviewed and incorporated into the refinements of the Selected Alternative to the extent practicable, most notably based on the mauka shift of the roadway as noted by the comments. Modifications to the Selected Alternative are summarized in Chapter 5, Selected Alternative, of this Final EIS.
				PROTECTION OF NATURAL RESOURCES: Mopua Stream is shown on the Olowalu maps as running straight down mauka to makai crossing through lot 19. It is an open stream from the mauka property line to the existing highway where a culvert crosses the highway into the ocean but is an underground stream above our property. The open section of this stream is teaming with life and well worth protecting. (37) In our exploration of the property, it appears there is also an underground stream channel that runs along the mauka property line of lots 19 and 20. (38) At a point on the Lot 20 mauka property line there is an existing abandoned pump house and moving water is visible in the bottom of the trench. It appears water comes together from multiple directions to this point and then flows underground along our mauka property line into the open section of Mopua Stream. Moving the highway mauka as we propose will protect this valuable water source as we do not know if it is coming from springs or other underground streams. (38 Cont.) Provisions should also be made for a culvert to be placed under the highway should State wish to re-establish all of Mopua Stream as an open channel in the future. (39) (See exhibit C)	37, 38, 39	Ch. 5	115	These comments have been reviewed and incorporated into the refinements of the Selected Alternative to the extent practicable. Modifications to the Selected Alternative are summarized in Chapter 5, Selected Alternative, of this Final EIS. During final design further geotechnical studies would be conducted related to the limits of disturbance. These studies would identify subsurface conditions (including potential underground streams) and potential design modifications would be evaluated based on those findings.
				FARM SOIL PROTECTION: The other consideration in locating the highway should be the protection of quality farming soil. The property above our mauka property line is very rocky and not suitable for farming. It is at best pasture land. All of lot 19 and 20 are comprised of good quality soil and it would be a shame to use any more of that land for the highway than absolutely necessary. (40) The viability of this soil to produce food plants and trees is clearly evidenced by the extensive crops being grown on the two farms by the regenerative farm stand and the two farms and orchards makai of the highway. Moving the highway mauka just the proposed distance protects an additional six or more acres of this soil.	40	Ch. 5	116	The consideration of soils of concern to the property owner are accommodated in the overall request of a mauka shift that has been included in the refinements to the Selected Alternative. Modifications to the Selected Alternative are summarized in Chapter 5, Selected Alternative, of this Final EIS.
				HOUSING: The route as proposed cuts directly through Lot 19 CPR Unit A and Lot 20 CPR Units A and B and includes a proposed detention basin in that area. As such, the State will need to acquire most if not all of each of these parcel rendering the remainder unbuildable as home sites. (41) These parcels are well suited to local style housing and should be saved if possible. (See exhibit A). The land just mauka of these parcels consists of an agricultural parcel that is designated as part of the subdivision Greenway Open Space. If the State agrees to move the highway as proposed, the owners of Lot 20 Units A and B would be willing to donate an open space easement on one acre of the Lot 20 CPR Units A and B to offset a portion of the loss of the required greenway at no cost to the State. (41 Cont.) (See exhibit C).	41	Ch. 5	117	These comments have been reviewed and incorporated into the refinements of the Selected Alternative.
				Moving the highway as suggested will add needed safety features, protect natural resources and reduce the cost of the project. We respeceully request that the State take a through look at all of the benefits this small adjustment will accomplish. Sincerely, Van Fischer				

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Anna Nalaniewalu Vinuya-Palakiko	-	23	Email	My name is Anna Nalaniewalu Vinuya-Palakiko. I am the 3rd great grand daughter of James Palakiko and Julia Piko of Olowalu and 3rd great cousin of Lily, James Jr and Maui Palakiko. All 5 are buried on top of Pu'u Kilea in unmarked burials. *My family kuleana aina is in Olowalu Valley and Ukumehame Valley (42)* . Our ohana of this area are; Palakiko,Piko, Pu'upa'a,Ka'awili,Pupuhi, Kaumaka, Kaho'opi'i, and Cason/Napaepae. *It has been brought to my attention that our aina and iwi in Olowalu are in harms way. I have attempted multiple times to have my ohana burials marked and chained off to help prevent future vandalism because it has happened in past (42).* example: petroglyphs with non prehistoric markings, names carved in the rocks and ceremonial items taken from the burials. My request is for them to be on the burial protection list and marked so visitors will know that it's protected Native Hawaiian burial site. (42) I also have death certificates proving my family is buried here if needed.	42	Ch. 3.6	45	We understand the community's concerns with burials in the project area and have been in communication with descendants and the Maui Lanai Island Burial Council. As stated in the Executed Programmatic Agreement (Appendix 3.6 of this Final EIS), the Maui/Lāna'i Island Burial Council (MLIBC) has the authority to determine treatment and jurisdiction over all requests to preserve or relocate previously identified Native Hawaiian burial sites. If a previously identified Native Hawaiian burial site will be affected by the project, HDOT, through its contractor, shall follow HAR § 13-300-33, Request for council determination to preserve or relocate Native Hawaiian Burial sites. With regard to burials in proximity to Pu'u Kilea, the Preferred Alternative would be makai of Pu'u Kilea and the Project would not result in physical disturbances to that area.
	-			The proposed APE (orange line) I say A'ole completely to this option because this would expose my family burials and bring more harm and vandalism with the road directly in front of it... there would be little to no protection for them... The proposed Alternate route #1 (red line) I say A'ole completely to this option because my grandmother foundation can still be found within the bushes, near the old water tower fronting Naho'oikaika aina just behind the Olowalu General store. I come to this area to mourn and to honor my deceased kupuna, coming here brings me comfort and helps me to stay grounded. I say NO to APE and Alternate #1 because they both would disrupt the land of which my family lived and is buried upon and lacks of respect to our people Kanaka Maoli because it offers no protection for our iwi and some of the only untouched aina left here in west maui. (43)	43	Ch. 3.6,	47	For clarification, the APE line referenced in the comment is intended to show the extent of the Project's study area of possible project effects on historic architectural and archaeological properties (the APE is not a proposed roadway alignment). In the evaluation of all Draft EIS alternatives for Olowalu, Build Alternative 4 (which is closest to the APE boundary) and Build Alternative 1 were excluded from the Preferred Alternative because these alternatives would have the greatest potential for adverse effects on historic properties (though neither directly affect the Naho'oikaika property).
	-			With this plan there is no acknowledgment of the ancient burials, heiau, reef, trees, water ways and uses, taro fields, and animals example: the endangered species ; Nene bird. (44) In order for me to ever be in agreement. There would have to be many steps taken to ensure all of which I addressed are acknowledged and cared for to the upmost respect as if it was your own families burials and kuleana. Protections in place for areas that have already been acknowledged to have ancient burials and Ka'iwaloa heiau. Research and surveyance of the land and water in and around Olowalu before construction using archaeologist, historians, and burial council. (45) Reviewing land patents, LCA land commission awards, survey records, and acknowledging water and land right given to our people from our Ali'i. (46) Allow for the people of the aina to determine the clarity of the research and surveyance. Starting with taking care of the people of the land and what is truly important our family history the only thing left for us to hold on too..	44, 45, 46	Ch. 3.6,	46, 72	Response 46: Chapter 3.6 of the Draft EIS and this Final EIS summarizes the extensive survey and research conducted by the Project's archeologists and historians. The results of the analysis to date have allowed for a refinement of the alignment of the Preferred Alternative to avoid and minimize disturbance of identified archeological and architectural historic resources, such as heiaus. Chapter 3.7 of the Draft EIS and this Final EIS provides a contextual history of the cultural resources of the project area including the importance of land, water, animals. Chapter 3.10 also looks at the areas flora and fauna including endangered species. In coordination and continued dialogue with the community, there will be comprehensive testing for historic resources (Archaeological Inventory Survey or AIS) for the Selected Alternative, with testing protocol and mitigation requirements set forth in the Executed Programmatic Agreement as required by the National Historic Preservation Act and the Hawai'i Revised Statutes, Chapter 6E process. Consultation with descendants and other individuals and organizations with a demonstrated interest in the Project (referred to as "consulting parties") is ongoing as part of the Federal Section 106 and Hawaii 6E processes and will continue as the Project moves into final design and construction. Response 72: The Final EIS incorporates a range of environmental commitments (see Chapter 5) that would be required to protect the nēnē during construction. These include but are not limited to high visibility signs to alert drivers to their presence, training for all on-site staff to recognize and protect nēnē, and protocol on what to do if nēnē or their nests are observed.
	-			In conclusion, the only option that I would be in agreement with is Alternate #2, * It is far enough away from both my family burials, kuleana land and foundation to provide more distance in hopes to give more protection from unwanted vandalism or desecration. * It is far enough away to offer protection of archeological sites ae, Petroglyphs, Ka'iwaloa, Lanakila Church, and Japanese burials. I say NO (A'ole) to APE and Alternate #1. (47) I look forward to our future conversations to talk about my ohana and Olowalu. Thank you for your time and understanding of my concerns, Sincerely, Anna Nalaniewalu Vinuya-Palakiko	47	Ch. 5	49	This is the Selected Alternative through Olowalu as described by the comment.

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Saman Dias	Maui Bicycling League	24	Email	A Message from the Maui Bicycling League Chair: Help Shape West Maui's Future. Aloha Members of the Committee, My name is Saman Dias, and I am the Chair of the Maui Bicycling League. I am submitting this testimony to express my strong support for the proposed 6.5-mile mauka relocation of the Honoapi**'ilani Highway. This project is critical for safeguarding** this vital transportation corridor from the impacts of rising sea levels and climate change, ensuring the safety and connectivity of West Maui's communities. (48)	48	Ch. 1	6	As stated in Chapter 2, Alternatives of the Draft EIS, based on current demand, the proposed highway would be constructed with two lanes but with sufficient right-of-way to accommodate a full four-lanes if and when demand indicates that need and if funding is available. Should HDOT pursue completion of a four-lane configuration in the future, a supplemental NEPA/HEPA environmental assessment would be undertaken.
				While I wholeheartedly support the realignment, I urge the Hawai**'i Department of Transportation (HDOT) to seize this** opportunity to enhance active transportation options by incorporating the West Maui Greenway (WMG) into the project. Specifically, I encourage prioritizing the following elements: Utilization of Old Highway 30 for West Maui Greenway Segments 6 and 7: (49) The existing coastal highway offers an unparalleled opportunity to create a safe, scenic bike and pedestrian path. Repurposing this corridor as a dedicated multi-use trail is a cost-effective and sustainable solution to advance Segments 6 and 7 of the WMG Master Plan, fostering a connected network of paths for the benefit of residents and visitors alike. Alignment with Climate and Community Goals: Incorporating the WMG into the highway realignment aligns with the Nā Wahine Climate Settlement Agreement and Maui's broader climate resilience goals. A multi-modal transportation corridor featuring pedestrian- and bike-friendly infrastructure reduces emissions, supports healthy lifestyles, and enhances disaster preparedness. Creating a Community-Driven Asset for Long-Term Benefits: Transforming the former highway into a recreational and commuting pathway will provide a lasting asset for the community, fostering economic recovery, public health, and local tourism. A dedicated bike and pedestrian trail will also preserve access to West Maui's cultural and natural landmarks, reinforcing our shared commitment to sustainability and stewardship. This project is not only about improving infrastructure but also about building a resilient, sustainable future for West Maui. By integrating the West Maui Greenway into the realignment project, we can create a legacy that prioritizes safety, connectivity, and environmental responsibility for generations to come. Mahalo nui loa for considering my testimony. I encourage my fellow advocates and community members to join me in supporting this critical project and ensuring that the West Maui Greenway vision becomes a reality. Respectfully submitted, Saman Dias Chair, Maui Bicycling League	49	Ch. 3.5	31	Implementing the West Maui Greenway (by the County) along the existing highway is considered a future condition that is fully compatible with the Honoapi'ilani Highway Improvements Project. The West Maui Greenway is not included in the Project because its ultimate design, funding, approvals and implementation would be a separate process led by Maui County. After the highway is realigned, jurisdiction of the existing Honoapi'ilani Highway would be transferred to the County of Maui, and the roadway would continue to carry vehicular traffic that serves local traffic (business, residences, beaches, parks) but with less volume. As set forth in Chapter 5 of this Final EIS, and based on public comments on the Draft EIS, the new Honoapi'ilani Highway alignment will incorporate a separate and protected shared-use path along the makai side of the new right-of-way (including two locations for protected crosswalks of the new highway). This will add flexibility and provide for integration with the West Maui Greenway, should it be constructed in the future.

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Jason Potts	-	25	Email	I'm writing in regards to the proposed hwy improvements in Olowalu/Ukumehame. I oppose all builds except maybe build 1 as long as this build doesn't demolish my wifes 2nd great grandmother's foundation located in the bushes right next to the old water tower/general store. (50) *I'm completely against build 4 and your purple project line is going right through the side of Pu'u Kilea and exactly where the oldest petroglyphs are located (50).*	50	Ch.1	18	The various alternatives (including a No Build Alternative that would keep the highway in its present location) were evaluated based on the technical environmental analyses conducted as part of the Draft EIS and this Final EIS. Overall, the No Build Alternative did not meet the Project's purpose and need because it leaves the existing highway vulnerable to coastal erosion and flooding and remains a less reliable transportation link to West Maui. However, the existing highway would continue to serve the community as a local road; it would carry far less traffic but still provide access to the Olowalu village center, homes, and business, as well as the beaches and parks in Ukumehame and Olowalu. Build Alternative 1 does pass through this area adjacent to the general store and water tower and could disturb the foundation mentioned in the comment. As detailed in Chapter 5, Preferred Alternative, of the Draft EIS, Build Alternative 1 in Olowalu was not selected as the Preferred Alternative based on several factors, including the complexity of the overlapping or proximity of the new alignment with the existing highway and its close proximity to the village center itself. Further, Build Alternative 4 was not identified as the Preferred Alternative because it has several environmental constraints associated with the mauka alignment. This included its proximity to the petroglyphs, which were identified as a likely adverse effect on land use, visual quality, and archeological and historic resources—including a noise impact at the location of the petroglyph. As described in Chapter 5 of the Draft EIS, the Preferred Alternative is based on Build Alternative 2 in Olowalu, which is considered the best opportunity to achieve the Project's purpose and need while minimizing and avoiding environmental impacts.
				If you look up old satellite images from 1950 and compare them to now the land looks exactly the same so what is the purpose of this? (51) *Is the land disappearing or is this a ploy to get Olowalu Town eventually passed? We don't want a new hwy that will increase taxes and bring in more millionaires. It's already hard enough to survive and the majority of kanaka have already been forced out due to the high cost of living. Only a few of the original families remain in Olowalu.*	51	Ch 1	10	As described in Chapter 1, Introduction, Purpose and Need, of this Final EIS, the Project's primary purpose is to provide a reliable transportation facility in West Maui and improve Honoapi'ilani Highway's resilience by reducing its vulnerability to coastal hazards. Specifically, the Project is intended to address existing coastal erosion and flooding vulnerabilities as well as future coastal erosion and flooding. The Project does not include land use actions or modifications to the existing zoning that would facilitate additional development in the surrounding area. Regarding the Olowalu Town Master Plan Project, on December 7, 2015, the State Land Use Commission denied the acceptance of the Final EIS and the project was discontinued. There are currently no filed applications or permits to indicate that the Olowalu Town Master Plan Project would be pursued again. In addition, should the Olowalu Town Master Plan Project (or a project of similar scope or nature) be proposed, it would likely be subject to approvals, potentially involving environmental review and associated public engagement requirements.
				After all of the attempts for olowalu town and now this hwy why is there still no attempts to protect our ancient sites like Kaiwaloa Heiau,Petroglyphs, and the many burials we have in Olowalu. (52) This includes my wifes ohana that is buried on top of Pu'u KIlea and the burials near our families land in Paumaumau Olowalu. We find people literally standing on top of the burials drinking and watching the sunset and they have no clue what they are standing on or they just don't care. The only thing protected in this area are the mansions and of course they recently put up a new gate blocking our access to the heiau. *So I say no to your new hwy and please fix what is already there (50 cont) .* Mahalo Jason	52, 50	Ch. 2	46, 18	Response 46: Chapter 3.6 of the Draft EIS and this Final EIS summarizes the extensive survey and research conducted by the Project's archeologists and historians. The results of the analysis to date have allowed for a refinement of the alignment of the Preferred Alternative to avoid and minimize disturbance of identified archeological and architectural historic resources, such as heiaus. Chapter 3.7 of the Draft EIS and this Final EIS provides a contextual history of the cultural resources of the project area. In coordination and continued dialogue with the community, there will be comprehensive testing for historic resources (Archaeological Inventory Survey or AIS) for the Selected Alternative, with testing protocol and mitigation requirements set forth in the Executed Programmatic Agreement as required by the National Historic Preservation Act and the Hawai'i Revised Statutes, Chapter 6E process. Consultation with descendants and other individuals and organizations with a demonstrated interest in the Project (referred to as "consulting parties") is ongoing as part of the Federal Section 106 and Hawaii 6E processes and will continue as the Project moves into final design and construction.

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Jason Potts (continued)	-	25	Email					Response 18: The various alternatives (including a No Build Alternative that would keep the highway in its present location) were evaluated based on the technical environmental analyses conducted as part of the Draft EIS and this Final EIS. Overall, the No Build Alternative did not meet the Project's purpose and need because it leaves the existing highway vulnerable to coastal erosion and flooding and remains a less reliable transportation link to West Maui. However, the existing highway would continue to serve the community as a local road; it would carry far less traffic but still provide access to the Olowalu village center, homes, and business, as well as the beaches and parks in Ukumehame and Olowalu. Build Alternative 1 does pass through this area adjacent to the general store and water tower and could disturb the foundation mentioned in the comment. As detailed in Chapter 5, Preferred Alternative, of the Draft EIS, Build Alternative 1 in Olowalu was not selected as the Preferred Alternative based on several factors, including the complexity of the overlapping or proximity of the new alignment with the existing highway and its close proximity to the village center itself. Further, Build Alternative 4 was not identified as the Preferred Alternative because it has several environmental constraints associated with the mauka alignment. This included its proximity to the petroglyphs, which were identified as a likely adverse effect on land use, visual quality, and archeological and historic resources—including a noise impact at the location of the petroglyph. As described in Chapter 5 of the Draft EIS, the Preferred Alternative is based on Build Alternative 2 in Olowalu, which is considered the best opportunity to achieve the Project's purpose and need while minimizing and avoiding environmental impacts.
Tavor White	-	26	Webform	Maui has a dearth of mixed-use public spaces, other than perhaps beaches, where people can enjoy our beautiful corner of the planet. And, beaches are not conducive for bicycles. Our island is a small place. So, maximizing green areas is essential to our quality of life. I urge you to design and approve plans that do so. (53) Mahalo.	53	Ch. 3.5	44	As analyzed in the Draft EIS and this Final EIS, the Honoapi'ilani Highway Improvements Project is compatible with the long-term planning by Maui County regarding open space planning and future implementation of the West Maui Greenway. Consistent with long term planning initiatives such as the Pali to Puamana Parkway Master Plan, the Project has been part of a coordinated planning effort with Maui County regarding the use of County owned land in Ukumehame with intended shared use for the relocated highway and open space uses makai of the new road. In addition, HDOT has coordinated with Maui County regarding continued use and access to the Ukumehame Firing Range. In Ukumehame and Olowalu, the Project has also been in a coordinated planning effort with the State of Hawai'i DLNR. This coordinated effort aims to establish the location of the new highway alignment, and subsequently adding to the protection of public lands, by extending the Natural Forest Reserve over much of the department-owned property in the project area exclusive of the new highway alignment.

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Dave Veldman	-	27	Email	Aloha Ken and members of the Committee! My name is David Veldman and I live in the Kaanapali Golf Estates. I have recently read about the proposed realignment of the Honoapi'ilani Highway. I am very supportive of the proposed 6.5 mile mauka relocation. (54) As planners for Maui's future this would seem to me to be an important component to safeguard the critical transportation corridor that serves West Maui.	54	Ch. 1	6	As stated in Chapter 2, Alternatives of the Draft EIS, based on current demand, the proposed highway would be constructed with two lanes but with sufficient right-of-way to accommodate a full four-lanes if and when demand indicates that need and if funding is available. Should HDOT pursue completion of a four-lane configuration in the future, a supplemental NEPA/HEPA environmental assessment would be undertaken.
				I have also been aware of and fully support the West Maui Greenway vision. This is a terrific opportunity to create a dedicated bike and pedestrian path along the old highway. Repurposing this corridor into a scenic bike and pedestrian corridor is an obvious positive and would help further the vision of the West Maui Greenway. (55) Thank you for listening. Dave Veldman	55	Ch. 3.5	31	Implementing the West Maui Greenway (by the County) along the existing highway is considered a future condition that is fully compatible with the Honoapi'ilani Highway Improvements Project. The West Maui Greenway is not included in the Project because its ultimate design, funding, approvals and implementation would be a separate process led by Maui County. After the highway is realigned, jurisdiction of the existing Honoapi'ilani Highway would be transferred to the County of Maui, and the roadway would continue to carry vehicular traffic that serves local traffic (business, residences, beaches, parks) but with less volume. As set forth in Chapter 5 of this Final EIS, and based on public comments on the Draft EIS, the new Honoapi'ilani Highway alignment will incorporate a separate and protected shared-use path along the makai side of the new right-of-way (including two locations for protected crosswalks of the new highway). This will add flexibility and provide for integration with the West Maui Greenway, should it be constructed in the future.
Allen Surbida	-	28	Webform	Aloha, County/state must keep the Ukumehame Firing Range where it is and provide easy access to the only range we have. This project is great but developers should make sure that the range entries are kept open and easy accessible. (56)	56	Ch. 3.5	36	The Draft EIS and this Final EIS established and evaluated alternatives specifically with the understanding of the importance of the Ukumehame Firing Range to the community. As a public recreational resource, the firing range was further evaluated under the FHWA's obligation pursuant to Section 4(f) of the USDOT Transportation Act. Preservation of the use of the facility contributed to the identification of the Preferred Alternative such that the crossing of the new highway alignment was more makai than the original Build Alternatives 1 and 4 evaluated in the Draft EIS. By placing the alignment on a viaduct over the HDOT detention basin, the elevation of the viaduct will provide for a minimum of 20 feet of clearance for the existing firing range driveway, allowing for enough clearance for most emergency vehicles and trucks that may need to enter the facility.
John Rafael	-	29	Webform	The Ukumehame Firing Range is the only public range on Maui. It needs to stay open and be easily accessible to the people. (57)	57	Ch. 3.5	36	The Draft EIS and this Final EIS established and evaluated alternatives specifically with the understanding of the importance of the Ukumehame Firing Range to the community. As a public recreational resource, the firing range was further evaluated under the FHWA's obligation pursuant to Section 4(f) of the USDOT Transportation Act. Preservation of the use of the facility contributed to the identification of the Preferred Alternative such that the crossing of the new highway alignment was more makai than the original Build Alternatives 1 and 4 evaluated in the Draft EIS. By placing the alignment on a viaduct over the HDOT detention basin, the elevation of the viaduct will provide for a minimum of 20 feet of clearance for the existing firing range driveway, allowing for enough clearance for most emergency vehicles and trucks that may need to enter the facility.
David Kingdon	-	30	Webform	I strongly support the reallocation of older, makai sections of the Honoapi'ilani Highway to be designated, redesigned, and *maintained* as a dedicated multi-use path for running, cycling, and allied activities. (58)	58	Ch. 3.5	31	Implementing the West Maui Greenway (by the County) along the existing highway is considered a future condition that is fully compatible with the Honoapi'ilani Highway Improvements Project. The West Maui Greenway is not included in the Project because its ultimate design, funding, approvals and implementation would be a separate process led by Maui County. After the highway is realigned, jurisdiction of the existing Honoapi'ilani Highway would be transferred to the County of Maui, and the roadway would continue to carry vehicular traffic that serves local traffic (business, residences, beaches, parks) but with less volume. As set forth in Chapter 5 of this Final EIS, and based on public comments on the Draft EIS, the new Honoapi'ilani Highway alignment will incorporate a separate and protected shared-use path along the makai side of the new right-of-way (including two locations for protected crosswalks of the new highway). This will add flexibility and provide for integration with the West Maui Greenway, should it be constructed in the future.
				This should also include prohibition or limitation of the use of 'e-bikes,' as many of those are capable of traveling at higher or even highway speeds, which could pose a danger to those employing muscle-powered sport and recreation. (59) As a bicycle commuter, distance runner, and a paramedic serving this area of Maui, I can personally and professionally attest that dedicating this portion of H-pi'ilani for running, cycling and the like will both promote health and improve safety. Further, if well-engineered, maintained, and marketed, this could actually provide a world class 'hike & bike' path for residents and visitors alike. Maui should be actively seeking adventure travelers, who typically have a lower environmental impact, more cultural sensitivity, with the same or even higher economic injects as more sedentary travelers. Thank you for your consideration.	59	Ch. 3.5	33	The prohibition or limitation of the use of "e-bikes" is beyond the scope of the Honoapi'ilani Highway Improvements Project, and therefore this EIS.

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Michele McLean	-	31	Webform	Please use roundabouts at intersections whenever possible. (60) Mahalo! -Michele.	60	Ch. 3.14	92	Roundabouts serve important transportation management functions and were evaluated for potential application as part of the preliminary design for the Honoapiʻilani Highway Improvements Project, although they have not been furthered as a design option. The project area has five intersections and for the Selected Alternative, two would be signalized to safely allow for pedestrian and bicycle crossings (which would generally not be appropriate for a free flowing roundabout). The other locations have limitations for the right-of-way necessary to implement a roundabout with the anticipated design capacity and free flow speeds of the new highway alignment. If the use of a roundabout is proposed at a future date, it would require further operational and environmental assessment.
Cesar Martin del Campo	-	32	Webform	Support for Honoapiʻilani Highway Improvements Project and Request for Correct Categorization of Parcel 48002115 To: Hawaiʻi Department of Transportation (HDOT) Subject: Public Comment on Honoapiʻilani Highway Improvements Project – Build Alternative 1. Dear Project Team, I am writing to express my support for the Honoapiʻilani Highway Improvements Project and its goals to improve transportation infrastructure while addressing environmental and safety concerns. (61) I appreciate the effort and planning involved in designing a project of this scale to benefit our community.	61	Ch. 1	6	As stated in Chapter 2, Alternatives of the Draft EIS, based on current demand, the proposed highway would be constructed with two lanes but with sufficient right-of-way to accommodate a full four-lanes if and when demand indicates that need and if funding is available. Should HDOT pursue completion of a four-lane configuration in the future, a supplemental NEPA/HEPA environmental assessment would be undertaken.
				However, I would like to address a critical issue regarding the classification and evaluation of Parcel 48002115, which has been flagged for full acquisition under Build Alternative 1. It is essential that the property's current and planned uses are accurately reflected in the project documentation to ensure an equitable and informed process. 1. Misclassification of Parcel Use The current project documentation categorizes Parcel 48002115 as "not in use," which does not accurately reflect its status. Specifically: The parcel is actively utilized for grass farming operations, supported by established water connections and other agricultural infrastructure. (62) Farming activities are currently underway, generating revenue and contributing to the agricultural economy of the area. Additionally, the lot is being developed with architectural plans for a residential structure to complement its agricultural use. (62 Cont.) This active farming operation and planned development demonstrate that the parcel is a valuable and productive asset, rather than idle or undeveloped land. If you have any questions, please contact me. Cesar El Toro Zoysia Turf - Maui Grass Farm LLC.	62	Ch 3.4	29	During development of the Draft EIS in 2022 and 2023, property record searches along with field reconnaissance and review of Geographic Information Systems (GIS) mapping and data layers did not reveal the level of activity as described in the comment. HDOT recognizes that property ownership and use activities initiated by owners will change over time—especially in an area where subdivisions have occurred—and this information was updated accordingly in the Final EIS. Most importantly, any updated and current information will be integrated into the process of determining land value and fair compensation if the property must be acquired as part of the Project (see Chapter 3.4 of the Final EIS, which includes an explanation of how the Uniform Relocation Act establishes the protocol that must be followed in the acquisition process as well as HDOT's guidelines for right-of-way acquisition). In Ukumehame, Build Alternative 1 has been determined to be the basis of the Preferred Alternative, so the alignment is directly through Parcel 48002115. This indicates that a full acquisition of the parcel would be required. Once final design has determined the requirements for property acquisition, a representative of HDOT Right-of-Way will contact the property owner to start the process. The Final EIS Chapter 3.4 has been revised to reflect this updated information.

Commentor	Organization	Submission No.	Submission Type	Comment	Comment No.	DEIS Section	Ch. 9 Comment No.	Response
Anonymous 1	-	33	Testimony - Written	Shoreline access - Will the County also be working concurrently to provide shoreline access for the 6 mile stretch? What access to Ukumehame Beach Park and Thousand Peaks will be provided? Parking? (63)	63	Ch. 3.5	43	The new alignment of the Honoapi'ilani Highway would be mauka of the existing highway and would not provide direct access to beach areas. The roadway is proposed to be limited access only at intersections, with existing mauka to makai cross-streets. There would be no parking or pull-off areas along the new alignment. Beach access would continue to be available from the existing Honoapi'ilani Highway, which would become a County roadway and is expected to be integrated with the future plans for the Maui County West Maui Greenway. Once under County jurisdiction, the management of parking, access to adjacent beaches, and access to/from the greenway can be integrated into corridor planning.
	-			Squatting/ Homeless - How will the State/ County address safety and cleanliness along the shoreline? (64) The abandoned portion of cut mountain has become overtaken by homeless and abandoned vehicles.	64	Ch. 3.5	42	As stated in the Draft EIS and this Final EIS, encampments in the project area are an issue independent of the Honoapi'ilani Highway Improvements Project. HDOT is coordinating with other State and County officials in the ongoing management of encampments. Also discussed in the Draft EIS Chapter 5 presentation of the Preferred Alternative: when the new highway alignment connects with the existing Lāhainā bypass, the old/existing highway would be reconnected with the old highway segment that currently dead ends before the bypass. The isolated nature of the current configuration that contributed to this area's density of homeless encampments would be improved with the Project.
	-			Bike Lanes - How will cycling be addressed along the realignment and across the viaduct and bridge structures? (65)	65	Ch. 3.5	23	The preliminary design consideration did not include a separate pathway for non-motorized users, and all alternatives would incorporate a standard width shared-use shoulder lane that would accommodate bicyclists. This was intended to provide a direct route to and from the Pali and Lāhainā (including the viaducts and bridges) as a complement and interconnect with the primary bike route served by implementing the West Maui Greenway, which is proposed to be alongside the existing highway. Plans for the West Maui Greenway indicate the greenway is intended to provide a more substantial and integrated shared-use pathway that would be closer to the coastline and away from the main highway. However, based on these and other comments generated during the public review period for the Draft EIS, the Selected Alternative has been refined to incorporate a separated travel way for nonmotorized traffic (golf carts would not be allowed). As described in Chapter 2 of this Final EIS, the pathway would be constructed along the makai edge of the new highway alignment. At Luawai Street in Olowalu and Ehehene Street in Ukumehame, traffic signals would allow bicyclists and pedestrians to safely cross the new roadway.
	-			Will a separate bike path along the shoreline be built? (66)	66	Ch. 2	32	The Honoapi'ilani Highway Improvements Project does not include development of the separate bike path along the shoreline. Maui County may implement plans for the West Maui Greenway and other potential shoreline recreational facilities sometime in the future.
Kathy Kihune	-	34	Testimony - Written	*Thank you for making the time to bring many stakeholders together from Olowalu and Ukumehame. It has been very informative and positive hearing the available/ potential routes in an effort to mitigate sea level rise along with environmental concerns. (67)* Applaud the open communication of your team. Mahalo.	67	Ch.1	1	Thank you for your comment and your interest in the Project.
Brandon Hazlet	-	35	Testimony - Written	For the Olowalu portion: use the mauka/ northern section of option #1 until it crosses option #2 then pick up that option. Basically use the uphill section of each 1&2 - a mauka hybrid - don't use the makai section of either. (68)	68	Ch. 2	20	This comment generally reflects the proposed refinements to the Selected Alternative made in consideration of public comments and refined design analysis.
Michele Lincoln	-	36	Testimony - Written	From past experience, SHPD does not verify accuracy of development information provided. Archaeologists and government departments are often more in compliance with the wishes of their employers and prospect of future work. For example, Kahoma Village reported no substantial historical importance. However , it was the homestead of David Malo LCA 3702, battle ground between Kam the Great and the high Chief of Maui, and part of the 'Alamihi Fishpond Complex. So, my suggestion is to consult with lineal descendants from each area the road goes thru to ensure pre-contact, iwi, and other cultural historical things are protected and preserved. (69) Least amount of impact to important Hawaiian sites. Iwi safes memorials for any disturbed iwi within the area.	69	Ch. 3.6	46	Chapter 3.6 of the Draft EIS and this Final EIS summarizes the extensive survey and research conducted by the Project's archeologists and historians. The results of the analysis to date have allowed for a refinement of the alignment of the Preferred Alternative to avoid and minimize disturbance of identified archeological and architectural historic resources, such as heiaus. Chapter 3.7 of the Draft EIS and this Final EIS provides a contextual history of the cultural resources of the project area. In coordination and continued dialogue with the community, there will be comprehensive testing for historic resources (Archaeological Inventory Survey or AIS) for the Selected Alternative, with testing protocol and mitigation requirements set forth in the Executed Programmatic Agreement as required by the National Historic Preservation Act and the Hawai'i Revised Statutes, Chapter 6E process. Consultation with descendants and other individuals and organizations with a demonstrated interest in the Project (referred to as "consulting parties") is ongoing as part of the Federal Section 106 and Hawaii 6E processes and will continue as the Project moves into final design and construction.

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Anonymous 2	-	37	Testimony - Written	Please keep the communities as peaceful and untouched as possible. A highway through a community will change it forever, if possible please create the highway furthest away from infringing on local people. Please create a highway that encourages safety and more efficient transportation but discourages further development that does not enhance nor empower local people. (70) I hope the money allocated to the highway also gives money to remaining old, poor infrastructure and giving it back to the 'aina and for all locals to take care of and grow. I am confident we can find more creative solutions that empower and center our locals more. Federal funding is [illegible], but if we need more money to bring better solutions, I hope we pursue more money, maybe through private sources?	70	Ch. 2	19	In both Ukumehame and Olowalu, Build Alternative 4 was intended to represent the most mauka of alignments (that is, the most separation from the coast and inundation flood zones). The evaluation of this alignment showed that the distance from the coastline resulted in substantially more potential adverse effects on private property and other environmental considerations compared with Build Alternatives 1 and 2. As identified in Chapter 5 of the Draft EIS, the Preferred Alternative was selected based on Build Alternative 1 in Ukumehame and Build Alternative 2 in Olowalu. Build Alternative 4 was not identified as part of the Preferred Alternative, and the Preferred Alternative would not result in potential adverse effects to the referenced heiau. The Preferred Alternative avoids and minimizes effects on existing residences as well as cultural resources and other environmental considerations. The alignment does not create new development opportunities within the project area.
Anonymous 3	-	38	Testimony - Written	Safety - Will intersections have lighting, signals, emergency roadside phones etc...? (71)	71	Ch. 3.14	93	As established in the Draft EIS, Luawai Street in Olowalu would be a signalized intersection and, as detailed in this Final EIS and based on public comments and input, a second signalized intersection at Ehehene Street would part of the Project. Limited street lighting would be included at project intersections but not along the entire corridor. Consistent with HDOT policy, there would be no provision for emergency phones along the roadway given the prevalence and availability of cellular phones.
	-			Travel Lanes Surface - Will the road be asphalt or pccp? [concrete] (72)	72	Ch. 3.14	95	The roadway and shoulders will be constructed with concrete pavement. Side street tie-ins will be asphalt concrete pavement.
	-			Cultural Preservation - Will any monies/ resources be steered back to the communities of Ukumehame and Olowalu for preservation and education? (73)	73	Ch. 3.7	50	Preservation and education may be incorporated into mitigation strategies established in coordination with HDOT, the FHWA, the SHPD, and the community as required by the Federal Section 106 process and the Hawai'i Revised Statutes, Chapter 6E process. Potential mitigation measures are described in the Project's Programmatic Agreement, which was presented in draft form in the Draft EIS. The Executed Programmatic Agreement is included in this Final EIS (see Appendix 3.6). As described in the Executed Programmatic Agreement, the FHWA and HDOT, in consultation with the SHPD and Native Hawaiian Organizations, will continue consultation to determine if alternate mitigation under HAR § 13-275-8(2) is appropriate.
Anonymous 4	-	39	Testimony - Written	It would be great if the project included returning the shoreline of the original highway to a more natural state; with minimal shoreline hardening. I'm concerned that giving this responsibility to the County will just result in miles of homeless encampments like those on the old highway when the bypass went in. (74)	74	Ch. 3.5	42	As stated in the Draft EIS and this Final EIS, encampments in the project area are an issue independent of the Honoapi'ilani Highway Improvements Project. HDOT is coordinating with other State and County officials in the ongoing management of encampments. Also discussed in the Draft EIS Chapter 5 presentation of the Preferred Alternative: when the new highway alignment connects with the existing Lāhainā bypass, the old/existing highway would be reconnected with the old highway segment that currently dead ends before the bypass. The isolated nature of the current configuration that contributed to this area's density of homeless encampments would be improved with the Project. Parkland designations are beyond the scope of the Project. However, it is noted that the shoreline is largely accessible along the length of the existing highway (as well as from the Olowalu Beach and the Olowalu Sugar Mill historic site public access and parking) and includes two County parks. This would primarily be in the realm of Maui County because the Project includes transferring the jurisdiction of the existing highway to the County. Further, the final design and potential implementation of the West Maui Greenway, in combination with County-owned recreational lands in Ukumehame, would also be under County jurisdiction.
Linda Magallanes	-	40	Testimony - Written	Remove trees - prefer route 1. There are burials in the area where the preferred is located on the map. Very concerned about burials. (75)	75	Ch. 1, Ch. 3.6,	48	As detailed in Chapter 5 of the Final EIS, the Selected Alternative has been refined and modified to minimize and avoid sensitive archeological resources. There will be comprehensive testing for historic resources (Archaeological Inventory Survey or AIS) with mitigation protocols established through federal and State commitments (Section 106 and Section 6E). As stated in the Executed Programmatic Agreement (Appendix 3.6 of this Final EIS), mitigation of effects on significant historic properties may include preservation per HAR § 13-275-8. Such mitigation may include avoidance and protection (conservation), stabilization, rehabilitation, restoration, reconstruction, interpretation, or appropriate cultural use of the significant historic property. With regard to burials, the Maui/Lāna'i Island Burial Council (MLIBC) has the authority to determine treatment and jurisdiction over all requests to preserve or relocate previously identified Native Hawaiian burial sites. If a previously identified Native Hawaiian burial site will be affected by the project, HDOT, through its contractor, shall follow HAR § 13-300-33, Request for council determination to preserve or relocate Native Hawaiian Burial sites.

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Jonathan Verona	-	41	Phone Call	Concern of the possible homeless camp and increase in homeless in the area between the existing Honoapiilani Highway and the Realigned Highway. (75)	75	Ch. 3.5	42	As stated in the Draft EIS and this Final EIS, encampments in the project area are an issue independent of the Honoapi'ilani Highway Improvements Project. HDOT is coordinating with other State and County officials in the ongoing management of encampments. Also discussed in the Draft EIS Chapter 5 presentation of the Preferred Alternative: when the new highway alignment connects with the existing Lāhainā bypass, the old/existing highway would be reconnected with the old highway segment that currently dead ends before the bypass. The isolated nature of the current configuration that contributed to this area's density of homeless encampments would be improved with the Project. Parkland designations are beyond the scope of the Project. However, it is noted that the shoreline is largely accessible along the length of the existing highway (as well as from the Olowalu Beach and the Olowalu Sugar Mill historic site public access and parking) and includes two County parks. This would primarily be in the realm of Maui County because the Project includes transferring the jurisdiction of the existing highway to the County. Further, the final design and potential implementation of the West Maui Greenway, in combination with County-owned recreational lands in Ukumehame, would also be under County jurisdiction.
Tamara Paltin	Maui County Council	42	Email	Aloha Ms. Takara and Ms. Sullivan, I am writing to provide comments pertaining to the Notice of Intent to Prepare an Environmental Impact Statement regarding potential improvements to the Honoapi'ilani Highway (State Route No. 30) between milepost 11 in the vicinity of Papalaua Wayside Park in Ukumehame and milepost 17 in Launiupoko. As stated in the Draft Notice of Intent, "Improvements are needed to provide a reliable transportation facility that would not be inundated by the predicted 3.2-foot sea level rise and undermined by coastal erosion."				
				I firmly believe and strongly support the Honoapi**'ilani Highway's proposed 6.5-mile mauka relocation as a necessary step** in improving the safety and resilience of West Maui's transportation system. (76) The Federal Highway Administration began discussions on realignment, as early as June 2007. Since then, no advancements have been made. Now, swift action is needed to safeguard this essential highway from the growing threats posed by climate change and sea level rise, as well as ensure continuous connectivity for locals and tourists, who depend on this route for work and leisure.	76	Ch. 1	6	As stated in Chapter 2, Alternatives of the Draft EIS, based on current demand, the proposed highway would be constructed with two lanes but with sufficient right-of-way to accommodate a full four-lanes if and when demand indicates that need and if funding is available. Should HDOT pursue completion of a four-lane configuration in the future, a supplemental NEPA/HEPA environmental assessment would be undertaken.
				Furthermore, I would like to encourage the Departments to think about implementing active transportation choices, particularly the West Maui Greenway (WMG) (77). Developed in 2022 as a vision for a proposed 25-mile multipurpose path that would connect Ukumehame to Lipoa Point, it can be viewed as a strategy to increase the region's resilience through sustainable, multimodal transportation for present and future generations. As such, I respectfully urge the Hawai'i Department of Transportation (HDOT) to prioritize the following key WMG elements within the project:	77	Ch. 1	31	Implementing the West Maui Greenway (by the County) along the existing highway is considered a future condition that is fully compatible with the Honoapi'ilani Highway Improvements Project. The West Maui Greenway is not included in the Project because its ultimate design, funding, approvals and implementation would be a separate process led by Maui County. After the highway is realigned, jurisdiction of the existing Honoapi'ilani Highway would be transferred to the County of Maui, and the roadway would continue to carry vehicular traffic that serves local traffic (business, residences, beaches, parks) but with less volume. As set forth in Chapter 5 of this Final EIS, and based on public comments on the Draft EIS, the new Honoapi'ilani Highway alignment will incorporate a separate and protected shared-use path along the makai side of the new right-of-way (including two locations for protected crosswalks of the new highway). This will add flexibility and provide for integration with the West Maui Greenway, should it be constructed in the future.
				Use of (Old) State Route 30 for Segments 6 and 7. Segments 6 and 7 (the southernmost sections, from Lahaina Pali Trailhead to Lauiniupoko Beach Park) of the WMG are best served by the current (Old) State Route 30 since it could offer a dedicated bike and pedestrian path. Transforming this scenic road into a continuously connected, pedestrian and bike-friendly corridor, would promote safe, nonmotorized travel and recreation, that also serves as a cost-effective means of connecting West Maui communities. (78)	78	Ch. 3.5	31	
				Conformity with Climate and Community Goals. Including the WMG in the highway realignment project is in line with Maui's commitment to climate resilience, as well as meets the Navahine v. Hawai'i Department of Transportation et al., Climate Settlement Agreement (2024), which requires the state to develop a plan to drastically reduce greenhouse gas emissions from the transportation sector with the goal of Zero Emissions by 2045. This multifunctional trail also promotes healthy lifestyles and augments disaster preparedness by serving as an evacuation route. Designed by the Community for Long-Term Benefits. Transforming Honoapi'ilani Highway into a recreational and commuting pathway would create a lasting community asset that boosts economic recovery, tourism, and public health. A designated bike and pedestrian path would promote environmental stewardship and community pride by offering secure, picturesque access to important natural and cultural landmarks.				
				As part of HDOT's broader goal to repair the coastal highway network from Mā'alaea to north of Lahaina, the Honoapi'ilani Highway Improvements Project will bring much-needed service dependability and resilience. This project also offers a rare chance to incorporate the West Maui Greenway as a crucial component of this reconstruction (76 Cont.).	76	Ch. 1	4	The West Maui Greenway project remains an independent initiative not led by HDOT. In the project area the West Maui Greenway is anticipated to eventually be integrated along the right-of-way of the existing Honoapi'ilani Highway which is anticipated to be relinquished to the Maui County one the Project is complete. In addition, based on comments received on the Draft EIS, the Selected Alternative as presented in this Final EIS will include a separated shared-use pathway along the makai edge of the new highway right-of-way, providing more multi-modal opportunities with the eventual and independent implementation of the West Maui Greenway.
				The August 2023 wildfires has forced our community to rethink present and future disaster recovery and infrastructure planning. Conversion of the former highway into a cycling and pedestrian path, as well as an evacuation route, will shape a legacy of sustainable infrastructure that will benefit West Maui for many years to come (76 Cont.). I respectfully ask for your consideration of incorporating the West Maui Greenway into the Honoapi'ilani Highway Improvement Project, and I look forward to seeing this move forward with these important elements included. Thank you for your time and consideration of this critical matter. Please feel free to contact me at: Tamara.Paltin@mauicounty.us. Me ka 'oia'i'o, Tamara Paltin Councilmember	76	Ch. 1	4	

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Nancy Haley	-	43	Zoom testimony	My name is Nancy Halley. I've been a resident of Maui for 40 years and I have listened to discussions about moving the highway back for a long time.· It's been going on for a long time, so I've kind of excited about that.· I could see how it could really benefit the island. I did have a question and I haven't read the EIS statements, I haven't read the paperwork yet so I really need to do that; and I will do that. But I was wondering about things that came into my mind were, you know, when all the -- unfortunately, all the -- the debris was moved to the Olowalu dump site and after the Lahaina fires and Bissen, Mayor Bissen, said that that will also be transported over to the Central Maui Landfill at one time. And so I'm just kind of wondering in my mind I was thinking how is that going to impact these plans for the highway? (79) There's been concern about the dump site -- the current dump site possibly leaching into the coastal waters off of Olowalu; and so I'm just kind of wondering. And then this whole movement of transport trucks moving back and forth to get to the Central Maui Landfill, so I'm just kind of wondering how that all ties into your EIS. Have you taken a look at that and do you think that your highway proposal would affect that in some way environmentally (79 Cont.) or, you know, I still have some questions about that.	79	Ch. 3.18	107	It is anticipated that the new roadway would begin construction after completion of removal operations and closure of the landfill. On October 27, 2023, the Board of Land and Natural Resource granted Maui County a land disposition to use the Olowalu Landfill to dispose of the Lāhainā wildfire ash and smaller particles. The debris would be wrapped in liners to prevent the migration of any waste materials and the landfill would again be capped and closed. Both the Temporary Debris Staging and Reduction site and the repurposed scale and weigh station are likely to be used for less than five years. The temporary uses related to disposal of debris from the Lāhainā wildfire is expected to stop prior to the development of the Project. Therefore, any affects to this facility or conflicts with the Lāhainā wildfire debris removal are unlikely. The new roadway would have an intersection with turning lanes and to serve the landfill site thus if any future transfer activities were to be undertaken, there would be roadway access to all for the movement of trucks and vehicles. The Selected Alternative does not disturb any disposal areas of prior landfill so construction of the roadway would not increase potential for off-site contamination. Evaluation of effects from the landfill would be part of the ongoing management of the closed landfill by the State of Hawaii.
Cesar Martin del Campo	-	44	Zoom testimony	Okay. It seems like the preferred alternative -- I know it's still not the final, but it seems like our property will be impacted in the Ukumehame subdivision. I was just wondering if there's going to be someone contacting us to understand the level of impact to our farming operations or who would be the best person for me to contact in order to have a discussion? (80)	80	Ch. 3.4	29	During development of the Draft EIS in 2022 and 2023, property record searches along with field reconnaissance and review of Geographic Information Systems (GIS) mapping and data layers did not reveal the level of activity as described in the comment. HDOT recognizes that property ownership and use activities initiated by owners will change over time—especially in an area where subdivisions have occurred—and this information was updated accordingly in the Final EIS. Most importantly, any updated and current information will be integrated into the process of determining land value and fair compensation if the property must be acquired as part of the Project (see Chapter 3.4 of the Final EIS, which includes an explanation of how the Uniform Relocation Act establishes the protocol that must be followed in the acquisition process as well as HDOT's guidelines for right-of-way acquisition). In Ukumehame, Build Alternative 1 has been determined to be the basis of the Preferred Alternative, so the alignment is directly through Parcel 48002115. This indicates that a full acquisition of the parcel would be required. Once final design has determined the requirements for property acquisition, a representative of HDOT Right-of-Way will contact the property owner to start the process. The Final EIS Chapter 3.4 has been revised to reflect this updated information.

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Saman Dias	Maui Bicycle League	45	Zoom testimony	Okay. Aloha. My name is Saman Dias and that is spelled S-a-m-a-n, last name D-i-a-s. And I am a Maui -- West Maui resident and have been on Maui over 25 years on the west side. And I'm also the chair for Maui Bicycling League. So I would like to first start with thanking the HDOT and FHWA and the consultants for a great job that you folks are doing. You are very appreciated. Maui Bicycling League do not oppose to the realignment.· However, we have -- we want to address some points to ensure part of the realignment that you folks do not forget the West Maui Greenway and all of you are very well aware and the community, as well. And Segments 3, 4, 5 and Segments 6 and 7 -- Segments 6 and 7 are getting affected by the realignment.· Segments 3, 4, 5 also received recently acknowledgment for race grant, so this 6/7 is really important to us.· We want to ensure that I'm calling it old highway after the new highway begins. The old highway is getting realigned with Segments 3, 4, 5 and the connectivity will continue to connect 6, 7 to 3, 4, 5.· So as part of the design of the old highway; it's important that we do not forget the West Maui Greenway 6 and 7; (81)	81	Ch. 3.5	31	Implementing the West Maui Greenway (by the County) along the existing highway is considered a future condition that is fully compatible with the Honoapi'ilani Highway Improvements Project. The West Maui Greenway is not included in the Project because its ultimate design, funding, approvals and implementation would be a separate process led by Maui County. After the highway is realigned, jurisdiction of the existing Honoapi'ilani Highway would be transferred to the County of Maui, and the roadway would continue to carry vehicular traffic that serves local traffic (business, residences, beaches, parks) but with less volume. As set forth in Chapter 5 of this Final EIS, and based on public comments on the Draft EIS, the new Honoapi'ilani Highway alignment will incorporate a separate and protected shared-use path along the makai side of the new right-of-way (including two locations for protected crosswalks of the new highway). This will add flexibility and provide for integration with the West Maui Greenway, should it be constructed in the future.
				and it should be part of the design to incorporate the bicycle/pedestrian pathways specifically safe for our children, as well as for Kupuna.· So do not forget that. And, also, the new highway it is really important that we incorporate somehow safe bicycling and pedestrian crossing.· Very important, do not forget the pedestrian covered crossing to be incorporated to the new highway. (82) And you all are aware of the Navahine Settlement Agreement where HDOT has made commitments to reducing the carbon footprint and please use this as a opportunity to build that bike network that you all are supposed to complete in year 2030. (83) So these are just reinforcing, I have been talking to you folks on every opportunity.· I also had sent testimonies and I'm just stating this opportunity as a way to remind again.· And mahalo and thank you so much.	82 83	Ch. 1 Ch. 3.5	23 23	The preliminary design consideration did not include a separate pathway for non-motorized users, and all alternatives would incorporate a standard width shared-use shoulder lane that would accommodate bicyclists. This was intended to provide a direct route to and from the Pali and Lāhainā (including the viaducts and bridges) as a complement and interconnect with the primary bike route served by implementing the West Maui Greenway, which is proposed to be alongside the existing highway. Plans for the West Maui Greenway indicate the greenway is intended to provide a more substantial and integrated shared-use pathway that would be closer to the coastline and away from the main highway. However, based on these and other comments generated during the public review period for the Draft EIS, the Selected Alternative has been refined to incorporate a separated travel way for nonmotorized traffic (golf carts would not be allowed). As described in Chapter 2 of this Final EIS, the pathway would be constructed along the makai edge of the new highway alignment. At Luawai Street in Olowalu and Ehehene Street in Ukumehame, traffic signals would allow bicyclists and pedestrians to safely cross the

Commentor	Organization	Submission No.	Submission Type	Comment	Comment No.	DEIS Section	Ch. 9 Comment No.	Response
Karen Comcowich	-	46	Zoom testimony	I'm a West Maui resident. I drive the Honoapi'ilani Highway multiple times a week for commuting to and from work and I fully support this project because I see the wave impacts that are happening around the highway. (84)	84	Ch. 1	5	Thank you for your comment and your interest in the Project.
				I would like to echo what Saman said that it's really important to have pedestrian access that goes across the highway and to ensure that the bicycle alignments are respected and that safe bicycling infrastructure is included in the plan. (85)	85	Ch. 2	23	The preliminary design consideration did not include a separate pathway for non-motorized users, and all alternatives would incorporate a standard width shared-use shoulder lane that would accommodate bicyclists. This was intended to provide a direct route to and from the Pali and Lāhainā (including the viaducts and bridges) as a complement and interconnect with the primary bike route served by implementing the West Maui Greenway, which is proposed to be alongside the existing highway. Plans for the West Maui Greenway indicate the greenway is intended to provide a more substantial and integrated shared-use pathway that would be closer to the coastline and away from the main highway. However, based on these and other comments generated during the public review period for the Draft EIS, the Selected Alternative has been refined to incorporate a separated travel way for nonmotorized traffic (golf carts would not be allowed). As described in Chapter 2 of this Final EIS, the pathway would be constructed along the makai edge of the new highway alignment. At Luawai Street in Olowalu and Ehehene Street in Ukumehame, traffic signals would allow bicyclists and pedestrians to safely cross the new roadway.
	-			I would also like to say that there should be a location where there's some sort of passing zone (86) because one of the dangerous things that does happen is getting stuck behind visitors who are -- who are sightseeing while people are commuting, encourages people to pass in unsafe ways. So if there's just a passing zone so people can get around the slower drivers.	86	Ch. 1	7	As stated in Chapter 2, Alternatives of the Draft EIS, based on current demand, the proposed highway would be constructed with two lanes but with sufficient right-of-way to accommodate a full four-lanes if and when demand indicates that need and if funding is available. The initial project construction would clear, grade and provide infrastructure (bridges and culverts) and be ready to accommodate four lanes. Should HDOT pursue completion of a four-lane configuration in the future, a supplemental NEPA/HEPA environmental assessment would be undertaken. Based on comments made during the Draft EIS public comment period and at the public hearings, the HDOT will evaluate in the design build process the potential for including a passing lane segment as part of the initial build-out.
	-			And past that, avoiding kuleana parcels as much as impacts the kuleana parcels as much as possible. (87) I was impressed that archeological resources and the environmental resources have been thought about as much as they have in the plan. And that's all my comments for now. I'll submit written comments.	87	Ch. 3.4	30	Chapter 3.4 of the Draft EIS and this Final EIS specifically identifies kuleana parcels and evaluates the effects of the Project on those parcels. The Preferred Alternative minimizes the potential impacts on the five affected kuleana parcels in both Olowalu and Ukumehame. HDOT must comply with the Hawai'i State Eminent Domain Law, which establishes the public purpose and acquisitions procedures for private property acquisition by the State of Hawai'i. In complying with the law, the individuals affected by land acquisition would have a transparent process to follow and a full understanding of their rights to just compensation.

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Teje Roy	-	47	Zoom testimony	I'm agreeing with everyone else. I do drive the Pali a lot, like four times a week; and getting stuck behind slow drivers and then having crazy fast drivers trying to pass in the bad areas I think maybe widening the roads in certain areas for passing would be great. (88)	88	Ch. 3.14	7	As stated in Chapter 2, Alternatives of the Draft EIS, based on current demand, the proposed highway would be constructed with two lanes but with sufficient right-of-way to accommodate a full four-lanes if and when demand indicates that need and if funding is available. The initial project construction would clear, grade and provide infrastructure (bridges and culverts) and be ready to accommodate four lanes. Should HDOT pursue completion of a four-lane configuration in the future, a supplemental NEPA/HEPA environmental assessment would be undertaken. Based on comments made during the Draft EIS public comment period and at the public hearings, the HDOT will evaluate in the design build process the potential for including a passing lane segment as part of the initial build-out.
	-			And then also I just want to go on the record; I don't really -- I mean, I understand Route 3 and 4 just from looking at the maps, but they do worry me a little bit because they go by the petroglyphs and recently the petroglyphs have been getting vandalized.· And so I'm afraid it would kind of instigate more of that happening (89) or maybe even roadblocks or traffic jamming up there from people pulling over to look; and that area doesn't really have a lot of parking space for people to be pulling over and looking at them. So I'd ask you guys if you do go Route 3 and 4 to take that into consideration; and that's all I really have to say. I do want to read up more on this. There's a lot to read up on.· So -- but, yeah, that's all I'd like to say.	89	Ch. 2	18	The various alternatives (including a No Build Alternative that would keep the highway in its present location) were evaluated based on the technical environmental analyses conducted as part of the Draft EIS and this Final EIS. Overall, the No Build Alternative did not meet the Project's purpose and need because it leaves the existing highway vulnerable to coastal erosion and flooding and remains a less reliable transportation link to West Maui. However, the existing highway would continue to serve the community as a local road; it would carry far less traffic but still provide access to the Olowalu village center, homes, and business, as well as the beaches and parks in Ukumehame and Olowalu. Build Alternative 1 does pass through this area adjacent to the general store and water tower and could disturb the foundation mentioned in the comment. As detailed in Chapter 5, Preferred Alternative, of the Draft EIS, Build Alternative 1 in Olowalu was not selected as the Preferred Alternative based on several factors, including the complexity of the overlapping or proximity of the new alignment with the existing highway and its close proximity to the village center itself. Further, Build Alternative 4 was not identified as the Preferred Alternative because it has several environmental constraints associated with the mauka alignment. This included its proximity to the petroglyphs, which were identified as a likely adverse effect on land use, visual quality, and archeological and historic resources—including a noise impact at the location of the petroglyph. As described in Chapter 5 of the Draft EIS, the Preferred Alternative is based on Build Alternative 2 in Olowalu, which is considered the best opportunity to achieve the Project's purpose and need while minimizing and avoiding environmental impacts.
Jason Potts	-	48	Zoom testimony	Is there a way to ask questions on here or it's just for comments?· Sorry. Okay. My question was, like, with the -- the highway that's already there, specifically in Olowalu, what is going to be done with that? (90) I haven't heard anything about that so I'm a little confused.	90	Ch.1	18	The various alternatives (including a No Build Alternative that would keep the highway in its present location) were evaluated based on the technical environmental analyses conducted as part of the Draft EIS and this Final EIS. Overall, the No Build Alternative did not meet the Project's purpose and need because it leaves the existing highway vulnerable to coastal erosion and flooding and remains a less reliable transportation link to West Maui. However, the existing highway would continue to serve the community as a local road; it would carry far less traffic but still provide access to the Olowalu village center, homes, and business, as well as the beaches and parks in Ukumehame and Olowalu. Build Alternative 1 does pass through this area adjacent to the general store and water tower and could disturb the foundation mentioned in the comment. As detailed in Chapter 5, Preferred Alternative, of the Draft EIS, Build Alternative 1 in Olowalu was not selected as the Preferred Alternative based on several factors, including the complexity of the overlapping or proximity of the new alignment with the existing highway and its close proximity to the village center itself. Further, Build Alternative 4 was not identified as the Preferred Alternative because it has several environmental constraints associated with the mauka alignment. This included its proximity to the petroglyphs, which were identified as a likely adverse effect on land use, visual quality, and archeological and historic resources—including a noise impact at the location of the petroglyph. As described in Chapter 5 of the Draft EIS, the Preferred Alternative is based on Build Alternative 2 in Olowalu, which is considered the best opportunity to achieve the Project's purpose and need while minimizing and avoiding environmental impacts.

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Jason Potts (continued)	-			Okay. And then my other question was I noticed on the map that the – where was it? So it's your preferred build that's going to go through two of those large rock mounds from the old like sugarcane· company, right? I've been told that there's possibly bones in that, so what will be happen -- like, what will happen if you guys find bones during construction? (91)	91	Ch. 3.6	51	For the entire Project, there are rigorous requirements in the testing for potential burials in the final design alignment and standing mitigation procedures if iwi (or unanticipated remains) are discovered during construction. As stated in the Executed Programmatic Agreement (Appendix 3.6 of this Final EIS), mitigation of effects on significant historic properties may include preservation per HAR § 13-275-8. Such mitigation may include avoidance and protection (conservation), stabilization, rehabilitation, restoration, reconstruction, interpretation, or appropriate cultural use of the significant historic property. With regard to burials, the Maui/Lāna'i Island Burial Council (MLIBC) has the authority to determine treatment and jurisdiction over all requests to preserve or relocate previously identified Native Hawaiian burial sites. If a previously identified Native Hawaiian burial site will be affected by the project, HDOT, through its contractor, shall follow HAR § 13-300-33, Request for council determination to preserve or relocate Native Hawaiian Burial sites. A note specific to the push pile mounds identified in the comment: based on other public comments and the evaluation of design refinements, the Selected Alternative has been adjusted so the roadway avoids these push piles.
	-			Okay. Perfect, yeah. And I did submit testimony. It was through email. I'm not sure if you got it. My wife did, also. Her family owns kuleana in the back near the petroglyphs, so hopefully, you got our testimony. That's pretty much it. I just had those questions, so appreciate your time. Thank you.				
Daniel Ornelas	-	49	Webform	Please consider making the road 4 lanes when built to allow better flow of traffic for those that commute to the west side for work. Impatient motorists stuck behind those driving below the speed limit routinely drive aggressively through this section in order to pass clusters of slower drivers. Building 2 lanes either direction will allow these motorists to safely pass slower drivers and reduce congestion through Lahaina. (92)	92	Ch. 1	8	As stated in in Chapter 2, Alternatives of the Draft EIS, based on current demand, the proposed highway would be constructed with two lanes but with sufficient right-of-way to accommodate a full four-lanes if and when demand indicates that need and if funding is available. Should HDOT pursue completion of a four-lane configuration in the future, a supplemental NEPA/HEPA environmental assessment would be undertaken. In addition, HDOT will evaluate in the design build process the potential for including a passing lane segment as part of the initial build-out.
Elaine Baker	-	50	Webform	Routing across any portion of the closed Olowalu Landfill should be avoided so that buried waste is not exposed to the environment. (93)	93	Ch. 3.18	107	It is anticipated that the new roadway would begin construction after completion of removal operations and closure of the landfill. On October 27, 2023, the Board of Land and Natural Resource granted Maui County a land disposition to use the Olowalu Landfill to dispose of the Lāhainā wildfire ash and smaller particles. The debris would be wrapped in liners to prevent the migration of any waste materials and the landfill would again be capped and closed. Both the Temporary Debris Staging and Reduction site and the repurposed scale and weigh station are likely to be used for less than five years. The temporary uses related to disposal of debris from the Lāhainā wildfire is expected to stop prior to the development of the Project. Therefore, any affects to this facility or conflicts with the Lāhainā wildfire debris removal are unlikely. The new roadway would have an intersection with turning lanes and to serve the landfill site thus if any future transfer activities were to be undertaken, there would be roadway access to all for the movement of trucks and vehicles. The Selected Alternative does not disturb any disposal areas of prior landfill so construction of the roadway would not increase potential for off-site contamination. Evaluation of effects from the landfill would be part of the ongoing management of the closed landfill by the State of Hawaii.
				Routing across any portion of the Olowalu Recycling and Refuse Center will result in a reduction of solid waste services for West Maui. (94)	94	Ch. 3.17	106	As presented in Chapter 3.17 of the Draft, the Preferred Alternative (and all alternatives evaluated) would be anticipated to result in the displacement and relocation of the existing County of Maui recycling and transfer station. Based on information provided by the County, the location at the landfill was not considered a permanent solution and the County has long considered relocation options for this facility to move it closer to the Lāhainā urban center, where most users originate.

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Saman Dias	Maui Bicycling League	51	Webform & Email	Aloha, I am writing to provide testimony on the Honoapi‘ilani Highway (State Route 30) realignment and strongly urge HDOT and FHWA to incorporate the West Maui Greenway (WMG) as part of this project. This realignment presents an unprecedented opportunity to enhance multimodal transportation, improve emergency evacuation infrastructure, and align with long-standing but unfulfilled state policies—most notably Act 214 (2007), which mandated the use of cane haul roads for emergency evacuation. 1. HDOT’s Failure to Implement Act 214 – A Costly Oversight. The 2007 Act 214 directed HDOT to incorporate cane haul roads into emergency evacuation planning. Yet over 100 lives were lost in the August 2023 Lahaina fire—many of which could have been prevented had these evacuation routes been open and accessible. The Honoapi‘ilani Highway realignment must correct this tragic failure by formally incorporating cane haul roads as emergency evacuation routes. HDOT must negotiate with private landowners for right-of-way access and develop permanent emergency routes as part of this highway realignment. Failure to integrate emergency evacuation routes now would be a continuation of HDOT’s past neglect and put West Maui residents at continued risk. (95)	95	Ch. 1	12	The objective of Act 214 is to provide alternative routes if the highway is closed. The Project’s new highway alignment, in combination with connections to the existing highway that will become a local roadway, generally supports the objectives of Act 214. There is no continuous north-south cane haul road network parallel to the existing highway and only a handful of mauka-makai cane haul roads in the project area. The existing roadway from Olowalu center towards the petroglyphs is being preserved. In the project area, subdivision streets are the primary mauka-to-makai travel ways including North Street and Luawai Street in Olowalu and Ehehene Steet and Pōhaku ‘Aeko Street in Ukumehame. The proposed highway realignment will have two signalized intersections that will provide access to the existing highway from the realigned highway.
				2. West Maui Greenway as a Vital Multimodal Corridor & Emergency Route. The West Maui Greenway (WMG), identified in the Hele Mai Maui Legacy Projects, is a critical component of West Maui’s future transportation network. This project is already funded in part and aligns with state and federal transportation priorities. Use of (Old) State Route 30 for WMG’s Segment 6: The realigned Honoapi‘ilani Highway creates a perfect opportunity to repurpose the old highway as a dedicated bike/pedestrian corridor. (96) This cost-effective solution promotes safe, non-motorized travel while doubling as an emergency evacuation route for residents and visitors. Conformity with Climate & Community Goals: Navahine Settlement Agreement (2024): HDOT must drastically reduce transportation-sector greenhouse gas emissions and prioritize multimodal solutions. Act 131 & Complete Streets Policy: State law mandates that new highways must be bike-friendly and accommodate pedestrians. (95 cont.) The WMG achieves this. 3. Current Funding & Alignment with Federal/State Priorities. The WMG has secured substantial funding, and it is listed as a priority in multiple state and federal programs: $15 million RAISE Grant – Federal funds awarded for WMG implementation. Inclusion in the Statewide Transportation Improvement Program (STIP) – Recognized as a priority transportation project for Hawai‘i. Hele Mai Maui MPO Plan & Hawai‘i Bike Plan – Officially designated as a core component of Maui’s transportation future. With this funding in place, HDOT must act immediately to integrate WMG into the highway realignment. Delays in implementation put these funds at risk.	96	Ch. 3.5	31	Implementing the West Maui Greenway (by the County) along the existing highway is considered a future condition that is fully compatible with the Honoapi‘ilani Highway Improvements Project. The West Maui Greenway is not included in the Project because its ultimate design, funding, approvals and implementation would be a separate process led by Maui County. After the highway is realigned, jurisdiction of the existing Honoapi‘ilani Highway would be transferred to the County of Maui, and the roadway would continue to carry vehicular traffic that serves local traffic (business, residences, beaches, parks) but with less volume. As set forth in Chapter 5 of this Final EIS, and based on public comments on the Draft EIS, the new Honoapi‘ilani Highway alignment will incorporate a separate and protected shared-use path along the makai side of the new right-of-way (including two locations for protected crosswalks of the new highway). This will add flexibility and provide for integration with the West Maui Greenway, should it be constructed in the future.
				4. A Safer Highway for Bicyclists & Pedestrians. The new Honoapi‘ilani Highway must not repeat past mistakes—it must be designed with safety in mind: Separated Bike Lanes & Pedestrian Crossings: The highway realignment must include protected bicycle infrastructure, in accordance with the Complete Streets Policy & Act 131. Safe pedestrian crossings must be prioritized to reduce conflict with vehicle traffic. Disaster Preparedness Through Smart Design: The WMG serves dual purposes—as a transportation corridor and evacuation route in case of future wildfires or climate-related disasters (97) Conclusion & Urgent Request for Action. The Honoapi‘ilani Highway realignment is not just a highway project—it is a life-saving infrastructure upgrade. HDOT must implement the long-overdue Act 214 (2007) by formally incorporating cane haul roads as emergency evacuation routes. WMG’s Segment 6 must be integrated into the old highway to maximize the state’s investment in safe, sustainable transportation. The new highway must be bike-friendly, pedestrian-accessible, and aligned with state & federal multimodal goals. This is a critical moment for West Maui. HDOT and FHWA cannot afford to overlook these urgent priorities. I urge immediate action to ensure no more lives are lost due to lack of proper evacuation routes. Mahalo for your time and consideration. Respectfully submitted, Saman Dias Chair, Maui Bicycling League	97	Ch. 2	23	The preliminary design consideration did not include a separate pathway for non-motorized users, and all alternatives would incorporate a standard width shared-use shoulder lane that would accommodate bicyclists. This was intended to provide a direct route to and from the Pali and Lāhainā (including the viaducts and bridges) as a complement and interconnect with the primary bike route served by implementing the West Maui Greenway, which is proposed to be alongside the existing highway. Plans for the West Maui Greenway indicate the greenway is intended to provide a more substantial and integrated shared-use pathway that would be closer to the coastline and away from the main highway. However, based on these and other comments generated during the public review period for the Draft EIS, the Selected Alternative has been refined to incorporate a separated travel way for nonmotorized traffic (golf carts would not be allowed). As described in Chapter 2 of this Final EIS, the pathway would be constructed along the makai edge of the new highway alignment. At Luawai Street in Olowalu and Ehehene Street in Ukumehame, traffic signals would allow bicyclists and pedestrians to safely cross the new roadway.

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Kellee Emmerich	-	52	In-person verbal testimony	Hi, my name's Kellee Emmerich. I have been a Lahaina resident for almost 40 years. We owned a home on Lahainaluna Road. And during the Lahaina Fire we lost our home. One of my children, my daughter, and her family also lost their home in Wahikuli. And after living in -- at the Hyatt for eight months we were -- it was very healing to move to Ukumehame. We bought a property in Ukumehame. And we put two tiny houses there, which we are farming now. We have chickens. We planted over 20 trees. And we have a barn that we're going to be building.				
	-			And so it would be very inconvenient and disappointing if -- the higher up the highway was, it would be possibly affecting our property. And so my request is that it goes as low as possible through County land rather than through the resident or the residential areas or the agricultural areas or, yeah, private property. I'm concerned also about the noise from the road noise. The closer up it comes to the --where the people are living. So my request is that it would just stay as low as possible on the highway (98). I think that's it.	98	Ch. 2	21	In Ukumehame, the most mauka alignment (Build Alternative 4) was not identified as the Preferred Alternative for many of the environmental constraints noted in the comment, including a high number of private property takings. The Preferred Alternative is primarily on State and County lands, with a more makai alignment than Build Alternative 4 but mauka of Build Alternative 2/3 and the existing highway to avoid the inundation and flood zones to the extent possible. As detailed in Chapter 3.4 of the Draft EIS and this Final EIS, property acquisitions and displacement of existing residences must follow the rigorous procedures of the federal Uniform Relocation Act. As presented in Chapter 3.16 of the Draft EIS and this Final EIS, there are no impacts from increased noise levels generated by the Preferred Alternative and no abatement is warranted.
Brad Emmerich	-	53	In-person verbal testimony	So after the fire I realized that this is going to be something that takes a long time. And so I needed to find a house or something -- a place for my family to live. So that's when we lived at property there in Ukumehame. I originally was trying to find a friend or something like that or somebody that was wanting to allow me to put a -- either a mobile home or something on their property. That's when somebody said, "Well, why don't you just look at the ones there in Ukumehame?" Which we had looked at earlier in the year but it was out of our ability. Anyway, to make a long story short, so after the fire I realized it was going to take a long time before we could rebuild. So we went and found something there in Ukumehame. And, like Kellee was saying, we were at the Hyatt for eight months. So while we were there we were working hard at trying to build something in Ukumehame. But it was difficult getting through all the process.				
	-			At any rate, now that we're there, of course, we really like the property and so we're more invested in what happens as far as the road is concerned. And there is property below us – the property that's next to the highway that is all County property. And there are “no trespassing” signs all over. But of course people have moved in there and, you know, they put up homesteads really -- gates and fences and right next to the "no trespassing" signs. (99) But it just -- it makes sense to me that the State would put the highway there at the County property at the bottom of Ukumehame development.	99	Ch. 2	21	In Ukumehame, the most mauka alignment (Build Alternative 4) was not identified as the Preferred Alternative for many of the environmental constraints noted in the comment, including a high number of private property takings. The Preferred Alternative is primarily on State and County lands, with a more makai alignment than Build Alternative 4 but mauka of Build Alternative 2/3 and the existing highway to avoid the inundation and flood zones to the extent possible. As detailed in Chapter 3.4 of the Draft EIS and this Final EIS, property acquisitions and displacement of existing residences must follow the rigorous procedures of the federal Uniform Relocation Act. As presented in Chapter 3.16 of the Draft EIS and this Final EIS, there are no impacts from increased noise levels generated by the Preferred Alternative and no abatement is warranted.
	-			And then my other concern was the noise mitigation -- if there was a way that they could --they would certainly -- my hope would be they would consider that because right now we can hear the highway noise. But when we go inside, you know, then at least you can't hear it when you're inside. But if the highway was closer it gets louder. And so my hope would be that they would take that into consideration also since we are a resident – that they would do something to try to mitigate the noise -- lessen the noise. (100) That's it.	100	Ch. 2	21	
Raymond Ishii	-	54	In-person verbal testimony	Hi, my name is Raymond Ishii. Is this thing on? Okay. I'm the president of the Valley Isle Sports Shooters Club, which is the oldest and largest user of Ukumehame Firing Range. While I fully support moving the existing highway, in that there are a number of concerns I have. The roads appear to run parallel to fire lines, which we are very grateful for, although there is a couple routes that were uncomfortably close. But my understanding is that's going to change.				
	-			The questions I have is right now to access the range and the Papalaua Wayside Park we have to drive past the range via the Viaduct exit to the Ukumehame subdivision, then backtrack on the existing highway. (101) The question I had, which was actually answered, was is the State going to maintain that highway to a correct standard where you can actually drive on it. And I was told that's going to be turned over to the County. So that's a County question now. Because that section of road – if anybody's driven it -- is probably going to fall in the ocean pretty soon. Because if you look every so often you'll see the -- basically the ocean undercutting the existing jersey barriers. So the question I have is, number one, is that road going to be maintained? (101 Cont.)	101	Ch. 3.5	38	The routing as described is correct. For the existing highway it is noted that the Project would result in the transfer of jurisdiction from HDOT to Maui County as a local roadway. The existing highway would have substantially less traffic demand after the realigned highway is open, and the intent would be for the County to maintain the road in a manner that improves environmental sensitivity (that is, less hardened shoreline structures) and includes the West Maui Greenway and other planning initiatives. The Nature Conservancy and University of Hawaii are currently studying the coastal zone in Olowalu and Ukumehame (including the existing highway alignment) to identify nature-based solutions that strengthen coastal ecosystems and resilience. While, as noted, this section of the existing highway is vulnerable to coastal erosion, it also serves important County uses including the firing range, Ukumehame Beach, and Pāpalaua Wayside Park.
	-			The second question I have -- to avoid that, prior on the left side of the bypass would it be possible to just simply restripe existing road and put in a turn lane so we can get direct access and not have to basically bypass everything? That will give access to both the range and the beach park. (102) Then, going back the other way, a merge lane.	102	Ch. 3.5	39	The option of having an intersection at the Pali terminus of the Project to maintain access to the old highway was reviewed and evaluated by the conceptual design team. However, the option was determined infeasible due to the angle of departure of the new highway both horizontally and vertically—the new highway must rapidly ascend an existing berm for the detention pond that is makai of the firing range—and the limited space that results from these geometric constraints. In short, the limited geometry leads to the inability to provide a safe intersection in this area.

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Raymond Ishii (continued)	-			My understanding is a viaduct is going to be 25 feet high, which is good so emergency vehicles can go under it. But the other question we had was during construction will people be allowed access basically to the range because they're going to build the viaduct over the existing road? (103) And that's it for the range.	103	Ch. 3.5	40	Because the viaduct would be constructed with piers on either side of the firing range driveway, the construction-related disruption to the driveway itself would be short-term. While the viaduct structures are being placed across the driveway from pier to pier, the driveway could be temporarily closed. The design build contractor would be required to coordinate construction phasing and sequencing in this area with Maui County Parks and Recreation (the owner and operator of the firing range).
	-			I have one comment though as far as the highway itself -- if there's any thought about putting protected passing lanes on that highway? Because if anybody's driven it, what happens is you get behind somebody going 20, 30 miles an hour and you got a line of cars, you know, half mile, mile long. Then you get one guy ten cars back who's late for work and he's going to start passing people. So has there been any thought about putting passing lanes on that highway? Not the whole thing but just intermittently to let people around slow people. (104) That's all I got.	104	Ch. 1	7	As stated in Chapter 2, Alternatives of the Draft EIS, based on current demand, the proposed highway would be constructed with two lanes but with sufficient right-of-way to accommodate a full four-lanes if and when demand indicates that need and if funding is available. The initial project construction would clear, grade and provide infrastructure (bridges and culverts) and be ready to accommodate four lanes. Should HDOT pursue completion of a four-lane configuration in the future, a supplemental NEPA/HEPA environmental assessment would be undertaken. Based on comments made during the Draft EIS public comment period and at the public hearings, the HDOT will evaluate in the design build process the potential for including a passing lane segment as part of the initial build-out.
David McPherson	-	55	In-person verbal testimony	Hi, my name is David McPherson. I live in Kipuka Village. Most people know it as Olowalu Village. I've been there for about ten years with my family. As we look at the alternate routes, it seems -- and I would like to see it go a little bit higher away from the homes. There's a lot more space Mauka.Hopefully there's no park sites or anything that would be -- that would hinder that to be pushed further away from our homes. We have a small little village there. And it seems like it goes, you know, fairly close. So that's one thing that I would really like to see happen is that it would be pushed further away from our homes for the noise. (105)	105	Ch. 5	112	There have been several comments looking to move the Preferred Alternative further mauka from its alignment as presented in the Draft EIS. These comments have been reviewed and incorporated into the refinements of the Selected Alternative, and the result would be a more mauka alignment (up to approximately 200 feet of the original alignment). Modifications to the Selected Alternative are summarized in Chapter 5, Selected Alternative, of this Final EIS. In terms of noise, there was no impact on the homes in the Kapāiki Village area from the Preferred Alternative as analyzed in the Draft EIS. Based on the removal of the high volume of through traffic on the existing highway, the homes in this area would experience a decrease in noise levels over the No Build condition (see Chapter 3.16 of the Draft EIS and Final EIS).
	-			And second of all, for the design team, if you thought about putting guardrails up (106) -- I know guardrails are to stop cars when there's no other runways that they can slow down. But guardrails keep vagrants out of State-covered lands. And that's a really – putting guardrails up would save our County and State dollars in not having to clean up cars. (106) I mean, if you do the stretch from Olowalu to Ukumehame you're going to see cars littered up there, especially if you take a helicopter and you fly over. It is unbelievable. And that takes a lot of money, a lot of effort, and it damages our wetland areas. So to keep everybody out of there, guardrails would eliminate anybody really driving into State-covered land or places that they should not be trespassing. (106) That's just one thing that I wanted to say on that.· Thank you, everybody, for coming. Appreciate it.	106	Ch. 2	22	Guard rails will be included along both sides of the new highway.
Jason Wolford	-	56	In-person verbal testimony	Good evening. My name's Jason Wolford. I'm with SAST. We're a nonprofit training organization at Ukumehame Firing Range. (107) We're a nonprofit. We teach firearm safety and training. My concern is along with the fires when the range was closed -- people need accesses through that. So during the construction are we still going to be able to access that? (107) Because people want to go hunt. They need to be able to sight rifles in for ethical hunting purposes and things like that. If it's shut down another six to eight months during the construction of that, you're just going to have people going other places shooting and as well as being able to take firearms, classes, and trainings -- and safety trainings -- which is required by the State of Hawaii. You're basically going to be locking people out of access to these constitutional rights as well if we don't have access to that.	107	Ch. 3.5	40	Because the viaduct would be constructed with piers on either side of the firing range driveway, the construction-related disruption to the driveway itself would be short-term. While the viaduct structures are being placed across the driveway from pier to pier, the driveway could be temporarily closed. The design build contractor would be required to coordinate construction phasing and sequencing in this area with Maui County Parks and Recreation (the owner and operator of the firing range).
	-			And my second question is I understand they're making it three lanes for finances and things like that. What happens when there's an accident on that elevated roadway? Whether there's guardrails and the vehicles are stopped there and people need to get through or -- how are you going to get people off of that? (108) If there's a fatality we all know the road shuts down here for six to eight hours. How are people going to get off of that elevated roadway to be able to at least go one way or the other to get back somewhere else rather than sitting in their cars for six to eight hours?	108	Ch. 5	118	The viaduct will have 6-foot-wide shoulders, 11-foot-wide travel lanes (one in each direction) and a 4-foot wide median, providing a total roadway width of 38-feet plus a shared use path. This width is anticipated to be adequate to provide the passage of vehicles should an accident occur either by having vehicles pulling to the side (and passing vehicles utilizing the median space to pass) or in more severe cases the use of a single contraflow lane with the assistance of Maui Police Department.

Commentor	Organization	Submission No.	Submission Type	Comment	Comment No.	DEIS Section	Ch. 9 Comment No.	Response
Van Fischer	-	57	In-person verbal testimony	Hello, my name is Van Fischer. I own six acres in Olowalu right where the wai stream goes up right below where the proposed highway is going to go through. Fortunately, the new highway that's proposed barely clips the corner of my property. So I'm grateful that it misses mine. But my neighbors are not so fortunate. I'm here to ask you to move the intersection of Luawai and the highway Mauka, like, 150 feet for a number of reasons. One, the way that it hits Luawai Street now is at an angle so it doesn't create a right-angle intersection. (109) So you're going to have to realign the side roads as opposed to realign the highway. If you just move the proposed highway up about 150 feet it changes the arc of the highway as it comes through. And then it hits Luawai Street at a right angle so you have a proper intersection. That intersection's going to need to be signalized because it's going to be a very busy intersection going down into Olowalu Village. (109)	109	Ch. 5	111, 113	Response 111: These comments have been reviewed and incorporated into the refinements of the Selected Alternative to the extent practicable, most notably with a mauka shift of the roadway. Modifications to the Selected Alternative are summarized in Chapter 5, Selected Alternative, of this Final EIS. Response 113: As indicated in the Draft and Final EIS, this intersection is proposed to be fully signalized.
	-			Another issue is that on the back of our property lines -- Lot 20 and Lot 19 -- there's a subservice tributary to Mapua Stream. And there's an old pumphouse right where you're putting your highway through where if you go down in there you can see there's water flowing under there. And that is a tributary into Mapua Stream, (110) which runs right through mine and Dave's property just down further. The rest of Mapua Stream up above is also subterranean. But in the section through our property it's an open stream and there's tons of life in there. And we would like to protect it and enhance it if possible. And putting the highway through there is not going to accomplish that. (110)	110	Ch. 5	115	These comments have been reviewed and incorporated into the refinements of the Selected Alternative to the extent practicable. Modifications to the Selected Alternative are summarized in Chapter 5, Selected Alternative, of this Final EIS. During final design further geotechnical studies would be conducted related to the limits of disturbance. These studies would identify subsurface conditions (including potential underground streams) and potential design modifications would be evaluated based on those findings.
	-			There is a substantial topography difference between the area where the highway can go right above Lots 19 and 20 as opposed to below. There's about a 12-foot vertical bank. And if it were moved up then you wouldn't have to deal with that bank. (111) If you do have to deal with the bank, behind my property's going to be a 20-foot-high embankment to support that highway up there. So for these reasons I'd like to ask that you move it.	111	Ch. 5	114	These comments have been reviewed and incorporated into the refinements of the Selected Alternative to the extent practicable, most notably based on the mauka shift of the roadway as noted by the comments. Modifications to the Selected Alternative are summarized in Chapter 5, Selected Alternative, of this Final EIS.
	-			The most important reason probably is that right where you go through Lot 20 there was two parcels there -- A and B -- just on the southside of the wai stream where there was two two-and-a-half-acre parcels there with two local families who are in contract to buy those to build their homes on. (112) And now they can't build their homes there. You're going right through those properties. And all it would take is to move it 150 feet Mauka into an open space tract that's already there that nobody's going to be building on. (112) So I would appreciate it if you would look into it. I feel really good. I spoke with Jamie about this and I feel like she really understood and cared about what I was saying. So I'm hopeful that you will take this into consideration. Thank you.	112	Ch. 5	117	These comments have been reviewed and incorporated into the refinements of the Selected Alternative.
Nick Nielson	-	58	In-person verbal testimony	Hello, my name is Nick Nielson. I'm a property owner in Ukumehame. Most of my concerns have been addressed so far so I'm just going to note one concern for us. We're kind of concerned about the hours of construction – if there's going to be limits or it's going to be a 24-hour operation and how that noise will be addressed and recorded before and after construction. Will there be a decibel meter at our location now and that's compared to construction? (113) That's it.	113	Ch. 3.16	105	As presented in Chapter 3.16 of the Draft EIS and this Final EIS, the Hawaii Department of Health maintains community noise control standards (HAR §11 46) that also apply to construction noise. These specifications would be adhered to, and a noise permit would be obtained for construction activities performed during standard work hours (Monday through Friday 7:00 a.m. to 6:00 p.m. and Saturday 9:00 a.m. to 6:00 p.m.). Should night work be required (outside of sea turtle nesting/hatching periods and seabird fledgling periods), it would be limited and of short duration at the connection points at the north and south ends of the corridor in order to limit daytime congestion. The distances of this anticipated night work would be far enough away from residences to have no adverse effect.
Malihini Keahi	-	59	In-person verbal testimony	Aloha. I'm Malihini Keahi. I'm from Lahaina all my life. You know, my dad was Moon Keahi. And my father used to help a lot of representatives who were trying to make a change on the west side. And the craziest thing was that every time they wanted to add a road something else was coming. So again, you know, I live in Leali'i. I spoke my piece up there. I think what I'm afraid of more so is the highway. So you take up more land. You open up the highway. And then you infringe on people in Olowalu.(114) Some of them are wanting the changes. But you know what? I think leave Olowalu as peaceful as it is. It doesn't stop traffic to come into Lahaina. Today I had an appointment on the other side. I came back this way. Traffic was backed up on the bypass.· And I think the more road you make the more people come. (114)	114	Ch. 1	10	As described in Chapter 1, Introduction, Purpose and Need, of this Final EIS, the Project's primary purpose is to provide a reliable transportation facility in West Maui and improve Honoapi'ilani Highway's resilience by reducing its vulnerability to coastal hazards. Specifically, the Project is intended to address existing coastal erosion and flooding vulnerabilities as well as future coastal erosion and flooding. The Project does not include land use actions or modifications to the existing zoning that would facilitate additional development in the surrounding area. Regarding the Olowalu Town Master Plan Project, on December 7, 2015, the State Land Use Commission denied the acceptance of the Final EIS and the project was discontinued. There are currently no filed applications or permits to indicate that the Olowalu Town Master Plan Project would be pursued again. In addition, should the Olowalu Town Master Plan Project (or a project of similar scope or nature) be proposed, it would likely be subject to approvals, potentially involving environmental review and associated public engagement requirements.

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Malihini Keahi (continued)	-			And with what Lahaina has just already gone through it's, like, this is too much. It's just too much. I think Lahaina, Olowalu needs to be rethink -- I know they were wanting to make a whole village and a whole town. That place is sacred. I think the few people that know about it and the people that have learned about it in this last 20 years is plenty enough. We need to speak -- we need to share the history of Olowalu, not condemn it because we're going to have more people coming in. You know, that area -- it's been sacred for me all my life growing up (115) . Whenever we were gathering with my grandmother there we'd always end up down by Olowalu Pier and we would spend a week or a month, especially when my grandparents were alive, and we'd all gather. Everybody who was from Pu'ukoli'i on this side of the island -- we'd go to Olowalu. That is gone now. Yeah. My babies grew up there. My grandbabies today -- they don't -- they enjoy it there because of the feeling and as we grew up there. But Olowalu is special. And those of you that are there, you're very blessed. And I just feel that this whole highway thing -- and I know progress is progress.	115	Ch 3.7	52	HDOT and the FHWA have worked to maintain an open dialogue with the community and to use this information to minimize disturbance to Aina and to cultural resources found within Ukumehame and Olowalu ahupua'a. The analyses contained within the Draft and Final EIS generally use ahupua'a as a geographic unit for delineation rather than 'ili (a smaller area of land within a ahupua'a); however, in instances where further geographic refinement was warranted (e.g., Chapter 3.7, Cultural Resources) 'ili are discussed.
	-			But, like I said, every time we add a road something else is happening. It gets developed.(114 cont) All the work that Tanya did of exposing our history is going to be covered all over again. Maybe not all the areas, but most of it -- of her hard work, of our past. And that is today that is going on – that we get to know of our past, our history. For our children and our grandchildren and our great-grandchildren -- they'll never see that. It's going to be covered.(115 cont.) And you add one more road -- that's not going to help.	114, 115	Ch.1, Ch. 3.7	10, 52	
				You know what? After the fire, traffic was very little. People respected and got only on the bypass through Lahaina and Keawe. And that got all messed up, yes. And then we asked these two, "Why couldn't you do the road Mauka and take it to Honokowai?" We said no more money. But you talk about money. So why don't you work on that part? (116)·	116	Ch. 2	27	As noted in the comment, there is no current funding for work on the bypass north of Lāhainā. The Project was started well before the devastating 2023 wildfire that destroyed Lāhainā and resulted in significant human loss and suffering as well as difficult economic impacts. The Project would generally support the efforts to rebuild Lāhainā by providing a reliable transportation facility in West Maui and improving Honoapi'ilani Highway's resilience by reducing its vulnerability to coastal hazards. Planning for the Project began with pre-Notice of Intent Scoping, where HDOT and FHWA held two early scoping meetings in February 2022. The EIS scoping period was initiated in November 2022. These activities informed HDOT and FHWA's approach to future public engagement and community input was used to hone the Project's Purpose and Need Statement and to understand potential concerns that should be considered in the analyses. At the time of the wildfire, the Draft EIS technical evaluations were largely complete and being reviewed and refined. The goal was to publish the Draft EIS toward the end of 2023. After the wildfire, HDOT and the FHWA reviewed each technical evaluation to acknowledge and identify whether changes in the analyses would be appropriate based on the wildfire's effects. While there was extensive public participation before the wildfire, HDOT and the FHWA understand that the community's focus has been on rebuilding efforts. However, the purpose and need for the Project remain, and the funding associated with the Project was committed prior to the wildfire.
	-			You know, above – So, anyway, I didn't mean to come talk but I had to say something. And I have my family Naho'oikaikas Olowalu and I was really worried where that road was going to change because they're right above the store. (117) And that's why I'm here.	117	Ch. 3.6	47	For clarification, the APE line referenced in the comment is intended to show the extent of the Project's study area of possible project effects on historic architectural and archaeological properties (the APE is not a proposed roadway alignment). In the evaluation of all Draft EIS alternatives for Olowalu, Build Alternative 4 (which is closest to the APE boundary) and Build Alternative 1 were excluded from the Preferred Alternative because these alternatives would have the greatest potential for adverse effects on historic properties (though neither directly affect the Naho'oikaika property).

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Ms. Keele	-	60	In-person verbal testimony	So mahalo to having this in Lahaina. I think that's really helpful. I want to recognize that, Director Sniffen, you've done this a couple times now. So thank you -- coming to the community to have conversations. I'm happy to see so many people from the area that we're discussing because I found out about this meeting because I opened my, like, Lahaina Strong weekly email today. So they happened to have it in there. And so just advertisement wise if there's something better that you guys could do for future engagement because our community is really overwhelmed. And so we need to have a little bit of notice so we can plan around things.				
	-			I do want to acknowledge that in the presentation it looks like someone did realize it since you had these printed because on the boards it does say "a grassy median" and that made me very uncomfortable. So I want to make sure that we are talking about that as a native plant median and not a grassy of some sort. (118)	118	Ch. 3.11	70	An environmental commitment of the Project as specified in Chapter 5 of this Final EIS requires the use of native species for all revegetation and landscaping purposes. Species identified in the project area will be prioritized. Additional consideration will be given to native, fire-resistant vegetation. Turf grass is prohibited for revegetation and landscaping in accordance with the 2011 HDOT Highway Manual for Sustainable Landscape Maintenance.
	-			And then just engagement wise, you know, I'm just kind of wondering, like, how you've done it and how much you've done because this is something that, especially on Maui, we've found is that we just -- there just isn't really engagement. People say there's engagement and, like, yeah, some people go the meetings but, like, it's always the same groups of us that do. And I appreciate the explanation of the preferred versus the alternatives. I think that was really helpful.				
	-			I do think that cultural concerns is very -- it's a very significant conversation for us to have. You know, we know that there's going to be Iwi where we're talking about. And so having a plan for that – because my understanding is, like, the state law, like, doesn't exist about it.· Like, you find Iwi and you stop. And that's, like, the law. So, you know, just being mindful of those kind of things because we know that's going to happen. (119)	119	Ch. 3.6	46	Chapter 3.6 of the Draft EIS and this Final EIS summarizes the extensive survey and research conducted by the Project's archeologists and historians. The results of the analysis to date have allowed for a refinement of the alignment of the Preferred Alternative to avoid and minimize disturbance of identified archeological and architectural historic resources, such as heiaus. Chapter 3.7 of the Draft EIS and this Final EIS provides a contextual history of the cultural resources of the project area. In coordination and continued dialogue with the community, there will be comprehensive testing for historic resources (Archaeological Inventory Survey or AIS) for the Selected Alternative, with testing protocol and mitigation requirements set forth in the Executed Programmatic Agreement as required by the National Historic Preservation Act and the Hawai'i Revised Statutes, Chapter 6E process. Consultation with descendants and other individuals and organizations with a demonstrated interest in the Project (referred to as "consulting parties") is ongoing as part of the Federal Section 106 and Hawaii 6E processes and will continue as the Project moves into final design and construction.
	-			And then to Dave's point, I really liked the comment about the guardrails. (120)	120	Ch. 2	22	Guard rails will be included along both sides of the new highway.
	-			And I also enjoyed the comment about the passing lanes.(121) And I don't know that that's necessarily an option, but I do think that at the very least we should have signs that say, like, pull over to let other cars pass or something because that absolutely happens. And I think encouraging people to drive faster around isn't great.But letting people know, like, "Hey, you're driving too slow -- get out of the way" is, like, very helpful to those in our community who have to commute every day and deal with all these tourists. And I think that's really it. Otherwise, everything's been covered. So mahalo for having this.	121	Ch.1	7	As stated in Chapter 2, Alternatives of the Draft EIS, based on current demand, the proposed highway would be constructed with two lanes but with sufficient right-of-way to accommodate a full four-lanes if and when demand indicates that need and if funding is available. The initial project construction would clear, grade and provide infrastructure (bridges and culverts) and be ready to accommodate four lanes. Should HDOT pursue completion of a four-lane configuration in the future, a supplemental NEPA/HEPA environmental assessment would be undertaken. Based on comments made during the Draft EIS public comment period and at the public hearings, the HDOT will evaluate in the design build process the potential for including a passing lane segment as part of the initial build-out.

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Victoria Kaluna-Palafox	-	61	In-person verbal testimony	Aloha. Good evening. My name is Victoria Kaluna-Palafox. I live in Ukumehame. I am and we are Ukumehame restoration wetlands and restoration of Limu projects working in Ukumehame. Also working with Olowalu. We pray that we connect with our ohanas here in Lahaina so that we can continue the growth of Limu to renourish our oceans again and to protect our wetlands. And with that, Ukumehame for many, many years has been very dry. The wetlands has had no life until a couple years ago. If you go to Pohaku Aeko Street there's, like, a culvert they made. Over there it used to be all dry. The only time that wetlands used to fill up is when the rains used to come and a little seepage from the ocean floor. Today in that culvert there's water in there and there's fishes. There is life right where you're thinking of putting that highway. I ask you not to do it. I ask you to go ahead, bring your scientists, and check our 'Aina Ukumehame because it's coming alive again. There is fishes where you wouldn't think there is fishes. There are water pools in Ukumehame where there weren't water pools. (122) It is starting to show us.	122	Ch. 3.10	71	Biologists performed surveys in the area throughout 2023 (Draft EIS Appendix 3.10 as well as additional field surveys conducted in March 2025 (Final EIS Appendix 3.10).While the culvert under Pōhaku ʻAeko Street was not included as part of these surveys (because it would not be affected by the Project), the surveys do acknowledge the local habitats in Ukumehame and names of fish species known to be in the Ukumehame and Olowalu streams were listed. They include ʻOʻopu and Āholehole. The biggest threats affecting fish include habitat degradation resulting from water diversion, stream channelization, dams, pollution, and the introduction of exotic species and parasites. For the Project, no streams will be diverted or channelized, and no in-water work is planned for bridges and stream crossings to avoid and minimize potential impacts on fish and other aquatic species. In coordination with state and federal natural resource agencies, environmental commitments to BMPs will be utilized to protect water resources and the area's native species from construction and operational impacts (see Final EIS Chapter 5). These include using native plants for revegetation which will help with soil retention. Water quality monitoring by trained local scientists will flag if any degradation is occurring so that mitigation can be implemented.
	-			There was one developer -- and the only developer back there -- he tried to help the community by building eight cottages. In order to get their cottages built he covered up a wetland pool and put the eight houses on it. My question to you -- how are you going to run your highway? With a big berm or are you doing dry pipe? If it is dry pipe I am against dry pipe because the wetlands are important for us, especially at this time. We need to start concentrating on growing food for our people.· And this is where it should be Ukumehame Olowalu -- the largest land in Lahaina. Open, barren, good 'Aina for grow food. (123) The other part that I am very concerned about is all the wetland pools. There's a special one that I talked to Tanya and I talked to Pua today. It was always kept within the Kupuna's, Mana', and Mo'olelo. We have not shared that space yet.	123	Ch. 3.9	53	As evaluated in the Draft EIS and this Final EIS, the Project's alternatives were established to avoid and minimize wetland areas and to manage stormwater flow from the new highway with low impact design standards and not hard infrastructure, such as piping storm flows for direct discharge to adjacent waters. As described in Chapter 5 of this Final EIS, the Selected Alternative incorporates many design features that would preserve and not substantially alter water flow from mauka sources towards the ocean. The alignment would be on viaduct over the low lying inundation areas adjacent to the Ukumehame Firing Range and wetlands in the Ukumehame area. Spanning these important ecological features preserves wetlands and wildlife habitat to the greatest extent practicable. Bridges and culverts would allow for continued water flow while crossing the new highway. Based on low impact design standards required by State and federal guidance, stormwater flowing off the new highway pavement would be collected and treated with infiltration basins located in multiple locations along the corridor.
	-			As Olowalu has a cave up in the valley filled with water and that land belonged to the Nahina and Ho'oikaika's, today Peter Martin wants to funnel that water out. Ukumehame is the same. It is a land of food growth. We need to look into that history. The wetlands of Ukumehame starts from the pipe and it comes almost all the way to the river. The reason why I'm saying almost to the river is because the river's water flow comes within that passage so the wetlands could stop at one certain point. Again -- Yeah. Again I will repeat -- many years from the time of the first development that area was all wet. Within the last year or so water has been seeping under the road. Kane has found his way, therefore bringing the fishes back to where they was in time past.(123, cont.) I thank you very much for the time.	123	Ch. 3.9	53	

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Linda Nahina Magallanes	-	62	In-person verbal testimony	Aloha mai kakou. My name is Linda Nahina Magallanes. I'm an original descendant of Olowalu -- my biggest concern. I know a lot of culture is significant in that area.(124)	124	Ch 2	17	As presented in the Draft EIS and this Final EIS, the various alternatives were evaluated based on the full range of technical environmental analyses conducted as well as roadway design considerations. In addition to the loss of monkeypod trees Build Alternative 1 in Olowalu would have resulted in further potentially adverse effects related to the proximity to existing residences and the intersection of Olowalu village center and the existing highway. All the alternatives are approximately the same length, so alignment length alone was not a primary factor in the comparative impact evaluation. As described in the Draft EIS, the Preferred Alternative is based on Build Alternative 1 in Ukumehame and Build Alternative 2 in Olowalu and is considered the best opportunity to achieve the Project's purpose
				I had asked about cutting down the trees through Olowalu -- the tunnel trees. I was told they cannot. Why? You protect the trees but you're not protecting the cultural significance of Olowalu. Every bit of Olowalu is significant culturally. (124 Cont.) I know that because I'm also from Olowalu with the connection of my ohana Naho'oikaika and Keao. I used to live where the farm is right now that -- by the highway -- that coconut farm and butterfly -- I lived there until we moved into Lahaina.	124	Ch 2	17	
				But my biggest concern is if you put the road up higher what about the heiau on the top? That heiau is still going strong. There's also Pu'u Kilea, which is -- our Kupunas are buried on top. (125) You're going to put one highway through that. You have Awalua, which is the outskirt of Olowalu on the Lahaina side. Then you've got Kapa'i, which is on the Wahikuli side of Olowalu. So also these places need to be named correctly. Not -- Kapa'i is not Olowalu. That's Kapa'i. (125)	125	Ch 2	19, 52	Response 19: In both Ukumehame and Olowalu, Build Alternative 4 was intended to represent the most mauka of alignments (that is, the most separation from the coast and inundation flood zones). The evaluation of this alignment showed that the distance from the coastline resulted in substantially more potential adverse effects on private property and other environmental considerations compared with Build Alternatives 1 and 2. As identified in Chapter 5 of the Draft EIS, the Preferred Alternative was selected based on Build Alternative 1 in Ukumehame and Build Alternative 2 in Olowalu. Build Alternative 4 was not identified as part of the Preferred Alternative, and the Preferred Alternative would not result in potential adverse effects to the referenced heiau. The Preferred Alternative avoids and minimizes effects on existing residences as well as cultural resources and other environmental considerations. The alignment does not create new development opportunities within the project area. Response 52: HDOT and the FHWA have worked to maintain an open dialogue with the community and to use this information to minimize disturbance to Aina and to cultural resources found within Ukumehame and Olowalu ahupua'a. The analyses contained within the Draft and Final EIS generally use ahupua'a as a geographic unit for delineation rather than 'ili (a smaller area of land within a ahupua'a); however, in instances where further geographic refinement was warranted (e.g., Chapter 3.7, Cultural Resources) 'ili are discussed.
				I said this in many meetings. I came to many meetings. I also was on you guys' Zoom meeting and somebody said they was going to get back to me and to today never got back. It really disappoints me because nobody listened because it's all about the road. If you cut the trees down, you got one road there. Use the old cane haul road. What's so hard about that? Instead of going up (124, cont) -- because even on the cane haul there's -- the cane road to the regular road has cemetery on the left. Check West Maui Land EIS and put that together with your EIS. Something will go right. That's all I got to say. I'm kind of angry and I'm sorry by coming out like this. But nobody listening to the people who from here of Maui, of Lahaina, in Olowalu. I'm very upset because nobody listens. They're just doing what they like, put roads where they like, but not listening to the people -- listening to the money. Thank you.	124	Ch. 5	17	As presented in the Draft EIS and this Final EIS, the various alternatives were evaluated based on the full range of technical environmental analyses conducted as well as roadway design considerations. In addition to the loss of monkeypod trees Build Alternative 1 in Olowalu would have resulted in further potentially adverse effects related to the proximity to existing residences and the intersection of Olowalu village center and the existing highway. All the alternatives are approximately the same length, so alignment length alone was not a primary factor in the comparative impact evaluation. As described in the Draft EIS, the Preferred Alternative is based on Build Alternative 1 in Ukumehame and Build Alternative 2 in Olowalu and is considered the best opportunity to achieve the Project's purpose and need while minimizing and avoiding environmental impacts.

Commentor	Organization	Submission No.	Submission Type	Comment	Comment No.	DEIS Section	Ch. 9 Comment No.	Response
Mr. Kaluna Palafox	-	63	In-person verbal testimony	I'm from Ukumehame. We're the first ones that you guys gonna plow through, you know, and come into our kuleana. That's like taking a part of our livelihood. (126) Even through how much you guys coming through, but you still coming through our kuleana. It was two generations. For me hard because now we feel like we are losing out again, you know, the kanaka – always the ones to lose all their -- especially for a generation. You know, how much more the kanaka people got to lose? You know, it's already there. It's already stated. We're impacted. Land Commission awards but they no accept one TMK over that. You know, we become a loser again. You know, we suffering already with what we get.	126	Ch. 1	11	The Project seeks to create a new highway alignment that is less vulnerable to coastal erosion and flooding that has undermined the reliability of the existing highway for decades. HDOT and the FHWA considered a "No Build" Alternative that would leave the highway in place or make other improvements (such as coastal armoring) that could protect the existing road alignment from the ocean. However, these solutions weren't found to fix the problem of the ocean flooding the road. The road needs to be moved mauka to keep ocean waters off the road, and coastal armoring was found to worsen coastal erosion, which would in turn further degrade the Olowalu reef. The Preferred Alternative, as described in the Draft EIS and the Selected Alternative, as presented in this Final EIS—include revisions that are based on public comments about specific elements of the Project. Refinements to the alignment provide a balanced approach that achieves the Project's stated purpose and need combined with the best opportunity to avoid, minimize, or mitigate impacts to the community and the environment. Generally, the No Build Alternative, or fixing the old highway as suggested in the comment, does not address the Project's purpose and need of having a reliable transportation link connecting West Maui and Central Maui. This assessment is based on the existing and predicted levels of coastal erosion and flooding inundation. Any parcels that may be affected by right-of-way requirements for the new highway alignment—including kuleana parcels—are evaluated for the need of full or partial acquisition. Property acquisition would adhere to the appropriate procedures for fair compensation as set forth in the Uniform Relocation Act, as applicable (see Chapter 3.4 of the Final EIS). With regard to wetlands and water bodies, the alignment would be on viaduct over the low lying inundation areas adjacent to the Ukumehame Firing Range and wetlands in the Ukumehame area. Spanning these important ecological features preserves wetlands and wildlife habitat to the greatest extent practicable. Bridges and culverts would allow for continued water flow while crossing the new highway.
	-			*We see all our beaches being destroyed, being used as recreation (127).* Ukumehame is a recreational park. Outsiders come do surf lessons and the instructor is just as White as the person that came off of the plane. You know, I could see with a local, but no. So our land is being used as a recreation. Economy. You can make money. What about the people that already is suffering -- all the kanaka? You got to fight for Lahaina. How is that? My wife -- generations, two generations. How come she got to fight just to stay on our land? Plenty kanaka kawai got to fight for our land. We already fighting for our water so we can make money.	127	Ch 3.5	43	The new alignment of the Honoapi'ilani Highway would be mauka of the existing highway and would not provide direct access to beach areas. The roadway is proposed to be limited access only at intersections, with existing mauka to makai cross-streets. There would be no parking or pull-off areas along the new alignment. Beach access would continue to be available from the existing Honoapi'ilani Highway, which would become a County roadway and is expected to be integrated with the future plans for the Maui County West Maui Greenway. Once under County jurisdiction, the management of parking, access to adjacent beaches, and access to/from the greenway can be integrated into corridor planning.
	-			The hotels, the greedy ones, sucking all up the water. But the people suffer with 20 percent of water. How is that? Even the kanaka -- they get first rights automatic -- first rights no questions asked. They get the right for the water, for the 'Aina. You cannot just come through and think you own and just plow through all our cultural sites or our wetlands or the river and life. (126 cont.) I mean, I'm pure Filipino. My dad came from the Philippines. My mom born here. But my heart is so kanaka. And I cry about all of that because I know all these kanakas out here is suffering. They're suffering. You know, I know it's hard for me. I got to see all this with my own eyes.	126	Ch. 1	11	The Project seeks to create a new highway alignment that is less vulnerable to coastal erosion and flooding that has undermined the reliability of the existing highway for decades. HDOT and the FHWA considered a "No Build" Alternative that would leave the highway in place or make other improvements (such as coastal armoring) that could protect the existing road alignment from the ocean. However, these solutions weren't found to fix the problem of the ocean flooding the road. The road needs to be moved mauka to keep ocean waters off the road, and coastal armoring was found to worsen coastal erosion, which would in turn further degrade the Olowalu reef. The Preferred Alternative, as described in the Draft EIS and the Selected Alternative, as presented in this Final EIS—include revisions that are based on public comments about specific elements of the Project. Refinements to the alignment provide a balanced approach that achieves the Project's stated purpose and need combined with the best opportunity to avoid, minimize, or mitigate impacts to the community and the environment. Generally, the No Build Alternative, or fixing the old highway as
	-			I mean, I'm 66 years old. I watch Maui from when I was born in to today how things look is all messed up. You know, I sorry. But the County and the State -- they making it more kapulu. You come with the machine, plow any kind, don't even -- you, sorry, but half-ass -- kapulu. I'm sorry. But mahalo. I hope they will get to you guys. You know, you guys -- we the first families. You guys coming through -- you know, I'm sorry. I no like you guys come through my property and my -- it's not my property, my kuleana. And my great-great-grandkids behind me -- I'd like them live the same life as me. So fix the old highway. You guys will save a lot more money by just fixing it. (126 cont.) Mahalo.	126	Ch. 1	11	
Ms. Felice	-	64	In-person verbal testimony	You kind of just, I guess, nipped it in the bud by saying that you're not going to build a highway up north because we don't have the funding. Right? But we need another way out of Lahaina. If you were here during the fire you would understand. (128)	128	Ch. 2	27	As noted in the comment, there is no current funding for work on the bypass north of Lāhainā. The Project was started well before the devastating 2023 wildfire that destroyed Lāhainā and resulted in significant human loss and suffering as well as difficult economic impacts. The Project would generally support the efforts to rebuild Lāhainā by providing a reliable transportation facility in West Maui and improving Honoapi'ilani Highway's resilience by reducing its vulnerability to coastal hazards. Planning for the Project began with pre-Notice of Intent Scoping, where HDOT and FHWA held two early scoping meetings in February 2022. The EIS scoping period was initiated in November 2022. These activities informed HDOT and FHWA's approach to future public engagement and community input was used to hone the Project's Purpose and Need Statement and to understand potential concerns that should be considered in the analyses. At the time of the wildfire, the Draft EIS technical evaluations were largely complete and being reviewed and refined. The goal was to publish the Draft EIS toward the end of 2023. After the wildfire, HDOT and the FHWA reviewed each technical evaluation to acknowledge and identify whether changes in the analyses would be appropriate based on the wildfire's effects. While there was extensive public participation before the wildfire, HDOT and the FHWA understand that the community's focus has been on rebuilding efforts. However, the purpose and need for the Project remain, and the funding associated with the Project was committed prior to the wildfire.

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Viktoriya Sirova	US Department of the Interior	65	Email	The U.S. Department of the Interior (Department), as required by the Department of Transportation Act of 1966 (49 U.S.C. §303 and 23 U.S.C. §138), has reviewed the December 2024 DRAFT Section 4(f) Evaluation for Honoapi'ilani Highway Improvements Project West Maui: Ukumehame to Launiupoko. The Hawai'i Department of Transportation (HDOT) proposes to build a new six-mile alignment of the Honoapi'ilani Highway to provide a reliable transportation facility in West Maui and reduce the highway's vulnerability to coastal hazards. Several areas with archaeological resources in Olowalu and Ukumehame were evaluated for potential impacts by one or more Build Alternatives. A draft Programmatic Agreement between HDOT and the Hawai'i State Historic Preservation Division includes protocols to avoid, minimize, or mitigate adverse effects to archaeological historic properties and burials. The 4(f) evaluation concludes that the Build Alternatives will not have direct, temporary, or constructive use of 4(f) resources within the Olowalu Sugar Plantation Historic District or on individually eligible and contributing resources in Olowalu. In Ukumehame, there are no eligible architectural historic properties - i.e., no 4(f) protected historic resources. The Department, through the National Park Service (NPS), concurs with a de minimis finding, that the project will have no adverse effects on any Section 4(f) properties within the project area. (129) If you have specific questions related to our comments, please contact Danette Woo Nolan at Danette_Woo@nps.gov. For all other questions, please contact me at Viktoriya_Sirova@ios.doi.gov.	129	Ch 4	109	Thank you for your comment and your interest in the Project.
Marianne Rossio, P.E.	Hawaii State Department of Health, Clean Air Branch	66	Email	All project activities shall comply with Hawaii Administrative Rules (HAR), Chapter 11-59 and 11-60.1. (130) If your proposed project: *Requires an Air Pollution Control Permit* You must obtain an air pollution control permit from the Clean Air Branch (130) and comply with all applicable conditions and requirements. If you do not know if you need an air pollution control permit, please contact the Permitting Section of the Clean Air Branch. Permit application forms can be found here: https://health.hawaii.gov/cab/permit-application- forms/ *Has the potential to generate fugitive dust* You must reasonably control the generation of all airborne, visible fugitive dust (130 cont.). Note that construction activities that occur near existing residences, businesses, public areas and major thoroughfares exacerbate potential dust concerns. It is recommended that a dust control management plan be developed which identifies and mitigates all activities that may generate airborne, visible fugitive dust. The plan, which does not require Department of Health approval, should help you recognize and minimize potential airborne, visible fugitive dust problems. Construction activities must comply with the provisions of Hawaii Administrative Rules, §11- 60.1-33 on Fugitive Dust. In addition, for cases involving mixed land use, it is strongly recommended that buffer zones be established, wherever possible, in order to alleviate potential dust concerns. You must provide reasonable measures to control airborne, visible fugitive dust from the road areas and during the various phases of construction. These measures include, but are not limited to, the following: Planning the different phases of construction, focusing on minimizing the amount of airborne, visible fugitive dust-generating materials and activities, centralizing on-site vehicular traffic routes, and locating potential dust-generating equipment in areas of the least impact; Providing an adequate water source at the site prior to start-up of construction activities; Landscaping and providing rapid covering of bare areas, including slopes, starting from the initial grading phase; Minimizing airborne, visible fugitive dust from shoulders and access roads; Providing reasonable dust control measures during weekends, after hours, and prior to daily start-up of construction activities; and Controlling airborne, visible fugitive dust from debris being hauled away from the project site. If you have questions about fugitive dust, please contact the Enforcement Section of the Clean Air Branch. Please also see fugitive dust fact sheet at: https://health.hawaii.gov/cab/files/2024/02/Hawaii-Fugitive-Dust-Fact-Sheet-February-2024.pdf.	130	Ch 3.15	99	As noted in this Final EIS (Chapter 5) project construction would be required to employ BMPs to control fugitive dust and any other air pollution control permit requirements would be obtained, as necessary.
-	-	-	-	Includes construction, demolition, or renovation activities that involve potential asbestos and lead containing materials please contact the Indoor and Radiological Health Branch (131) at (808) 586-4700 or visit: https://health.hawaii.gov/irhb/	131	Ch 3.15	100	The project would not be demolishing or renovating structures that might have asbestos and lead containing materials.

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Marianne Rossio, P.E. (continued)	-			Increases the population and potential number of vehicles in an area (132) The creation of apartment buildings, complexes, and residential communities may increase the overall population in an area. Increasing the population in an area may inadvertently lead to more air pollution via vehicle exhaust. Vehicle exhaust releases pollutants in the air that can negatively impact human health and air quality, including lung irritants, carcinogens, and greenhouse gases. Ensure that drivers keep vehicle idling times to three (3) minutes or less. Consider and incorporate support for alternative transportation options such as bike racks and/or electric vehicle charging stations where possible. If you have any questions, please contact the Clean Air Branch at (808) 586-4200 or at cab@doh.hawaii.gov.	132	Ch 3.15	101	The project does not have a development or land use component and is not expected to induce development so there is no anticipated incremental increase in population or vehicular traffic. The Selected Alternative will incorporate bicycle and pedestrian facilities and is fully compatible with the potential future implementation of the West Maui Greenway.
	-			The Department of Health (DOH), Clean Air Branch (CAB), will no longer be responding directly to requests for comments on the following documents (including pre-consultation, early consultation, preparation notice, draft, final, addendums, and/or supplements): Environmental Impact Statements (EIS) Environmental Assessments (EA) Anticipated Finding of No Environmental Significant Impacts (AFONSI) Conservation District Use Applications (CDUA) Special Management Area Permits (SMAP) For agencies or project owners requiring DOH-CAB comments on one or more of these documents, please utilize the DOH-CAB Standard Comments below regarding your project's responsibilities to maintain air quality and any necessary permitting. DOH-CAB Standard Comments are also available on the DOH-CAB website located at: https://health.hawaii.gov/cab/files/2024/07/Standard-Comments-for-Land-Use-Reviews-Clean-Air-Branch-July_2024.pdf. If you have any questions, please the Clean Air Branch at (808) 586-4200.				
Kathleen Rooney, Ulupono Initiative	-	67	Webform	Ulupono Initiative appreciates the Hawaii Department of Transportation's work on this realignment project and generally supports the chosen alternative; we acknowledge the significant amount of care and time spent on this project to bring it to this point. We also appreciate the department's transparent approach on the website, particularly the explicit connection to the Olowalu project, as well as discussions on Maui County's role in the use of the old road. While acknowledging these efforts, we recommend — similar to our past comments — that consideration be made to strengthening the multimodal and active transportation components within the project framework. This could include any number of more robust commitments, including: • Consider modifying the current cross-section design to be more amenable to active transportation elements, such as a moving the roads more inward and including a multi-use path. • Strengthen financial commitments to the active transportation infrastructure. While the West Maui Greenway represents a promising initiative, securing dedicated funding would ensure its implementation. Similar funding considerations could benefit the Olowalu project, creating a comprehensive active transportation network. (133) This list is not exhaustive, and Ulupono stands ready to collaborate on the exploration of these and other options with Hawaii Department of Transportation. Mahalo, Kathleen Rooney Director, Transportation Policy and Programs Ulupono Initiative	133	Ch 3.14	96	Based on this and several other comments, the Selected Alternative as presented in this Final EIS will include a separated shared-use pathway along the makai edge of the new highway right-of-way and will include signal-controlled bicycle and pedestrian crossings at Luawai Street in Olowalu and Ehehene Street in Ukumehame. This addition to the Selected Alternative is included in the revised cost estimates for the Project as summarized in Chapter 5, Selected Alternative. The West Maui Greenway is an independent project outside the jurisdiction of HDOT. Funding for the West Maui Greenway Plan is outside of the scope of the Project and this Final EIS.
Jeremy Morgan	U.S. Army Corps of Engineers	68	Email	Thank you for allowing the U.S. Army Corps of Engineers the opportunity to provide comments on the Honoapi'ilani Highway Improvements Project draft EIS. When fill quantities and impact areas within aquatic resources are finalized, please submit a Corps permit application to CEPOH-RO@usace.army.mil, so we can begin the review process for discharges of fill under Section 404 of the Clean Water Act (134).	134	Ch. 3.9	67	Permitting will occur in the next phase of the Project, after the Final EIS/ROD is finalized.

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Brian J. Neilson	Hawaii Department of Land and Natural Resources - Division of Aquatic Resources	69	Email	The project will cross two major streams—Ukumehame and Olowalu—but the Draft Environmental Impact Statement (EIS) does not adequately assess the potential impacts of the highway relocation on these streams. Both streams are home to endemic Hawaiian gobies, including the IUCN-listed Sicyopterus stimpsoni, and snails, which have been observed during the CWRM/DAR stream monitoring. (135) As these species are amphidromous, they rely on healthy and continuous stream habitats for their life cycles. Therefore, we recommend that a more detailed analysis of impacts to the stream habitats be included in this EIS. (135)	135	Ch. 3.10	60	As presented in Chapter 3.9 of the Draft EIS and this Final EIS, the Project would be required to provide a bridge spanning the Olowalu and Ukumehame streams, and design standards will be required that prohibit any bridge structures from being within the water course and outside the mean high water level. Coordinating with State and federal agencies, environmental commitments will include construction best management practices and permanent low impact stormwater treatment. Further, the Project's pre-construction, construction, and completion will include water quality and sedimentation monitoring (including in-stream and near shore locations). Overall, no adverse effects on aquatic resources are expected.
				Additionally, the EIS does not clearly specify the type of stream crossing to be used. The impact on water flow and habitat connectivity will differ significantly depending on whether a culvert, bridge, or viaduct is employed. It is important to note that culverts, overtime, can develop undercuts and erosion, which can obstruct the migration of stream species and disrupt habitat continuity. These potential issues should be avoided. There are also no clearly defined Best Management Practices (BMPs) for stream protection during construction. (136)	136	Ch. 3.10	61	The DLNR – Division of Aquatic Resources is a Participating Agency and their input helped guide implementation of best practices to be required for the Project. Full span bridges would be used for the two major perennial streams (Olowalu and Ukumehame Streams) and there is no in-water work planned for the Project at these locations since the bridge embankments would be outside the Ordinary High-Water Mark. Therefore, the Project would not affect species within the Ukumehame and Olowalu streams. Table 3.10-12 of the Draft EIS Chapter 3.10, Flora and Fauna, identifies Avoidance and Minimization Measures that would be implemented as part of the Project. The USFWS has also prepared a Biological Opinion (see Appendix 3.10) with additional commitments identified. As described in Chapter 2, Alternatives and Chapter 5, Selected Alternative, the ultimate determination of culvert and bridge specifications for all crossings in addition to the two perennial streams, or the use of viaducts to span larger areas, is based on identification of the Selected Alternative, the length of the span required, environmental effects, constructability, and cost. These would be finalized during the development of final construction documents as part of the design-build process.
				The report identifies Alternative 2 as the preferred route for Olowalu and Alternative 1 for Ukumehame. However, in Table S-3, a new column labeled "Preferred Alternative" appears, which the score does not seem to align with Ukumehame's Alternative 1. Figure S-6 depicts the preferred alternative route, but it labels it as U-1 and 0-2, making it difficult to clearly distinguish the modified section. According to Table S-3, the preferred alternative is intended to reduce impacts to the wetland, and we would like to see a clearer depiction of how this route has been modified from Alternative 1 on the map. Furthermore, it would be appreciated if wetland and other waterbodies are delineated in the map to assess the impact to the area more accurately. (137)	137	3.9	63	As described in Chapter 5 of the Draft EIS, Alternative 1 was modified in the area where the alignment would connect with the existing highway, shifting to a more makai alignment. The modifications result in the alignment crossing the sediment basin rather than going mauka of the basin. Shifting Alternative 1 further makai in the vicinity of the basin and firing range allows for the avoidance of critical archaeological and cultural sites and reduces impacts to the firing range. The Selected Alternative does reduce impacts to wetland areas by elevating the alignment on a viaduct. The viaduct would cross over the wetland and other water features, reducing impacts to the greatest extent practicable when compared with a roadway on fill. There is no reduction in wetland area crossed by the viaduct (the discrepancy was a GIS layer error and has been corrected as part of this Final EIS).
				Although 0-3/4 and U-4 did not achieve the highest overall score, from an environmental perspective, these alternatives perform well by minimizing impacts to the wetland and preserving the vulnerable lower stream reach habitat. This habitat is crucial for two of our endemic goby species, Eleotris sandwicensis and Stenogobius hawaiiensis, which are unable to migrate to the upper reaches. (138)	138	3.9	64	As noted in the comment, there were instances where the mauka alternatives provided better environmental outcomes. However, on the balance of fulfilling purpose and need and minimizing adverse effects overall, the mauka alternatives were not identified for the Preferred Alternative. Generally, the mauka alternatives resulted in more adverse effects on a range of environmental factors including cultural resources, archaeology, and impacts on the community (such as noise, visual quality, and property acquisition). The potential adverse effects on water and aquatic biota resources would be avoided or minimized based on bridge designs crossing the perennial streams to fully stay out of surface waters and mean high water levels. Project construction would adhere to the HDOT Standard Specifications for Road and Bridge Construction (Section 209) Temporary Water Pollution, Dust, and Erosion Control. Construction BMPs that have been either preapproved or coordinated with regulatory agencies, which are included in an integrated storm water management approach. A "Summary of Clear Water Diversion and Isolation BMPs for Use in the State of Hawai'i," would be utilized to minimize the potential for water quality impacts to the streams. Additionally, the HDOT Construction Best Management Practices Field Manual (October 2021) would be used for land-based BMPs. Structures crossing streams would be designed to preserve water flow and the biological processes of the fauna living in them. Hardening the stream crossings would be avoided to the extent practicable.
				Additionally, the sea level rise simulation indicates that certain sections of the preferred U1 route will be adjacent to or within the sea level rise exposure area, potentially increasing the risk of coastal hardening and erosion in the future. (139)	139	Ch. 3.13	89	To avoid the potential requirement for coastal hardening, the Selected Alternative would be placed on a viaduct above the inundation zone. Other than the piers and columns with a small footprint in these areas (and included in the modeling of potential effects), there would be open flow of water below the viaduct and no additional hardening would be required.

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Dina U. Lau	Hawaii DLNR - Engineering Division	70	Email	The rules and regulations of the National Flood Insurance Program (NFIP), Title 44 of the Code of Federal Regulations (44CFR), are in effect when development falls within a Special Flood Hazard Area (high-risk areas). Be advised that 44CFR, Chapter 1, Subchapter B, Part 60 reflects the minimum standards as set forth by the NFIP. Local community flood ordinances may stipulate higher standards that can be more restrictive and would take precedence over the minimum NFIP standards. The owner of the project property and/or their representative is responsible for researching the Flood Hazard Zone designation for the project. Flood zones subject to NFIP requirements are identified on FEMA's Flood Insurance Rate Maps (FIRM). (140) If there are questions regarding the local flood ordinances, please contact the applicable County NFIP coordinating agency below: Oahu: City and County of Honolulu, Department of Planning and Permitting (808) 768-8098. Hawaii Island: County of Hawaii, Department of Public Works (808) 961-8327. Maui/Molokai/Lanai County of Maui, Department of Planning (808) 270-7139. Kauai: County of Kauai, Department of Public Works (808) 241-4849.	140	Ch. 3.11	88	These requirements are reflected in the initial analyses for the draft floodplain assessment presented in the Draft EIS and there has been no change of condition identified in this Final EIS for the Selected Alternative.
Ciara W.K. Kahahane	Hawaii DLNR - Commission on Water Resource Management	71	Email	We recommend the use of best management practices (BMP) for stormwater management to minimize the impact of the project to the existing area's hydrology while maintaining on-site infiltration and preventing polluted runoff from storm events. (141) Stormwater management BMPs may earn credit toward LEED certification. More information on stormwater BMPs can be found at http://planning.hawaii.gov/czm/initiatives/low-impact-development/	141	Ch. 3.9	65	Based on coordination with state and federal resource agencies, a comprehensive array of stormwater BMPs have been incorporated into the environmental commitments associated with the Project. These BMPs could include detention ponds to promote infiltration and treatment of discharge generated on-site using industry standard low-impact development practices, such as vegetated swales, vegetated buffers, and bioswales as appropriate (including use of the median, where applicable). Permanent BMPs would be designed to treat stormwater generated by the impervious area of the new roadway as it collects at natural low points along the roadway as defined by the final roadway profile. These set asides are conservatively sized for a maximum potential area of disturbance and the final locations and size of the infrastructure may vary depending on the treatment strategies as identified through final design as part of the design-build process, which is assumed to be fully within the right-of-way analyzed as part of this environmental review. HDOT has a comprehensive approach to the management of stormwater runoff associated with its highways as documented in HDOT's Storm Water Post-Construction BMPs Manual, as amended in February 2022. This manual outlines HDOT's policy to prioritize the utilization of low-impact development practices to address polluted runoff from highway surfaces. Additional BMPs included in An Integrated Storm Water Management Approach and a Summary of Clear Water Diversion and Isolation Best Management Practices for Use in the State of Hawai'i, would be utilized to minimize the potential for water quality impacts to the streams. Additionally, the HDOT Construction Best Management Practices Field Manual (October 2021) would be used for land-based BMPs.
				There may be the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality. (142)	142	Ch. 3.9	66	Water quality monitoring would be performed in accordance with a Clean Water Act Section 401 Water Quality Certification that would be sought from the Hawai'i Department of Health (HDOH) Clean Water Branch in a future phase of the Project. The HDOH Clean Water Branch issues this certificate and is most frequently required in tandem with a Section 404 permit request. To address permanent and temporary discharges associated with individual projects, the HDOH Clean Water Branch may issue a set of requirements that outline water quality protection measures that must be taken. Additional requirements, as set forth in a National Pollutant Discharge Elimination System General Permit to be sought in a future phase of the Project, would be adhered to including monitoring and inspection of erosion and sediment controls and pollution prevention practices throughout the entire construction process.

Commentor	Organization	Submission No.	Submission Type	Comment	Comment No.	DEIS Section	Ch. 9 Comment No.	Response
Michael Cain	Hawaii DLNR - Office of Conservation and Coastal Lands	72	Email	The Department of Land and Natural Resources (DLNR), Office of Conservation and Coastal Lands (OCCL) is responding the request for comments on the DEIS for the proposed Honoapi'ilani Highway Improvements. The OCCL regulates land uses in the Conservation District. The preferred alternative as presented in the DEIS moves the existing highway out of the Conservation District and away from coastal hazards and sea level rise. According to the plans as presented in the DEIS, the intent of DOT is to leave the existing road and shoreline hardening structures in place, and to transfer ownership and maintenance responsibilities to Maui County to become a local access road. OCCL would like to see an assessment of the cost and long-term impact to the shoreline of removal of the existing road and all affiliated protective structures. (143) Given the history and exposure of portions of the existing road to high waves, high tides and sea level rise, ongoing hardening and continual maintenance operations in the Conservation District may be required to maintain the road in service.	143	Ch. 1	13	There are no known plans that would suggest the existing road, or its affiliated protective structures would be removed in their entirety in the future and such conditions are not proposed as part of the Project. Accordingly, an assessment of the cost and long-term impact to the shoreline of removal of the existing road and all affiliated protective structures would be outside the purview of this environmental review. The existing road would continue to provide important local access to homes, businesses, beach areas and parks so it is not anticipated to be removed in its entirety. The ability to plan for the future of the existing roadway to serve a new public use of local access and providing right-of-way to implement the West Maui Greenway but without the burden of ensuring the ability to carry more than 20,000 vehicles per day will enable the roadway to be managed with more flexibility in accommodating less shoreline hardening or other measures. The Draft EIS indicated that The Nature Conservancy is currently evaluating such opportunities along the old highway. The Draft EIS and this Final EIS indicate that once jurisdiction is transferred, there may be conditions in the future where the old highway is not a continuous link throughout the corridor.
				Portions of the old road are in the Limited Subzone of the Conservation District. Per HAR §15-5-12, the objective of the Limited Subzone is to "limit uses where natural conditions suggest constraints on human activities". The natural conditions at the location of the existing highway have necessitated the improvement plan and realignment of the road away from coastal hazards and sea level rise. As identified in the DEIS, approximately four of the six miles of highway proposed for relocation are in the sea level rise exposure area (SLR-XA) at a predicted 3.2ft of sea level rise. The DEIS acknowledges that continued use of the highway at its existing location would require ongoing maintenance work and hardening to achieve short-term fixes to the chronic impacts of coastal hazards. Footnote 5 on page 2-12 of the DEIS states the following: "As part of the relinquishment process, HDOT and the FHWA must concur that the land is not needed for federal-aid Highway purposes in the foreseeable future, that the new roadway segment and its traffic operations would not be adversely affected by relinquishments, and that the lands are not suitable to restore, preserve, or improve the scenic beauty of the new roadway." The lands which are currently occupied by the existing highway are suitable for restoration. Naturalization of the shoreline would improve public access, return public trust land to the public, and benefit reef health at the Olowalu reef by enabling the land to naturally filter freshwater runoff. Restoration may provide a more substantial storm and wave buffer for the areas of the realigned highway which will remain in the SLR-XA. Finally, the scenic beauty of the realigned road will be improved if the existing road is removed and restored to a natural beach profile. (144) Please contact Amy Wirts, University of Hawaii Sea Grant Extension Agent and OCCL Coastal Lands Program Coordinator at (808) 587-0376 or by email atAmy.E.Wirts@hawaii.gov, should you have any questions regarding this matter.	144	Ch. 1	14	The relinquishment of the existing highway would not adversely affect the new roadway segment. The existing highway would continue to provide important local access to homes, businesses, beach areas and parks so it is not anticipated to be removed in its entirety. Once the Project is constructed and operational, the existing highway would not be the primary transportation link between West Maui and Central Maui, and the volume of traffic on the roadway would be substantially reduced. The reduction in traffic volume would allow the County to pursue multiple uses, such as the Maui Greenway, and consider non-hardening measures that are more conducive to naturalizing the shoreline. The Draft EIS and this Final EIS indicate that The Nature Conservancy is currently evaluating such opportunities along the old highway, and that once jurisdiction is transferred, there may be conditions in the future where the old highway is not a continuous link throughout the corridor.
Russell Y. Tsuji	Hawaii DLNR - Land Division Maui District	73	Email	We have no comments.				
Kathleen Rooney	Ulupono Initiative	74	Email (Duplicate Submission - Same as Submission 67)	Ulupono Initiative appreciates the Hawaii Department of Transportation's work on this realignment project and generally supports the chosen alternative; we acknowledge the significant amount of care and time spent on this project to bring it to this point. We also appreciate the department's transparent approach on the website, particularly the explicit connection to the Olowalu project, as well as discussions on Maui County's role in the use of the old road. While acknowledging these efforts, we recommend — similar to our past comments — that consideration be made to strengthening the multimodal and active transportation components within the project framework. This could include any number of more robust commitments, including: • Consider modifying the current cross-section design to be more amenable to active transportation elements, such as a moving the roads more inward and including a multi-use path. • Strengthen financial commitments to the active transportation infrastructure. While the West Maui Greenway represents a promising initiative, securing dedicated funding would ensure its implementation. Similar funding considerations could benefit the Olowalu project, creating a comprehensive active transportation network. (145) This list is not exhaustive, and Ulupono stands ready to collaborate on the exploration of these and other options with Hawaii Department of Transportation. Mahalo, Kathleen Rooney Director, Transportation Policy and Programs Ulupono Initiative	145	Ch. 3.14	96	Based on this and several other comments, the Selected Alternative as presented in this Final EIS will include a separated shared-use pathway along the makai edge of the new highway right-of-way and will include signal-controlled bicycle and pedestrian crossings at Luawai Street in Olowalu and Ehehene Street in Ukumehame. This addition to the Selected Alternative is included in the revised cost estimates for the Project as summarized in Chapter 5, Selected Alternative. The West Maui Greenway is an independent project outside the jurisdiction of HDOT. Funding for the West Maui Greenway Plan is outside of the scope of the Project and this Final EIS.

Commentor	Organization	Submission No.	Submission Type	Comment	Comment No.	DEIS Section	Ch. 9 Comment No.	Response
Julie Durham	-	75	Email	Aloha, I am writing to express my support for the proposed 6.5-mile mauka relocation of the Honoapiʻilani Highway, in conjunction with the Maui Greenway Project . Before moving to the islands in 2018, I had lived in two towns/cities (Boulder, CO and Melbourne, Australia) with amazing greenway infrastructure, and had travelled to several others (Austin, TX, Copenhagen, DEN, Sydney, AUS) I saw the benefits that the greenways brought to the communities where they were located. (146) They were heavily utilized for commuting and exercise, but also created environmental enhancement and protection. The greenways created natural buffers and green spaces and reduced congestion, but also created a tighter knit sense of community and a peaceful environment for nearby home owners. My dream is that Maui could become another model community which demonstrates the positive impacts of greenspace and greenways, and this is the perfect opportunity to begin making this happen. I feel like it could be a key component to recreating a sense of renewal on the West Side while also creating a sense of newness and hope in the community and island at large. Further, this is a critical realignment that will safeguard a vital transportation corridor that serves as a lifeline for West Maui residents, workers, and visitors, addressing the escalating risks posed by rising sea levels and climate change. As we work toward a more resilient future, this project is a pivotal step in West Maui's recovery, resilience, and sustainability.	146	Ch.3.5	31	Implementing the West Maui Greenway (by the County) along the existing highway is considered a future condition that is fully compatible with the Honoapiʻilani Highway Improvements Project. The West Maui Greenway is not included in the Project because its ultimate design, funding, approvals and implementation would be a separate process led by Maui County. After the highway is realigned, jurisdiction of the existing Honoapiʻilani Highway would be transferred to the County of Maui, and the roadway would continue to carry vehicular traffic that serves local traffic (business, residences, beaches, parks) but with less volume. As set forth in Chapter 5 of this Final EIS, and based on public comments on the Draft EIS, the new Honoapiʻilani Highway alignment will incorporate a separate and protected shared-use path along the makai side of the new right-of-way (including two locations for protected crosswalks of the new highway). This will add flexibility and provide for integration with the West Maui Greenway, should it be constructed in the future.
				I respectfully urge the Hawai**ʻi Department of Transportation (HDOT) to prioritize the following key elements within this** project: 1. Utilization of the Old Highway 30 for West Maui Greenway Segments 6 and 7. (146 cont.) The existing coastal highway presents an ideal route for a dedicated bike and pedestrian path. Repurposing this scenic corridor as a multi-use trail is a cost-effective solution that supports safe, non-motorized transportation and recreation. This approach would facilitate the implementation of Segments 6 and 7 of the WMG (as outlined on pages 111 and 51 of the WMG Master Plan), creating a continuous and connected path linking West Maui communities. 2. Alignment with Climate and Community Goals. Incorporating the WMG within the realignment project would align with Maui's commitment to climate resilience, as outlined in the Nā Wahine Climate Settlement Agreement. A multi-modal transportation corridor, featuring pedestrian and bike-friendly infrastructure, supports efforts to reduce emissions, promote healthy lifestyles, and enhance disaster preparedness. 3. Community-Driven Design for Long-Term Benefits. By transforming the former highway into a recreational and commuting pathway, we can create a lasting community asset that bolsters economic recovery, and public health. A dedicated bike and pedestrian trail would provide safe, scenic access to key cultural and natural landmarks, fostering community pride and environmental stewardship. In summary, while I support the current realignment effort, I respectfully request that the HDOT integrates plans for the West Maui Greenway into the redevelopment of the former highway route. By repurposing this space for non-motorized transportation, we can build a legacy of sustainable infrastructure that meets the needs of future generations and supports West Maui's long-term recovery and growth. Thank you for the opportunity to provide testimony. Mahalo nui loa for your consideration. Juile Durham	146	Ch. 3.5	31	Implementing the West Maui Greenway (by the County) along the existing highway is considered a future condition that is fully compatible with the Honoapiʻilani Highway Improvements Project. The West Maui Greenway is not included in the Project because its ultimate design, funding, approvals and implementation would be a separate process led by Maui County. After the highway is realigned, jurisdiction of the existing Honoapiʻilani Highway would be transferred to the County of Maui, and the roadway would continue to carry vehicular traffic that serves local traffic (business, residences, beaches, parks) but with less volume. As set forth in Chapter 5 of this Final EIS, and based on public comments on the Draft EIS, the new Honoapiʻilani Highway alignment will incorporate a separate and protected shared-use path along the makai side of the new right-of-way (including two locations for protected crosswalks of the new highway). This will add flexibility and provide for integration with the West Maui Greenway, should it be constructed in the future.
Dr. Marion Ceruti	-	76	Email	Aloha Mr. Tatsuguchi, Mahalo for the opportunity to comment on the EIS for the proposed road project. In general, the idea is good but care should be taken to provide sufficient exits and roads in the makai direction for beach access, to include better parking, particularly at the Ukumehame beach park, on the mauka side of the existing road, (147) if possible.	147	Ch. 3.5	43	The new alignment of the Honoapiʻilani Highway would be mauka of the existing highway and would not provide direct access to beach areas. The roadway is proposed to be limited access only at intersections, with existing mauka to makai cross-streets. There would be no parking or pull-off areas along the new alignment. Beach access would continue to be available from the existing Honoapiʻilani Highway, which would become a County roadway and is expected to be integrated with the future plans for the Maui County West Maui Greenway. Once under County jurisdiction, the management of parking, access to adjacent beaches, and access to/from the greenway can be integrated into corridor planning.
				Moreover, more and better parking is needed at the Ukumehame Firing Range to keep users from having to park their cars in the mud puddles. This is a great opportunity to upgrade the parking at Papalaua to do something about the drainage problem that has plagued the area for years. (148)	148	Ch. 3.5	41	Under the Preferred Alternative, the viaduct construction would be makai of the firing range and its parking lots and therefore the Project does not include construction or proposed improvements to the existing parking lots. Similarly, the Preferred Alternative would not involve construction or permanent physical disturbance to Pāpalaua Wayside Park, as evaluated in Chapter 3.5, "Parklands and Recreational Facilities/Beach Access," of the Draft EIS and this Final EIS.
				It might be necessary to relocate the nenes in the area temporarily, for their safety. (149) E Hana Kakou, Dr. Marion Ceruti, West Maui resident	149	Ch. 3.10	72	The Final EIS incorporates a range of environmental commitments (see Chapter 5) that would be required to protect the nēnē during construction. These include but are not limited to high visibility signs to alert drivers to their presence, training for all on-site staff to recognize and protect nēnē, and protocol on what to do if nēnē or their nests are observed.

Commentor	Organization	Submission No.	Submission Type	Comment	Comment No.	DEIS Section	Ch. 9 Comment No.	Response
Roy Ikeda	Hawaii Department of Education	77	Email	Dear Mr. Tatsuguchi, Thank you for your email dated January 6, 2025. Based on the information provided and despite the Lahaina Bypass Highway serving as an alternate route for Honoapiilani Highway, the Hawaii State Department of Education (Department) is concerned about commute times and traffic patterns for its students, parents, and staff as there are many that have been displaced to different parts of the island due to the West Maui Wildfires. With the uncertainty that still lies ahead, the Department requests that your staff and consultants meet with the administrators of Lahainaluna High, Lahaina Intermediate, and Nahienaena Elementary Schools to present traffic impacts leading to and from each of these campuses and specific timelines associated with the project. (150) Should you have any questions, please contact Cori China, of the Facilities Development Branch, Planning Section, at (808) 784-5080 or via email at cori.china@k12.hi.us. We appreciate the opportunity to comment. Sincerely, Roy Ikeda Interim Public Works Manager Planning Section	150	Ch. 3.14	97	HDOT understands the concerns related to commute times and traffic patterns around one of West Maui's most vital centers for community and educational purposes. HDOT will coordinate a meeting with the referenced parties to address uncertainties that the Hawaii Department of Education has about the Project's effect on traffic. There are no changes at these school sites as a result of the Project. As established in the Final EIS, the Project would not increase traffic and would decrease travel delays since current disrupters such as flooding and emergency roadway storm repairs would be reduced. During project construction, the existing highway would remain open and operational because the Selected Alternative is not on the existing alignment.
Dennis R. Eyler	-	78	Email	Aloha, I was able to attend the first four of the public presentation of the DEIS for this project on January 23. I have filled out the form that was handed out and I have attached a copy to this email. My interest in this project is based on several things. 1. My wife and I have been regular visitors to Maui since the 1990's. In 2012, after I retired, we bought a residence here and since then, we spend several months of the year on the island. 2. We were shocked and saddened at what happened to Lahaina as a result of the fires. We know several people who lost their homes. 3. I would like to help in the island's recovery. 4. I spent my career as a traffic and highway preliminary design engineer, and I worked as an employee for 2 state transportation departments and then as a consultant for government agencies for 35 years and worked on highway projects in 6 different states. I have attached a copy of my resume. 5. Since the 1990's I have been involved with the development and implementation of projects meeting the design criteria of the Super-2 highway concept and also in the development and implementation of reduced conflict intersections (RCIs). The RCI concept utilizes the proven safety benefits of certain roundabout features but also strives to minimize the added travel time to the major roadway when it intersects with low volume minor roadways. I have attached a few of the technical papers I have presented on these topics. The most recent was at the University of Minnesota's Center for Transportation Studies annual meeting in 2023. It was on the subject of the Super-2 and in that presentation, I referenced the completed section of the Lahaina Bypass on pages 14 and 35. 6. I am also very impressed by the high daily traffic volumes carried by the existing facility. Of course, I also realize that the flows are fairly balanced directionally and that there are no high-volume crossing roadways due to the roadway following the coastline. 7. In viewing the various materials of this projects DEIS, I quickly concluded that the project as a whole is badly needed. The environmental issues are many and I certainly have no problem with the preferred alignment and its proposed limited access 8. I do have some questions about the geometry that is proposed for those limited access intersections. I also realize that the figures in the DEIS are conceptual and not final. A. The use of left side acceleration lanes without sufficient length to allow entering traffic to get up to speed and the requiring those vehicles to merge right. In my experience left side merges and lane drops have proven to have higher crash rates. Having those entering left turns sit in the center of the roadway without any physical, lateral buffering space from traffic passing on both sides at higher speeds, would seem to be uncomfortable for the drivers and may result in sideswipe crashes. However, since there are many existing locations with left side merges on Maui, my concerns would be greatly lessened if the crash data shows that they perform safely on Maui. (151) 9. The Reduced Conflict Intersection (RCI) design concept eliminates those problems and provides the following benefits. All conflict points involve traffic headed in on direction conflicting with another single traffic movement. At all conflict points the "threat" or priority traffic movement is always approaching from the left or from ahead, never from the right. Since drivers sit on the left sides of their vehicles, this provides good visibility when selecting a gap to enter or cross traffic. No left turns are required into higher speed, higher volume traffic flows. Those features provide safety advantages similar to roundabouts. In addition, RCIs provide two stage crossings of the heavy, high-speed traffic movements and two stage left turns onto the major roadways for any length vehicle. Vehicles of any length are not required to cross both directions of the major roadway while requiring a gap in both directions. (151 cont.)	151	Ch. 3.14	94	The preliminary alignment design has been based on state and federal design standards and reflects the limitations of right-of-way availability, as well as constraints related to sensitive cultural resources and other environmental considerations. For example, innovative reduced conflict intersection concepts noted in the comment would require additional right-of-way acquisition, including areas potentially containing sensitive cultural resources or other environmental concerns and as a result, would be difficult to implement as part of the Project or result in potentially adverse impacts.
					151	Ch. 3.14	94	

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Dennis R. Eyler (continued)	-	78	Email	10. The Minnesota DOT recently announced that on their rural divided highways, they will no longer construct full movement intersections without traffic signals or roundabouts (151 cont.) being provided on day 1. Instead, they will use J-turns or Restricted Crossover U-turns (RCUTS), both of those designs meet the criteria of the RCI. Here is a picture of a MnDOT J-turn for an intersection on a divided highway. Traffic entering from the minor road desiring to cross or turn or turn left, waits for a gap in traffic approaching from the left and then crosses the through lanes and enters the turn lane for the downstream U-turn. The turn lane length for the U-turn is based on speed and storage needs. At the U-turn intersection, a pavement "loon" or widening is provided to accommodate the turning path of the design vehicle making that U-turn. There are other possible designs based on speeds and major roadway traffic volumes. There have been RCUT intersections built on high volume, high-speed roadways were traffic on the minor street turns right, merges, then weaves across to a downstream U-turn Lane. The distances needed for that weave are typically greater than 1700 feet. A J-turn on a high-volume, two-lane roadway would probably not need to use a design where entering traffic gets up to speed, merges, then exits, and slows to make the U-turn. With only one through lane, a gap in the traffic is likely to arrive due to a slow vehicle and the minor roadway vehicle desiring to cross or make a left onto the major roadway can easily get to the U-turn Lane. Here is a typical sign used on the minor roadway approaches. Here's an example of a full RCUT intersection. It's located at US-212 and MN-284 in Cologne, MN. This type of intersection is being used in Minnesota, Wisconsin, Maryland, North Carolina (they call them Super Streets) and Texas. Here is a list of the attachments. 1. DEIS comment form. 2. My resume. 3. The Super-2 presentation at the U of M CTS conference in 2023. 4. Alternative Intersection Designs Wis ACEC-2009. 5. Sketches of possible Reduced Conflict Intersection designs for use of a "Super-2" roadway along with other information. Look these materials over and use them as you desire. I will not have any communications with the public regarding this material. I will always defer to the people responsible for operating the highways. I will be on Maui and available to meet, if you so desire, until February 27th. I'll be back on Maui during the first two weeks in June. If your consultant Jamie Bentz wants to contact me, when we are both in Minnesota, she is welcome to do so. Mahalo for your efforts on this project. I am looking forward to its completion. Dennis R. Eyler Aloha, my wife and I are part-time residents of Maui. We spend 3+ months of the year on island. I am also a retired traffic and highway preliminary design engineer. I am very interested in this project as well as the upcoming planned extension of the Lahaina bypass. As a modest effort on my part to help in the recovery of the area after the Lahaina fire. I am offering my modest assistance, if desired. I have attached my resume and a few technical papers and presentations. Also attached is a more thorough description of my offer of assistance.	151	Ch. 3.14	94	The preliminary alignment design has been based on state and federal design standards and reflects the limitations of right-of-way availability, as well as constraints related to sensitive cultural resources and other environmental considerations. For example, innovative reduced conflict intersection concepts noted in the comment would require additional right-of-way acquisition, including areas potentially containing sensitive cultural resources or other environmental concerns and as a result, would be difficult to implement as part of the Project or result in potentially adverse impacts.
Kim Falinski	The Nature Conservancy	79	Email	Dear Mr. Tatsuguchi, Thank you for this opportunity to provide comments on the Honoapi'ilani Highway Improvements Project (HHIP) Draft Environmental Impact Statement and the proposed preferred alternative, dated January 2025. The Honoapi'ilani Highway from Ukumehame to Launiupoko in West Maui ranks as one of the most threatened highways in the state of Hawai'i because of rising sea levels, king tides, storm surges and other coastal hazards fueled by climate change. The Hawai'i Department of Transportation has prioritized this important road connecting central Maui to the growing West Maui community because of its risk from coastal erosion. What we are working on. Our team at The Nature Conservancy (TNC) has been working on a ridge to reef approach to protecting and restoring the sensitive environments adjacent to the 939-acre Olowalu reef tract that involve working with community and government partners to establish a vision for a restored coastal area and watershed. We have been excited about the opportunity presented by the highway realignment to collaborate to protect key ecosystem functions. (152) Our comments emphasize the need to protect the unique coral reef and future wetland extent, preserve Pāpalaua sediment retention basin and its sediment capture capacity, design ecologically sensitive stream crossings, and recommend a drainage plan that uses green infrastructure to filter and infiltrate stormwater. With regards to the Honoapi'ilani Highway Improvement Project (HHIP), TNC is focused on three areas: 1) Reducing sedimentation to the coral reef; 2) Implementing a suite of mauka-makai protective and restorative interventions that protect the reef, wetlands and streams, and 3) Visioning, with Hawai`i Department of Transportation, Highways Division (HDOT), County of Maui, partners, and community the future of this existing Honoapi'ilani (makai) highway as a place where people and nature thrive. (153) We see the opportunity to utilize nature-based solutions for preservation and restoration of the coral reef, shorelines, wetlands, recreational spaces, and infrastructure. We have published several reports that may be useful: one on sediment sources, another on wetland extent, and a third on 2022 coral reef surveys.	152 153	Ch. 3.9 Ch. 3.9	62 62	HDOT and the FHWA acknowledge The Nature Conservancy's dedication to the collaborative efforts described in this comment. HDOT is aware of the Olowalu Mauka to Makai project and the Final EIS recognizes these efforts relative to the Project in the Final EIS Chapter 3.20, Cumulative Effects. The Project will involve the implementation of low impact BMPs that are anticipated to manage stormwater and limit additional sediment loading as a result of the Project. These BMPs could include detention ponds to promote infiltration and treatment of discharge generated on-site using industry standard low-impact development practices, such as vegetated swales, vegetated buffers, and bioswales as appropriate (including use of the median, where applicable). Permanent BMPs would be designed to treat stormwater generated by the impervious area of the new roadway as it collects at natural low points along the roadway as defined by the final roadway profile in accordance with the HDOT Storm Water Post-Construction BMPs Manual (February 2022). The design process outlined within the manual includes principles that mimic pre-development hydrologic regimes. The design of permanent BMP measures will consider appropriate hydraulic capacity per HDOT design guidelines.

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Kim Falinski (continued)				Coral reef and wetland ecosystems are in need of protection. Coral reef ecosystems are key to protecting the shoreline from waves and storm impacts, including the current highway, and these systems are threatened by both global and local stressors. Recent studies show that coral larvae are struggling to find places to settle in the sedimented benthos, and that adult corals are subject to sediment and heat stressors. Coral cover remains reduced compared to the 2010s. Corals are not only organisms to protect, they also protect our coastal infrastructure from wave events and sea level rise (Storlazzi et al 2019). Once abundant wetlands in the area are important habitat for endangered waterbirds and plants and serve to provide hazard mitigation in coastal areas, such as absorption and filtering of surface waters and flood reduction. Upland forests both protect soils from erosion and provide essential groundwater recharge function to provide water for nature and people. Sedimentation damages coral reefs. Sediment is one of the most pervasive and damaging threats to coral reef. A recent geomorphological survey by TNC demonstrated that the Pāpalaua watershed is the most degraded watershed in the area, and one of the largest contributors to sediments downstream. Upland shrublands have been decimated by fire and drought in the last twenty years, leading to orders of magnitude higher levels of erosion compared to previous centuries. Former native forest that grew on highly erodible soils in the upland bog have been lost, especially along the edges of the Pāpalaua and Manawaipueo stream basins. Data from the water quality monitoring group Hui O Ka Wai Ola show that all of the coastal areas in the Olowalu-Ukumehame region are above the state coastal turbidity standard, while Ukumehame stream has been highlighted since 2001 (and as recently as 2022) by the Hawai'i Department of Health as an impaired stream because of turbidity.				
				What TNC is doing to help. Olowalu: The Road to Resilience - Community Design for the Existing Highway and Surrounding Areas The planned HHIP provides opportunities to re-imagine the Olowalu-Ukumehame coastal corridor by incorporating park spaces, traditional biocultural practices, and nature-based solutions for coastal resiliency. This project aims to strengthen coastal ecosystems, reduce pressures on the Olowalu-Ukumehame reef system, and improve resilience in the area that includes the existing roadway to adapt to climate change effects, including sea level rise. Through research, analysis, and engagement with stakeholders and community, TNC and University of Hawai`i Community Design Center are leading a process culminating in a conceptual design for local and state stakeholders as the effects of climate change threaten the shoreline. (154)	154	Ch. 3.9	62	HDOT and the FHWA acknowledge The Nature Conservancy's dedication to the collaborative efforts described in this comment. HDOT is aware of the Olowalu Mauka to Makai project and the Final EIS recognizes these efforts relative to the Project in the Final EIS Chapter 3.20, Cumulative Effects. The Project will involve the implementation of low impact BMPs that are anticipated to manage stormwater and limit additional sediment loading as a result of the Project. These BMPs could include detention ponds to promote infiltration and treatment of discharge generated on-site using industry standard low-impact development practices, such as vegetated swales, vegetated buffers, and bioswales as appropriate (including use of the median, where applicable). Permanent BMPs would be designed to treat stormwater generated by the impervious area of the new roadway as it collects at natural low points along the roadway as defined by the final roadway profile in accordance with the HDOT Storm Water Post-Construction BMPs Manual (February 2022). The design process outlined within the manual includes principles that mimic pre-development hydrologic regimes. The design of permanent BMP measures will consider appropriate hydraulic capacity per HDOT design guidelines.
				Through the recently completed first phases of community engagement, specifically referencing the HHIP, we received comments from over 80 participants who voiced common concerns regarding disturbance of cultural resources or `iwi kūpuna as the preferred alternative is pursued; disturbance to Ukumehame Wetlands and native species by the preferred alternative; the desire for sustained access to the shoreline between the new alternative and the existing highway; and concerns around management and maintenance of the land areas between the "old" and the "new" roadways in order to prevent fire, illegal dumping and human encampments. We look forward to working together to help address some of these concerns as our respective projects progress. We appreciate the ongoing support of HDOT as this project moves forward. For more information, please refer to the project engagement website at: https://storymaps.arcgis.com/stories/2ba79613d0aa4da182fe9bc34cc10cc7				

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Kim Falinski (continued)				Collaboration on wetland and mauka restoration. A primary threat to reef health comes not from the sea but from the mountains above: sediment is carried in surface water from mauka lands impacted by non-native feral ungulates, poor land use practices, and fire. These stressors contribute to habitat degradation and erosion. The DLNR Division of Forestry & Wildlife (DOFAW) is embarking on a three-year NOAA Transformational Habitat project, "Olowalu Mauka to Makai," which will implement a full suite of ecosystem-based, mauka-to-makai conservation measures. With DOFAW, TNC will partner with Kipuka Olowalu and Coral Reef Alliance on projects including wetland restoration planning, sediment management, and community engagement, working to address threats and hazards throughout the Olowalu and Ukumehame ahupua`a. This project is inter-related with and impacted by the realignment project, so we look forward to continued communication and collaboration with you as our projects progress. (155) For more information, please refer to: https://dlnr.hawaii.gov/dofaw/	155	Ch. 3.9	62	HDOT and the FHWA acknowledge The Nature Conservancy's dedication to the collaborative efforts described in this comment. HDOT is aware of the Olowalu Mauka to Makai project and the Final EIS recognizes these efforts relative to the Project in the Final EIS Chapter 3.20, Cumulative Effects. The Project will involve the implementation of low impact BMPs that are anticipated to manage stormwater and limit additional sediment loading as a result of the Project. These BMPs could include detention ponds to promote infiltration and treatment of discharge generated on-site using industry standard low-impact development practices, such as vegetated swales, vegetated buffers, and bioswales as appropriate (including use of the median, where applicable). Permanent BMPs would be designed to treat stormwater generated by the impervious area of the new roadway as it collects at natural low points along the roadway as defined by the final roadway profile in accordance with the HDOT Storm Water Post-Construction BMPs Manual (February 2022). The design process outlined within the manual includes principles that mimic pre-development hydrologic regimes. The design of permanent BMP measures will consider appropriate hydraulic capacity per HDOT design guidelines.
				Comments for the EIS. 1. Protect Pāpalaua-Ukumehame wetlands. The degraded wetlands of Pāpalaua and Ukumehame are important for both flood water and sediment retention, and have historically been a crucial part of the Ukumehame watershed hydrologic system. (156) According to local knowledge-keepers, Ukumehame once had thriving wetlands that were home to endangered waterbirds like ae'o and 'alae 'ula, whose habitat along the leeward Maui coast has been reduced by agriculture, development and drought. The draft EIS highlights vestige native plant communities that are surviving in the reduced footprint of the former wetlands, including akulikuli, 'ae'ae, naupaka and milo. Sea level rise is expected to expand the area into where the bypass is proposed to go, and groundwater levels will rise. We will be working with DOFAW on wetland restoration planning in two State parcels that will be affected by the bypass.	156	Ch. 3.9	53	As evaluated in the Draft EIS and this Final EIS, the Project's alternatives were established to avoid and minimize wetland areas and to manage stormwater flow from the new highway with low impact design standards and not hard infrastructure, such as piping storm flows for direct discharge to adjacent waters. As described in Chapter 5 of this Final EIS, the Selected Alternative incorporates many design features that would preserve and not substantially alter water flow from mauka sources towards the ocean. The alignment would be on viaduct over the low lying inundation areas adjacent to the Ukumehame Firing Range and wetlands in the Ukumehame area. Spanning these important ecological features preserves wetlands and wildlife habitat to the greatest extent practicable. Bridges and culverts would allow for continued water flow while crossing the new highway. Based on low impact design standards required by State and federal guidance, stormwater flowing off the new highway pavement would be collected and treated with infiltration basins located in multiple locations along the corridor.
				We agree with the assessment of Ansari and Erickson documented in Section 3.9.3.1 of the prime wetland areas, and we ask you to also consider that ewe identified a broader buffer of wetlands in the regions (Maui Environmental Consultants, 2024) (157).	157	Ch. 3.9	54	Historical distributions and hydrology of water and wetlands, particularly prior to the plantations when in community use, are part of this dynamic landscape. As described in Chapter 5 of this Final EIS, the Selected Alternative has been designed to avoid and minimize adverse effects to waterbodies and wetlands and to not exacerbate historic alterations that have adversely affected wetlands. This is the underlying principle of State and federal protections and policies and the Project has incorporated a comprehensive array of best management practices pursuant to these regulations, most notably the Clean Water Act. As described in Chapter 3.9, Water Resources of the Final EIS, the parameters for wetlands to be considered Waters of the U.S. are defined in 40 CFR 120 and 33 CFR 328.3. The wetland delineations identified a total of 12 wetlands, all found in the Ukumehame area around the Ukumehame Firing Range and totaling approximately 21.403 acres. Figure 3.9 1 identifies these 12 wetlands and their jurisdictional status.
				We appreciate the comment that "new construction in wetlands and floodplains is to be avoided unless there is no practicable alternative to the construction." (3.9-24), and advocate for HDOT to make all efforts to reduce impact to current, former, and potential wetlands, and the proposed wetland restoration area. We strongly advocate that the highway realignment include a viaduct to bypass the existing wetland areas. Wetland areas will likely expand in the future, and existing restoration planning would be adversely affected by the realignment without a viaduct. (158) In particular, wetland birds would struggle to find habitat next to the highway. Efforts to avoid these vital wetlands, as habitats, ecosystems, and areas to retain land-based sediments and remove pollutants would align with the aims of the partners currently working in the area.	158	Ch. 3.9	55	As established in the Draft and Final EIS, the use of a viaduct over wetlands in the vicinity of the Ukumehame Firing Range is a key design commitment that will be required as part of final design and design build contractor obligations.
				2. Reduce sediments and increase groundwater infiltration. We commend efforts to reduce erosion during the project, and advocate for watershed-scale efforts to reduce erosion in the project area more broadly as a strategy to protect the reef. (159) As identified in the draft EIS, the area is comprised of fine alluvial sediments, which are sensitive to disturbance and removal of vegetation. We hope to not only reduce short term sedimentation, but to create a landscape that is more efficient at reducing sediment in the longer term.	159	Ch. 3.9	56	The collaborative efforts of the Honoapi'ilani Highway Improvements Project with The Nature Conservancy and the State of Hawai'i DLNR provide the basis for larger watershed-scale benefits. Chapter 5, Selected Alternative of this Final EIS contains environmental commitments related to water resources. As part of the Project, HDOT will ensure the Contractor adheres to HDOT Storm Water Post-Construction Best Management Practices Manual (February 2022). Site-specific stormwater BMPs would be implemented and/or installed at the staging and work areas by the Contractor to prevent water quality degradation associated with stormwater runoff.

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Kim Falinski (continued)				Maintain the efficiency of Pāpalaua Retention Basin. The maintenance and preservation of sediment retention basins is one of the key methods to hold back sediment in the near-term, as outlined by the West Maui Community Plan, and is the primary intervention needed for Pāpalaua. The Pāpalaua basin serves as the primary retention basin for the Makiwa gulch intermittent stream. The basin has been shown to be a large contributor of fine sediments due to degraded upland conditions. The basin was installed in 1999, and has since filled with sediment above the original height of the standpipes, and has not received regular maintenance. It is at risk of overflow in every storm event, delivering sediment directly into coastal waters. For larger flows the basin is undersized. Additional retention capacity through maintenance and possible redesign is needed to prevent further ecosystem damage to the coral reef. The proposed preferred alternative in Ukumehame reduces the footprint of the basin. Increased attention to replacing the sediment retention capacity is needed. We recommend considering drainage plans upland of the proposed bypass to serve as additional areas for retention. In addition, we would hope that the project would instigate a reconsideration of operations and maintenance of the existing basin, the redevelopment of culverts, and a re-design of the volume of the basin to make sure that it is the most efficient possible for protecting the downstream reef from sedimentation. (160)	160	Ch. 3.9	57	As detailed in Chapter 5 of the Draft EIS, the Preferred Alternative would not reduce the functional capacity of the HDOT detention basin makai of the Ukumehame Firing Range. As a point of clarification, this basin was built in 1970 and primarily drains the Papalaua Gulch. The Makiwa Gulch is located further west of the basin and likely drains through multiple small channels as part of the coastal floodplain, including the Hanaula Gulch, though its direct flow has been altered by historic land use practices. Routine maintenance is performed by HDOT, including sediment removal and vegetation management. Inspection and maintenance protocols adhere to the 2022 HDOT Storm Water Permanent Best Management Practices Manual. In 2023, HDOT brought the basin into a state of good repair, re-establishing the capacity of the basin through restoration of the original bottom of basin elevations and exposing the outfall standpipes. HDOT will continue to monitor the sediment basin annually and remove built up sediment material periodically to ensure that the basin remains effective. The areas that would be occupied by viaduct piers are small and may contribute to a marginal change to volume of water that could be detained at the basin. Use of the viaduct preserves wetlands in the area to the greatest extent practicable while providing for the structural integrity and safety of the viaduct. Large scale redesign of the existing detention basin would be based on a watershed-wide assessment and rethinking of water flows mauka of the firing range and the new highway. This is beyond the jurisdiction of HDOT and out of the scope of potential effects evaluated in this Final EIS. As noted in comments from The Nature Conservancy, such an effort would reasonably be part of the larger watershed initiative of the State of Hawai'i DLNR. As owner of the detention basin, HDOT could be a stakeholder participant in such an effort.
				Incorporate nature-based solutions alongside best practices for stormwater management. The proposed alternative builds would traverse the Olowalu and Ukumehame landscapes approximately along elevation. To address the main threats for the region – namely sedimentation to the reef and future drought/flooding cycles – best management practices for stormwater, groundwater and surface flows that exceed County design standards are needed to protect ecosystem health, along with operations and maintenance plans that are practicable and have clear ownership models. In particular, we recommend that where possible, drainage swales that incorporate grasses and plants that can hold back sediment be used, or a similar nature-based alternative. If possible, the grading plans can include earthen berms to disperse water more broadly for infiltration. (161)	161	Ch. 3.9	58	Consistent with this comment, HDOT's comprehensive approach to stormwater management for the Project is based on low-impact permanent best management practices (BMPs) to lessen effects to water quality caused by stormwater. For the Selected Alternative, there will be about an acre set aside (on average) at eight natural low points for stormwater management infrastructure to capture and detain roadway stormwater. BMPs will be required and, based on final design completed through the design build process after the ROD, they could include detention ponds to promote infiltration and treatment of discharge generated on-site using industry standard low-impact development practices, such as vegetated swales, vegetated buffers, and bioswales as appropriate (including use of the median, where applicable).
				We recommend that the goal for the drainage system be to infiltrate water or deliver it to the wetland instead of shunting it quickly to the ocean. The conceptual study conducted (p. 3.9-25) was not included in the Appendices, so at this point it is not clear on how to collaborate to improve those BMPs to increase infiltration or sediment holding capacity. The draft EIS refers to using 100-yr storms for bridges and 50-yr storms for culverts. It would be important to consider the effects of increased storm intensity, especially for culverts, and how this may impact overall sediment movement on the landscape. (162) The 2018 floods in Kauai showed that large storm events can alter the coastal ecosystem trajectories for many years, if not decades (Rodgers et al 2021). Careful planning may be able to mitigate some of these concerns.	162	Ch. 3.9	59	The Project would be designed consistent with HDOT's Design Criteria for Highway Drainage. In addition to requiring all bridges to be designed for 100-year storm events and all culverts to be designed for 50-year storm events (unless they involve FEMA flood zones, where they will be designed for 100-year storm events), the design criteria also outlines how design discharges are determined, including the use of regression equations that are periodically updated based on observations made by the U.S. Geological Survey. These design standards are intended to ensure that bridges and culvert crossings that carry off site flow across a highway corridor are not significantly altered by the highway, thereby minimizing impacts to these waterways by the highway development itself. Onsite drainage systems will be designed per HDOT's drainage and permanent best management practices policies to ensure treatment of highway generated runoff prior to discharge. Wherever possible, low impact development based designs, such as infiltration ponds/systems, will be utilized to minimize impacts of stormwater runoff from the highway itself. These culverts will meet HDOT standards as well as effectively manage sediment transport, protect the environment, and ensure the safety and longevity of infrastructure.

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Kim Falinski (continued)				3. Stream crossing mitigation. Ukumehame and Olowalu streams have been identified by the State of Hawai'i Division of Aquatic Resources (DAR) as important for their aquatic species diversity, with over five species of native fish and invertebrates found in both streams. (163) Hawai'i's native stream animals have amphidromous life cycles meaning that they spend their larval stages in the ocean (salt water), then return to freshwater streams to spend their adult stage and reproduce. Newly hatched fish larvae are carried downstream to the ocean where they become part of the planktonic pool in the open ocean. The larvae remain at sea from a few weeks to a few months, eventually migrating back into a fresh water stream as juvenile hinana, or post larvae. The ability for juvenile fish to migrate upstream is critical to population success.	163	Ch. 3.9	60	As presented in Chapter 3.9 of the Draft EIS and this Final EIS, the Project would be required to provide a bridge spanning the Olowalu and Ukumehame streams, and design standards will be required that prohibit any bridge structures from being within the water course and outside the mean high water level. Coordinating with State and federal agencies, environmental commitments will include construction best management practices and permanent low impact stormwater treatment. Further, the Project's pre-construction, construction, and completion will include water quality and sedimentation monitoring (including in-stream and near shore locations). Overall, no adverse effects on aquatic resources are expected.
				Minimizing long stretches of concretized stream and incorporating small pools and riffles with artificial materials would help to make sure larvae can make it upstream to their final habitat. (164) The draft EIS proposes that either "BMPs that have either been preapproved or coordinated with regulated agencies" be used to minimize water quality effect to the streams (p. 7-4) We would add, though, that the BMPs to assist o'opu migration may be different than those used to mitigate water quality impairment. Consultation with the Division of Aquatic Resources for guidance on best construction may be needed to make the stream habitat functional for Hawaii's stream organisms. (164 Cont.) We advocate that the alternative road scenario be carefully planned to ensure that key bridge crossings are ecologically sound for o'opu `akupa and other diadramous native species.	164	Ch. 3.9	61	The DLNR – Division of Aquatic Resources is a Participating Agency and their input helped guide implementation of best practices to be required for the Project. Full span bridges would be used for the two major perennial streams (Olowalu and Ukumehame Streams) and there is no in-water work planned for the Project at these locations since the bridge embankments would be outside the Ordinary High-Water Mark. Therefore, the Project would not affect species within the Ukumehame and Olowalu streams. Table 3.10-12 of the Draft EIS Chapter 3.10, Flora and Fauna, identifies Avoidance and Minimization Measures that would be implemented as part of the Project. The USFWS has also prepared a Biological Opinion (see Appendix 3.10) with additional commitments identified. As described in Chapter 2, Alternatives and Chapter 5, Selected Alternative, the ultimate determination of culvert and bridge specifications for all crossings in addition to the two perennial streams, or the use of viaducts to span larger areas, is based on identification of the Selected Alternative, the length of the span required, environmental effects, constructability, and cost. These would be finalized during the development of final construction documents as part of the design-build process.
				Recommendations. Given the importance of the above factors, we make the following recommendations for mitigation measures: 1. Preserve the maximum extent of former, current, and potential wetlands; (Section 3.9.8) We support the creation of a viaduct to reduce disruption to the wetland to support future wetland restoration actions on TMKs 48002002, 48002039 48002045, 48002046 and 48002047. 2. Preserve the sediment retention capacity of Pāpalaua basin; (Section 3.11.7) Replace the area used by the bypass in Pāpalaua basin with improved functionality for the area that remains. Remove existing sediments after bypass construction. Improve efficiency by supporting or developing an operations and maintenance plan. Redesign basin to increase sediment retention and flood prevention capacity. 3. Prioritize a drainage plan that uses green infrastructure to filter stormwater and increases groundwater infiltration (Section 3.12.6) Consider drainage systems on the upland side of the bypass that use nature-based approaches to capturing sediment and infiltrating groundwater, such as green-grey drainage swales and vegetated buffers for velocity dissipation. 4. Build ecologically sensitive stream crossings at Ukumehame and Olowalu streams. (Section 3.9.8) If a stream needs to be hardened at the crossover, consider best practices for keeping stream cool, shaded, and oxygenated. The crossings at Olowalu, Ukumehame, and intermittent Pāpalaua streams must be carefully designed for water flow as well as preservation and maintenance of biological processes. Summary. The Nature Conservancy is invested in working with community, State, and County partners on the restoration and revitalization of the Olowalu and Ukumehame ahupua'a from mauka to makai. We look forward to working with you as a partner to ensure lasting benefits for people and nature. Thank you for your consideration, Emily J. Fielding Hawai'i Marine Conservation Director, Kim Falinski, PhD, PE Coastal and Estuarine Scientist				
Shayne Agawa	Maui Department of Environmental Management	80	Email	Thank you for the opportunity to comment on the Honoapiilani Highway Improvements Draft Environmental Impact Statement (DEIS). The County of Maui, Department of Environmental Management has the following comments related to the Honoapiilani Highway Improvements DEIS:				
				A portion of the proposed "common" route appears to encroach onto landfilled waste along the toe of closed Olowalu Landfill. Constructing structures and roadways on landfilled waste should be avoided. Please advise if this project does plan to place the improved highway on top of landfilled waste at the Closed Olowalu Landfill. (165)	165	Ch. 3.18	108	The Selected Alternative would be constructed in the area of the closed Olowalu Landfill but would remain makai of the toe of the slope over covered materials. The roadway realignment will not be located over landfilled waste and the alignment was developed in coordination with the Maui County Environmental Management Division.
				The proposed route also appears to pass through the existing Olowalu Convenience Center (OCC) at the Closed Olowalu Landfill. OCC is the only recycling and waste transfer station for the West Maui community. Please advise if the OCC will be affected, and if so, the plan to relocate the OCC to another location to allow the County of Maui to continue providing this service to the local community. (166)	166	Ch. 3.17	106	As presented in Chapter 3.17 of the Draft, the Preferred Alternative (and all alternatives evaluated) would be anticipated to result in the displacement and relocation of the existing County of Maui recycling and transfer station. Based on information provided by the County, the location at the landfill was not considered a permanent solution and the County has long considered relocation options for this facility to move it closer to the Lāhainā urban center, where most users originate.
				Should you have any questions or comments, please contact Sage Kiyonaga, Solid Waste Engineer, at (808) 270-7941.				

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Mahesh Cleveland	EarthJustice	81	Email	Earthjustice submits the following public comments on the proposed Honoapiʻilani Highway Improvements, West Maui: Ukumehame to Launiupoko (the "Honapiʻilani Project" or "Project"), for which a draft environmental impact statement ("DEIS") was published in The Environmental Notice on January 8, 2025. Earthjustice commends the Hawai'i Department of Transportation ("HDOT") for proactively responding to the climate crisis by undertaking the complex endeavor of realigning portions of the Honoapiʻilani Highway that are highly vulnerable to sea level rise and coastal hazards, and that serve as the main artery to West Maui in an area of high cultural, archaeological, ecological, and recreational significance. We also continue to value and acknowledge HDOT for its groundbreaking leadership and commitments to decarbonizing the state transportation system in accordance with state law and the landmark settlement in the youth-led climate lawsuit Navahine F., et al. v. Dep't of Transp., 1CCV-22-0000631 ("Navahine Settlement"), appended hereto as Attachment A. The Honoapiʻilani Project presents a historic opportunity for HDOT to create a best-in-class model for adapting to climate change (i.e., sea level rise and coastal hazards), while at the same time also mitigating climate change by incorporating sensible bicycle and pedestrian-friendly measures that would ultimately reduce car traffic and greenhouse gas emissions, while promoting public health and mobility for Hawaiʻi's residents. (167) We offer these comments to enhance the Project's climate benefits, and to allow for full consideration of its climate-related impacts, mitigation measures, and alternatives through the environmental review process.	167	Ch. 1	3	Thank you for your comment and your interest in the Project.
				HDOT Should Disclose and Mitigate the Project's Climate Change Impacts, Consistent With the Navahine Settlement. The Navahine Settlement contains provisions to decarbonize the state transportation system through HDOT's transportation projects and their prerequisite environmental review documents. These provisions are key components of the settlement's broader vision, commitment, and roadmap to achieve "zero [greenhouse gas] emissions across all transportation modes within the State," including from "ground transportation" under Haw. Rev. Stat. ("HRS") § 225P-8.[1] HDOT's environmental review of the proposed Honoapiʻilani Project should contain analyses and mitigation measures to reduce greenhouse gas emissions, consistent with the Navahine Settlement and state law. (168)	168	Ch. 3.15	102	As described in Draft EIS, the Project does not generate additional traffic demand since the realignment creates a new and more reliable linkage between West Maui and Central Maui and there would be no up or downstream changes in the transportation network or new anticipated growth or development as a result of the Project. A qualitative analysis was conducted according to agency guidance in place at the time of the Draft EIS. Compared to the No Build Alternative, the Project would not result in a material change in regional criteria air pollutant and emissions. No mitigation measures are proposed for any of the Build Alternatives because no violations of the National Ambient Air Quality Standards or State Ambient Air Quality Standards are anticipated.
				For example, the Navahine Settlement requires HDOT to "implement policies and procedures to ensure that Complete Streets improvements remain part of the project throughout the planning and development process."[2] Hawai'i's Complete Streets statute requires HDOT to "adopt a complete streets policy that seeks to reasonably accommodate convenient access and mobility for all users of the public highways," including "pedestrians, bicyclists, transit users, motorists, and persons of all ages and abilities."[3] The mandate applies specifically to "new construction, reconstruction, and maintenance" of highways such as the Honoapiʻilani Project.[4] The Honoapiʻilani Project, as proposed in the DEIS, lacks any Complete Streets improvements for pedestrians, bicyclists, and transit users. (169) The DEIS specifically states that "[t]he Project does not include bicycle lanes or other bicycle or pedestrian facilities for any of the Build Alternatives."[5] The DEIS further notes that once the realignment is complete, the affected portions of the existing Honoapiʻilani Highway will be deeded to County of Maui ("County")[6] for use in conjunction with the West Maui Greenway Plan for a coastal bicycle and pedestrian pathway from Līpoa Point to Ukumehame,[7] while acknowledging that "formal plans have not been developed."8	169	Ch. 5	23	The preliminary design consideration did not include a separate pathway for non-motorized users, and all alternatives would incorporate a standard width shared-use shoulder lane that would accommodate bicyclists. This was intended to provide a direct route to and from the Pali and Lāhainā (including the viaducts and bridges) as a complement and interconnect with the primary bike route served by implementing the West Maui Greenway, which is proposed to be alongside the existing highway. Plans for the West Maui Greenway indicate the greenway is intended to provide a more substantial and integrated shared-use pathway that would be closer to the coastline and away from the main highway. However, based on these and other comments generated during the public review period for the Draft EIS, the Selected Alternative has been refined to incorporate a separated travel way for nonmotorized traffic (golf carts would not be allowed). As described in Chapter 2 of this Final EIS, the pathway would be constructed along the makai edge of the new highway alignment. At Luawai Street in Olowalu and Ehehene Street in Ukumehame, traffic signals would allow bicyclists and pedestrians to safely cross the new roadway.
				Deeding the existing highway to the County without any certainty or commitments around what will happen to it afterward, while also building a new highway without any designated bike or pedestrian facilities, runs the risk of creating a second roadway or bypass without any Complete Streets accommodations on either. It would also impede compliance with the Navahine Settlement's requirement for HDOT to "complete the pedestrian, bicycle, and transit networks in coordination with the counties as contemplated under HRS § 264-142, with a goal of completing this work in five years."[9] Given that federal and other funding for the West Maui Greenway Plan is uncertain, HDOT should provide funding for the West Maui Greenway Plan Segments 6 and 7, which would be located on or along the portions of the existing highway that will be deeded to the County[10] and have not yet been funded. (170)	170	Ch. 1	35	The Project's primary purpose is to provide a reliable transportation facility in West Maui and improve the resilience of Honoapiʻilani Highway by reducing its vulnerability to coastal hazards. Specifically, the Project is intended to address existing coastal erosion and flooding vulnerabilities as well as future coastal erosion and flooding caused by anticipated sea level rise. The Project provides a reliable transportation facility for vehicles, bicycles, and pedestrians. Funding for the West Maui Greenway Plan is outside of the scope of the Project and this Final EIS.

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Mahesh Cleveland (continued)				HDOT should also include a shaded, protected bike and pedestrian pathway through the center of the realigned highway to comply with the Navahine Settlement and Complete Streets mandate and ensure this $160.8M[11] Project contributes to decarbonizing the state transportation system. This pathway should provide for integration and linkages with the West Maui Greenway, in consultation with stakeholders. (171) Indeed, providing bike and pedestrian facilities in both the original and realigned highways—both of which are contemplated to be (re)constructed in this case—would maximize multimodal accommodations and properly comply with the Complete Streets mandate and other state laws.	171	Ch.2	24	Based on this and other comments submitted during the public review period for the Draft EIS, the Selected Alternative has been refined to incorporate a separated travel way for nonmotorized traffic within the new alignment. However, the provision of a shaded shared-use path through the center of the new alignment would introduce new safety concerns particularly the increase of potential conflicts between pedestrians/cyclists and motorists (especially at intersections). In addition, this would require the addition of fixed objects within the median to protect bicyclists and pedestrians (guardrails and crash cushions). The user experience would be compromised in this environment particularly if a future four lane configuration were implemented. Furthermore, the center median of the new alignment is anticipated to be vegetated to provide for the management of stormwater runoff. Based on preliminary conceptual design, the appropriate location for a new bicycle/pedestrian facility would be along the makai edge of the realigned roadway right-of-way. Given the limitations of the geometry of the roadway—that is, the need to restrict the area of disturbance mauka and makai of the new alignment to avoid cultural resources and other environmental constraints—and the arid nature of the surrounding open landscape, providing shading for this segment of a shared-use path would not be feasible.
				The Navahine Settlement further requires HDOT to "develop and implement an objective, scientifically-based methodology to assess and report the total, long-term [greenhouse gas] emission and [vehicle miles traveled] impacts of each infrastructure project,"[12] specifically for use in "preparing environmental review documents for its transportation projects."[13] Such analyses are not included in the DEIS.[14] (172) Given that HDOT must develop and implement this methodology by April 2025,[15] any subsequent environmental review documents should disclose these Project impacts.	172	Ch. 3.15	103	The Draft EIS was published in December 2024, before the development and implementation of the HDOT methodology applicable to new planning projects initiated after April 2025. Further, as noted in the Draft EIS, the Project is not expected to add travel demand or increase regional VMT so the emissions analysis would show little or no change.
				HDOT should specifically consider and compare the greenhouse gas emissions and vehicle miles traveled impacts of (1) constructing the new highway while closing or keeping the existing highway open to motorist traffic, and (2) including or omitting bike and pedestrian facilities on the existing and new highways. (173) These analyses will enable full disclosure of the Honoapi'ilani Project's impacts, as well as informed consideration of mitigation measures and alternatives.	173	Ch. 3.15	104	Given that the Project would not generate new trips, the Selected Alternative would not be anticipated to result a material change in regional criteria air pollutants or greenhouse gas emissions as compared to the No Build Alternative. Given the limited bicycle and pedestrian activity in the area presently, the incremental difference with or without the bicycle and pedestrian facilities would be minimal. However, for the purposes of presenting a conservative evaluation, such trips are not accounted for in the analysis.
				The Navahine Settlement further mandates that "Level of Service is discontinued as a criterion for project prioritization,"[16] which goes hand-in-hand with the requirement to instead assess each project's greenhouse gas and vehicle miles traveled impacts. As the youth highlighted in Navahine, level of service, a metric assessing how quickly cars move along a roadway, "promotes projects that induce additional traffic and ultimately increase congestion over time and imposes blind spots and barriers against multimodal projects."[17] Any subsequent environmental review documents should avoid use of or reliance on level of service to evaluate the Honoapi'ilani Project.[18] (174)	174	Ch. 3.14	98	As described in Chapter 1 of the Draft EIS, the Project's primary purpose is to provide a reliable transportation facility in West Maui and improve Honoapi'ilani Highway's resilience by reducing its vulnerability to coastal hazards. Overall, Level of Service is not a criteria for the prioritization of this project; rather it is based on the Statewide Coastal Highway Program Report and the Coastal Road Erosion Susceptibility Index ranking system. In Chapter 3.14 of the Draft EIS, Level of Service is provided to confirm that creating the new highway alignment achieves project goals but does not worsen operating conditions. Roadway segment level of service was determined using ranges of volume/capacity ratios based on guidance contained in the Highway Capacity Manual, Seventh Edition: A Guide for Multimodal Mobility Analysis. For the purposes of the transportation analysis, level of service is utilized to quantify the performance of the roadway or element being analyzed.

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Mahesh Cleveland (continued)				HDOT Should Disclose and Consider Alternatives that Account for Updated Sea-Level Rise Projections. HDOT's stated purpose and need for realigning the Honoapi'ilani Highway is "to address existing coastal erosion and flooding vulnerabilities as well as future coastal erosion and flooding caused by anticipated sea level rise."[19] Indeed, around two-thirds of the highway span proposed for realignment "are considered exposed and potentially vulnerable to sea level rise."[20] HDOT acknowledges that, among a variety of potential hazards to transportation infrastructure in West Maui, sea level rise is "the most urgent," while the associated risks of passive flooding, storm surges, and coastal erosion are already occurring and predicted to worsen.[21] (175)	175	Ch. 3.13	90	Effective July 2019, the State of Hawai'i required all new projects undergoing environmental review under the Hawai'i Environmental Policy Act (also known as HRS, Chapter 343) to consider whether the Project is likely to have an adverse effect or be vulnerable to a sea level rise exposure area (SLR-XA), as defined by the 2017 Hawai'i Sea Level Rise Vulnerability and Adaptation Report. This accepted guidance is to use a 3.2-foot sea level rise as a planning target for 2100, with an additional consideration of a 6-foot target in that time frame. The impact evaluation was based on the best available information as the Draft EIS was initiated, and in coordination with the Hawai'i Climate Change Mitigation and Adaptation Commission and the State of Hawai'i DLNR. All alternatives were evaluated based on a 3.2-foot and 6-foot sea level rise scenario. Additional modeling was performed to provide a higher resolution site-specific inundation model to better define the hazards associated with passive and annual high-wave flooding for 3.2 feet of sea level rise. This methodology, as described in Appendix 3.13, Climate Change and Sea Level Rise Supplemental Information, of the Draft EIS is supported by the Intergovernmental Panel on Climate Change Fifth and Sixth Assessment Reports, the HDOT Climate Resilience Action Plan, and the Hawaii Sea Level Rise Vulnerability and Adaption Report. The most mauka alternatives which mostly avoid inundation zones were found to have cultural resource impacts and other environmental adverse effects that resulted in these alternatives not being considered as the
				To fulfill the Project's stated purpose and need to adapt to sea level rise, HDOT should disclose and consider alternatives that account for updated sea level rise projections. The alternatives considered in the DEIS are all based on the conservative assumption that ocean levels will rise by 3.2 feet by 2100.[22] More recent estimates, however, predict that sea level may rise by closer to 4 feet and by as much as 6 feet by 2100,[23] (175 Cont.) which would move the projected sea level rise inundation area further mauka. HDOT should disclose these updated sea level projections and consider alternatives that plan for and adapt to them. Along these lines, HDOT should consider the costs and risks of underestimating sea level rise, including the estimated costs of having to relocate the Honoapi'ilani Highway again in the event of sea level rise exceeds 3.2 feet by 2100.	175	Ch. 3.13	90	
				HDOT Should Disclose and Mitigate the Climate Change Effects from Leaving the Existing Highway In Place. The DEIS acknowledges the harm that climate change and sea level rise are "already causing to the existing highway,"[24] but does not discuss how relinquishing the existing highway to the County will affect the environment. So long as the County keeps the existing highway in place and sea levels continue rising, the existing highway will increasingly serve as shoreline armoring that would harm beach and reef ecosystems, including monk seal habitat.[25] HDOT should, at minimum, consider these harmful effects and measures to mitigate them. (176)	176	Ch. 3.13	91	As noted in the response to Comment 12, part of the rationale for transferring the old highway to Maui County is that once this portion of the roadway is not utilized as the primary transportation link between West Maui and Central Maui, the volume of traffic would be substantially reduced. This allows the County to pursue multiple uses of the old highway such as the West Maui Greenway as well as to consider long-term maintenance measures that are less reliant on shoreline hardening and more conducive to naturalizing the shoreline. The Draft and Final EIS indicated that The Nature Conservancy is evaluating such opportunities along the old highway as part of its "Road to Resilience" initiative. The Draft and Final EIS also acknowledge that once jurisdiction is transferred, there may be conditions in the future that would prevent the old highway from being a continuous link.
				HDOT Should Disclose the Honoapiilani Project's Reasonably Foreseeable Growth-Inducing Effects As discussed in our December 23, 2022 scoping comments, appended hereto as Attachment E, HDOT should disclose and analyze any reasonably foreseeable growth-inducing effects from the Honoapi'ilani Project. For example, to the extent that any plans to develop Olowalu Town are still in the works and would be dependent on implementing the Honoapi'ilani Project, HDOT must address these effects.[26] (177)	177	Ch. 1	15	As established in the Draft EIS, the Honoapi'ilani Highway Improvements Project is not expected to have a growth inducing effect locally or in the larger region. The purpose of the Project is to ensure a reliable and resilient transportation link connecting West Maui with Central Maui. There is no change in up or downstream capacity of the highway and there are no actions included in the Project that would generate new travel demand (that is, no changes in land use, zoning, or development regulations). Specifically, as a limited-access road there would be no new driveways or access points connected directly to the realigned highway, and there is no change in overall development opportunities created by the roadway. Regarding the Olowalu Town Master Plan Project, on December 7, 2015, the State Land Use Commission denied the acceptance of the Final EIS and the project was discontinued. There are currently no filed applications or permits to indicate that the Olowalu Town Master Plan Project would be pursued again. In addition, should the Olowalu Town Master Plan Project (or a project of similar scope or nature) be proposed, it would likely be subject to approvals, potentially involving environmental review and associated public engagement requirements.
				We appreciate the opportunity to comment on the Honoapi'ilani Project, which could be precedent-setting for proactively adapting to climate change, while incorporating sensible and timely design measures to reduce greenhouse gas emissions from transportation. Please contact us if you have any questions or would like to discuss this further. Respectfully submitted, /s/ Mahesh Cleveland Isaac Moriwake Kylie Wager Cruz Mahesh Cleveland EARTHJUSTICE				
Karen Comcowich	Maui County Long Range Division	82	Email	PROJECT DESCRIPTION: The State Department of Transportation is proposing to realign the Honoapi'ilani Highway to provide a reliable transportation facility in West Maui and improve Honoapi'ilani Highway's resiliance by reducing the highways vulnerability to coastal hazards.				
				LONG RANGE DIVISION COMMENTS: The realignment of Honoapi'ilani Highway out of the Sea-Level Rise Exposure Area (SLR-XA) is supported in the Maui County General Plan and more specifically by the West Maui Community Plan. (178)	178	Ch 5	119	Thank you for your comment and your interest in the Project.
				However, multimodal transportation options and Complete Streets elements should be incorporated into the Honoapi'ilani Highway Improvements. In addition, thoughtful consideration should be given to the road design to ensure the realigned highway retains and enhances the existing character and scenic resources found in Ukumehame and Olowalu. The inclusion of trees and landscaping appropriate to the microclimate is also important (179)	179	Ch. 5	120	The Selected Alternative, as documented in the Final EIS/ROD, includes an adjacent shared-use path as part of the highway realignment for bicycles and pedestrians, and two mauka-makai signalized crossings of the corridor that non-motorized vehicles can use. Revegetation for disturbed areas or for landscaping purposes would use native plants found within the project area or native, wildfire resistant plant species. Turf grass would be prohibited, and all landscaping and vegetation maintenance would adhere to the 2011 HDOT Highway Manual for Sustainable Landscape Maintenance. As the area is arid and wildfire risk is a major concern, during dry seasons, vegetation along the roadway would be kept low to avoid risk of fires. Trees along the new alignment are not proposed since there would be limited right-of-way and with limited access to irrigation in an arid area. In addition, trees within a median for this design speed would be a safety concern.
				GENERAL COMMENTS. The realignment of Honoapi'ilani Highway out of the SLR-XA is supported by the West Maui Community Plan (WMCP), the Maui Island Plan (MIP) and the Countywide Policy Plan (CWPP) (see WMCP Policy 2.2.10, and Action 2.21; MIP 6.4.3 Action 3; CWPP H.1.b.). The design of the Honoapi'ilani Highway Improvements will need to incorporate multimodal and Complete Street design elements, while thoughtfully considering the existing character and scenic resources of the communities through which it passes (179 cont.) (MIP 6.4.3 a, and b; CWPP H.1.b, c, and g).	179	Ch. 5	120	

Commentor	Organization	Submission No.	Submission Type	Comment	Comment No.	DEIS Section	Ch. 9 Comment No.	Response
Karen Comcowich (continued)				WMCP 2.2.10 | Improve resilience of the transportation system to climate change related hazards such as sea level rise, flooding, and wildfires. WMCP Action 2.21 | Work in partnership with the State Department of Transportation to prioritize and facilitate realignment of Honoapi'ilani Highway out of the coastal hazard zone, and manage public lands makai of the realigned highway as wetlands, public parks, and open space. MIP | Goal 6.4 | An interconnected, efficient, and well-maintained, multimodal transportation system. Objective 6.4.3 | An island-wide, multimodal transportation system that respects and enhances the natural environment, scenic views, and each community's character. 6.4.3 a. Ensure that the roadway and transit alignments respect the natural environment and scenic views. 6.4.3 b. Ensure that roadways and transit systems in rural areas and small towns enhance community character. 6.4.3-Action 3 | Urge the State to relocate Honoapi'ilani Highway mauka between the Pali and Puamana, and develop a network of parks and open space on the makai side of the highway, in accordance with the Pali to Puamana Master Plan. CWPP | H. Diversify Transportation Options. Goal: Maui County will have an efficient, economical, and environmentally sensitive means of moving people and goods. Objective 1: Provide an effective, affordable, and convenient ground-transportation system that is environmentally sustainable. b. Plan for the efficient relocation of roadways for the public benefit. c. Support the use of alternative roadway designs, such as traffic-calming techniques and modern roundabouts. d. Increase route and mode options in the ground-transportation network. e. Ensure that roadway systems are safe, efficient, and maintained in good condition. g. Design new roads and roadway improvements to retain and enhance the existing character and scenic resources of the communities through which they pass. CONCERNS AND OPPORTUNITIES. Multimodal Transportation. The Maui County General Plan, including the West Maui Community Plan, supports transportation projects that increase active transportation, including biking and walking, and transit services. Honoapi'ilani Highway is the primary connection between West Maui and the rest of the island of Maui. Designing the realigned portions of the highway to support transit, bike and pedestrian access would provide multiple benefits from resilience actions by increasing transportation options and making walking and bicycling safe and easy between and within communities. (180) WMCP 2.2.1 | Improve West Maui's active transportation network by increasing multimodal transportation options, incorporating Complete Streets, adding new sidewalks, and improving existing sidewalks and other pedestrian and bicycle facilities. WMCP 2.1.4 | Prioritize projects that provide multiple benefits from resilience actions. WMCP 2.2.5 | Support increased transit service within and between West Maui's neighborhoods, parks, and commercial areas, and between the Kahului Airport and West Maui hotels. WMCP 2.5.9 | Encourage and increase active transportation options throughout West Maui to promote public health and reduce auto use and carbon emissions. MIP| Goal 6.4 | An interconnected, efficient, and well-maintained, multimodal transportation system. Objective 6.4.1 | Provide for a more integrated island-wide transportation and land use planning program that reduces congestion and promotes more efficient (transit-friendly) land use patterns. 6.4.1.a. Plan for an integrated multi-modal transportation system comprised of public transit, bicycle, pedestrian, automobile, and other transportation modes. 6.4.1.b. Refocus transportation investment from the construction of additional roadways only for the automobile to the expansion of a multimodal transportation system. 6.4.1.c. Encourage the use of "complete streets" design methods. MIP | Goal 6.5 An island-wide transit system that addresses the needs of residents and visitors and contributes to healthy and livable communities. Objective 6.5.1 | An integrated transit system that better serves all mobility needs of Maui's residents and visitors. 6.5.1.b. Expand regional and inter-regional transit services, where appropriate, in heavily traveled corridors and within communities. 6.5.1.e. Require new development where appropriate, to provide right-of-ways (ROWs) to accommodate transit circulation and support facilities. 6.5.1.f. Identify, protect, and preserve, or acquire corridors for future inter-community transit use, including but not limited to, rail and also multimodal use corridors. CWPP | H. Diversify Transportation Options. Goal: Maui County will have an efficient, economical, and environmentally sensitive means of moving people and goods. Objective 2: Reduce the reliance on the automobile and fossil fuels by encouraging walking, bicycling, and other energy-efficient and safe alternative modes of transportation. a. Make walking and bicycling transportation safe and easy between and within communities. b. Require development to be designed with the pedestrian in mind. c. Design new and retrofit existing rights-of-way with adequate sidewalks, bicycle lanes, or separated multi-use transit corridors. d. Support the development of a countywide network of bikeways, equestrian trails, and pedestrian paths.	180	Ch. 5	121	The new highway alignment would likely be compatible with through travelling buses since the alignment would be controlled with no driveways or curbside uses which can disrupt through movements. Local bus service would be expected to leave the new alignment to serve the Olowalu Village via connector roads and the existing highway that would become a local road serving community uses. The Selected Alternative, as documented in the Final EIS/ROD, includes an adjacent shared-use path as part of the highway realignment for bicycles and pedestrians, and two mauka-makai signalized crossings of the corridor that non-motorized vehicles can use.

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Karen Comcowich (continued)				Trees and Landscaping. The West Maui Community Plan and Countywide Policy Plan support the inclusion of trees along public right of ways. The West Maui Community Plan specifies the use of native trees and landscaping that is appropriate to the microclimate. Trees and other appropriate landscaping should be included in the realigned Honoapi'ilani Highway Improvements. (181)	181	Ch. 5	122	Appropriate landscaping will be included in the realigned Honoapi'ilani Highway in accordance with the 2011 HDOT Highway Manual for Sustainable Landscape Maintenance. Native vegetation found in the project area will be used for revegetation efforts along with native, wildfire resistant species to reduce the risks associated with wildfires. During the dry season, the area immediately adjacent to the roadway will be mowed to keep vegetation low to prevent the risk of fuel buildup/wildfires. While certain native trees grow in the area, there is a constrained right-of-way to incorporate tree planting and limited access for irrigation in an arid area. However, as part of avoidance and minimization measures for the endangered Hawaiian hoary bat, large trees would be preserved in place to the greatest extent practicable.
				WMCP 2.1.11 | Require new developments to install landscaping that reduces water use, using drought resistant and micro-climate appropriate design and plants including native species, and gray water and water catchment systems where the State Department of Health allows it. WMCP 2.3.4 | All development must implement recommendations of the Maui County Planting Plan for street and parking area trees, encouraging the use of native and endemic plants. Plants that are on the Hawai'i Pacific Weed Risk Assessment list must not be used. WMCP 2.3.12 | Design landscape barriers along major roadways in such a manner as to maintain existing views of the mountains and ocean to the extent possible. WMCP 2.5.5 | Include native trees that are appropriate for the microclimate in parks, along streets, trails, and greenways, and throughout the community to provide shade, beauty, and reduce sediment runoff. CWPP | H. Diversify Transportation Options. Goal: Maui County will have an efficient, economical, and environmentally sensitive means of moving people and goods. Objective 4: Improve and expand the planning and management of transportation systems. h. Accommodate the planting of street trees and other appropriate landscaping in all public rights-of-way.				
				Natural and Cultural Resources. The Maui County General Plan, the MIP and the WMCP all support protecting and enhancing natural and cultural resources. This includes using Low Impact Development strategies and vegitated buffers around gulches and wetlands, giving consideration to how agriculture areas will be impacted, particularly where there is active subsitance farming or lo'i cultivation, and ensuring access to kuleana lands. It is noted that the project proponents have consulted with community members in development of the Environmental Impact Statement Preparation Notice, including the Aha Moku Council and Lineal Decedents. As final alignment and design for Honoapi'ilani Highway Improvements are refined, protecting, and enhancing natural and cultural resources should be a priority. Continued involvement and collaboration with community members as plans are refined is encouraged. (182)	182	Ch. 5	123	The alternatives considered potential impacts to natural and cultural resources, and the Selected Alternative provides the best balance to achieve the Project's purpose and need and minimize and avoid adverse effects. Consultation with descendants and other individuals and organizations with a demonstrated interest in the Project (referred to as "consulting parties") is ongoing as part of the National Historic Preservation Act Section 106 and the Hawai'i Revised Statutes, Chapter 6E processes. The Executed Programmatic Agreement (Appendix 3.6 of the Final EIS) provides the framework for commitments on resource evaluation and mitigation as well as continued consultation with interested participants.
				WMCP 2.2.9 | Protect and enhance natural and cultural resources during implementation of transportation projects through early consultation and community engagement with resource management agencies, residents, and cultural practitioners. WMCP 2.3.1 | Ensure new development projects provide continued access to kuleana lands protected under Section 7-1, Hawai'i Revised Statutes. WMCP 2.3.2 |Gulches, as identified in the map in Figure 2.3 of this Plan, must remain in open space and no new permanent structures may be developed in or within 100 feet of the top of the bank of identified gulches, unless Low Impact Development strategies are implemented to prevent stormwater runoff. WMCP 2.3.3 |Protect ocean and stream water quality by requiring that wetlands, as defined by traditional historic knowledge or by Section 404 of the Clean Water Act, be preserved with vegetated buffer areas that are adequate to protect them from pollutants. WMCP 2.3.5 | Require implementation of Low Impact Development practices in developments in West Maui to reduce stormwater runoff and protect water quality. WMCP 2.3.8 | Preserve and protect the region's cultural resources and traditional lifestyles, including agricultural pursuits, such as subsistence agriculture on lands owned by the State Department of Hawaiian Home Lands in Honokōwai and lo'i cultivation of Native Hawaiians in Honokōhau Valley, Kahoma Valley, Kaua'ula Valley, Olowalu, and Ukumehame. WMCP 2.3.10 | Existing areas of open space, including agricultural lands and gulches, should be viewed as a resource to be protected and enhanced. WMCP 2.3.13 | The marine and nearshore environment and open space areas are important assets of the region and should be protected and preserved. Habitat connectivity for threatened and endangered species, watersheds, undeveloped shoreline areas and other environmentally sensitive lands must be preserved. WMCP 2.3.16 | All development projects must engage in consultation with the Aha Moku 'o Maui representative associated with the project area – either Moku 'o Lāhainā or Moku 'o Kā'anapali – and provide evidence of this engagement to the Department. WMCP 2.3.18 | Any ground-altering activities in the areas described in this Plan's ascription list must have a cultural monitor on site, due to the sensitive nature of these areas, until cultural overlay policies are established by the Council. See Appendix C | Cultural Reserve Ascription List.				

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Karen Comcowich (continued)				MIP | Goal 2.1 | Our community respects and protects archaeological and cultural resources while perpetuating diverse cultural identities and traditions. Objective 2.1.3 | Enhance the island's historic, archaeological, and cultural resources. 2.1.3.f | Support opportunities for public involvement with the intent to facilitate the protection and restoration of historic and archeological sites, including consultation with stakeholders.2.1.3.g | Encourage the resolution of land title questions relating to Land Commission Awards and Royal patents. 2.1.3.h | Ensure compliance with historic preservation laws, and discourage demolition of properties that are determined to be eligible for listing on the National or State Register of Historic Places. CWPP| B. Preserve Local Cultures and Traditions | Goal: Maui County will foster a spirit of pono and protect, perpetuate, and reinvigorate its residents' multi-cultural values and traditions to ensure that current and future generations will enjoy the benefits of their rich island heritage. Objective 1: Perpetuate the Hawaiian culture as a vital force in the lives of residents. a. Protect and preserve access to mountain, ocean, and island resources for traditional Hawaiian cultural practices. f. Recognize and preserve the unique natural and cultural characteristics of each ahupua'a or district. h. Ensure the protection of Native Hawaiian rights. Objective 2 | Emphasize respect for our island lifestyle and our unique local cultures, family, and natural environment. d. Recognize the interconnectedness between the natural environment and the cultural heritage of the islands.				
				Trails. The protection and enhancement of trails is encouraged throughout the Maui County General Plan. While it is not expected that the Honoapi**'ilani Highway Improvements will develop additional trails, preservation of existing trails and** options for new connections should be incorporated. (183)	183	Ch. 5	124	There are no existing public hiking trails that are along the proposed highway alignment. The trailhead for the West Lāhainā Pali trail is located along the existing highway about a half mile further south (towards Maalaea). The existing Olowalu subdivision shared-use path, which is largely built out by the private owners, will be disrupted by the Selected Alternative. As presented in this Final EIS, the continuity of the path would be tied into the pathway alongside the makai alignment of the Selected Alternative.
				WMCP 2.5.8 | Ensure existing government trails are preserved through the subdivision process or other approval process, such as land use designation change; reviews under Chapter 343, Hawai'i Revised Statutes; and reviews under Chapter 205A, Hawai'i Revised Statutes. Refer to the West Maui Trails Map (Figure 2.4, pg. 61) and consult with the Nā Ala Hele Trails and Access Program. WMCP 2.5.3 | Support the development of trails and greenways in West Maui as part of a larger integrated recreation and transportation network and manage existing public mauka to makai access along the tops of gulches as identified in Figure 2.3 (pg. 60) to prevent the spread of rapid 'Ōhi'a death, feral ungulates, and other invasive species in upper watersheds. MIP | GOAL 2.1 |Our community respects and protects archaeological and cultural resources while perpetuating diverse cultural identities and traditions. OBJECTIVE 2.1.1 | An island culture and lifestyle that is healthy and vibrant a smeasured by the ability of residents to live on Maui, access and enjoy the natural environment, and practice Hawaiian customs and traditions in accordance with Article XII, Section7, Hawai`i State Constitution, and Section7-1, Hawai`i Revised Statutes(HRS). 2.1.1.c Ensure traditional public access routes, including native Hawaiian trails, are maintained for public use. MIP | Goal 6.6 |Maui will have a diverse range of active and passive recreational parks, wilderness areas, and other natural-resource areas linked, where feasible, by a network of greenways, bikeways, pathways, and roads that are accessible to all Objective 6.6.3 | An expanded network of greenways, trails, pathways, and bikeways. 6.6.3.c Collaborate with the State and private land owners to ensure perpetual access and proper stewardship of traditional trails and access systems. CWPP | H. Diversify Transportation Options Goal: Maui County will have an efficient, economical, and environmentally sensitive means of moving people and goods. Objective 2: Reduce the reliance on the automobile and fossil fuels by encouraging walking, bicycling, and other energy-efficient and safe alternative modes of transportation. e. Support the reestablishment of traditional trails between communities, to the ocean, and through the mountains for public use. CWPP | G. Improve Parks and Public Facilities Goal: A full range of island-appropriate public facilities and recreational opportunities will be provided to improve the quality of life for residents and visitors. Objective 1 | Expand access to recreational opportunities and community facilities to meet the present and future needs of residents of all ages and physical abilities. a. Protect, enhance, and expand access to public shoreline and mountain resources. b. Expand and enhance the network of parks, multi-use paths, and bikeways.				
				Undergrounding Utlities. Undergrounding utilities is supported throughout the Maui County General Plan. This may be an opportunity to work with MECO to underground utilities in the area where improvements are being implemented. (184)	184	Ch.5	125	The Honoapi'ilani Highway project is compatible with this plan element in that the corridor is suitable to accommodate new utility systems, although no utility realignments are proposed. As described in Chapter 3.17 of the Draft and Final EIS, the new alignment would have no existing or future driveways or access points to properties requiring local utility connections. Therefore, the existing system for local distribution would remain along the existing Honoapi'ilani Highway for local uses or from the Olowalu and Ukumehame subdivision utility lines which are already primarily below ground. Regional transmission lines parallel the highway but are considerably mauka of the developed areas up into the higher elevations and would require a major regional change to its routing if it were to be accommodated within the new highway alignment.

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Karen Comcowich (continued)				WMCP 2.5.20 | Promote the placement of utilities underground in new areas of development and in existing areas, where possible, unless desecration of iwi kūpuna is likely to occur or if the development lies within areas of significant cultural resources in the proposed cultural overlay, a permit will be required. CWPP | I. Improve Physical Infrastructure Goal: Maui County's physical infrastructure will be maintained in optimum condition and will provide for and effectively serve the needs of the County through clean and sustainable technologies. Objective 4: Improve the planning and management of infrastructure systems. j. Promote the undergrounding of utility and other distribution lines for health, safety, and aesthetic reasons. Scenic Resources and Community Character. Ensuring scenic vistas and community character are considered and retained in the design of new roads or roadway improvements is supported in the WMCP, the MIP and the CWPP. While it is evident that the Honoapi'ilani Highway Improvements have considered the impacts of the alignment on the character and scenic resources of the surrounding area, it will also be important consider the character and scenic resources of the surrounding area in the design of the road and how it interacts with the surrounding communites. (185) WMCP 2.3.11 | Protect public mauka to makai view corridors in each subarea and scenic vistas. MIP| Goal 6.4 | An interconnected, efficient, and well-maintained, multimodal transportation system Objective 6.4.2| Safe, interconnected transit, roadway, bicycle, equestrian, and pedestrian network. 6.4.2.a Ensure transit-, roadway-, and pedestrian-facilities design and level-of-service standards respect the unique character of our communities. Objective 6.4.3 | An island-wide, multimodal transportation system that respects and enhances the natural environment, scenic views, and each community's character. 6.4.3.c Design all transit systems to respect visual corridors and Maui's character. CWPP | H. Diversify Transportation Options Goal: Maui County will have an efficient, economical, and environmentally sensitive means of moving people and goods. Objective 1: Provide an effective, affordable, and convenient ground-transportation system that is environmentally sustainable. o g. Design new roads and roadway improvements to retain and enhance the existing character and scenic resources of the communities through which they pass.	185	Ch. 5	126	The proposed new alignment will largely weave through the community outside the village center in Olowalu and the parks and beaches in Ukumehame. As the comment notes, the potential visual character of the Project is evaluated in Chapter 3.8 of the Draft and Final EIS. The visual impact assessment identifies recommended guidelines to best integrate the road design with the character and scenic resources of the community.
				Parks and Open Space. Although this is not part of the scope of this project the realignement will offer the possibilty to achieve goals supported by the Maui County General Plan regarding protection and enhancement of shoreline resources, the developement of Parks and Open Space, and altenative modes of transportation makai of the realigned highway. (186) WMCP 2.1.5 | Protect the shoreline and beaches by preserving waterfront land within the SLR-XA as open space wherever possible. MIP | Goal 6.4 | An interconnected, efficient, and well-maintained, multimodal transportation system Objective 6.4.2: Safe, interconnected transit, roadway, bicycle, equestrian, and pedestrian network. 6.4.2.e Consider identification, acquisition where appropriate, and utilization of abandoned rightof-ways for bikeways, pedestrian pathways, and open-space networks. MIP | Goal 6.6 Maui will have a diverse range of active and passive recreational parks, wilderness areas, and other natural-resource areas linked, where feasible, by a network of greenways, bikeways, pathways, and roads that are accessible to all Objective 6.6.3 An expanded network of greenways, trails, pathways, and bikeways. 6.6.3.a Link existing and future park sites, natural areas, the shoreline, and residential areas with a network of bikeways, pedestrian paths, trails, and greenways. 6.6.3.b Support the implementation of plans and programs that facilitate pedestrian mobility and access to active and passive recreation areas and sites. CWPP | H. Diversify Transportation Options Goal: Maui County will have an efficient, economical, and environmentally sensitive means of moving people and goods. Objective 1: Provide an effective, affordable, and convenient ground-transportation system that is environmentally sustainable. f. Preserve roadway corridors that have historic, scenic, or unique physical attributes that enhance the character and scenic resources of communities. CWPP | A. Protect the Natural Environment Goal: Maui County's natural environment and distinctive open spaces will be preserved, managed, and cared for in perpetuity. Objective 2: Improve the quality of environmentally sensitive, locally valued natural resources and native ecology of each island. a. Protect and restore nearshore reef environments and water quality. e. Mitigate the negative effects of upland uses on coastal wetlands, marine life, and coral reefs. CWPP | L. Mitigate Climate Change and Work Toward Resilience Goal: Minimize the causes and negative effects of climate change. Objective 2: Reduce the impacts of sea-level rise by acknowledging climate change, adapting, mitigating, and planning accordingly. Policies: a. Evaluate development to assess potential short-term and long-term sea-level rise impacts on nearshore environments. b. Improve efforts to mitigate and plan for the impact of sea-level rise. c. Protect undeveloped beaches, dunes, and ecosystems, and restore natural shoreline processes. e. Strengthen coastal-zone management, re-naturalization of shorelines, where possible, and filtration or treatment of urban and agricultural runoff.	186	Ch. 3.5	127	Thank you for your comment and your interest in the Project.

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Francisco Dóñez	Environmental Protection Agency	83	Email	The U.S. Environmental Protection Agency has reviewed the above-referenced document pursuant to the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act (CAA). The CAA Section 309 role is unique to EPA. It requires EPA to review and comment on the environmental impact of any proposed federal action subject to NEPA's environmental impact statement requirements and to make its comments public. EPA 309 Review Summary. EPA did not identify significant concerns to be addressed in the final EIS. (187) We acknowledge and recognize our colleagues in the state for continuing the NEPA process to analyze and deliver this project following the devastating wildfire impacts to Lahaina just north of the proposed project area. We provided scoping comments to the Hawaii Department of Transportation and Federal Highways Administration and accepted the invitation to provide early coordination as defined in Title 23 United States Code Section 139(d) and (5), and Title 40 Code of Federal Regulations, part 1508.5 on April 29, 2022. We note that many of our scoping comments were adopted in the development of the Draft EIS, and that our November 1, 2024, comments on the Administrative Draft EIS regarding aquatic resources and community engagement were fully addressed in the Draft EIS. (187 Cont.) We appreciate HDOT and FHWA's emphasis of continuing community dialogue (page 3.7-14) as it pertains to protecting cultural resources pursuant to the National Historic Preservation Act, Section 106. The EPA appreciates the opportunity to review this DEIS. If you have any questions, please contact me at (415) 972-3659 or the NEPA reviewer, Zac Appleton, at (415) 972-3321 or appleton.zac@epa.gov	187	Ch. 1	16	Thank you for your comment and your interest in the Project.
Chelsie Javar-Salas	USFWS	84	Email	We recommend culverts and bridges over streams be designed with the height and width to handle periodic massive surges of water from torrential rain events that are known to occur in the area. Due to climate change, 100-year storms may become more frequent. Flooding has the potential to destroy ae**ʻo (Hawaiian stilt, Himantopus mexicanus knudseni) and** nēnē (Hawaiian goose, Branta sandvicensis) nests that may be found in the project area. Additionally, ensuring culverts and bridges have the height and width to handle 100-year storm torrential rains may also minimize impacts to other trust resources protected under the Fish and Wildlife Coordination Act. (188) These recommendations also apply to Appendix 3.10 section 2.2.1.	188	Ch. 3.9	68	As set forth in the Draft EIS and this Final EIS (see Chapters 2 and 3.9), the Project would be designed consistent with HDOT's Design Criteria for Highway Drainage. Design flows are determined utilizing the National Oceanic and Atmospheric Administration (NOAA) Precipitation Frequency Data Server website. Stream crossings would be designed to preserve water flow and the biological processes of the fauna living in them. In addition to requiring all bridges to be designed for 100-year storm events and all culverts to be designed for 50-year storm events (unless they involve FEMA flood zones, where they will be designed for 100-year storm events), the design criteria also outlines how design discharges are determined, including the use of regression equations that are periodically updated based on observations made by the U.S. Geological Survey. These design standards are intended to ensure that bridges and culvert crossings that carry off-site flow across a highway corridor are not significantly altered by the highway, thereby minimizing impacts to these waterways and habitats by the highway development itself. Wherever possible, low impact development and nature-based designs, such as infiltration ponds/systems, will be utilized to minimize impacts of stormwater runoff from the highway itself. These designs will meet HDOT standards as well as effectively manage sediment transport, protect the environment, and ensure the safety and longevity of infrastructure.
				For erosion control during construction, we recommend using materials (e.g., biosock) that are at least 3 feet (ft) in diameter to reduce chances of runoff into the ocean during torrential rain. (189) The typical 1 ft diameter biosock will likely not serve as an adequate barrier during torrential rainfall, especially in an area that is highly degraded, expansive ephemeral wetland habitat combined with known high flow rates in streams during these storm events. Sedimentation runoff onto the beach and into the ocean degrades sea turtle habitat and has the potential to bury sea turtle nests. This emphasizes the importance of incorporating our Best Management Practices (BMPs) for Work In and Around Aquatic Environments to minimize project impacts. These BMPs may also help minimize impacts to other trust resources protected under the Fish and Wildlife Coordination Act. (189 Cont.)	189	Ch. 3.9	69	HDOT employs the use of its Construction Best Management Practices Field Manual to govern the development of Site Specific BMP Plans during construction. The manual describes appropriate use and diameter width for Compost Filter Berm/Socks which include limitations on placement in areas where high volumes or velocities of flow are anticipated and recommends other methods/materials for sediment control in such situations. The USFWS BMPs for Work In and Around Aquatic Environments have been agreed to and incorporated into the Project design (see Draft EIS Table 3.10-16).
				The DEIS describes monitoring for waterbirds by a qualified biologist, but then follows up with: The contractor will assign dedicated, trained, competent personnel to perform daily visual monitoring and nest surveys prior to the start of and during construction work to check for listed species bird nests. The daily monitoring protocol would include designated personnel to walk the project site every morning prior to the start of construction work to determine if any ESA-listed species nests are present at the work site and note if any listed individuals were present. All surveys to detect for the presence of aeʻo nests and ae**ʻo exhibiting defensive nest protection behavior should be carried out by a qualified biologist with knowledge of the** species' life history. If heavy rains result in ephemeral wetlands, ʻalae keʻokeʻo (Hawaiian coot, Fulica alai) should be surveyed for as well. (190)	190	Ch. 3.10	73	The Biological opinion from USFWS is found in Appendix 3.10 and the environmental commitments are summarized in Chapter 5 of this Final EIS. This refined protocol includes but is not limited to; qualified biologist would be on-call throughout the duration of construction to assist in monitoring, surveys, and in an advisory capacity; prior to the initial clearing and grubbing phase of the Project, a qualified biologist would be on-site to perform visual surveys for listed species and nests. Should individuals or nests be observed, then species specific buffers and protocol would apply; prior to the start of any construction activities, a qualified biologist would produce a handout on listed species that occur within the Action Area and present a mandatory Environmental Awareness Program to on-site personnel, including but not limited to contractors, contractor's employees, supervisors, inspectors, and all subcontractors. USFWS would be contacted to review the awareness program prior to administering to on-site personnel; the qualified on-call biologist would be present on-site once every three weeks, or as needed, to provide training to new on-site personnel; should work be halted for more than 72 hours, the on-call biologist shall be contacted to survey the area prior to resumption of work.

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Chelsie Javar-Salas (continued)				The DEIS describes morning surveys and monitoring for nēnē by a qualified biologist, but then follows up with: The contractor will assign dedicated, trained, competent personnel to perform daily visual monitoring and nest surveys prior to the start of and during construction work to check for listed species bird nests. The daily monitoring protocol would include designated personnel to walk the project site every morning prior to the start of construction work to determine if any ESA-listed species nests are present at the work site and note if any listed individuals were present. All surveys to detect for presence of **nēnē** nests and **nēnē** exhibiting defensive nest protection behavior should be carried out by a qualified biologist with knowledge of the species' life history. (191)	191	Ch. 3.10	74	See Response 69 (above); a qualified biologist would be on-call throughout the duration of construction to assist in monitoring, surveys, and in an advisory capacity; prior to the initial clearing and grubbing phase of the Project, a qualified biologist would be on-site to perform visual surveys for listed species and nests.
				We recommend including all final biological survey and monitoring protocols in the final EIS under Appendix 3.10. We encourage your team to submit draft survey and monitoring protocols/standard operating procedures to our office for review and comments prior to finalization. We also encourage incorporating adaptive management into these procedures and triggers for modifying them. (192)	192	Ch. 3.10	75	Biological survey and monitoring protocols are finalized in the Section 7 Biological Opinion (BO) prepared by USFWS (Appendix 3.10).
				The draft EIS states additional biological surveys will be performed by trained biologists in areas of "permanent BMPs." The Service recommends providing more details about this objective, including protocols and habitat features that support listed species in the draft EIS. (193)	193	Ch. 3.10	76	As set forth in Appendix 3.10, biological surveys were performed by qualified biologists in areas of "permanent BMPs" that were not included in previous surveys. This additional assessment evaluated and affirmed that the full range of environmental effects and environmental commitments first identified in the Draft EIS remain the basis of the BO from USFWS (Appendix 3.10 of this Final EIS)
				We recommend that temporary signs be placed around the project area during construction to remind workers of the potential presence of **aeʻo** and **nēnē** and to drive slowly (10 miles per hour as stated in the DEIS). Additionally, permanent signs should be placed along the highway through the Ukumehame wetland area alerting drivers of the potential presence of **aeʻo** and **nēnē** and for reducing the speed limit through the area to minimize injury and mortality to listed birds from vehicle strikes. (194)	194	Ch. 3.10	77	This comment is consistent with the environmental commitments incorporated into this Final EIS (see Chapter 5) and as presented in the USFWS BO (Appendix 3.10 of this Final EIS).
				Avoid placing staging areas in or directly adjacent to wetland habitat (jurisdictional and nonjurisdictional) and streambanks identified by the consultants to avoid and minimize impacts to habitat that supports listed waterbirds and **nēnē**. (195)	195	Ch. 3.10	78	This comment is consistent with the environmental commitments incorporated into this Final EIS (see Chapter 5) and as presented in the USFWS BO (Appendix 3.10 of this Final EIS).
				Any hazing that occurs to **nēnē** must follow the 4(d) rule. We recommend keeping a copy of the regulations at the on-site office for easy reference. A key section of the 4(d) rule follows: Before implementing any such intentional harassment activities during the **nēnē** breeding season (September through April), a qualified biologist knowledgeable about the nesting behavior of **nēnē** must survey in and around the area to determine whether a nest or goslings are present. If a nest is discovered, the Service must be notified within 72 hours and the following measures implemented to avoid disturbance of nests and broods: No disruptive activities may occur within a 100-ft (30-meter) buffer around all active nests and broods until the goslings have fledged; Brooding adults (i.e., adults with an active nest or goslings) or adults in molt may not be subject to intentional harassment at any time; and The landowner must arrange follow-up surveys of the property by qualified biologists to assess the status of birds present. (196)	196	Ch. 3.10	79	This comment is consistent with the environmental commitments incorporated into this Final EIS (see Chapter 5) and as presented in the USFWS BO (Appendix 3.10 of this Final EIS).
				Hawaiian yellow-faced bees are known to occur in scattered populations along the western coastline of Mauna Kah**ālā**wai (Maui Komohana or West Maui Mountains). Coastal populations of yellow-faced bees occur in habitat along rocky shorelines with naupaka (Scaevola taccada) and tree heliotrope (Heliotropium arboreum) with either landscaped vegetation, nonnative kiawe (Neltuma pallida), or bare rock inland. Bees are restricted to an extremely narrow corridor, typically 33 to 66 ft (10 to 20 meters) wide, and do not occur on barren sandy beaches or inland, or on landscaped native plants on hotel grounds. Documented nectar plants include naupaka, **ʻ**ilima (Sida fallax), **ʻ**akoko (Euphorbia spp.), pua kala (Argemone glauca), naio (Myoporum sandwicense), and tree heliotrope. Threats to yellow-faced bees include habitat destruction and modification from land use change, nonnative plants, ungulates, and fire, along with predation by nonnative ants and wasps. Mahalo for including the Service's avoidance and minimization measures for coastal Hawaiian yellow-faced bees. (197)	197	Ch. 3.10	80	We appreciate the USFWS providing these measures and have included them as commitments as presented in Chapter 5 of this Final EIS.

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Chelsie Javar-Salas (continued)				Table 3.9.10 states that project effects on listed waterbirds and nēnē would be minimal due to the implementation of avoidance and minimization measures outlined in Appendix 3.10. The project may potentially impact aeʻo and nēnē. Therefore, we recommend that the cumulative impacts analysis in the draft EIS include an assessment for the construction phase and the normal operations phase. This should specifically address how the highway designs in the Ukumehame area will avoid car strikes and minimize impacts to aeʻo and nēnē. Additionally, we encourage your team to consider the anticipated increase in waterbird populations (aeʻo and ʻalae keʻokeʻo) and nēnē in the Ukumehame area following wetland restoration when conducting the cumulative impact analysis. Currently, neither Chapter 3.10 nor the Biological Resource Discussion in Appendix 3.10 includes an evaluation of the impacts to listed waterbirds and nēnē from the routine operations of the new highway after construction. (198)	198	Ch. 3.10	81	This comment is consistent with the assessments outlined in the Section 7 BA and the BO (Appendix 3.10 of this Final EIS). As described in Chapter 3, Affected Environment and Reasonably Foreseeable Effects of this Final EIS, on February 19, 2025, CEQ issued a memorandum, Implementation of the National Environmental Policy Act, which acknowledged that the Fiscal Responsibility Act of 2023 amended NEPA to clarify that EISs must analyze and disclose the "reasonably foreseeable environmental effects of the proposed agency action." CEQ encouraged Federal agencies to "analyze the reasonably foreseeable effects of the proposed action consistent with section 102 of NEPA, which does not employ the term 'cumulative effects;'[...and the agencies should consider] 'reasonably foreseeable' effects, regardless of whether or not those effects might be characterized as 'cumulative.'" Further, since the publication of the Draft EIS, the U.S. Supreme Court issued its decision in Seven County Infrastructure Coalition v. Eagle County, Colorado, which held the focus of NEPA is the project at hand, not other separate projects. 605 U.S. ____ (May 29, 2025). Accordingly, this Final EIS analyzes reasonably foreseeable effects that result from the proposed action. The Honoapiʻilani Highway Improvements Project considers reasonably foreseeable effects to have a rational link to the Project in terms of geographic and temporal proximity and must be sufficiently likely to occur.
				The draft EIS states nighttime work is not anticipated; however, if it does become necessary, the DOT and FHWA will consult with the Service (see Appendix 3.9, page 4). Chapter 3.10, Table 3.10.9 states the project does not anticipate to impact seabirds, as standard Service seabird avoidance and minimization measures will be implemented. However, Table 3.10.5 mentions that nighttime work may occur, but not during the seabird fallout season. Please confirm whether nighttime work will occur during the seabird fallout season. If it is determined that nighttime work will occur during the seabird fallout season, we recommend contacting our office several months in advance for guidance to avoid adverse impacts to listed seabirds. Additionally, we recommend following the 2022 Maui Dark Skies Ordinance for all permanent lighting. For permanent lighting, limit these lights as human safely considerations allow, and include light frequencies and intensities that have the least impact on seabirds and sea turtles. There is also a growing body of peer-reviewed literature and seabird groups to help guide you with the most current animal friendly lighting. (199)	199	Ch. 3.10	82	Following completion of the Draft EIS, nighttime work commitments were made such that nighttime work is limited in scope and duration and would be specifically at the tie-in points to the existing roadways (at the Lāhainā Bypass to the north, at the Pali to the south) in order to prevent traffic delays. Nighttime work would not be allowed during the seabird fallout season. The 2022 Maui Dark Skies Ordinance for all permanent lighting has already been incorporated into the commitments described in this Final EIS (Chapter 5).
				For revegetation efforts, we recommend using only native plants, in particular those documented in the biological survey: ʻilima (Sida fallax), ʻiliahialoʻe (Santalum ellipticum), ʻaʻaliʻi (Dodonaea viscosa), hoary abutilon (Abutilon incanum), akulikuli (Sesuvium portulacastrum), milo (Thespesia populnea), and naupaka (Scaevola taccada). If possible, we recommend avoiding disturbance to endemic plant species such as ʻiliahialoʻe that currently occupy the project area. ʻIliahialoʻe is an endemic plant species to the Hawaiian Islands. Limiting disturbance of non-listed endemic plants help to prevent their decline. (200)	200	Ch. 3.10	83	This comment is consistent with the environmental commitments incorporated into this Final EIS (see Chapter 5) and as presented in the USFWS BO (Appendix 3.10 of this Final EIS).
				For erosion control, we recommend following our comment in Chapter 3.9 above related to biosocks. To minimize collisions for seabirds, we recommend: Flagging the tops of monopoles, cranes, and crane wires/cables. Flagging fencing that extends above vegetation. (201)	201	Ch. 3.10	84	This comment is consistent with the environmental commitments incorporated into this Final EIS (see Chapter 5) and as presented in the USFWS BO (Appendix 3.10 of this Final EIS).
				To avoid and minimize invasive species potential impacts to ESA listed species, we recommend incorporating our invasive species biosecurity protocols into your project planning (202) Attachment A). The proposed project will be transporting a substantial amount of materials (i.e., construction materials or aggregate, etc.), vehicles, machinery, equipment, and personnel between sites, which has the potential to unintentionally introduce invasive species to the project site. (202 Cont.)	202	Ch. 3.10	85	This comment is consistent with the environmental commitments incorporated into this Final EIS (see Chapter 5) and as presented in the USFWS BO (Appendix 3.10 of this Final EIS).

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Chelsie Javar-Salas (continued)				Under Mammals, the DEIS states that **ʻ**ōpeʻapeʻa (Hawaiian hoary bat, Lasiurus cinereus semotus) have not been detected on Maui and cites Tomich 1986. Current data show that **ʻ**ōpeʻapeʻa do occur on Maui (203): https://dlnr.hawaii.gov/wildlife/files/2021/01/MauiBatsHTHFebruary2020.pdf The DEIS states that if scheduling becomes a serious issue and cutting down or pruning trees taller than 15 feet cannot be avoided during the bat breeding season (June 1 through September 15), FHWA will consult with the Service. We recommend FHWA consult with us several months in advance if scheduling is anticipated to prevent implementing the Service's avoidance and minimization measures for **ʻ**ōpeʻapeʻa or any other listed species that occurs or may occur in the project area. (203 Cont.)	203	Ch. 3.10	86	Under Section 3.10.3.2 Mammals, the Draft EIS states that "There are records for this species on Maui, and their potential presence is assumed within the project area" and then cites Tomich 1986. This Final EIS states in Chapter 5, that if bat breeding season cannot be avoided for cutting down or pruning trees taller than 15 feet, the contractor would contact the USFWS five months in advance for guidance.
				Please include Service avoidance and minimization measures for sea turtles (honu (green sea turtles, Chelonia mydas) and honu**ʻea (Hawksbill sea turtles, Eretmochelys imbricata)). Construction on, or in the vicinity of, beaches can result in sand** and sediment compaction, sea turtle nest destruction, beach erosion, contaminant and nutrient runoff, and an increase in direct and ambient light pollution, which may disorient hatchlings or deter nesting females. Off-road vehicle traffic may result in direct impacts to sea turtles or nests, and contributes to habitat degradation through erosion and compaction. (204) Information for projects with a beach hardening, stabilization, or nourishment component: Projects that alter the natural beach profile, such as nourishment and hardening, including the placement of seawalls, jetties, sandbags, and other structures, are known to reduce the suitability of on-shore habitat for sea turtles. These types of projects often result in sand compaction, erosion, and additional sedimentation in nearshore habitats, resulting in adverse effects to the ecological community and may inhibit future sea turtle nesting. The hardening of a shoreline increases the potential for erosion in adjacent areas, resulting in subsequent requests to install stabilization structures or conduct beach nourishment in adjacent areas. Given projected sea level rise estimates, the likelihood of increase in storm surge intensity, and other factors associated with climate change, we anticipate that beach erosion will continue and likely increase. Where possible, projects should consider alternatives that avoid modifying or hardening of coastlines. Beach nourishment or beach hardening projects should evaluate the long-term effect to sea turtle nesting habitat and consider the cumulative effects.	204	Ch. 3.10	87	
				Avoidance and minimization measures include: No vehicle use on or modification of the beach/dune environment during the sea turtle nesting or hatching season (See nesting date ranges above); Do not remove native dune vegetation; Have a biologist familiar with sea turtles conduct a visual survey of the project site to ensure no basking sea turtles are present; If a basking sea turtle is found within the project area, cease all mechanical or construction activities within 100 feet until the animal voluntarily leaves the area; Cease all activities between the basking turtle and the ocean; Remove any project-related debris, trash, or equipment from the beach or dune if not actively being used; Do not stockpile project-related materials in the intertidal zone, reef flats, sandy beach and adjacent vegetated areas, or stream channels. (204 Cont.)	204	Ch. 3.10	87	This comment is consistent with the environmental commitments incorporated into this Final EIS (see Chapter 5) and as presented in the USFWS BO (Appendix 3.10 of this Final EIS). As noted in Chapter 5, since completion of the Draft EIS, nighttime work commitments have been made such that nighttime work is limited in scope and duration and would be specifically at the tie-in points to the existing roadways (at the Lāhainā Bypass to the north, at the Pali to the south) in order to prevent traffic delays. Nighttime work would not be allowed during the sea turtle nesting/hatching season. According to shapefiles downloaded from USFWS Ecos, https://ecos.fws.gov/ecp/species/C00S#crithab, there is no USFWS PIFWO 07/19/2023 proposed critical habitat for Hawaiian green sea turtle (Chelonia mydas) overlapping the northern end of the project area. The closest proposed critical habitat for Chelonia mydas is located in Lāhainā, approximately 2.8 miles from the northern terminus of the Project.
				Optimal sea turtle nesting habitat is a dark beach free of barriers that restrict sea turtle movement. Nesting turtles may be deterred from approaching or laying successful nests on lighted or disturbed beaches. They may become disoriented by artificial lighting, leading to exhaustion and placement of a nest in an inappropriate location (such as at or below the high tide line). Hatchlings that emerge from nests may also be disoriented by artificial lighting. Inland areas visible from the beach should be sufficiently dark to allow for successful navigation by hatchlings to the ocean. To avoid and minimize project impacts to sea turtles from lighting we recommend: Avoiding nighttime work during the nesting and hatching season; Minimizing the use of temporary and permanent lighting on or near beaches and shield all project-related temporary and permanent lights so the light is not visible from any beach; If lights can't be fully shielded or if headlights must be used, fully enclose the light source with light filtering tape or filters; Incorporating design measures into the construction or operation of buildings adjacent to the beach to reduce ambient outdoor lighting such as tinting, reducing the height of exterior lighting to below 3 feet and pointed downward or away from the beach, and minimizing light intensity to the lowest level feasible and, when possible, include timers and motion sensors. (204 Cont.)	204	Ch. 3.10	87	
				Implementing our sea turtle avoidance and minimization measures, including our BMPs for Work In and Around Aquatic Environments, will also help avoid and minimize project impacts to sea turtle nesting habitat, including proposed critical habitat that overlaps with the northern end of the project area. Additionally, we recommend keeping workers, staging areas, and temporary resting equipment on the mauka side of the old highway, away from the beach, especially during sea turtle nesting season and within the proposed green sea turtle critical habitat. (204 Cont.)	204	Ch. 3.10	87	

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Chelsie Javar-Salas (continued)				We recommend including conceptual designs of the preferred alternative viaduct through the Ukumehame area, including identified wetland habitat (jurisdictional and nonjurisdictional) in the area, architectural/design features aimed at reducing car strikes for nēnē and listed waterbirds (e.g., diversion poles and/or guardrails), and any land alterations to assist with stormwater management and highway runoff as described in section 3.9.8 of Chapter 3. (205)	205	Ch. 5	128	Conceptual designs of the Preferred Alternative and viaduct were provided in the Section 7 BA for USFWS PIFWO review and use in development of the Biological Opinion (Appendix 3.10 of this Final EIS), as are the identified wetland habitat in the area, and preliminary typical section drawings of the proposed highway and stream crossings (with guardrails). Conceptual designs of the diversion poles to be affixed to the viaduct have not been developed, but dimensions and placement are described in the BA as extending approximately 6 feet (1.8 meters) above the 54-inch (137 centimeters) rail and spaced approximately 12 feet (3.7 meters) apart across the length of and on both sides of the viaduct. As described in Chapter 2, Alternatives of the Draft EIS, the ultimate determination of culvert and bridge specifications, or the use of viaducts to span larger areas, would be based on identification of the Preferred Alternative, the length of the span required, environmental effects, constructability, and cost. This would be finalized during the development of final construction documents as part of the design-build process.
				In section 5.1.1.3, the DEIS mentions guardrails would be placed on either side of the viaduct. We recommend clarifying whether the architectural design features aimed at reducing listed bird car strikes will be placed on one side or both sides of the highway. (206)	206		129	The Final EIS specifies that diversion poles would be included on both sides of the viaduct. Guardrails would be placed on either side of the roadway and viaduct. Preliminary designs for the viaduct and roadway are included in typical section drawings in the BA.
				We recommend providing more details about the swales (Appendix 3.10) to control stormwater, and other highway design features aimed at minimizing highway contaminant runoff into wetland habitat to reduce impacts to nēnē, aeʻo, and other listed waterbirds that may use the wetland habitat in the project area. Specifically, clarify where the stormwater will be diverted to or be collected, and will these areas have the potential to attract nēnē and listed waterbirds. (207)	207		130	The Selected Alternative would traverse the wetland area on the viaduct. Stormwater flow from the elevated viaduct would run along the parapet walls until the width of the water running along the wall reaches a threshold to enter a closed drainage system where it would flow through downspouts attached to the piers to a permanent BMP at ground level. Proposed locations of permanent BMPs are shown in the BA. The final design established as part of the design-build process would determine the design, size, and location of the permanent BMPs, including conceptual detention ponds to promote infiltration and treatment of discharge generated on-site, and incorporation of Low Impact Development strategies, such as vegetated swales in the median and on the outside edges of the pavement structure to the maximum extent practicable. Revegetation strategies outlined in the BA and in the Biological Opinion (Appendix 3.10 of this Final EIS) would prohibit the use of turf grass, and include native species found within the project area. Regular maintenance of the permanent BMPs would deter nēnē and listed waterbirds.
				Additionally, the proposed grassy swales adjacent to the road may increase the risk for nēnē car strikes. We recommend you inquire with the Nēnē Recovery Action Group about the proposed grassy swales and for potential alternative options for the swales, as applicable. (208)	208		131	The project team reached out to the Nēnē Recovery Action Group about best practices for proposed grassy swales and potential alternatives. No additional recommendations were provided.
Andrew Viloria	-	85	Webform	Aloha, I recognize this may be too late, but as a lifelong citizen I do not want this highway to cut through our only outdoor flat open firing range. It would make the inaccesibility of sport shooting that much more difficult for Hawaii citizens. Please reconsider these changes. (209) Mahalo, Andrew	209	Ch. 3.5	36	The Draft EIS and this Final EIS established and evaluated alternatives specifically with the understanding of the importance of the Ukumehame Firing Range to the community. As a public recreational resource, the firing range was further evaluated under the FHWA's obligation pursuant to Section 4(f) of the USDOT Transportation Act. Preservation of the use of the facility contributed to the identification of the Preferred Alternative such that the crossing of the new highway alignment was more makai than the original Build Alternatives 1 and 4 evaluated in the Draft EIS. By placing the alignment on a viaduct over the HDOT detention basin, the elevation of the viaduct will provide for a minimum of 20 feet of clearance for the existing firing range driveway, allowing for enough clearance for most emergency vehicles and trucks that may need to enter the facility.

Commentor	Organization	Submission No.	Submission Type	Comment	Comment No.	DEIS Section	Ch. 9 Comment No.	Response
Cesar Ivan Martin del Campo	Maui Grass Farm LLC	86	Webform	Dear Project Team, I am writing to express my support for the Honoapi'ilani Highway Improvements Project and its goals to improve transportation infrastructure while addressing environmental and safety concerns. I appreciate the effort and planning involved in designing a project of this scale to benefit our community. However, I would like to address a critical issue regarding the classification and evaluation of Parcel 48002115, which has been flagged for full acquisition under Build Alternative 1. It is essential that the property's current and planned uses are accurately reflected in the project documentation to ensure an equitable and informed process. 1. Misclassification of Parcel Use. The current project documentation categorizes Parcel 48002115 as "not in use," which does not accurately reflect its status. Specifically: The parcel is actively utilized for grass farming operations, supported by established water connections and other agricultural infrastructure. Farming activities are currently underway, generating revenue and contributing to the agricultural economy of the area. This active farming operation and planned development demonstrate that the parcel is a valuable and productive asset, rather than idle or undeveloped land. 2. Support for the Project and Request for Reevaluation. I fully support the objectives of the Honoapi'ilani Highway Improvements Project and recognize the importance of enhancing the region's transportation network. At the same time, I request the following: 1. *Reevaluation of Parcel 48002115's classification in project documentation to accurately reflect its active agricultural use, ongoing farming operations, and planned developments* . 2. Assurance that compensation and project decisions account for the parcel's true value and active use, rather than being based on an inaccurate "not in use" designation. (210) Collaborative Approach. I remain committed to working collaboratively with the HDOT and project team to support the project's success. By addressing this issue and ensuring an accurate representation of Parcel 48002115, we can achieve a fair and equitable outcome that aligns with the project's goals while respecting the contributions of local landowners. Conclusion. I respectfully request that the project team reevaluate the classification of Parcel 48002115 and ensure its active farming operations and development plans are accurately reflected in all documentation. I look forward to working with the HDOT to address these concerns and support the successful implementation of this important project. Thank you for your time and attention to this matter. Please feel free to contact me if additional details or documentation would be helpful. Sincerely, Cesar Ivan Martin del Campo Garcia President, El Toro Soysia Turf - Maui Grass Farm LLC	210	3.4	29	During development of the Draft EIS in 2022 and 2023, property record searches along with field reconnaissance and review of Geographic Information Systems (GIS) mapping and data layers did not reveal the level of activity as described in the comment. HDOT recognizes that property ownership and use activities initiated by owners will change over time—especially in an area where subdivisions have occurred—and this information was updated accordingly in the Final EIS. Most importantly, any updated and current information will be integrated into the process of determining land value and fair compensation if the property must be acquired as part of the Project (see Chapter 3.4 of the Final EIS, which includes an explanation of how the Uniform Relocation Act establishes the protocol that must be followed in the acquisition process as well as HDOT's guidelines for right-of-way acquisition). In Ukumehame, Build Alternative 1 has been determined to be the basis of the Preferred Alternative, so the alignment is directly through Parcel 48002115. This indicates that a full acquisition of the parcel would be required. Once final design has determined the requirements for property acquisition, a representative of HDOT Right-of-Way will contact the property owner to start the process. The Final EIS Chapter 3.4 has been revised to reflect this updated information.

Commentor	Organization	Submission No.	Submission Type	Comment	Comment No.	DEIS Section	Ch. 9 Comment No.	Response
Lee Chamberlain	Maui Bicycling League	87	Webform	Dear Hawai‘i Department of Transportation (HDOT) and Federal Highway Administration (FHWA), I am writing to express strong support for the integration of the West Maui Greenway (WMG) into the Honoapi‘ilani Highway realignment project. The WMG, as part of the Hele Mai Maui Legacy Projects, offers a unique and timely opportunity to promote sustainable, multimodal transportation that strengthens resilience and community connectivity in West Maui. (211)	211	Ch. 3.5	31	
				1. Strategic Implementation of Segment 6 (211 Cont.) The WMG Final Report (September 2022) identified Segment 6 (Olowalu to Lahaina Pali Trailhead) as a priority due to its potential to repurpose the existing Honoapi‘ilani Highway. Alternative A was evaluated as the top-performing route, benefiting from its scenic views, strong recreational connections, and the minimal need for new right-of-way (ROW). By utilizing the existing highway, this option is not only cost-effective but also highly feasible, despite its location within the sea-level rise (SLR) exposure area.	211	Ch. 3.5	31	
				2. Compliance with the Navahine Settlement Commitments (211 Cont.) The WMG supports the Navahine Settlement’s requirement to expand multimodal transportation infrastructure, including pedestrian pathways and bikeways, to reduce vehicle miles traveled (VMT) and support decarbonization goals. • Public Transit, Pedestrian, and Bikeway Expansion: The WMG aligns with interim goals for multimodal projects that integrate alternative transportation options across the state. • Specific Deadlines: Key elements, including pedestrian and cycling infrastructure, are to be incorporated into the planning and budgeting cycles starting by April 2025, in line with the Mid-Range Transportation Plan (MRTP) and the Statewide Transportation Improvement Program (STIP). • Budgeting Prioritization: Projects such as the WMG that align with decarbonization and VMT reduction goals will be prioritized, with a five-year timeline set for completion of key multimodal infrastructure expansions.	211	Ch. 3.5	31	Implementing the West Maui Greenway (by the County) along the existing highway is considered a future condition that is fully compatible with the Honoapi‘ilani Highway Improvements Project. The West Maui Greenway is not included in the Project because its ultimate design, funding, approvals and implementation would be a separate process led by Maui County. After the highway is realigned, jurisdiction of the existing Honoapi‘ilani Highway would be transferred to the County of Maui, and the roadway would continue to carry vehicular traffic that serves local traffic (business, residences, beaches, parks) but with less volume. As set forth in Chapter 5 of this Final EIS, and based on public comments on the Draft EIS, the new Honoapi‘ilani Highway alignment will incorporate a separate and protected shared-use path along the makai side of the new right-of-way (including two locations for protected crosswalks of the new highway). This will add flexibility and provide for integration with the West Maui Greenway, should it be constructed in the future.
				3. Integration with Complete Streets Policy (211 Cont.) The Complete Streets policy requires all transportation projects to prioritize the safety and accessibility of all users, including pedestrians, cyclists, and transit riders. • Policy Integration: The WMG is a model project for implementing Complete Streets, ensuring safe pedestrian and bike pathways, public transit access, and roadway infrastructure improvements that support walking and cycling. • Complete Streets Assessment: Beginning with the April 2025 planning cycle, all Capital Improvement Projects (CIPs), including the WMG, will undergo a Complete Streets assessment to document adherence to these principles. Any exceptions must be justified to ensure transparency and accountability. • Expenditure Prioritization: The WMG’s focus on multimodal connectivity positions it for prioritization within the Complete Streets framework, ensuring that it receives the necessary funding and resources to move forward.	211	Ch. 3.5	31	
				4. Alignment with Act 131 and the Hawai‘i Bike Plan (211 Cont.) The WMG aligns with Act 131’s mandate for a fully multimodal, accessible, and sustainable transportation system, as well as the Hawai‘i Bike Plan’s goals of creating a statewide network of protected bikeways. Act 131 emphasizes the importance of separated pathways that improve public safety, health, and quality of life, all of which are central to the WMG’s design.	211	Ch. 3.5	31	
				5. Environmental and Permitting Benefits By repurposing the existing highway, the WMG may qualify for a Categorical Exclusion (CE) under 23 CFR 771.111(f) due to its minimal environmental impact. This reduces the need for extensive environmental reviews and allows for faster implementation while maintaining compliance with state and federal environmental standards. 6. Public Health and Emergency Preparedness The WMG contributes to improved public healthoutcomes by encouraging active transportation and providing equitable access to safe, recreational spaces. Additionally, the greenway can serve as a non-motorized evacuation route during emergencies, supporting West Maui’s resilience and emergency response capabilities.				
				Recommendation: I respectfully urge HDOT and FHWA to incorporate the West Maui Greenway into the Honoapi‘ilani Highway realignment plan by repurposing the existing highway for Segment 6. This approach will maximize cost-efficiency, adhere to state and federal policy goals, and enhance West Maui’s safety, resilience, and community connectivity. (212) Thank you for your commitment to building a sustainable and resilient transportation future for West Maui. Sincerely, Lee Chamberlain Maui Bicycling League Advocacy Chair	212	Ch. 3.5	31	Implementing the West Maui Greenway (by the County) along the existing highway is considered a future condition that is fully compatible with the Honoapi‘ilani Highway Improvements Project. The West Maui Greenway is not included in the Project because its ultimate design, funding, approvals and implementation would be a separate process led by Maui County. After the highway is realigned, jurisdiction of the existing Honoapi‘ilani Highway would be transferred to the County of Maui, and the roadway would continue to carry vehicular traffic that serves local traffic (business, residences, beaches, parks) but with less volume.As set forth in Chapter 5 of this Final EIS, and based on public comments on the Draft EIS, the new Honoapi‘ilani Highway alignment will incorporate a separate and protected shared-use path along the makai side of the new right-of-way (including two locations for protected crosswalks of the new highway). This will add flexibility and provide for integration with the West Maui Greenway, should it be constructed in the future.

DEIS Public Comments – Commentor Submissions

From: Lee Chamberlain <lachamb91@gmail.com>
Sent: Tuesday, January 7, 2025 1:57 PM
To: Tatsuguchi, Ken <ken.tatsuguchi@hawaii.gov>
Cc: Speicher, Meredith <meredith_speicher@nps.gov>; Saman Dias <samandias.skd@gmail.com>; Donna Clayton/Jerome. <djclaytonmaui@gmail.com>
Subject: [EXTERNAL] Honoapiʻilani Highway realignment project

Dear Mr Tatsuguchi

Hawaiʻi Department of Transportation (HDOT) and Federal Highway Administration (FHWA),

I am writing to express strong support for the integration of the West Maui Greenway (WMG) into the Honoapi‘ilani Highway realignment project. The WMG, as part of the Hele Mai Maui Legacy Projects, presents a significant opportunity to foster sustainable, multimodal transportation that strengthens resilience and community connectivity in West Maui.

1. Strategic Implementation of Segment 6

The WMG Final Report (September 2022) identified **Segment 6 (Olowalu to Lahaina Pali Trailhead)** as a priority due to its potential to repurpose the realigned Honoapi‘ilani Highway. **Alternative A** scored highest in the evaluation due to its scenic views, strong recreational connections, and the minimal need for new right-of-way (ROW). By utilizing the existing highway, this option is both cost-effective and highly feasible, despite its location within the sea-level rise (SLR) exposure area.

2. Compliance with the Navahine Settlement Commitments

The WMG supports the Navahine Settlement’s mandate to expand multimodal transportation infrastructure, including pedestrian pathways and bikeways, to reduce vehicle miles traveled (VMT) and support decarbonization goals.

- **Public Transit, Pedestrian, and Bikeway Expansion:** The WMG aligns with interim goals to integrate alternative transportation options statewide.
- **Specific Deadlines:** Planning and budgeting for multimodal infrastructure must begin by April 2025, per the Mid-Range Transportation Plan (MRTP) and the Statewide Transportation Improvement Program (STIP).
- **Budgeting Prioritization:** Projects such as the WMG that align with decarbonization and VMT reduction goals are prioritized within a five-year timeline for infrastructure completion .

3. Integration with Complete Streets Policy

The WMG is a model project for the Complete Streets policy, which requires transportation projects to prioritize safety and accessibility for all users.

- **Policy Integration:** The WMG will create safe, separated pathways for cyclists and pedestrians and improve public transit access.
- **Complete Streets Assessment:** Beginning in April 2025, all Capital Improvement Projects (CIPs), including the WMG, must undergo assessments to document compliance with Complete Streets principles.
- **Expenditure Prioritization:** The WMG’s focus on multimodal connectivity positions it for priority funding under the Complete Streets framework, ensuring that resources are allocated to support this vital project.

4. Alignment with Act 131 and the Hawai‘i Bike Plan

The WMG aligns with Act 131’s requirement for a multimodal, accessible, and sustainable transportation system and the Hawai‘i Bike Plan’s vision for a statewide network of protected bike paths. Act 131 emphasizes separated pathways that improve public safety, health, and quality of life..

5. Current Funding and Federal Support
The WMG has secured significant financial support, including:

- **RAISE Grant:** $15 million awarded to the WMG to support development and implementation efforts.
- **Inclusion in STIP (MC28):** Ensures that the project is recognized as a priority for state and federal transportation funding allocations .

This available funding underscores the importance of expediting the WMG by integrating Segment 6 into the Honoapi‘ilani Highway realignment project, ensuring that the funds are utilized effectively and within the required timelines.

6. Environmental and Permitting Benefits
Repurposing the existing highway corridor may qualify for a Categorical Exclusion (CE) under 23 CFR 771.111(f), as the project involves minimal environmental impact. This streamlined approach reduces the need for extensive environmental reviews and accelerates project implementation.

7. Public Health and Emergency Preparedness
The WMG will enhance community health by promoting active transportation and equitable access to safe recreational spaces. Additionally, the greenway can function as a non-motorized evacuation route, supporting emergency response efforts in disaster scenarios.

Recommendation:
I respectfully urge HDOT and FHWA to incorporate the West Maui Greenway into the Honoapi‘ilani Highway realignment plan by repurposing the existing highway for Segment 6. This approach will maximize cost-efficiency, adhere to policy mandates, and support West Maui’s resilience, safety, and community connectivity goals.

Thank you for your commitment to building a sustainable and resilient transportation future for West Maui.

Sincerely,
Lee Chamberlain

Maui Bicycling League Advocacy Chair

--
Lee A. Chamberlain
lachamb91@gmail.com
(925) 917 1994

"The optimist expects the wind;
the pessimist complains about the wind;
the realist adjusts the sails."

From: Thorne Abbott <coastalplanners@gmail.com>
Sent: Wednesday, January 8, 2025 12:42 PM
To: Tatsuguchi, Ken <ken.tatsuguchi@hawaii.gov>
Subject: [EXTERNAL] eis comment

We fully support. Hdoh's efforts of adaptive realignment of this critical highway inland. Previously the County approved a subdivision in the Ukumehame section for highway relocation and creation of a linear coastal park. County council also authorized purchase of the land to relocate the highway inland, uphill and out of the tsunami inundation zone. This may be a prudent route to use for the relocated highway.
Mahalo!
Thorne Abbott
Coastal Planners, LLC
(808) 344-1595
www.CoastalZone.com

From: Carter Barto <carter@aloha.storage>
Sent: Thursday, January 9, 2025 10:53 AM
To: Tatsuguchi, Ken <ken.tatsuguchi@hawaii.gov>; honoapiilanieis@online.wspis.com
Cc: ekbarto@gmail.com; Tamara Barto <Tamarabarto@mac.com>
Subject: [EXTERNAL] Support of the Honoapiilani Highway Realignment and Expansion

Aloha,

I am writing to express my strong support for the proposed project to realign Honoapiilani Highway inland and please also expand it from two lanes to four lanes. As a daily commuter who relies on this highway to travel between my job in West Maui and my home in Pukalani, I have firsthand experience with the challenges posed by the current state of this vital roadway. The most recent alignment proposal makes the most sense for the long term viability of this highway.

Honoapiilani Highway serves as the sole viable connection between these regions, making it a critical infrastructure for residents, businesses, and visitors alike. However, its current alignment and capacity have proven inadequate in meeting the demands of a growing population. Increasing traffic is often caused by whale watchers, high tides washing salt water over the road, and frequent traffic jams or closures due to accidents and brush fires. The need for this project is both urgent and clear, and I urge decision-makers to prioritize its implementation for the following reasons:

1. **Safety:** The existing highway's proximity to the coastline exposes it to flooding, erosion, and other hazards, particularly during extreme weather events. Relocating the highway inland will enhance safety for all users

by mitigating these risks. Additionally, the expansion to four lanes will reduce congestion-related accidents by allowing for smoother traffic flow, safer overtaking opportunities, and detour options during unfortunate closures caused by fatal traffic accidents.

2. **Economic Vitality:** As the primary route connecting West Maui to Central Maui, Honoapiilani Highway supports the movement of goods, services, and workforce. This need has dramatically increased following the August 2023 fires, which displaced much of the workforce to Central Maui, adding additional daily commuters who still work in West Maui. Delays and disruptions caused by traffic congestion or road closures have a significant economic impact. A four-lane highway moved inland will ensure more reliable and efficient travel, benefiting local businesses and sustaining economic growth.
3. **Quality of Life:** For daily commuters like myself, the current two-lane configuration often results in extended travel times and frustration. On some occasions, I have been unable to return home or make it to work, losing an entire workday or being forced to stay overnight. The proposed re-alignment along with an expansion to four lanes will alleviate congestion, allowing residents to spend less time on the road and more time with their families or engaging in their communities.
4. **Environmental Considerations:** While moving the highway inland may raise concerns about environmental and cultural impacts, the current alignment's vulnerability to sea-level rise and coastal erosion poses a long-term environmental threat. A carefully planned realignment can minimize ecological and cultural disruption while safeguarding the highway's longevity.
5. **Emergency Preparedness:** In times of natural disasters or emergencies, Honoapiilani Highway serves as a critical evacuation route and access point for emergency services. Expanding the highway's capacity and moving it to a safer location will ensure that it can fulfill this role effectively.

I urge the State of Hawaii DOT and County of Maui to act swiftly to approve, fund, and complete this project. The benefits of an inland, four-lane Honoapiilani Highway far outweigh the costs, and its timely completion is essential for the safety, economic stability, and overall well-being of our community.

Thank you for considering my comments. I appreciate the opportunity to contribute to this important decision-making process.

Mahalo,

Carter Barto
General Manager
Aloha Self Storage Lahaina
23 Ulupono Street, Lahaina, HI 96761
Office: 808.661.2775
Fax: 808.661.1989
Mobile: 808.298.6418
Email: carter@aloha.storage
Website: www.Aloha.Storage

New Comment from HonoapiilaniHwyImprovements.com

From no-reply@wspis.com <no-reply@wspis.com>
Date Sun 1/12/2025 5:04 PM
To Small, Matthew <Matthew.Small@wsp.com>; Liebowitz, Peter <Peter.Liebowitz@wsp.com>; Bents, Jamie <Jamie.Bents@wsp.com>; honoapiilanieis@online.wspis.com <honoapiilanieis@online.wspis.com>

First Name: Janice and James
Last Name: Revells
Email Address: kimo501999@aol.com
Join Mailing List: True
Comment:
The proposed route does not show access to the Ukumehame Firing Range nor beach accesses for the general public. The four ranges are used almost daily by the numerous clubs and MPD. There is also a building used for firearm safety classes. Driving to Laniupoko and then returning toward Kahului to get to access the ranges and the beaches is ludicrous. The majority of the users are local and are coming from Central. Upcountry and South Maui. Driving miles into Lahaina to just turn around to get back to the ranges and beaches is stupid. . Not having reasonable accesses to this area would encourage criminal activity and safety and health hazards. Response time for First Responders would be greatly increased. The general public needs are not being served. This realignment serves to improve drive time into Lahaina and the beauty and use of this area is Lost..

New Comment from HonoapiilaniHwyImprovements.com

From no-reply@wspis.com <no-reply@wspis.com>
Date Sun 1/5/2025 10:34 AM
To Small, Matthew <Matthew.Small@wsp.com>; Liebowitz, Peter <Peter.Liebowitz@wsp.com>; Bents, Jamie <Jamie.Bents@wsp.com>; honoapiilanieis@online.wspis.com <honoapiilanieis@online.wspis.com>

First Name: Victoria
Last Name: Kaluna-Palafox
Email Address: vkalunapalafox1@gmail.com
Join Mailing List: False
Comment:
My concern is to not disturb the true function of Aina. That, can never be repaired, unless we can better protect, what is. Mahalo

New Comment from HonoapiilaniHwyImprovements.com

From no-reply@wspis.com <no-reply@wspis.com>
Date Thu 1/9/2025 9:22 AM
To Small, Matthew <Matthew.Small@wsp.com>; Liebowitz, Peter <Peter.Liebowitz@wsp.com>; Bents, Jamie <Jamie.Bents@wsp.com>; honoapiilanieis@online.wspis.com <honoapiilanieis@online.wspis.com>

First Name: Kevin
Last Name: Bridges
Email Address:
Join Mailing List: False
Comment:
Alternative 1 would be the best alternative as it provides the shortest distance and will provide outstanding views. However, the preferred alternative would adequately address the ocean flooding issue and stand a better chance of not being delayed with nuisance lawsuits. My biggest comment is to speed up the construction timeline. The proposed construction timeline is way too long; this needs to be done now! The federal government just provided $2 billion for Lahaina housing needs so that should free up state and local money to get this project started and finished sooner. The vulnerability threat to west side is only getting worse with time and needs to be fixed sooner rather than later. Get this extremely critical project finished sooner.

New Comment from HonoapiilaniHwyImprovements.com

From no-reply@wspis.com <no-reply@wspis.com>
Date Thu 1/9/2025 10:26 AM
To Small, Matthew <Matthew.Small@wsp.com>; Liebowitz, Peter <Peter.Liebowitz@wsp.com>; Bents, Jamie <Jamie.Bents@wsp.com>; honoapiilanieis@online.wspis.com <honoapiilanieis@online.wspis.com>

First Name: Carter
Last Name: Barto
Email Address: waiakoa@gmail.com
Join Mailing List: True
Comment:
I express strong support for the proposed project to realign Honoapiilani Highway inland and please also expand it from two lanes to four lanes. As a daily commuter who relies on this highway to travel between West Maui and Central Maui, I have firsthand experience with the challenges posed by the current state of this vital roadway. Honoapiilani Highway serves as the sole viable connection between these regions, making it a critical infrastructure for residents, businesses, and visitors alike. However, its current alignment and capacity have proven inadequate in meeting the demands of a growing population and increasing traffic. The need for this project is both urgent and clear, and I urge decision-makers to prioritize its implementation.

New Comment from HonoapiilaniHwyImprovements.com

From no-reply@wspis.com <no-reply@wspis.com>
Date Mon 10/28/2024 6:23 AM
To Small, Matthew <Matthew.Small@wsp.com>; Liebowitz, Peter <Peter.Liebowitz@wsp.com>; Bents, Jamie <Jamie.Bents@wsp.com>; honoapiilanieis@online.wspis.com <honoapiilanieis@online.wspis.com>

First Name: Darrell
Last Name: Tanaka
Email Address: sunshineorchids@gmail.com
Join Mailing List: False
Comment:
The homeless situation is getting worse in Olowalu, they are slowly taking over the beach area at Mile Marker 14....when the new highway is built that area will become a derelict destination....we should make it into a state park and manage it to prevent it from being trashed, its a popular tourist and local spot to take kids to the beach and snorkel and fish...in fact, make the area from Ukumehame park all the way to Olowalu general store a state beach park.

New Comment from HonoapiilaniHwyImprovements.com

From no-reply@wspis.com <no-reply@wspis.com>
Date Sun 11/17/2024 12:55 PM
To Small, Matthew <Matthew.Small@wsp.com>; Liebowitz, Peter <Peter.Liebowitz@wsp.com>; Bents, Jamie <Jamie.Bents@wsp.com>; honoapiilanieis@online.wspis.com <honoapiilanieis@online.wspis.com>

First Name: Benny
Last Name: Martin
Email Address: tcbhawaii@gmail.com
Join Mailing List: True
Comment:
My family and I, like so many others, were deeply affected by the devastating wildfires in Lahaina. We lost our home and everything we had worked so hard for. In the aftermath, we saved what we could and decided to purchase an agricultural lot in the Ukumehame subdivision, where many other displaced families have also found a place to rebuild. It has been a journey of resilience, and the Ukumehame subdivision offers us a chance to start anew. However, I am deeply concerned about the proposed highway realignment options, especially Alternative 4, which would run directly through many of our homes in the subdivision. This would have a significant and disruptive impact on the families who are already struggling to rebuild their lives. While I truly appreciate the environmental decision to move the highway away from the coastline, I strongly encourage consideration of Alternatives 2 and 3 for our section of the realignment, as they seem to pose less of a threat to the homes and families already established in the area. I would greatly appreciate any information on when and where in-person testimonials or meetings will take place to discuss these important decisions. This is a critical issue for the families in Ukumehame, and we need to have our voices heard as we work toward rebuilding both our homes and our community. Thank you for considering our concerns.

New Comment from HonoapiilaniHwyImprovements.com

From no-reply@wspis.com <no-reply@wspis.com>
Date Tue 12/17/2024 4:34 PM
To Small, Matthew <Matthew.Small@wsp.com>; Liebowitz, Peter <Peter.Liebowitz@wsp.com>; Bents, Jamie <Jamie.Bents@wsp.com>; honoapiilanieis@online.wspis.com <honoapiilanieis@online.wspis.com>

First Name: Robert
Last Name: Santos
Email Address: santosro@hawaii.edu
Join Mailing List: True
Comment:
Can I see the details of the work to be done including their staging area?

From:	no-reply@wspis.com
Sent:	Thursday, January 16, 2025 8:51 PM
To:	Small, Matthew; Liebowitz, Peter; Bents, Jamie; honoapiilanieis@online.wspis.com; Mitchell, Andrew
Subject:	New Comment from HonoapiilaniHwyImprovements.com

First Name: Tara
Last Name: King
Email Address: taradastarra@gmail.com
Join Mailing List: True
Comment:
I really hope you are going to rebuild Weinberg Court .Between PrisonSt.and Dickenson St.. That was the Giant (for Maui) apartment building.I think the address was 161 Honoapiilani Hwy.Naturally offer the original tenants that are still here 1st dibs.I was there since June '08, 15 years.I loved living there.I cared about my neighbors.Irwin Miyamoto was the manager.We had a good relationship with him and his family.My son left a week after the fire,he was so devastated,But I'm still here.I would love to be back in Lahaina,but I couldn't find another apartment.63 apts.altogether.We wait and hope.I still have severe PTSD.I hope you understand.Mahalo,Tara

Comment Log Submission No. 11

From:	no-reply@wspis.com
Sent:	Thursday, January 16, 2025 8:57 PM
To:	Small, Matthew; Liebowitz, Peter; Bents, Jamie; honoapiilanieis@online.wspis.com; Mitchell, Andrew
Subject:	New Comment from HonoapiilaniHwyImprovements.com

First Name: C-T
Last Name: Folding
Email Address: ctfolding@gmail.com
Join Mailing List: False
Comment:
Can there be a separate biking, walking, golf cart lane, with it's own divider along the side? So many bikers are on Honoapi'ilani Hwy they deserve their own "green lane". Thanks

Comment Log Submission No. 12

From:	no-reply@wspis.com
Sent:	Friday, January 17, 2025 1:33 PM
To:	Small, Matthew; Liebowitz, Peter; Bents, Jamie; honoapiilanieis@online.wspis.com; Mitchell, Andrew
Subject:	New Comment from HonoapiilaniHwyImprovements.com

First Name: Kai
Last Name: Kalani
Email Address: kk808uppah@mailinator.com
Join Mailing List: False
Comment:
The next question is when do we get an escape route, not just a road down from Ulupalakua lookup down exactly 2.2 miles to the road at Makena golf course? Thompson road, aka "Oprah's road" might be a handshake deal for MFD, but what about the rest of us trying to get down the hill for another fire event?

Comment Log Submission No. 13

From: no-reply@wspis.com
Sent: Friday, January 17, 2025 6:20 PM
To: Small, Matthew; Liebowitz, Peter; Bents, Jamie; honoapiilanieis@online.wspis.com; Mitchell, Andrew
Subject: New Comment from HonoapiilaniHwyImprovements.com

First Name: Darrell
Last Name: Tanaka
Email Address: sunshineorchids@gmail.com
Join Mailing List: False
Comment:
when you build the new highway, please ensure there is ample beach access routes periodically along the shoreline...DOT has recently cut off several of our traditional beach accesses from the McGregor's point to Olowalu and we don't appreciate losing our ability to fish and gather. thank you.

Comment Log Submission No. 14

From: no-reply@wspis.com
Sent: Friday, January 17, 2025 9:54 PM
To: Small, Matthew; Liebowitz, Peter; Bents, Jamie; honoapiilanieis@online.wspis.com; Mitchell, Andrew
Subject: New Comment from HonoapiilaniHwyImprovements.com

First Name: Raymond
Last Name: Ishii
Email Address: ray38super@gmail.com
Join Mailing List: True
Comment:
Aloha I am Raymond Ishii the current President of the Valley Isle Sports Shooters Club, which is the oldest and largest user of the Ukumehame Firing range. While I fully support moving the existing highway inland there are a number of concerns I have. The routes appear to run makai of the firing lines which we are grateful although a couple are uncomfortable close to the range. The Ukumehame Firing Range is the only legal firing range on the island and is used by thousands of sportsmen's practicing marksmanship and exercising their 2nd Amendment rights. It is also used by Law Enforcement and the military on a regular basis for Firearms and riot control training, Whenever unexploded ordnance is found on Maui, they take it to the range to blow it up. I have been on the range when EOD had blown up everything from IEDs, hand grenades, live artillery shell to 100 pounds of TNT. The preferred alternative route for the bypass is an elevated viaduct that will run makai of the firing ranges, with access to the range and the beach parks will be via the Ukumehame subdivision and back tracking on the existing highway. That section of highway between Ukumehame Beach Park and Papalaua State Wayside park often has waves breaking over the wall and with sea water covering the road. This is the section that is in most the danger to eventually fall into the ocean. Is the state planning to maintain that section of the highway to it existing standards for eternity or will it abandon that section of highway once the ocean claims it, and we will lose access to the range and beach park. To avoid the above, would it be possible to install a turn lane before the viaduct begins on the Pali side to allow direct access to the range and beach parks, plus a merge lane on to the highway for Maalaea bound traffic. That section of highway is protected from the ocean by the Papalaua State Wayside Park. This will give direct access to the public to these areas and allow Emergency Vehicle responding to the area more direct access and quicker response time. It will also allow the state to simply block off the section of the road between Papalaua Park and Ukumehame park once the road is damaged by the ocean. Another concern is the height of the viaduct, one or more of the routes has the entrance road the to range being under the viaduct. Will the viaduct be high enough to allow fire trucks and heavy equipment to drive under it. Due to the constant threat of brush fires on the Pali, and medical calls to the range, the more access Emergency Services has the better. Lastly during construction, will we be be allowed access to the range. Understandably while the viaduct is being constructed, the section under it will be blocked off. Will a temporary road be constructed to allow access under a completed section of the viaduct to ensure access to the public firing range. Thank You for allowing me to comment on this matter. Raymond Ishii President, Valley Isle Sports Shooter Club

Comment Log Submission No. 15

From:	no-reply@wspis.com
Sent:	Monday, January 20, 2025 3:59 PM
To:	Small, Matthew; Liebowitz, Peter; Bents, Jamie; honoapiilanieis@online.wspis.com; Mitchell, Andrew
Subject:	New Comment from HonoapiilaniHwyImprovements.com

First Name: Robert
Last Name: Cole
Email Address: RLC-MauiMetPlan@proton.me
Join Mailing List: False
Comment:
Please do everything possible to make this happen. This is so very important for the island, the community, and the planet. Mahalo, Robert.

Comment Log Submission No. 16

From: Tatsuguchi, Ken <ken.tatsuguchi@hawaii.gov>
Sent: Monday, January 20, 2025 7:53:03 PM
To: Bents, Jamie <Jamie.Bents@wsp.com>; Liebowitz, Peter <Peter.Liebowitz@wsp.com>; La Farga, Paul <paul.lafarga@dot.gov>; Aiu, Pua <pua.aiu@hawaii.gov>
Subject: Fw: [EXTERNAL] West Maui Greenway Connectivity

Ken K Tatsuguchi, PE
Hawaii DOT, Highways Planning
869 Punchbowl St, Rm 301
Honolulu, HI 96813-5097
Ofc # 808-587-1830

This email message including attachments is for the sole use of the intended recipient and may contain confidential and/or privileged information. Any review, use, disclosure or distribution by unintended recipients is prohibited. Thank you.

From: Dan Dennison <danmountain15@yahoo.com>
Sent: Monday, January 20, 2025 8:50:02 AM
To: Tatsuguchi, Ken <ken.tatsuguchi@hawaii.gov>
Subject: [EXTERNAL] West Maui Greenway Connectivity

Testimony in Support of the Realignment of Honoapiʻilani Highway with Emphasis on West Maui Greenway Connectivity

Aloha members of the committee,

I am writing to express my support for the proposed 6.5-mile mauka relocation of the Honoapiʻilani Highway. This critical realignment will safeguard a vital transportation corridor that serves as a lifeline for West Maui residents, workers, and visitors, addressing the escalating risks posed by rising sea levels and climate change.

As we work toward a more resilient future, this project is a pivotalstep in West Maui's recovery, resilience, and sustainability.

However, while I support the realignment project, it is essential to highlight a complementary opportunity to strengthen active transportation options and preserve the vision of the West Maui Greenway (WMG). I respectfully urge the Hawai'i Department of Transportation (HDOT) to prioritize the following key elements within this project:

1. Utilization of the Old Highway 30 for West Maui Greenway Segments 6 and 7

○ The existing coastal highway presents an ideal route for a dedicated bike and pedestrian path.
○ Repurposing this scenic corridor as a multi-use trail is a cost-effective solution that supports safe, non-motorized transportation and recreation.
○ This approach would facilitate the implementation of Segments 6 and 7 of the WMG (as outlined on pages 111 and 51 of the WMG Master Plan), creating a continuous and connected path linking West Maui communities.

2. Alignment with Climate and Community Goals

○ Incorporating the WMG within the realignment project would align with Maui's commitment to climate resilience, as outlined in the Nā Wahine Climate Settlement Agreement.

○ A multi-modal transportation corridor, featuring pedestrian and bike-friendly infrastructure, supports efforts to reduce emissions, promote healthy lifestyles, and enhance disaster preparedness.

3. Community-Driven Design for Long-Term Benefits

○ By transforming the former highway into a recreational and commuting pathway, we can create a lasting community asset that bolsters economic recovery, public health, and local tourism.
○ A dedicated bike and pedestrian trail would provide safe, scenic access to key cultural and natural landmarks, fostering community pride and environmental stewardship.

In summary, while I support the current realignment effort, I respectfully request that the HDOT integrates plans for the West Maui Greenway into the redevelopment of the former highway route. By repurposing this space for non-motorized transportation, we can build a legacy of sustainable infrastructure that meets the needs of future generations and supports West Maui's long-term recovery and growth.

Sincerely,

Dan Dennison
Honolulu

Yahoo Mail: Search, Organize, Conquer

From:	Tatsuguchi, Ken <ken.tatsuguchi@hawaii.gov>
Sent:	Thursday, January 23, 2025 9:43 AM
To:	Bents, Jamie; Liebowitz, Peter; La Farga, Paul; Aiu, Pua
Subject:	Fw: [EXTERNAL] Draft EIS for Honoapiilani Hwy. Segments
Attachments:	Testimony in Support of the Realignment of Honoapi'ilani Highway with Emphasis on West Maui Greenway Connectivity.docx

FYI

Ken K Tatsuguchi, PE
Hawaii DOT, Highways Planning
869 Punchbowl St, Rm 301
Honolulu, HI 96813-5097
Ofc # 808-587-1830

This email message including attachments is for the sole use of the intended recipient and may contain confidential and/or privileged information. Any review, use, disclosure or distribution by unintended recipients is prohibited. Thank you.

From: Donna Clayton <djclaytonmaui@gmail.com>
Sent: Wednesday, January 22, 2025 8:26:56 PM
To: Tatsuguchi, Ken <ken.tatsuguchi@hawaii.gov>
Subject: [EXTERNAL] Draft EIS for Honoapiilani Hwy. Segments

Please see attached testimony regarding the subject Draft EIS
Aloha,
Donna Clayton

Testimony in Support of the Realignment of Honoapiʻilani Highway with Emphasis on West Maui Greenway Connectivity

Aloha members of the committee,

I am writing to express my support for the proposed 6.5-mile mauka relocation of the Honoapiʻilani Highway. This critical realignment will safeguard a vital transportation corridor that serves as a lifeline for West Maui residents, workers, and visitors, addressing the escalating risks posed by rising sea levels and climate change. As we work toward a more resilient future, this project is a pivotal step in West Maui's recovery, resilience, and sustainability.

However, while I support the realignment project, it is essential to highlight a complementary opportunity to strengthen active transportation options and preserve the vision of the West Maui Greenway (WMG). I respectfully urge the Hawaiʻi Department of Transportation (HDOT) to prioritize the following key elements within this project:

1. **Utilization of the Old Highway 30 for West Maui Greenway Segments 6 and 7**
    - The existing coastal highway presents an ideal route for a dedicated bike and pedestrian path.
    - Repurposing this scenic corridor as a multi-use trail is a cost-effective solution that supports safe, non-motorized transportation and recreation.
    - This approach would facilitate the implementation of Segments 6 and 7 of the WMG (as outlined on pages 111 and 51 of the WMG Master Plan), creating a continuous and connected path linking West Maui communities.
2. **Alignment with Climate and Community Goals**
    - Incorporating the WMG within the realignment project would align with Maui's commitment to climate resilience, as outlined in the Nā Wahine Climate Settlement Agreement.
    - A multi-modal transportation corridor, featuring pedestrian and bike-friendly infrastructure, supports efforts to reduce emissions, promote healthy lifestyles, and enhance disaster preparedness.
3. **Community-Driven Design for Long-Term Benefits**
    - By transforming the former highway into a recreational and commuting pathway, we can create a lasting community asset that bolsters economic recovery, public health, and local tourism.
    - A dedicated bike and pedestrian trail would provide safe, scenic access to key cultural and natural landmarks, fostering community pride and environmental stewardship.

In summary, while I support the current realignment effort, I respectfully request that the HDOT integrates plans for the West Maui Greenway into the redevelopment of the former highway route. By repurposing this space for non-motorized transportation, we can build a legacy of sustainable infrastructure that meets the needs of future generations and supports West Maui's long-term recovery and growth.

Thank you for the opportunity to provide testimony. I encourage my fellow community members to participate in this process and advocate for an active transportation network that prioritizes safety, sustainability, and connectivity.

Mahalo nui loa for your consideration.
Donna Clayton/West Maui Greenway Alliance

From:	no-reply@wspis.com
Sent:	Thursday, January 23, 2025 4:01 PM
To:	Small, Matthew; Liebowitz, Peter; Bents, Jamie; honoapiilanieis@online.wspis.com; Mitchell, Andrew
Subject:	New Comment from HonoapiilaniHwyImprovements.com

First Name: Constantine
Last Name: Mittendorf
Email Address: cmittendorf@gmail.com
Join Mailing List: False
Comment:
Testimony in SUPPORT of Honoapiʻilani Highway Realignment – Connect the West Maui Greenway Aloha committee members, I am writing to support realigning the Honoapi'ilani Hwy and expanding the West Maui Greenway. Specifically, I support the proposed 6.5-mile mauka relocation for starters. This realignment is critical and will safeguard a vital transportation corridor. Realignment will mitigate against risks posed by rising sea levels, wildfire, and climate change. This project is a pivotal step in West Maui's recovery, resilience, and sustainability. I urge the Hawaiʻi Department of Transportation (HDOT) to prioritize the following: Use the Old Highway 30 for West Maui Greenway. The existing coastal highway presents an ideal route for a dedicated bike and pedestrian path. Further, it would help diversify transportation and options in case of emergecy. It would be absolutely fantastic for our keiki and future. Folding the former highway into the West Maui Greenway will create a major community asset that bolsters economic recovery, public health, and local quality of life. Please incorporate the WMG within the realignment project. It would align with Maui's commitment to climate resilience, as outlined in the Nā Wahine Climate Settlement Agreement. Including the West Maui Greenway into this project will likely also help the Maui County and the State of Hawaii in reaching it's legal obligations regarding climate change and public safety. Mahalo nui loa for your consideration. Constantine Mittendorf January 23, 2025

Comment Log Submission No. 19

From: Jerome Kellner <jerome.kellner@gmail.com>
Sent: Thursday, January 23, 2025 8:16 AM
To: Tatsuguchi, Ken <ken.tatsuguchi@hawaii.gov>
Subject: [EXTERNAL] proposed 6.5-mile mauka H-Hwy relocation

Aloha members of the committee,

I support the proposed 6.5-mile mauka relocation of the Honoapiʻilani Highway. I urge the Hawaiʻi Department of Transportation to prioritize key elements: Utilization of the Old Highway 30 for West Maui Greenway Segments 6 and 7.The coastal highway is an ideal route for a dedicated bike and pedestrian path. Repurposing this corridor as a multi-use trail supports safe, non-motorized transportation and recreation.This approach facilitates the implementation of Segments 6 and 7 of the WMG (as outlined on pages 111 and 51 of the WMG Master Plan), creating a continuous and connected path linking West Maui communities.

A multi-modal transportation corridor, featuring pedestrian and bike-friendly infrastructure, supports efforts to reduce emissions, promote healthy lifestyles, and enhance disaster preparedness.

I support the current realignment effort, and request that the HDOT integrates plans for the West Maui Greenway into the redevelopment of the former highway route.

Jerome Kellner
200 Hina Ave Apt J7
Kahului, HI 96732

From: no-reply@wspis.com
Sent: Thursday, January 23, 2025 5:47 PM
To: Small, Matthew; Liebowitz, Peter; Bents, Jamie; honoapiilanieis@online.wspis.com; Mitchell, Andrew
Subject: New Comment from HonoapiilaniHwyImprovements.com

First Name: Richard
Last Name: Gailey
Email Address: richardrgailey@msn.com
Join Mailing List: True
Comment:
To all concerned, The Island is a cultural Entity, moving the Honoapi'iani Highway is within everyone's responsibility to protect this sacred place. Mahalo.

Comment Log Submission No. 21

January 23, 2025 ***Comment Log Submission No. 22***

To: Ken Tatsuguchi, HDOT Project Manager

From: Van Fischer, Olowalu Ranch LLC

Regarding: Honoapiilani Highway Realignment Olowalu Section

Aloha,

My name is Van Fischer and I am writing to you as the owner of lot 19, CPR Unit C in the Olowalu Mauka subdivision. Our property is located just mauka of the existing highway intersection with Luawai Street and wraps around to the back of the existing homes on Olowalu Village Road. We recently purchased this land and are in the planning stages of implementing a farming operation.

The proposed highway location just cuts a small corner of our property and we are relieved that it will not destroy our vision for our farm. That said, we believe there are a number of reasons why a minor adjustment to a small section of the highway moving the route approximately 150-200 feet mauka will improve the safety and flow of traffic and help to avoid valuable natural resources.

As you are aware, most of the subdivision lots in this area have been condominiumized. I have attached a map as exhibit A for your reference.

INTERSECTION ALIGNMENT & SAFETY:

Once the highway is relocated, its intersection with Luawai Street will become the main intersection for access into Olowalu. Due to sea level rise, the existing highway will need to be closed off both north and south of Olowalu so all traffic will come down Luawai Street. Lower Olowalu will become an even more popular destination once the beaches are more secluded and user friendly.

As the preferred Highway route is currently designed, it does not cross Luawai Street at a right angle creating an unsafe intersection for vehicles entering the highway from both the subdivision above the new highway and out of the lower Olowalu village. This intersection absolutely must be signalized with right turn lanes. For vehicles driving up Luawai Street to the highway, there is a bend in the road that will prevent drivers from seeing the traffic that is stopped at the light causing a dangerous situation with lack of safe stopping distance. (See exhibit B)

If the highway is relocated 150-200 feet mauka in this small section as proposed on exhibit B, the highway will cross Luawai Street at a right angle providing maximum sight distance for vehicles using the intersection and more stopping distance for vehicles approaching the intersection from the lower road. It also makes more sense to locate the detention basin next to this intersection as it can be used to collect the water that flows down Luawai Street in heavy rain events.

TOPOGRAPHY:

The topography along a section of the mauka lot line of lot 19 CPR Unit C has a very steep 10-12 foot tall cut bank that runs along that property line in the exact area where the proposed highway crosses that property corner. Due to the continued rise up the hill, building the highway in this spot will result in the sloped bank of the highway will be approximately 20 feet high or more. Simply moving the highway mauka 100 feet or so will eliminate this situation. In the area we are proposing the highway be moved to, the cross section topography is reasonable and will not add cost to the construction of the highway. (See exhibit C)

PROTECTION OF NATUERAL RESOURCES:

Mopua Stream is shown on the Olowalu maps as running straight down mauka to makai crossing through lot 19. It is an open stream from the mauka property line to the existing highway where a culvert crosses the highway into the ocean but is an underground stream above our property. The open section of this stream is teaming with life and well worth protecting. In our exploration of the property, it appears there is also an underground stream channel that runs along the mauka property line of lots 19 and 20. At a point on the Lot 20 mauka property line there is an existing abandoned pump house and moving water is visible in the bottom of the trench. It appears water comes together from multiple directions to this point and then flows underground along our mauka property line into the open section of Mopua Stream. Moving the highway mauka as we propose will protect this valuable water source as we do not know if it is coming from springs or other underground streams. Provisions should also be made for a culvert to be placed under the highway should State wish to re-establish all of Mopua Stream as an open channel in the future. (See exhibit C)

FARM SOIL PROTECTION:

The other consideration in locating the highway should be the protection of quality farming soil. The property above our mauka property line is very rocky and not suitable for farming. It is at best pasture land. All of lot 19 and 20 are comprised of good quality soil and it would be a shame to use any more of that land for the highway than absolutely necessary. The viability of this soil to produce food plants and trees is clearly evidenced by the extensive crops being grown on the two farms by the regenerative farm stand and the two farms and orchards makai of the highway. Moving the highway mauka just the proposed distance protects an additional six or more acres of this soil.

HOUSING:

The route as proposed cuts directly through Lot 19 CPR Unit A and Lot 20 CPR Units A and B and includes a proposed detention basin in that area. As such, the State will need to acquire most if not all of each of these parcel rendering the remainder unbuildable as home sites. These parcels are well suited to local style housing and should be saved if possible. (See exhibit A)

The land just mauka of these parcels consists of an agricultural parcel that is designated as part of the subdivision Greenway Open Space. If the State agrees to move the highway as proposed, the owners of Lot 20 Units A and B would be willing to donate an open space easement on one acre of the Lot 20 CPR Units A and B to offset a portion of the loss of the required greenway at no cost to the State. (See exhibit C)

Moving the highway as suggested will add needed safety features, protect natural resources and reduce the cost of the project. We respectfully request that the State take a through look at all of the benefits this small adjustment will accomplish.

Sincerely,

Van Fischer
808-419-2766
vanfischer@gmail.com


EXHIBIT A
State Proposed Highway Alignment
24 (Walin-Haynes)
22
20
19
17
Luawai St
30

480031180000

Lihau

480031150000

Our Suggested Route

Mopua

480031010000

14

480031000000

480031110000

480031140000

480031050000

480031020000

480031130000

Q2

480031120000

480031040000

480031030000

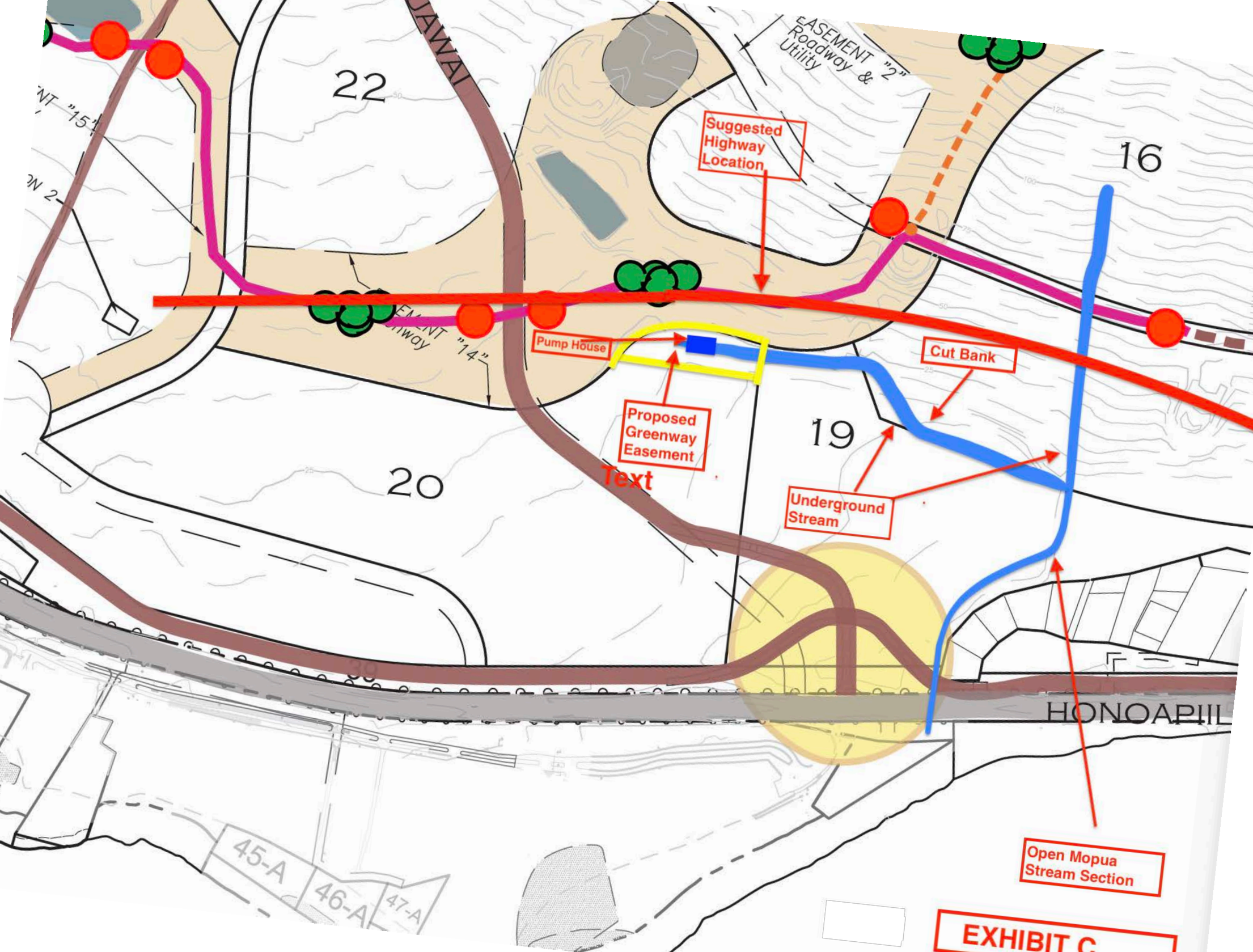
Mā‘alaea

EXHIBIT B

HDOT
Proposed
Route

15

Olowalu


Suggested Highway Location
Pump House
Proposed Greenway Easement
Text
Cut Bank
Underground Stream
Open Mopua Stream Section
EASEMENT "2" Roadway & Utility
22
20
19
16
HONOAPIIL
45-A
46-A
47-A
EXHIBIT C

From: Anna Vinuya <acvinuya1@gmail.com>
Comment Log Submission No. 23
Sent: Thursday, January 23, 2025 5:19:20 PM
To: Tatsuguchi, Ken <ken.tatsuguchi@hawaii.gov>; jasonapotts@gmail.com <jasonapotts@gmail.com>
Subject: [EXTERNAL] A'ole

My name is Anna Nalaniewalu Vinuya-Palakiko

I am the 3rd great grand daughter of James Palakiko and Julia Piko of Olowalu and 3rd great cousin of Lily, James Jr and Maui Palakiko. All 5 are buried on top of Pu'u Kilea in unmarked burials.

My family kuleana aina is in Olowalu Valley and Ukumehame Valley.

Our ohana of this area are; Palakiko,Piko, Pu'upa'a,Ka'awili,Pupuhi, Kaumaka, Kaho'opi'i, and Cason/Napaepae.

It has been brought to my attention that our aina and iwi in Olowalu are in harms way.

I have attempted multiple times to have my ohana burials marked and chained off to help prevent future vandalism because it has happened in past. example: petroglyphs with non prehistoric markings, names carved in the rocks and ceremonial items taken from the burials.

My request is for them to be on the burial protection list and marked so visitors will know that it's protected Native Hawaiian burial site. I also have death certificates proving my family is buried here if needed.

The proposed APE (orange line)

I say A'ole completely to this option because this would expose my family burials and bring more harm and vandalism with the road directly in front of it... there would be little to no protection for them...

The proposed Alternate route #1 (red line)

I say A'ole completely to this option because my grandmother foundation can still be found within the bushes, near the old water tower fronting Naho'oikaika aina just behind the Olowalu General store.
I come to this area to mourn and to honor my deceased kupuna, coming here brings me comfort and helps me to stay grounded.

I say NO to APE and Alternate #1 because they both would disrupt the land of which my family lived and is buried upon and lacks of respect to our people Kanaka Maoli because it offers no protection for our iwi and some of the only untouched aina left here in west maui.

With this plan there is no acknowledgment of the ancient burials, heiau, reef, trees, water ways and uses, taro fields, and animals example: the endangered species ; Nene bird.

In order for me to ever be in agreement. There would have to be many steps taken to ensure all of which I addressed are acknowledged and cared for to the upmost respect as if it was your own families burials and kuleana.

Protections in place for areas that have already been acknowledged to have ancient burials and Ka'iwaloa heiau.

Research and surveyance of the land and water in and around Olowalu before construction using archiologist, historians, and burial council.

Reviewing land patents, LCA land commission awards, survey records, and acknowledging water and land right given to our people from our Ali'i.

Allow for the people of the aina to determine the clarity of the research and surveyance.

Starting with taking care of the people of the land and what is truly important our family history the only thing left for us to hold on too..

In conclusion, the only option that I would be in agreement with is Alternate #2,

* It is far enough away from both my family burials, kuleana land and foundation to provide more distance in hopes to give more protection from unwanted vandalism or desecration.

* It is far enough away to offer protection of archeological sites ae, Petroglyphs, Ka'iwaloa, Lanakila Church, and Japanese burials.

I say NO (A'ole) to APE and Alternate #1.

I look forward to our future conversations to talk about my ohana and Olowalu.

Thank you for your time and understanding of my concerns,

Sincerely,

Anna Nalaniewalu Vinuya-Palakiko
(808)495-6334

Comment Log Submission No. 24

From: maui@hbl.org <maui@hbl.org>
Sent: Thursday, January 23, 2025 3:59:54 PM
To: Tatsuguchi, Ken <ken.tatsuguchi@hawaii.gov>; honoapiilanieis@online.wspis.com <honoapiilanieis@online.wspis.com>
Subject: [EXTERNAL] Testimony - Draft Environmental Impact Study proposing the relocation of a 6.5-mile segment of the Honoapi'ilani Highway

Aloha Ken,

Please accept my testimony ref to The Department of Transportation Draft Environmental Impact Study proposing the relocation of a 6.5-mile segment of the Honoapiʻilani Highway.

Please reach put with any questions.

Mahalo for the opportunity to submit my testimony.

Mahalo!
Saman



Together, we can make our streets safer for everyone.

Saman Dias
Chair Maui Bicycling League
808-209-2542
maui@hbl.org

Make a donation
www.mauibike.org
Follow us on Facebook
Become a MBL member
Add to receive newsletter

January 23, 2024

A Message from the Maui Bicycling League Chair: Help Shape West Maui's Future

Aloha Members of the Committee,

My name is Saman Dias, and I am the Chair of the Maui Bicycling League. I am submitting this testimony to express my strong support for the proposed 6.5-mile mauka relocation of the Honoapiʻilani Highway. This project is critical for safeguarding this vital transportation corridor from the impacts of rising sea levels and climate change, ensuring the safety and connectivity of West Maui's communities.

While I wholeheartedly support the realignment, I urge the Hawaiʻi Department of Transportation (HDOT) to seize this opportunity to enhance active transportation options by incorporating the West Maui Greenway (WMG) into the project. Specifically, I encourage prioritizing the following elements:

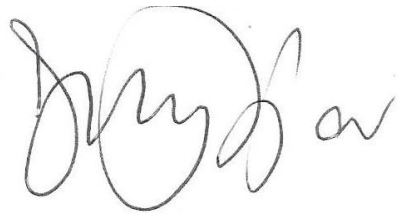
- **Utilization of Old Highway 30 for West Maui Greenway Segments 6 and 7**: The existing coastal highway offers an unparalleled opportunity to create a safe, scenic bike and pedestrian path. Repurposing this corridor as a dedicated multi-use trail is a cost-effective and sustainable solution to advance Segments 6 and 7 of the WMG Master Plan, fostering a connected network of paths for the benefit of residents and visitors alike.
- **Alignment with Climate and Community Goals**: Incorporating the WMG into the highway realignment aligns with the Nā Wahine Climate Settlement Agreement and Maui's broader climate resilience goals. A multi-modal transportation corridor featuring pedestrian- and bike-friendly infrastructure reduces emissions, supports healthy lifestyles, and enhances disaster preparedness.
- **Creating a Community-Driven Asset for Long-Term Benefits**: Transforming the former highway into a recreational and commuting pathway will provide a lasting asset for the community, fostering economic recovery, public health, and local tourism. A dedicated bike and pedestrian trail will also preserve access to West Maui's cultural and natural landmarks, reinforcing our shared commitment to sustainability and stewardship.

This project is not only about improving infrastructure but also about building a resilient, sustainable future for West Maui. By integrating the West Maui Greenway into the

realignment project, we can create a legacy that prioritizes safety, connectivity, and environmental responsibility for generations to come.

Mahalo nui loa for considering my testimony. I encourage my fellow advocates and community members to join me in supporting this critical project and ensuring that the West Maui Greenway vision becomes a reality.

Respectfully submitted,



Saman Dias
Chair, Maui Bicycling League

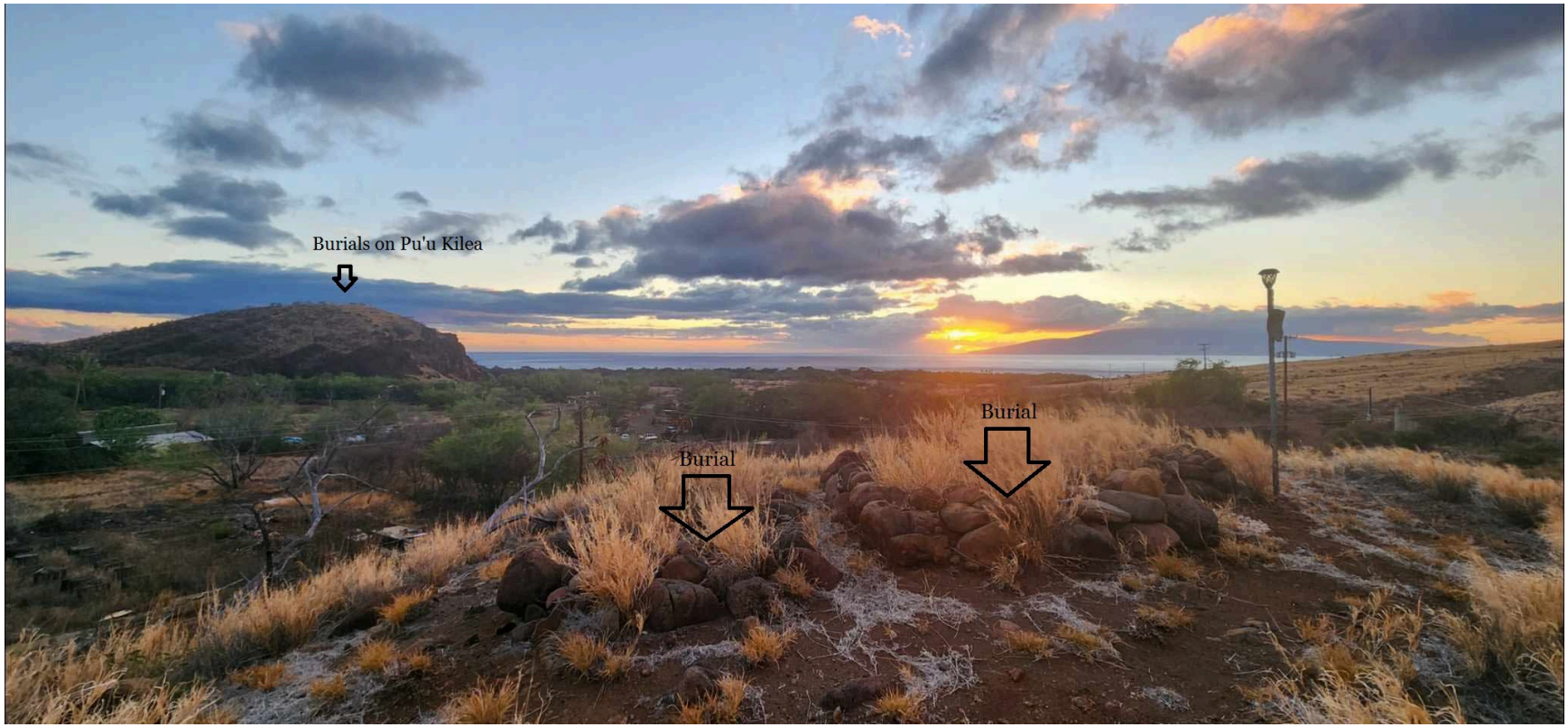
Comment Log Submission No. 25

From: J P <jasonapotts@gmail.com>
Sent: Thursday, January 23, 2025 4:12:50 PM
To: J P <jasonapotts@gmail.com>; Tatsuguchi, Ken <ken.tatsuguchi@hawaii.gov>
Subject: [EXTERNAL] Olowalu Highway

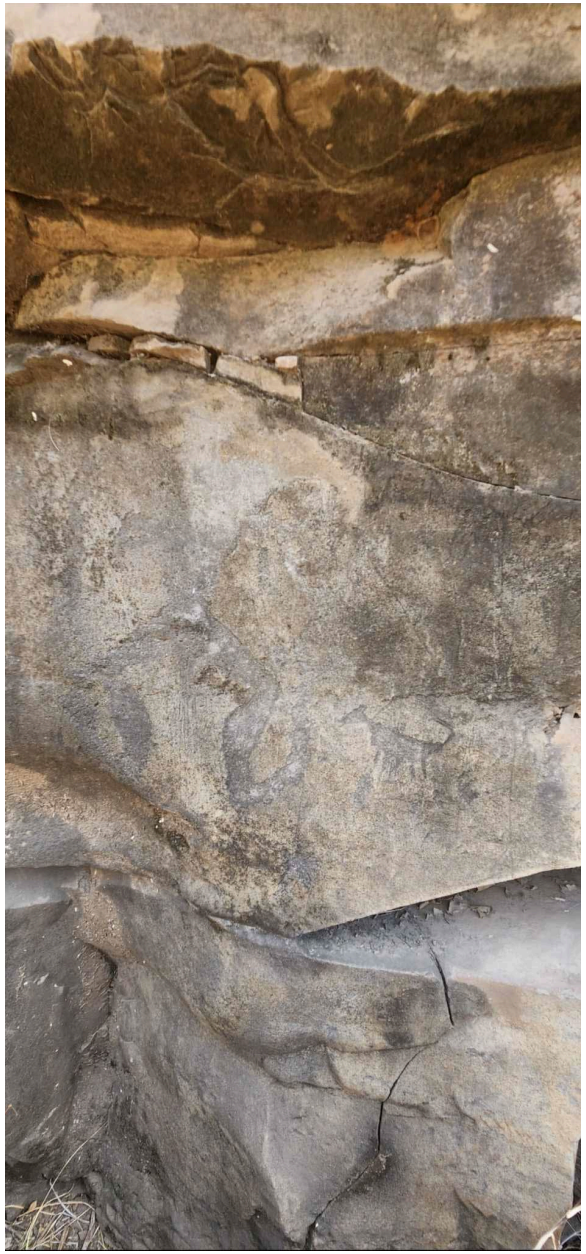
I'm writing in regards to the proposed hwy improvements in Olowalu/Ukumehame. I oppose all builds except maybe build 1 as long as this build doesn't demolish my wifes 2nd great grandmother's foundation located in the bushes right next to the old water tower/general store. I'm completely against build 4 and your purple project line is going right through the side of Pu'u Kilea and exactly where the oldest petroglyphs are located. (see attached pictures) This area is continually vandalised and we constantly deal with drug addicts sleeping in their cars right in front of the petroglyphs. If you put the main hwy right next to Kilea, more will come. Why not build this closer to the hwy that already exists? If you look up old satellite images from 1950 and compare them to now the land looks exactly the same so what is the purpose of this? Is the land disappearing or is this a ploy to get Olowalu Town eventually passed? We don't want a new hwy that will increase taxes and bring in more millionaires. It's already hard enough to survive and the majority of kanaka have already been forced out due to the high cost of living. Only a few of the original families remain in Olowalu. After all of the attempts for olowalu town and now this hwy why is there still no attempts to protect our ancient sites like Kaiwaloa Heiau,Petroglyphs, and the many burials we have in Olowalu. This includes my wifes ohana that is buried on top of Pu'u KIlea and the burials near our families land in Paumaumau Olowalu. We find people literally standing on top of the burials drinking and watching the sunset and they have no clue what they are standing on or they just don't care. The only thing protected in this area are the mansions and of course they recently put up a new gate blocking our access to the heiau. So I say no to your new hwy and please fix what is already there. Mahalo

Jason
(808)495-6657




Burials on Pu'u Kilea
Burial
Burial


USGS
GS MF
4-50
6315 KODAK AEROGRAPHIC SAFETY
SAFETY
USGS
science for a changing world




Luawai St
Luawai St
Luawai St
Image © 2025 Airbus




Olowalu

From: no-reply@wspis.com
Sent: Saturday, January 25, 2025 11:33 PM
To: Small, Matthew; Liebowitz, Peter; Bents, Jamie; honoapiilanieis@online.wspis.com; Mitchell, Andrew
Subject: New Comment from HonoapiilaniHwyImprovements.com

First Name: Tavor
Last Name: White
Email Address: Tovarishfriend@aol.com
Join Mailing List: False
Comment:
Maui has a dearth of mixed-use public spaces, other than perhaps beaches, where people can enjoy our beautiful corner of the planet. And, beaches are not conducive for bicycles. Our island is a small place. So, maximizing green areas is essential to our quality of life. I urge you to design and approve plans that do so. Mahalo.

Comment Log Submission No. 26

-----Original Message-----
From: Dave Veldman <Dave@veldmanmorgan.com>
Sent: Saturday, January 25, 2025 3:11 PM
To: Tatsuguchi, Ken <ken.tatsuguchi@hawaii.gov>
Subject: [EXTERNAL] Support for the Realignment of the Honuapi'ilani highway

Aloha Ken and members of the Committee!

My name is David Veldman and I live in the Kaanapali Golf Estates. I have recently read about the proposed realignment of the Honoapi’ilani Highway. I am very supportive of the proposed 6.5 mile mauka relocation. As planners for Maui’s future this would seem to me to be an important component to safeguard the critical transportation corridor that serves West Maui. I have also been aware of and fully support the West Maui Greenway vision. This is a terrific opportunity to create a dedicated bike and pedestrian path along the old highway. Repurposing this corridor into a scenic bike and pedestrian corridor is an obvious positive and would help further the vision of the West Maui Greenway.

Thank you for listening.

Dave Veldman
970-567-8130 M

From:	no-reply@wspis.com
Sent:	Tuesday, January 28, 2025 3:18 AM
To:	Small, Matthew; Liebowitz, Peter; Bents, Jamie; honoapiilanieis@online.wspis.com; Mitchell, Andrew
Subject:	New Comment from HonoapiilaniHwyImprovements.com

First Name: Allen
Last Name: Surbida
Email Address: allensurbida1003@gmail.com
Join Mailing List: False
Comment:
Aloha, County/state must keep the Ukumehame Firing Range where it is and provide easy access to the only range we have . This project is great but developers should make sure that the range entries are kept open and easy accessible .

Comment Log Submission No. 28

From: no-reply@wspis.com
Sent: Tuesday, January 28, 2025 3:49 AM
To: Small, Matthew; Liebowitz, Peter; Bents, Jamie; honoapiilanieis@online.wspis.com; Mitchell, Andrew
Subject: New Comment from HonoapiilaniHwyImprovements.com

First Name: John
Last Name: Rafael
Email Address: john808rafael@gmail.com
Join Mailing List: True
Comment:
The Ukumehame Firing Range is the only public range on Maui. It needs to stay open and be easily accessible to the people.

Comment Log Submission No. 29

From:	no-reply@wspis.com
Sent:	Tuesday, January 28, 2025 1:41 PM
To:	Small, Matthew; Liebowitz, Peter; Bents, Jamie; honoapiilanieis@online.wspis.com; Mitchell, Andrew
Subject:	New Comment from HonoapiilaniHwyImprovements.com

First Name: David
Last Name: Kingdon
Email Address: david@kingdonconsulting.com
Join Mailing List: True
Comment:
I strongly support the reallocation of older, makai sections of the Honoapi‘ilani Highway to be designated, redesigned, and *maintained* as a dedicated multi-use path for running, cycling, and allied activities. This should also include prohibition or limitation of the use of 'e-bikes,' as many of those are capable of traveling at higher or even highway speeds, which could pose a danger to those employing muscle-powered sport and recreation. As a bicycle commuter, distance runner, and a paramedic serving this area of Maui, I can personally and professionally attest that dedicating this portion of H-pi‘ilani for running, cycling and the like will both promote health and improve safety. Further, if well-engineered, maintained, and marketed, this could actually provide a world class 'hike & bike' path for residents and visitors alike. Maui should be actively seeking adventure travelers, who typically have a lower environmental impact, more cultural sensitivity, with the same or even higher economic injects as more sedentary travelers. Thank you for your consideration.

Comment Log Submission No. 30

From: no-reply@wspis.com
Sent: Tuesday, January 28, 2025 10:29 PM
To: Small, Matthew; Liebowitz, Peter; Bents, Jamie; honoapiilanieis@online.wspis.com; Mitchell, Andrew
Subject: New Comment from HonoapiilaniHwyImprovements.com

First Name: Michele
Last Name: McLean
Email Address: mchouteau@yahoo.com
Join Mailing List: False
Comment:
Please use roundabouts at intersections whenever possible. Mahalo! -Michele.

Comment Log Submission No. 31

From:	no-reply@wspis.com
Sent:	Tuesday, January 28, 2025 10:46 PM
To:	Small, Matthew; Liebowitz, Peter; Bents, Jamie; honoapiilanieis@online.wspis.com; Mitchell, Andrew
Subject:	New Comment from HonoapiilaniHwyImprovements.com

First Name: cesar
Last Name: martin del campo
Email Address: cesarivangarcia@gmail.com
Join Mailing List: False
Comment:
Support for Honoapiʻilani Highway Improvements Project and Request for Correct Categorization of Parcel 48002115 To: Hawaiʻi Department of Transportation (HDOT) Subject: Public Comment on Honoapiʻilani Highway Improvements Project – Build Alternative 1 Dear Project Team, I am writing to express my support for the Honoapiʻilani Highway Improvements Project and its goals to improve transportation infrastructure while addressing environmental and safety concerns. I appreciate the effort and planning involved in designing a project of this scale to benefit our community. However, I would like to address a critical issue regarding the classification and evaluation of Parcel 48002115, which has been flagged for full acquisition under Build Alternative 1. It is essential that the property's current and planned uses are accurately reflected in the project documentation to ensure an equitable and informed process. 1. Misclassification of Parcel Use The current project documentation categorizes Parcel 48002115 as "not in use," which does not accurately reflect its status. Specifically: The parcel is actively utilized for grass farming operations, supported by established water connections and other agricultural infrastructure. Farming activities are currently underway, generating revenue and contributing to the agricultural economy of the area. Additionally, the lot is being developed with architectural plans for a residential structure to complement its agricultural use. This active farming operation and planned development demonstrate that the parcel is a valuable and productive asset, rather than idle or undeveloped land. If you have any questions, please contact me at (202) 746-0133. Cesar El Toro Zoysia Turf - Maui Grass Farm LLC.

Comment Log Submission No. 32

Comment Form

Honoapi'ilani Highway Improvements DEIS

We want to hear from you! Please share your comments and questions with our team before February 24, 2025. More information on the Honoapi'ilani Highway Improvements project can be found at www.honoapiilanihwyimprovements.com. Thank you for your participation!

(1) SHORELINE ACCESS - WILL THE COUNTY ALSO BE WORKING CONCURRENTLY TO PROVIDE SHORELINE ACCESS FOR THE 5 MILE STRETCH? WHAT ACCESS TO KUMUKAHI BEACH PARK & THOUSAND PEAKS. [redacted] WILL BE PROVIDED? PARKING?

(2) SQUATTING / HOMELESS. HOW WILL THE STATE/COUNTY ADDRESS SAFETY AND CLEANLINESS ALONG THE SHORELINE? THE ABANDONED PORTION OF CUT MOUNTAIN HAS BECOME OVERTAKEN BY HOMELESS & ABANDONED VEHICLES.

(3) BIKE LANES - HOW WILL CYCLING BE ADDRESSED ALONG THE REALIGNMENT AND ACROSS THE VIADUCT AND BRIDGE STRUCTURES? WILL A SEPARATE BIKE PATH ALONG THE SHORELINE BE BUILT

Providing your contact information below is optional. It will allow us to add you to the mailing/email list to receive future project information.

Comment Log Submission No. 33

Name:

Address:

City: State: Zip:

Email: Phone:

Share your comments and questions by handing in this form at the hearing, by sending this form via mail or email, or by calling Ken Tatsuguchi from the Hawaii Department of Transportation.

Ken Tatsuguchi, HDOT
Email: ken.tatsuguchi@hawaii.gov
Phone: 808-587-1830

Federal Highway Administration, Hawaii Division
Attention: Richelle Takara, Division Administrator Box 50206, 300 Ala Moana Blvd., Room 3-229, Honolulu, HI 96850

The questions below are **optional**, but intended to help our staff better understand what worked well and what improvements to consider for future public meetings.

How did you hear about this public meeting? *(please check)*

❑ Newspaper ❑ Email ❑ Community board ❑ Word-of-mouth ❑ Social media
❑ Other: _____

Was the information easy to understand and informative? ❑ Yes ❑ No

Please indicate which of the following best represents you:

❑ Local Resident ❑ Local Business/Industry/Trade Association ❑ Neighborhood Group

❑ Local Non-Profit Organization ❑ National Environmental Organization

❑ Local or State Government ❑ Federal or Tribal Government

❑ Other (please specify) _____

Answering the following questions is optional, but your response will be extremely helpful in ensuring the fairness and equity of HDOT's public involvement process. Submissions will be kept confidential and separate from any personally identifiable information.

What is your race?

❑ Black or African American ❑ American Indian or Alaskan Native ❑ Asian

❑ Hispanic or Latino ❑ White ❑ Native Hawaiian or Other Pacific Islander

❑ I prefer to self-describe: _____

What is the primary language spoken in your home?

❑ English ❑ Hawaiian ❑ Spanish ❑ Tagalog ❑ Vietnamese
❑ Other (Please specify): _____

Was project information translated into other languages appropriately?

❑ Yes ❑ No ❑ Specify: _____

Gender identity:

❑ Man ❑ Woman ❑ Non-binary ❑ I prefer to self-describe: _____

Do any individuals living in your home have a physical or mental impairment that substantially limits one or more major life activities?

❑ Yes ❑ No

Please suggest additional ways you think HDOT and FHWA can improve the inclusiveness of public outreach efforts. **Thank you for completing this survey!**

_____

_____

Comment Form

Honoapi'ilani Highway Improvements DEIS

We want to hear from you! Please share your comments and questions with our team before February 24, 2025. More information on the Honoapi'ilani Highway Improvements project can be found at www.honoapiilanihwyimprovements.com. Thank you for your participation!

THANK YOU FOR MAKING THE TIME TO BRING MANY STAKEHOLDERS TOGETHER FROM OLOWALU & UKUMEHAME. IT HAS BEEN VERY INFORMATIVE & POSITIVE HEARING THE AVAILABLE/POTENTIAL ROUTES IN AN EFFORT TO MEDIGATE SEA LEVEL RISE ALONG WITH ENVIRONMENTAL CONCERNS. APPLAUD THE OPEN COMMUNICATION OF YOUR TEAM.

MAHALO

Comment Log Submission No. 34

Providing your contact information below is optional. It will allow us to add you to the mailing/email list to receive future project information.

Name: KATHY KITUNE

Address: 796 OLOWALU VILLAGE ROAD

City: LAHAINA State: HI Zip: 96761

Email: katkitune@gmail.com Phone: 808-357-1096

Share your comments and questions by handing in this form at the hearing, by sending this form via mail or email, or by calling Ken Tatsuguchi from the Hawaii Department of Transportation.

Ken Tatsuguchi, HDOT
Email: ken.tatsuguchi@hawaii.gov
Phone: 808-587-1830

Federal Highway Administration, Hawaii Division
Attention: Richelle Takara, Division Administrator Box 50206, 300 Ala Moana Blvd., Room 3-229, Honolulu, HI 96850

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How did you hear about this public meeting? *(please check)*

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☐ Other: _____

Was the information easy to understand and informative? ☐ Yes ☐ No

Please indicate which of the following best represents you:

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☐ Local or State Government ☐ Federal or Tribal Government

☐ Other (please specify) _____

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☐ Black or African American ☐ American Indian or Alaskan Native ☐ Asian

☐ Hispanic or Latino ☐ White ☑ Native Hawaiian or Other Pacific Islander

☐ I prefer to self-describe: _____

What is the primary language spoken in your home?

☑ English ☐ Hawaiian ☐ Spanish ☐ Tagalog ☐ Vietnamese
☐ Other (Please specify): _____

Was project information translated into other languages appropriately?

☑ Yes ☐ No ☐ Specify: _____

Gender identity:

☐ Man ☑ Woman ☐ Non-binary ☐ I prefer to self-describe: _____

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☐ Yes ☑ No

Please suggest additional ways you think HDOT and FHWA can improve the inclusiveness of public outreach efforts. **Thank you for completing this survey!**

_____

_____

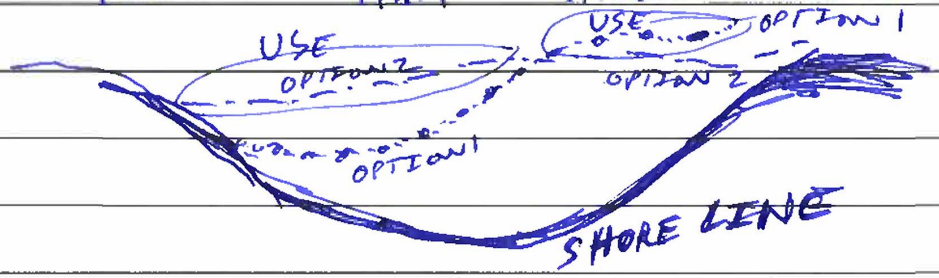
Comment Form

Honoapi'ilani Highway Improvements DEIS

We want to hear from you! Please share your comments and questions with our team before February 24, 2025. More information on the Honoapi'ilani Highway Improvements project can be found at www.honoapiilanihwyimprovements.com. Thank you for your participation!

FOR THE OLOWALU PORTION:

USE THE MAUKA/NORTHERN SECTION OF OPTION #1 UNTIL IT CROSSES OPTION #2 THEN PICK UP THAT OPTION



BASICALLY USE THE UPHILL SECTION OF EACH OF 1 & 2 - A MAUKA HYBRID - DON'T USE THE MAKAI SECTION OF EITHER

Providing your contact information below is optional. It will allow us to add you to the mailing/email list to receive future project information.

Name: BRANDON HAZLES

Address: 8014 OLOWALU ROAD

City: Lahaina State: HI Zip: 96761

Email: bhazlet@gmail.com Phone: 808 222-3258

Comment Log Submission No. 35

Share your comments and questions by handing in this form at the hearing, by sending this form via mail or email, or by calling Ken Tatsuguchi from the Hawaii Department of Transportation.

Ken Tatsuguchi, HDOT
Email: ken.tatsuguchi@hawaii.gov
Phone: 808-587-1830

Federal Highway Administration, Hawaii Division
Attention: Richelle Takara, Division Administrator Box 50206, 300 Ala Moana Blvd., Room 3-229, Honolulu, HI 96850

Ken.tatsuguchi@hawaii.gov (808)587-1830 www.honoapiilanihwyimprovements.com

The questions below are **optional**, but intended to help our staff better understand what worked well and what improvements to consider for future public meetings.

How did you hear about this public meeting? *(please check)*

☐ Newspaper ☐ Email ☐ Community board ☑ Word-of-mouth ☐ Social media
☐ Other: _____

Was the information easy to understand and informative? ☑ Yes ☐ No

Please indicate which of the following best represents you:

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☐ Local Non-Profit Organization ☐ National Environmental Organization

☐ Local or State Government ☐ Federal or Tribal Government

☐ Other (please specify) _____

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What is your race?

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☐ Hispanic or Latino ☐ White ☐ Native Hawaiian or Other Pacific Islander

☐ I prefer to self-describe: _____

What is the primary language spoken in your home?

☑ English ☐ Hawaiian ☐ Spanish ☐ Tagalog ☐ Vietnamese
☐ Other (Please specify): _____

Was project information translated into other languages appropriately?

☐ Yes ☐ No ☐ Specify: _____

Gender identity:

☐ Man ☐ Woman ☐ Non-binary ☐ I prefer to self-describe: _____

Do any individuals living in your home have a physical or mental impairment that substantially limits one or more major life activities?

☐ Yes ☒ No

Please suggest additional ways you think HDOT and FHWA can improve the inclusiveness of public outreach efforts. **Thank you for completing this survey!**

_____

_____

Comment Form

Honoapi'ilani Highway Improvements DEIS

We want to hear from you! Please share your comments and questions with our team before February 24, 2025. More information on the Honoapi'ilani Highway Improvements project can be found at www.honoapiilanihwyimprovements.com. Thank you for your participation!

From past experience, S.H.P.D does not verify accuracy of development information provided. Archeologists and gov't departments are often more in compliance with the wishes of their employers and prospect of future work. For example, Kahoma Village reported no substantial historical importance. However, it was the homestead of David Malo LCA 3702, battle ground between Kamehameha Great and the high chief of Maui and part of the 'Alamihi Fishpond Complex. So, my suggestion is to consult with lineal descendants from each area the road goes thru to ensure pre-contact, iwi, and other cultural historical things are protected and preserved. Least amount of impact to important Hawaiian site Iwi safes memorials for any disturbed iwi within an area.

Providing your contact information below is optional. It will allow us to add you to the mailing/email list to receive future project information.

Comment Log Submission No. 36

Name: Michele Lincoln

Address: 951 Kaihele Kuu St

City: Lahaina State: HI Zip: 96761

Email: lincolnmichele@yahoo.com Phone: (808) 385-3157

Share your comments and questions by handing in this form at the hearing, by sending this form via mail or email, or by calling Ken Tatsuguchi from the Hawaii Department of Transportation.

Ken Tatsuguchi, HDOT
Email: ken.tatsuguchi@hawaii.gov
Phone: 808-587-1830

Federal Highway Administration, Hawaii Division
Attention: Richelle Takara, Division Administrator Box 50206, 300 Ala Moana Blvd., Room 3-229, Honolulu, HI 96850

Ken.tatsuguchi@hawaii.gov (808)587-1830 www.honoapiilanihwyimprovements.com

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☐ Other: _____

Was the information easy to understand and informative? ☒ Yes ☐ No

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☐ Local or State Government ☐ Federal or Tribal Government

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☐ Other (Please specify): _____

Was project information translated into other languages appropriately?

☐ Yes ☐ No ☐ Specify: _____

Gender identity:

☐ Man ☒ Woman ☐ Non-binary ☐ I prefer to self-describe: _____

Do any individuals living in your home have a physical or mental impairment that substantially limits one or more major life activities?

☐ Yes ☒ No

Please suggest additional ways you think HDOT and FHWA can improve the inclusiveness of public outreach efforts. **Thank you for completing this survey!**

_____

_____

Comment Form

Honoapi'ilani Highway Improvements DEIS

We want to hear from you! Please share your comments and questions with our team before February 24, 2025. More information on the Honoapi'ilani Highway Improvements project can be found at www.honoapiilanihwyimprovements.com. Thank you for your participation!

please keep the communities as peaceful & untouched as possible. A highway through a community will change it forever, if possible please create the highway furthest away from infringing on local people. please create a highway that encourages safer ~~t~~ & more efficient transportation but discourages further development that does not enhance nor empower local people. ~~[illegible]~~ i hope the money allocated to the highway also gives money to removing ~~the~~ old, poor infrastructure, & ~~[illegible]~~ giving it back to the 'āina & for all locals to take care of & grow. i am confident we can find more creative solutions that empower & center our locals more. federal funding is so hard, but if we need more money to bring better solutions, we pursue more $$ maybe through private? sources.

Providing your contact information below is optional. It will allow us to add you to the mailing/email list to receive future project information.

Name:

Address:

City: State: Zip:

Email: Phone:

Comment Log Submission No. 37

Share your comments and questions by handing in this form at the hearing, by sending this form via mail or email, or by calling Ken Tatsuguchi from the Hawaii Department of Transportation.

Ken Tatsuguchi, HDOT
Email: ken.tatsuguchi@hawaii.gov
Phone: 808-587-1830

Federal Highway Administration, Hawaii Division
Attention: Richelle Takara, Division Administrator Box 50206, 300 Ala Moana Blvd., Room 3-229, Honolulu, HI 96850

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❑ Other: _____

Was the information easy to understand and informative? ❑ Yes ❑ No

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What is the primary language spoken in your home?

❑ English ❑ Hawaiian ❑ Spanish ❑ Tagalog ❑ Vietnamese
❑ Other (Please specify): _____

Was project information translated into other languages appropriately?

❑ Yes ❑ No ❑ Specify: _____

Gender identity:

❑ Man ❑ Woman ❑ Non-binary ❑ I prefer to self-describe: _____

Do any individuals living in your home have a physical or mental impairment that substantially limits one or more major life activities?

❑ Yes ❑ No

Please suggest additional ways you think HDOT and FHWA can improve the inclusiveness of public outreach efforts. **Thank you for completing this survey!**

_____

_____

Comment Form

Federal Highway Administration

Honoapi'ilani Highway Improvements DEIS

We want to hear from you! Please share your comments and questions with our team before February 24, 2025. More information on the Honoapi'ilani Highway Improvements project can be found at www.honoapiilanihwyimprovements.com. Thank you for your participation!

A. SAFETY - WILL INTERSECTIONS HAVE LIGHTING, SIGNALS, EMERGENCY ROADSIDE PHONES ETC.?

B. TRAVEL LANES SURFACE - WILL THE ROAD BE ASPHALT OR PCCP?

C. [redacted] CULTURAL PRESERVATION - WILL ANY MONIES/RESOURCES BE STEERED BACK TO THE COMMUNITIES OF UKUMEHAME AND OLOWALU FOR PRESERVATION AND EDUCATION.

D.

Comment Log Submission No. 38

Providing your contact information below is optional. It will allow us to add you to the mailing/email list to receive future project information.

Name:

Address:

City: State: Zip:

Email: Phone:

Share your comments and questions by handing in this form at the hearing, by sending this form via mail or email, or by calling Ken Tatsuguchi from the Hawaii Department of Transportation.

Ken Tatsuguchi, HDOT
Email: ken.tatsuguchi@hawaii.gov
Phone: 808-587-1830

Federal Highway Administration, Hawaii Division
Attention: Richelle Takara, Division Administrator Box 50206, 300 Ala Moana Blvd., Room 3-229, Honolulu, HI 96850

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❑ Newspaper ❑ Email ❑ Community board ❑ Word-of-mouth ❑ Social media
❑ Other: _____

Was the information easy to understand and informative? ❑ Yes ❑ No

Please indicate which of the following best represents you:

❑ Local Resident ❑ Local Business/Industry/Trade Association ❑ Neighborhood Group

❑ Local Non-Profit Organization ❑ National Environmental Organization

❑ Local or State Government ❑ Federal or Tribal Government

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What is the primary language spoken in your home?

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Was project information translated into other languages appropriately?

❑ Yes ❑ No ❑ Specify: _____

Gender identity:

❑ Man ❑ Woman ❑ Non-binary ❑ I prefer to self-describe: _____

Do any individuals living in your home have a physical or mental impairment that substantially limits one or more major life activities?

❑ Yes ❑ No

Please suggest additional ways you think HDOT and FHWA can improve the inclusiveness of public outreach efforts. **Thank you for completing this survey!**

_____

_____

Comment Form

Honoapi'ilani Highway Improvements DEIS

We want to hear from you! Please share your comments and questions with our team before February 24, 2025. More information on the Honoapi'ilani Highway Improvements project can be found at www.honoapiilanihwyimprovements.com. Thank you for your participation!

It would be great if the project included returning the shoreline of the original highway to a more natural state; with minimal shoreline hardening. I'm concerned that giving this responsibility to the County will just result in miles of homeless encampments like those on the old highway when the bypass went in.

Providing your contact information below is optional. It will allow us to add you to the mailing/email list to receive future project information.

Comment Log Submission No. 39

Name:

Address:

City: State: Zip:

Email: Phone:

Share your comments and questions by handing in this form at the hearing, by sending this form via mail or email, or by calling Ken Tatsuguchi from the Hawaii Department of Transportation.

Ken Tatsuguchi, HDOT
Email: ken.tatsuguchi@hawaii.gov
Phone: 808-587-1830

Federal Highway Administration, Hawaii Division
Attention: Richelle Takara, Division Administrator Box 50206, 300 Ala Moana Blvd., Room 3-229, Honolulu, HI 96850

The questions below are **optional**, but intended to help our staff better understand what worked well and what improvements to consider for future public meetings.

How did you hear about this public meeting? *(please check)*

☐ Newspaper ☒ Email ☐ Community board ☐ Word-of-mouth ☒ Social media
☐ Other: _____

Was the information easy to understand and informative? ☒ Yes ☐ No

Please indicate which of the following best represents you:

☒ Local Resident ☐ Local Business/Industry/Trade Association ☐ Neighborhood Group

☐ Local Non-Profit Organization ☐ National Environmental Organization

☐ Local or State Government ☐ Federal or Tribal Government

☐ Other (please specify) _____

Answering the following questions is optional, but your response will be extremely helpful in ensuring the fairness and equity of HDOT's public involvement process. Submissions will be kept confidential and separate from any personally identifiable information.

What is your race?

☐ Black or African American ☐ American Indian or Alaskan Native ☐ Asian

☐ Hispanic or Latino ☒ White ☐ Native Hawaiian or Other Pacific Islander

☐ I prefer to self-describe: _____

What is the primary language spoken in your home?

☒ English ☐ Hawaiian ☐ Spanish ☐ Tagalog ☐ Vietnamese
☐ Other (Please specify): _____

Was project information translated into other languages appropriately?

☐ Yes ☐ No ☐ Specify: _____

Gender identity:

☐ Man ☒ Woman ☐ Non-binary ☐ I prefer to self-describe: _____

Do any individuals living in your home have a physical or mental impairment that substantially limits one or more major life activities?

☐ Yes ☒ No

Please suggest additional ways you think HDOT and FHWA can improve the inclusiveness of public outreach efforts. **Thank you for completing this survey!**

_____

_____

Comment Form

Honoapi'ilani Highway Improvements DEIS

We want to hear from you! Please share your comments and questions with our team before February 24, 2025. More information on the Honoapi'ilani Highway Improvements project can be found at www.honoapiilanihwyimprovements.com. Thank you for your participation!

Linda Magallanes

Remove trees - prefer Route 7
There are burials in the area where the preferred is located on the map. Very concerned about burials

Comment Log Submission No. 40

Providing your contact information below is optional. It will allow us to add you to the mailing/email list to receive future project information.

Name:

Address:

City: State: Zip:

Email: Phone:

Share your comments and questions by handing in this form at the hearing, by sending this form via mail or email, or by calling Ken Tatsuguchi from the Hawaii Department of Transportation.

Ken Tatsuguchi, HDOT
Email: ken.tatsuguchi@hawaii.gov
Phone: 808-587-1830

Federal Highway Administration, Hawaii Division
Attention: Richelle Takara, Division Administrator Box 50206, 300 Ala Moana Blvd., Room 3-229, Honolulu, HI 96850

The questions below are **optional**, but intended to help our staff better understand what worked well and what improvements to consider for future public meetings.

How did you hear about this public meeting? *(please check)*

❑ Newspaper ❑ Email ❑ Community board ❑ Word-of-mouth ❑ Social media
❑ Other: _____

Was the information easy to understand and informative? ❑ Yes ❑ No

Please indicate which of the following best represents you:

❑ Local Resident ❑ Local Business/Industry/Trade Association ❑ Neighborhood Group

❑ Local Non-Profit Organization ❑ National Environmental Organization

❑ Local or State Government ❑ Federal or Tribal Government

❑ Other (please specify) _____

Answering the following questions is optional, but your response will be extremely helpful in ensuring the fairness and equity of HDOT's public involvement process. Submissions will be kept confidential and separate from any personally identifiable information.

What is your race?

❑ Black or African American ❑ American Indian or Alaskan Native ❑ Asian

❑ Hispanic or Latino ❑ White ❑ Native Hawaiian or Other Pacific Islander

❑ I prefer to self-describe: _____

What is the primary language spoken in your home?

❑ English ❑ Hawaiian ❑ Spanish ❑ Tagalog ❑ Vietnamese
❑ Other (Please specify): _____

Was project information translated into other languages appropriately?

❑ Yes ❑ No ❑ Specify: _____

Gender identity:

❑ Man ❑ Woman ❑ Non-binary ❑ I prefer to self-describe: _____

Do any individuals living in your home have a physical or mental impairment that substantially limits one or more major life activities?

❑ Yes ❑ No

Please suggest additional ways you think HDOT and FHWA can improve the inclusiveness of public outreach efforts. **Thank you for completing this survey!**

_____

_____

Comment Log Submission No. 41

Phone call with Jonathan Verona

NOTES:
Concern of the possible homeless camp and increase in homeless in the area between the existing Honoapiilani Highway and the Realigned Highway**.**

From: Tatsuguchi, Ken <ken.tatsuguchi@hawaii.gov>
Sent: Wednesday, January 29, 2025 8:04 PM
To: Bents, Jamie <Jamie.Bents@wsp.com>; Liebowitz, Peter <Peter.Liebowitz@wsp.com>; La Farga, Paul <paul.lafarga@dot.gov>; Aiu, Pua <pua.aiu@hawaii.gov>
Subject: FW: Honoapiilani Hwy Imps Project, Info Request

Spoke with Jonathan Verona, he lives in the Olawalu area, think he's a landowner. He wanted information on the project which I emailed him the project site and sent some of the presentation from the hearing. Also, he wanted to provide his comment on the homeless, see below. Thanks,

Ken K Tatsuguchi, PE
Hawaii DOT Planning Branch
869 Punchbowl Street, Room 301
Honolulu, HI 96813-5097
Office phone: 1-808-587-1830

This e-mail message, including any attachments, is for the sole use of the intended recipient and may contain confidential and/or privileged information. Any review, use, disclosure or distribution by unintended recipients is prohibited. If you are not the intended recipient, please destroy all copies of the original e-mail message and contact the sender by e-mail reply. Thank you.

From: Tatsuguchi, Ken
Sent: Wednesday, January 29, 2025 3:01 PM
To: jonnyvaron@gmail.com
Subject: Honoapiilani Hwy Imps Project, Info Request

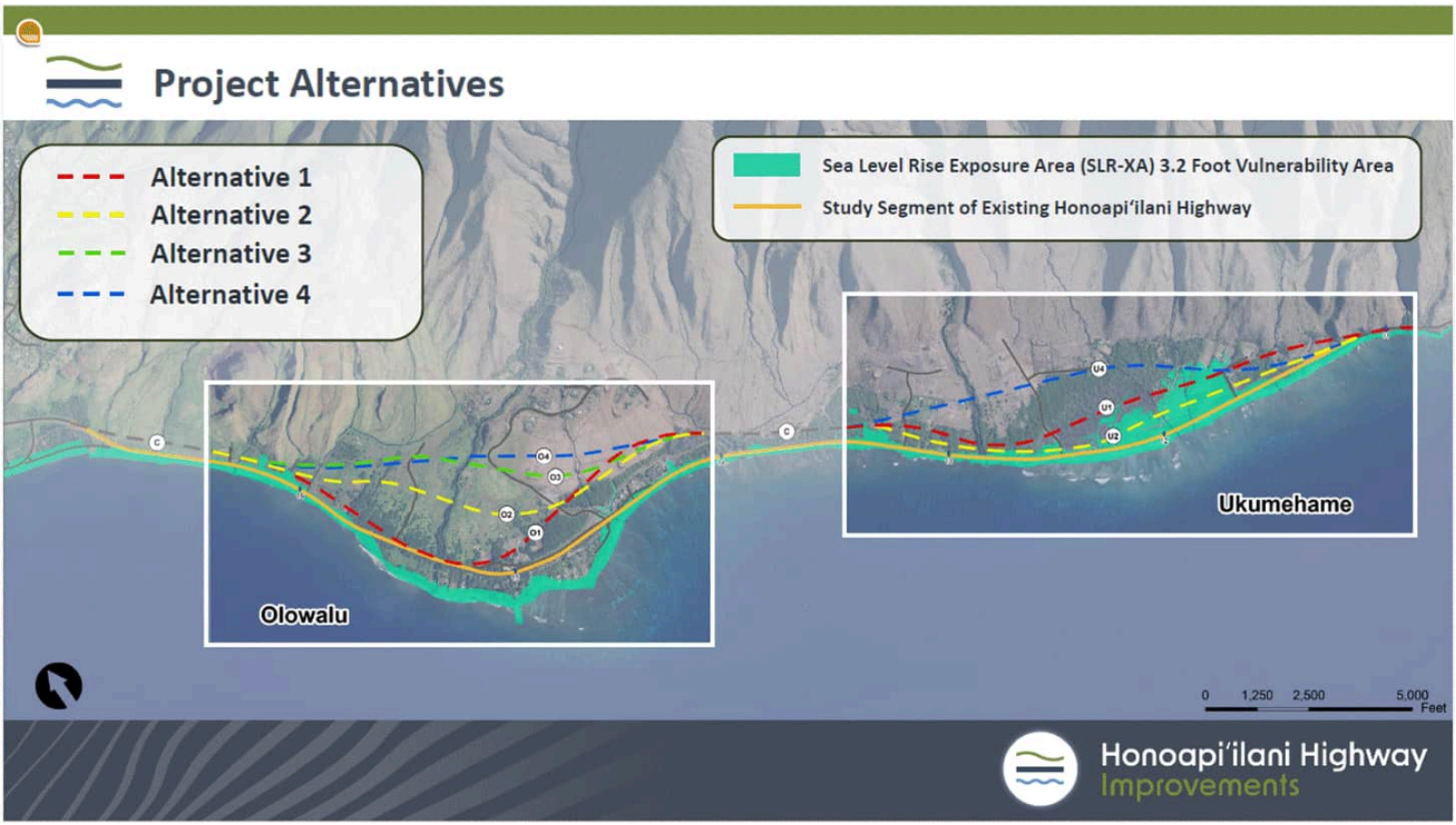
Jonathan,

Following up on our conversation today. Here's the project link to Draft EIS which has the alignments and information you are interested with- honoapiilanihwyimprovements.com

Will provide the project team the your comment on the concern of the possible homeless camp and increase in homeless in the area between the existing Honoapiilani Highway and the Realigned Highway.

And below are some slides from the public hearing that were tied to our conversation.


Project Area
Existing Honoapi'ilani Highway
Landmark
Park
HONOAPI'ILANI HIGHWAY IMPROVEMENTS
This project will look at reliability, resiliency, and safety for roughly 6 miles from Launiupoko to Ukumehame
Ukumehame Firing Range
11
Olowalu Convenience Center
Ukumehame Beach State Park
12
Papalaua Wayside Park
Launiupoko Wayside Park
Awalua Beach
16
14
Kailiili Beach
13
Mā'alaea
Ukumehame
Launiupoko
15
Camp Olowalu
Olowalu Sugar Mill
Olowalu Warf
Olowalu
0 1,250 2,500 5,000 Feet
Honoapi'ilani Highway Improvements


Project Alternatives
Alternative 1
Alternative 2
Alternative 3
Alternative 4
Sea Level Rise Exposure Area (SLR-XA) 3.2 Foot Vulnerability Area
Study Segment of Existing Honoapi'ilani Highway
Olowalu
Ukumehame
0 1,250 2,500 5,000 Feet
Honoapi'ilani Highway Improvements

Olowalu Preferred Alternative (Alternative 2)



Honoapi'ilani Highway Improvements



● BEST
◕ GOOD
◑ NEUTRAL
◔ POOR
○ WORST

TOPIC	NO BUILD ALTERNATIVE	BUILD ALTERNATIVE 1	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3	BUILD ALTERNATIVE 4	PREFERRED ALTERNATIVE
Preliminary Construction Cost Estimates	◕	◑	◑	◑	◑	◑
Land Use and Zoning	◑	◕	●	◕	◕	●
Agriculture and Farmlands	◕	◕	◕	◑	◑	◕
Community Services	◕	●	●	●	●	●
Land Acquisition, Displacement, and Relocation	●	◑	◑	◔	◔	◑
Parklands and Recreational Resources	●	◕	●	●	●	●
Archaeological and Architectural Historic Properties	●	◕	◕	◕	◔	●
Cultural Resources	●	◑	◕	◑	◔	●
Visual and Scenic Character	◑	◑	◕	◑	◔	◕
Water Resources, Wetlands, and Floodplains	○	◕	◕	◕	◕	◕
Flora and Fauna, Endangered Species	◑	◕	◕	◕	◕	◕
Geology, Soils, and Natural Hazards	◔	◕	●	●	●	●
Coastal Zone Management/Hawai'i Special Management Areas	○	◕	●	●	●	●
Climate Change and Sea Level Rise	○	●	●	●	●	●
Transportation	○	◕	●	●	●	●
Air Quality and Energy	◕	●	●	●	●	●
Noise	◑	●	●	●	◔	●
Infrastructure and Utilities	◕	●	●	●	●	●
Hazardous Materials	●	◕	●	●	●	●
Environmental Justice	◕	●	●	●	●	●
OLOWALU OVERALL ASSESSMENT	◔	◕	●	◕	◑	●

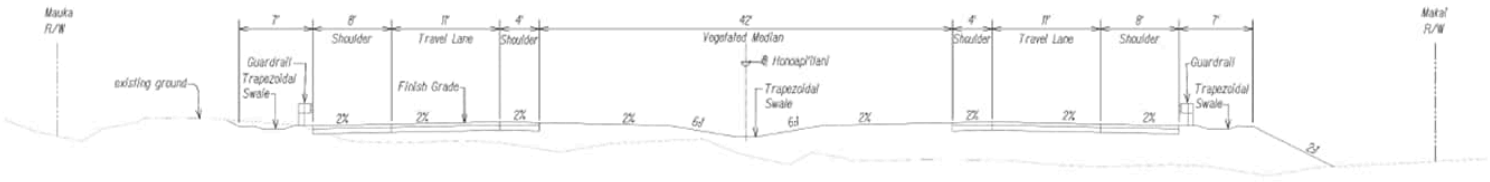
Alternative Impact Evaluation and Screening

Honoapi'ilani Highway Improvements

Design Elements

Basic Design Elements Include:

- 45 MPH posted speed limit
- 11-ft wide travel lanes
- Paved shoulders (4-ft min. at median, 8-ft outside)
- Guardrails where appropriate
- Wide vegetated medians (for improved safety and stormwater management)
- Acceleration / deceleration lanes at intersections
- Infiltration/detention ponds



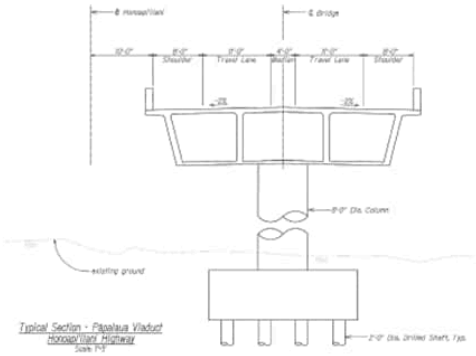
Primary Typical Section - Two Lane with Wide Vegetated Median
Honoapi'ilani Highway
Scale 1"=5'

Honoapi'ilani Highway Improvements

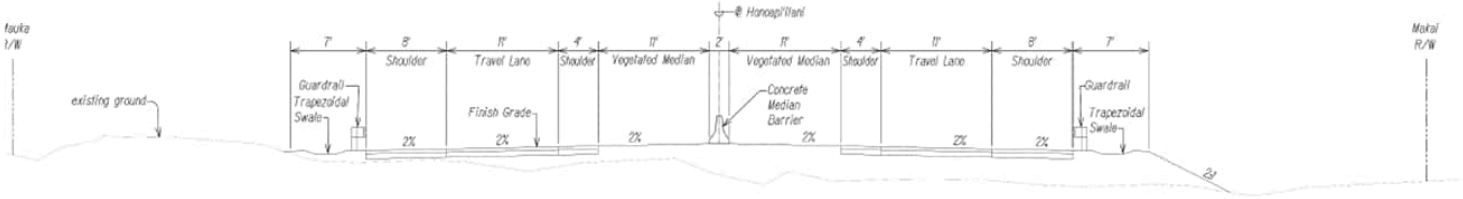
Design Elements

Variations in Design Elements Include:

- Narrower medians (to reduce footprint for preservation of archaeological and historic resources)
- Viaduct in Ukumehame (to span over sedimentation pond and wetland areas)
- Street lighting only at intersections



Typical Section - Pāpalaua Viaduct
Honoapi'ilani Highway
Scale 1"=5'



Pinch Point Typical Section - Two Lane Narrow Vegetated Median
Honoapi'ilani Highway
Scale 1"=5'

Honoapi'ilani Highway Improvements

The Draft EIS comment deadline is February 24th. Mahalo,

Ken K Tatsuguchi, PE
Hawaii DOT Planning Branch
869 Punchbowl Street, Room 301
Honolulu, HI 96813-5097
Office phone: 1-808-587-1830

Council Chair
Alice L. Lee

Councilmembers
Tom Cook
Gabe Johnson
Tasha Kama
Tamara Paltin
Keani N.W. Rawlins-Fernandez
Shane M. Sinenci
Yuki Lei K. Sugimura
Nohelani U'u-Hodgins

COUNTY COUNCIL
COUNTY OF MAUI
200 S. HIGH STREET WAILUKU,
MAUI, HAWAII 96793
www.MauiCounty.us

Director of Council Services
David M. Raatz, Jr., Esq.

Deputy Director of Council Services
Richelle K. Kawasaki, Esq.

Comment Log Submission No. 42

January 28, 2025

Federal Highway Administration
Hawaii Division
Attention: Richelle Takara
Division Administrator
Box 50206
300 Ala Moana Blvd., Room 3-229
Honolulu, HI 96850
Richelle.Takara@dot.gov

Hawai'i Department of Transportation
Highways Division
Attention: Genevieve Sullivan
869 Punchbowl Street, Room 301
Honolulu, HI 96813
Genevieve.h.sullivan@hawaii.gov

RE: A Department of Transportation, Federal Highway Administration, Environmental Impact Statement for the Honoapi'ilani Highway Improvements Project

Aloha Ms. Takara and Ms. Sullivan,

I am writing to provide comments pertaining to the Notice of Intent to Prepare an Environmental Impact Statement regarding potential improvements to the Honoapi'ilani Highway (State Route No. 30) between milepost 11 in the vicinity of Papalaua Wayside Park in Ukumehame and milepost 17 in Launiupoko,

As stated in the Draft Notice of Intent, "Improvements are needed to provide a reliable transportation facility that would not be inundated by the predicted 3.2-foot sea level rise and undermined by coastal erosion."

I firmly believe and **strongly support** the Honoapi'ilani Highway's proposed 6.5-mile mauka relocation as a necessary step in improving the safety and resilience of West Maui's transportation system. The Federal Highway Administration began discussions on realignment, as early as June 2007. Since then, no advancements have been made. Now, swift action is needed to safeguard this essential highway from the growing threats posed by climate change and sea level rise, as well as ensure continuous connectivity for locals and tourists, who depend on this route for work and leisure.

Furthermore, I would like to encourage the Departments to think about implementing active transportation choices, particularly the West Maui Greenway (WMG). Developed in 2022 as a vision for a proposed 25-mile

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Keani N.W. Rawlins-Fernandez
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Yuki Lei K. Sugimura
Nohelani U'u-Hodgins

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Director of Council Services
David M. Raatz, Jr., Esq.

Deputy Director of Council Services
Richelle K. Kawasaki, Esq.

multipurpose path that would connect Ukumehame to Lipoa Point, it can be viewed as a strategy to increase the region's resilience through sustainable, multimodal transportation for present and future generations.

As such, I respectfully urge the Hawai'i Department of Transportation (HDOT) to prioritize the following key WMG elements within the project:

1. **Use of (Old) State Route 30 for Segments 6 and 7**

   - Segments 6 and 7 (the southernmost sections, from Lahaina Pali Trailhead to Lauiniupoko Beach Park) of the WMG are best served by the current (Old) State Route 30 since it could offer a dedicated bike and pedestrian path.

   - Transforming this scenic road into a continuously connected, pedestrian and bike-friendly corridor, would promote safe, nonmotorized travel and recreation, that also serves as a cost-effective means of connecting West Maui communities.

2. **Conformity with Climate and Community Goals**

   - Including the WMG in the highway realignment project is in line with Maui's commitment to climate resilience, as well as meets the *Navahine v. Hawai'i Department of Transportation et al.*, Climate Settlement Agreement (2024), which requires the state to develop a plan to drastically reduce greenhouse gas emissions from the transportation sector with the goal of Zero Emissions by 2045.

   - This multifunctional trail also promotes healthy lifestyles and augments disaster preparedness by serving as an evacuation route.

3. **Designed by the Community for Long-Term Benefits**

   - Transforming Honoapi'ilani Highway into a recreational and commuting pathway would create a lasting

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community asset that boosts economic recovery, tourism, and public health.

- A designated bike and pedestrian path would promote environmental stewardship and community pride by offering secure, picturesque access to important natural and cultural landmarks.

As part of HDOT's broader goal to repair the coastal highway network from Māʻalaea to north of Lahaina, the Honoapiʻilani Highway Improvements Project will bring much-needed service dependability and resilience. This project also offers a rare chance to incorporate the West Maui Greenway as a crucial component of this reconstruction.

The August 2023 wildfires has forced our community to rethink present and future disaster recovery and infrastructure planning. Conversion of the former highway into a cycling and pedestrian path, as well as an evacuation route, will shape a legacy of sustainable infrastructure that will benefit West Maui for many years to come.

I respectfully ask for your consideration of incorporating the West Maui Greenway into the Honoapiʻilani Highway Improvement Project, and I look forward to seeing this move forward with these important elements included.

Thank you for your time and consideration of this critical matter. Please feel free to contact me at: Tamara.Paltin@mauicounty.us or (808) 295-2967.

Me ka ʻoiaʻiʻo,

Tamara A. M. Paltin

Tamara Paltin
Councilmember

The following submissions were given during the virtual public hearing as Zoom Testimony. See DEIS Public Hearing Transcripts for the transcript of these comments.

Comment Log Submission No. 43

Comment Log Submission No. 44

Comment Log Submission No. 45

Comment Log Submission No. 46

Comment Log Submission No. 47

Comment Log Submission No. 48

From:	no-reply@wspis.com
Sent:	Monday, February 10, 2025 4:24 AM
To:	Small, Matthew; Liebowitz, Peter; Bents, Jamie; honoapiilanieis@online.wspis.com; Mitchell, Andrew
Subject:	New Comment from HonoapiilaniHwyImprovements.com

First Name: Daniel
Last Name: Ornelas
Email Address: Devictimized@gmail.com
Join Mailing List: False
Comment:
Please consider making the road 4 lanes when built to allow better flow of traffic for those that commute to the west side for work. Impatient motorists stuck behind those driving below the speed limit routinely drive aggressively through this section in order to pass clusters of slower drivers. Building 2 lanes either direction will allow these motorists to safely pass slower drivers and reduce congestion through Lahaina.

Comment Log Submission No. 49

From:	no-reply@wspis.com
Sent:	Thursday, February 13, 2025 10:27 PM
To:	Small, Matthew; Liebowitz, Peter; Bents, Jamie; honoapiilanieis@online.wspis.com; Mitchell, Andrew
Subject:	New Comment from HonoapiilaniHwyImprovements.com

First Name: Elaine
Last Name: Baker
Email Address: Elaine.Baker@co.maui.hi.us
Join Mailing List: False
Comment:
Routing across any portion of the closed Olowalu Landfill should be avoided so that buried waste is not exposed to the environment. Routing across any portion of the Olowalu Recycling and Refuse Center will result in a reduction of solid waste services for West Maui.

Comment Log Submission No. 50

From: no-reply@wspis.com
Sent: Wednesday, February 12, 2025 10:24 PM
To: Small, Matthew; Liebowitz, Peter; Bents, Jamie; honoapiilanieis@online.wspis.com; Mitchell, Andrew
Subject: New Comment from HonoapiilaniHwyImprovements.com

First Name: Saman
Last Name: Dias
Email Address: maui@hbl.org
Join Mailing List: False
Comment:
February 12, 2025 Revised Testimony to HDOT and FHWA on Honoapi‘ilani Highway Improvements & West Maui Greenway Integration _____ To: Hawaii Department of Transportation (HDOT) Federal Highway Administration (FHWA) Subject: Integration of the West Maui Greenway (WMG) into the Honoapi‘ilani Highway Realignment & Compliance with ACT 214 Aloha, I am writing to provide testimony on the Honoapi‘ilani Highway (State Route 30) realignment and strongly urge HDOT and FHWA to incorporate the West Maui Greenway (WMG) as part of this project. This realignment presents an unprecedented opportunity to enhance multimodal transportation, improve emergency evacuation infrastructure, and align with long-standing but unfulfilled state policies—most notably Act 214 (2007), which mandated the use of cane haul roads for emergency evacuation. 1. HDOT’s Failure to Implement Act 214 – A Costly Oversight The 2007 Act 214 directed HDOT to incorporate cane haul roads into emergency evacuation planning. Yet over 100 lives were lost in the August 2023 Lahaina fire—many of which could have been prevented had these evacuation routes been open and accessible. • The Honoapi‘ilani Highway realignment must correct this tragic failure by formally incorporating cane haul roads as emergency evacuation routes. • HDOT must negotiate with private landowners for right-of-way access and develop permanent emergency routes as part of this highway realignment. • Failure to integrate emergency evacuation routes now would be a continuation of HDOT’s past neglect and put West Maui residents at continued risk. 2. West Maui Greenway as a Vital Multimodal Corridor & Emergency Route The West Maui Greenway (WMG), identified in the Hele Mai Maui Legacy Projects, is a critical component of West Maui’s future transportation network. This project is already funded in part and aligns with state and federal transportation priorities. • Use of (Old) State Route 30 for WMG’s Segment 6: o The realigned Honoapi‘ilani Highway creates a perfect opportunity to repurpose the old highway as a dedicated bike/pedestrian corridor. o This cost-effective solution promotes safe, non-motorized travel while doubling as an emergency evacuation route for residents and visitors. • Conformity with Climate & Community Goals: o Navahine Settlement Agreement (2024): HDOT must drastically reduce transportation-sector greenhouse gas emissions and prioritize multimodal solutions. o Act 131 & Complete Streets Policy: State law mandates that new highways must be bike-friendly and accommodate pedestrians. The WMG achieves this. 3. Current Funding & Alignment with Federal/State Priorities The WMG has secured substantial funding, and it is listed as a priority in multiple state and federal programs: ✅ $15 million RAISE Grant – Federal funds awarded for WMG implementation. ✅ Inclusion in the Statewide Transportation Improvement Program (STIP) – Recognized as a priority transportation project for Hawai‘i. ✅ Hele Mai Maui MPO Plan & Hawai‘i Bike Plan – Officially designated as a core component of Maui’s transportation future. With this funding in place, HDOT must act immediately to integrate WMG into the highway realignment. Delays in implementation put these

funds at risk. 4. A Safer Highway for Bicyclists & Pedestrians The new Honoapi‘ilani Highway must not repeat past mistakes—it must be designed with safety in mind: • Separated Bike Lanes & Pedestrian Crossings: o The highway realignment must include protected bicycle infrastructure, in accordance with the Complete Streets Policy & Act 131. o Safe pedestrian crossings must be prioritized to reduce conflict with vehicle traffic. • Disaster Preparedness Through Smart Design: o The WMG serves dual purposes—as a transportation corridor and evacuation route in case of future wildfires or climate-related disasters. Conclusion & Urgent Request for Action The Honoapi‘ilani Highway realignment is not just a highway project—it is a life-saving infrastructure upgrade. ✅ HDOT must implement the long-overdue Act 214 (2007) by formally incorporating cane haul roads as emergency evacuation routes. ✅ WMG’s Segment 6 must be integrated into the old highway to maximize the state’s investment in safe, sustainable transportation. ✅ The new highway must be bike-friendly, pedestrian-accessible, and aligned with state & federal multimodal goals. This is a critical moment for West Maui. HDOT and FHWA cannot afford to overlook these urgent priorities. I urge immediate action to ensure no more lives are lost due to lack of proper evacuation routes. Mahalo for your time and consideration. Respectfully submitted, Saman Dias Chair, Maui Bicycling League Together, we can make our streets safer for everyone. Saman Dias Chair Maui Bicycling League 808-209-2542 maui@hbl.org www.mauibike.org

Comment Log Submission No. 51

Comment Log Submission No. 51

From: maui@hbl.org <maui@hbl.org>
Sent: Wednesday, February 12, 2025 5:28:22 PM
To: Tatsuguchi, Ken <ken.tatsuguchi@hawaii.gov>
Cc: Saman Dias - Maui Bicycling League <Maui@hbl.org>
Subject: [EXTERNAL] Updated testimony

Aloha Ken,

Pls. accept my updated testimony.

Mahalo!
Saman

Together, we can make our streets safer for everyone.
Saman Dias
Chair Maui Bicycling League
808-209-2542
maui@hbl.org
Make a donation
www.mauibike.org/
Follow us on Facebook
Become a MBL member
Add to receive newsletter

February 12, 2025

Revised Testimony to HDOT and FHWA on Honoapi‘ilani Highway Improvements & West Maui Greenway Integration

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To:
Hawaii Department of Transportation (HDOT)
Federal Highway Administration (FHWA)

Subject: Integration of the West Maui Greenway (WMG) into the Honoapi‘ilani Highway Realignment & Compliance with ACT 214

Aloha,

I am writing to provide testimony on the Honoapi‘ilani Highway (State Route 30) realignment and strongly urge HDOT and FHWA to incorporate the **West Maui Greenway (WMG)** as part of this project. This realignment presents an **unprecedented opportunity** to enhance multimodal transportation, improve emergency evacuation infrastructure, and align with **long-standing but unfulfilled** state policies—most notably **Act 214 (2007),** which mandated the use of cane haul roads for emergency evacuation.

1. HDOT’s Failure to Implement Act 214 – A Costly Oversight

The **2007 Act 214** directed HDOT to incorporate cane haul roads into **emergency evacuation planning.** Yet over **100 lives were lost** in the August 2023 Lahaina fire—many of which could have been **prevented** had these evacuation routes been **open and accessible.**

- The **Honoapi‘ilani Highway realignment** must correct this **tragic failure** by formally incorporating **cane haul roads as emergency evacuation routes.**
- HDOT must **negotiate with private landowners** for right-of-way access and develop **permanent emergency routes** as part of this highway realignment.
- **Failure to integrate emergency evacuation routes now** would be a continuation of HDOT’s past neglect and put West Maui residents at continued risk.

2. West Maui Greenway as a Vital Multimodal Corridor & Emergency Route

The **West Maui Greenway (WMG),** identified in the **Hele Mai Maui Legacy Projects**, is a critical component of West Maui's future transportation network. This project is already funded in part and aligns with **state and federal transportation priorities.**

- **Use of (Old) State Route 30 for WMG's Segment 6:**
  - The realigned **Honoapi'ilani Highway creates a perfect opportunity** to repurpose the old highway as a dedicated bike/pedestrian corridor.
  - This **cost-effective** solution promotes **safe, non-motorized travel** while doubling as an **emergency evacuation route** for residents and visitors.
- **Conformity with Climate & Community Goals:**
  - **Navahine Settlement Agreement (2024):** HDOT must drastically reduce **transportation-sector greenhouse gas emissions** and prioritize multimodal solutions.
  - **Act 131 & Complete Streets Policy:** State law mandates that **new highways must be bike-friendly and accommodate pedestrians.** The **WMG achieves this.**

3. Current Funding & Alignment with Federal/State Priorities

The WMG **has secured substantial funding**, and it is listed as a priority in multiple state and federal programs:

✅ **$15 million RAISE Grant** – Federal funds awarded for WMG implementation.
✅ **Inclusion in the Statewide Transportation Improvement Program (STIP)** – Recognized as a priority transportation project for Hawai'i.
✅ **Hele Mai Maui MPO Plan & Hawai'i Bike Plan** – Officially designated as a **core component of Maui's transportation future.**

With this funding in place, HDOT must act **immediately** to integrate WMG into the highway realignment. **Delays in implementation put these funds at risk.**

4. A Safer Highway for Bicyclists & Pedestrians

The new Honoapi'ilani Highway must **not repeat past mistakes**—it must be designed with safety in mind:

- **Separated Bike Lanes & Pedestrian Crossings:**
  - The highway realignment **must include protected bicycle infrastructure**, in accordance with the **Complete Streets Policy & Act 131.**
  - Safe pedestrian crossings must be **prioritized** to reduce conflict with vehicle traffic.
- **Disaster Preparedness Through Smart Design:**
  - The **WMG serves dual purposes**—as a transportation corridor and **evacuation route** in case of future wildfires or climate-related disasters.

Conclusion & Urgent Request for Action

The **Honoapi‘ilani Highway realignment is not just a highway project—it is a life-saving infrastructure upgrade.**

✅ **HDOT must implement the long-overdue Act 214 (2007) by formally incorporating cane haul roads as emergency evacuation routes.**
✅ **WMG’s Segment 6 must be integrated into the old highway to maximize the state’s investment in safe, sustainable transportation.**
✅ **The new highway must be bike-friendly, pedestrian-accessible, and aligned with state & federal multimodal goals.**

This is a **critical moment for West Maui.** HDOT and FHWA **cannot afford to overlook these urgent priorities.** I urge immediate action to ensure **no more lives are lost due to lack of proper evacuation routes.**

Mahalo for your time and consideration.

Respectfully submitted,



Saman Dias
Chair, Maui Bicycling League

Together, we can make our streets safer for everyone.
Saman Dias
Chair Maui Bicycling League
808-209-2542
maui@hbl.org
www.mauibike.org

The following submissions were given during the public hearing as in-person verbal testimony. See DEIS Public Hearing Transcripts for the transcript of these comments.

Comment Log Submission No. 52 - Kellee Emmerich

Comment Log Submission No. 53 - Brad Emmerich

Comment Log Submission No. 54 - Raymond Ishii

Comment Log Submission No. 55 - David McPherson

Comment Log Submission No. 56 - Jason Wolford

Comment Log Submission No. 57 - Van Fischer

Comment Log Submission No. 58 - Nick Nielson

Comment Log Submission No. 59 - Malihini Keahi

Comment Log Submission No. 60 - Ms. Keele

Comment Log Submission No. 61 - Victoria Kaluna-Palafox

Comment Log Submission No. 62 - Linda Nahina Magallanes

Comment Log Submission No. 63 - Mr. Kaluna Palafox

Comment Log Submission No. 64 - Ms. Felice

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
1111 Broadway, Suite 1200
Oakland, CA 94607

February 18, 2025

IN REPLY REFER TO:
ER 25/0010
4111

Comment Log Submission No. 65

Ken Tatsuguchi
HDOT Highways Planning Branch
869 Punchbowl Street, Room 301
Honolulu, HI 96813

Subject: U.S. Department of the Interior Comments – DRAFT Section 4(f) Evaluation for *Honoapi'ilani Highway Improvements Project West Maui: Ukumehame to Launiupoko, December 2024*

Dear Ken Tatsuguchi:

The U.S. Department of the Interior (Department), as required by the Department of Transportation Act of 1966 (49 U.S.C. §303 and 23 U.S.C. §138), has reviewed the December 2024 DRAFT Section 4(f) Evaluation for *Honoapi'ilani Highway Improvements Project West Maui: Ukumehame to Launiupoko*.

The Hawai'i Department of Transportation (HDOT) proposes to build a new six-mile alignment of the Honoapi'ilani Highway to provide a reliable transportation facility in West Maui and reduce the highway's vulnerability to coastal hazards. Several areas with archaeological resources in Olowalu and Ukumehame were evaluated for potential impacts by one or more Build Alternatives. A draft Programmatic Agreement between HDOT and the Hawai'i State Historic Preservation Division includes protocols to avoid, minimize, or mitigate adverse effects to archaeological historic properties and burials. The 4(f) evaluation concludes that the Build Alternatives will not have direct, temporary, or constructive use of 4(f) resources within the Olowalu Sugar Plantation Historic District or on individually eligible and contributing resources in Olowalu. In Ukumehame, there are no eligible architectural historic properties - i.e., no 4(f) protected historic resources.

The Department, through the National Park Service (NPS), concurs with a de minimis finding, that the project will have no adverse effects on any Section 4(f) properties within the project area. If you have specific questions related to our comments, please contact Danette Woo Nolan at Danette_Woo@nps.gov. For all other questions, please contact me at Viktoriya_Sirova@ios.doi.gov.

Sincerely,

VIKTORIYA SIROVA
Digitally signed by VIKTORIYA SIROVA
Date: 2025.02.18 11:41:55 -08'00'

Viktoriya Sirova
Regional Environmental Officer

Electronic distribution: honoapiilanieis@online.wspis.com, ken.tatsuguchi@hawaii.gov

cc: Roxanne Runkel, National Park Service: Roxanne_Runkel@nps.gov
Danette Woo, National Park Service: Danette_Woo@nps.gov

JOSH GREEN, M.D.
GOVERNOR OF HAWAI'I
KE KIA'ĀINA O KA MOKU'ĀINA 'O HAWAI'I

KENNETH S. FINK, MD, MGA, MPH
DIRECTOR OF HEALTH
KA LUNA HO'OKELE

STATE OF HAWAII
DEPARTMENT OF HEALTH
KA 'OIHANA OLAKINO
P.O. Box 3378
HONOLULU, HAWAII 96801-3378

In reply, please refer to:
File:
24-288A CAB

July 3, 2024

MEMORANDUM

Comment Log Submission No. 66

TO: Agencies and Project Owners

FROM: MARIANNE ROSSIO, P.E., CHIEF
Clean Air Branch

SUBJECT: Clean Air Branch Standard Project Comments

This memo is provided for your information and sharing. You are encouraged to share this memo with your project partners, team members, and appropriate personnel.

The Department of Health (DOH), Clean Air Branch (CAB), will no longer be responding directly to requests for comments on the following documents (including pre-consultation, early consultation, preparation notice, draft, final, addendums, and/or supplements):

- Environmental Impact Statements (EIS)
- Environmental Assessments (EA)
- Anticipated Finding of No Environmental Significant Impacts (AFONSI)
- Conservation District Use Applications (CDUA)
- Special Management Area Permits (SMAP)

For agencies or project owners requiring DOH-CAB comments on one or more of these documents, please utilize the DOH-CAB Standard Comments below regarding your project's responsibilities to maintain air quality and any necessary permitting. DOH-CAB Standard Comments are also available on the DOH-CAB website located at: https://health.hawaii.gov/cab/files/2024/07/Standard-Comments-for-Land-Use-Reviews-Clean-Air-Branch-July_2024.pdf.

If you have any questions, please the Clean Air Branch at (808) 586-4200.

CH:rkb

Standard Comments for Land Use Reviews
Clean Air Branch
Hawaii State Department of Health
July 3, 2024

All project activities shall comply with Hawaii Administrative Rules (HAR), Chapter 11-59 and 11-60.1.

If your proposed project:

Requires an Air Pollution Control Permit

- You must obtain an air pollution control permit from the Clean Air Branch and comply with all applicable conditions and requirements. If you do not know if you need an air pollution control permit, please contact the Permitting Section of the Clean Air Branch.
- Permit application forms can be found here: https://health.hawaii.gov/cab/permit-application- forms/

Has the potential to generate fugitive dust

- You must reasonably control the generation of all airborne, visible fugitive dust. Note that construction activities that occur near existing residences, businesses, public areas and major thoroughfares exacerbate potential dust concerns. It is recommended that a dust control management plan be developed which identifies and mitigates all activities that may generate airborne, visible fugitive dust. The plan, which does *not* require Department of Health approval, should help you recognize and minimize potential airborne, visible fugitive dust problems.
- Construction activities must comply with the provisions of Hawaii Administrative Rules, §11- 60.1-33 on Fugitive Dust. In addition, for cases involving mixed land use, it is strongly recommended that buffer zones be established, wherever possible, in order to alleviate potential dust concerns.
- You must provide reasonable measures to control airborne, visible fugitive dust from the road areas and during the various phases of construction. These measures include, but are not limited to, the following:
    - Planning the different phases of construction, focusing on minimizing the amount of airborne, visible fugitive dust-generating materials and activities, centralizing on-site vehicular traffic routes, and locating potential dust-generating equipment in areas of the least impact;
    - Providing an adequate water source at the site prior to start-up of construction activities;
    - Landscaping and providing rapid covering of bare areas, including slopes, starting from the initial grading phase;
    - Minimizing airborne, visible fugitive dust from shoulders and access roads;
    - Providing reasonable dust control measures during weekends, after hours, and prior to daily start-up of construction activities; and
    - Controlling airborne, visible fugitive dust from debris being hauled away from the project site.
- If you have questions about fugitive dust, please contact the Enforcement Section of the Clean Air Branch. Please also see fugitive dust fact sheet at: https://health.hawaii.gov/cab/files/2024/02/Hawaii-Fugitive-Dust-Fact-Sheet-February-2024.pdf.

Includes construction, demolition, or renovation activities that involve potential asbestos and lead containing materials

- Please contact the Indoor and Radiological Health Branch at (808) 586-4700 or visit: https://health.hawaii.gov/irhb/

Increases the population and potential number of vehicles in an area

- The creation of apartment buildings, complexes, and residential communities may increase the overall population in an area. Increasing the population in an area may inadvertently lead to more air pollution via vehicle exhaust. Vehicle exhaust releases pollutants in the air that can negatively impact human health and air quality, including lung irritants, carcinogens, and greenhouse gases.
- Ensure that drivers keep vehicle idling times to three (3) minutes or less.
- Consider and incorporate support for alternative transportation options such as bike racks and/or electric vehicle charging stations where possible.

If you have any questions, please contact the Clean Air Branch at (808) 586-4200 or at cab@doh.hawaii.gov.

From:	no-reply@wspis.com
Sent:	Thursday, February 20, 2025 8:07 PM
To:	Small, Matthew; Liebowitz, Peter; Bents, Jamie; honoapiilanieis@online.wspis.com; Mitchell, Andrew
Subject:	New Comment from HonoapiilaniHwyImprovements.com

First Name: Kathleen
Last Name: Rooney
Email Address: krooney@ulupono.com
Join Mailing List: True
Comment:
Ulupono Initiative appreciates the Hawaii Department of Transportation's work on this realignment project and generally supports the chosen alternative; we acknowledge the significant amount of care and time spent on this project to bring it to this point. We also appreciate the department's transparent approach on the website, particularly the explicit connection to the Olowalu project, as well as discussions on Maui County's role in the use of the old road. While acknowledging these efforts, we recommend — similar to our past comments — that consideration be made to strengthening the multimodal and active transportation components within the project framework. This could include any number of more robust commitments, including: • Consider modifying the current cross-section design to be more amenable to active transportation elements, such as a moving the roads more inward and including a multi-use path. • Strengthen financial commitments to the active transportation infrastructure. While the West Maui Greenway represents a promising initiative, securing dedicated funding would ensure its implementation. Similar funding considerations could benefit the Olowalu project, creating a comprehensive active transportation network. This list is not exhaustive, and Ulupono stands ready to collaborate on the exploration of these and other options with Hawaii Department of Transportation. Mahalo, Kathleen Rooney Director, Transportation Policy and Programs Ulupono Initiative

Comment Log Submission No. 67

From: Morgan, Jeremy K CIV USARMY CEPOH (USA) <Jeremy.K.Morgan@usace.army.mil>
Sent: Friday, February 21, 2025 1:01 PM
To: Tatsuguchi, Ken <ken.tatsuguchi@hawaii.gov>
Subject: [EXTERNAL] U.S. Army Corps of Engineers Comments on Honoapi'ilani Highway Improvements Project Draft EIS

Aloha Mr. Tatsuguchi,

Please see the attached comment form for the Honoapi'ilani Highway Improvements Project draft EIS.

Mahalo,

Comment Log Submission No. 68

Jeremy Morgan
Biologist/Regulatory Specialist
Regulatory Division
U.S. Army Corps of Engineers | Honolulu District
230 Otake Street, Building 252
Fort Shafter, Hawaii 96858-5440
Phone: 808-551-5496
Jeremy.K.Morgan@usace.army.mil
https://www.poh.usace.army.mil/Missions/Regulatory/

RRS beta REGULATORY REQUEST SYSTEM
Streamline the permitting process with the **Regulatory Request System (RRS)** — your new online platform for permit applications.
rrs.usace.army.mil

Comment Form

Honoapiʻilani Highway Improvements DEIS

We want to hear from you! Please share your comments and questions with our team before February 24, 2025. More information on the Honoapiʻilani Highway Improvements project can be found at www.honoapiilanihwyimprovements.com. Thank you for your participation!

Thank you for allowing the U.S. Army Corps of Engineers the opportunity to provide comments
on the Honoapi'ilani Highway Improvements Project draft EIS. When fill quantities and impact
areas within aquatic resources are finalized, please submit a Corps permit application to
CEPOH-RO@usace.army.mil, so we can begin the review process for discharges of fill under
Section 404 of the Clean Water Act.

Providing your contact information below is optional. It will allow us to add you to the mailing/email list to receive future project information.

Name:

Address:

City: State: Zip:

Email: Phone:

Share your comments and questions by handing in this form at the hearing, by sending this form via mail or email, or by calling Ken Tatsuguchi from the Hawaii Department of Transportation.

Ken Tatsuguchi, HDOT
Email: ken.tatsuguchi@hawaii.gov
Phone: 808-587-1830

Federal Highway Administration, Hawaii Division
Attention: Richelle Takara, Division Administrator Box 50206, 300 Ala Moana Blvd., Room 3-229, Honolulu, HI 96850

The questions below are **optional**, but intended to help our staff better understand what worked well and what improvements to consider for future public meetings.

How did you hear about this public meeting? *(please check)*
❑ Newspaper ❑ Email ❑ Community board ❑ Word-of-mouth ❑ Social media
❑ Other: _____

Was the information easy to understand and informative? ❑ Yes ❑ No

Please indicate which of the following best represents you:
❑ Local Resident ❑ Local Business/Industry/Trade Association ❑ Neighborhood Group
❑ Local Non-Profit Organization ❑ National Environmental Organization
❑ Local or State Government ❑ Federal or Tribal Government
❑ Other (please specify) _____

Answering the following questions is optional, but your response will be extremely helpful in ensuring the fairness and equity of HDOT's public involvement process. Submissions will be kept confidential and separate from any personally identifiable information.

What is your race?
❑ Black or African American ❑ American Indian or Alaskan Native ❑ Asian
❑ Hispanic or Latino ❑ White ❑ Native Hawaiian or Other Pacific Islander
❑ I prefer to self-describe: _____

What is the primary language spoken in your home?
❑ English ❑ Hawaiian ❑ Spanish ❑ Tagalog ❑ Vietnamese
❑ Other (Please specify): _____

Was project information translated into other languages appropriately?
❑ Yes ❑ No ❑ Specify: _____

Gender identity:
❑ Man ❑ Woman ❑ Non-binary ❑ I prefer to self-describe: _____

Do any individuals living in your home have a physical or mental impairment that substantially limits one or more major life activities?
❑ Yes ❑ No

Please suggest additional ways you think HDOT and FHWA can improve the inclusiveness of public outreach efforts. **Thank you for completing this survey!**

_____

_____

JOSH GREEN, M.D.
GOVERNOR | KE KIA'ĀINA

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIA'ĀINA

DAWN N. S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

Comment Log Submission No. 69

STATE OF HAWAI'I | KA MOKU'ĀINA 'O HAWAI'I
DEPARTMENT OF LAND AND NATURAL RESOURCES
KA 'OIHANA KUMUWAIWAI 'ĀINA
LAND DIVISION

P.O. BOX 621
HONOLULU, HAWAII 96809

January 8, 2025

MEMORANDUM

TO: **DLNR Agencies:**
X Div. of Aquatic Resources (kendall.l.tucker@hawaii.gov)
___Div. of Boating & Ocean Recreation
X Engineering Division (DLNR.ENGR@hawaii.gov)
X Div. of Forestry & Wildlife (rubyrosa.t.terrago@hawaii.gov)
X Div. of State Parks (curt.a.cottrell@hawaii.gov)
X Commission on Water Resource Management (DLNR.CWRM@hawaii.gov)
X Office of Conservation & Coastal Lands (sharleen.k.kuba@hawaii.gov)
X Land Division – Maui District (dlnr.land.maui@hawaii.gov)
X Aha Moku Advisory Committee (leimana.k.damate@hawaii.gov)

FROM: Russell Y. Tsuji, Land Administrator *Russell Tsuji*
SUBJECT: DEIS for **Honoapi'ilani Highway Improvements**
LOCATION: Ukumehame to Launiupoko, Lahaina, Island of Maui; Portions of TMK Plats: (2) 4-7-001, 4-8-0001, 002, 003,004, and Honoapi'ilani Highway ROWs
APPLICANT: Hawaii Department of Transportation, Highways Division

Transmitted for your review and comment is information on the above-referenced subject matter. The DEIS was published on January 8, 2025, by the State Environmental Review Program (formerly the Office of Environmental Quality Control) at the Office of Planning and Sustainable Development in the periodic bulletin, The Environmental Notice, available at the following link:

https://files.hawaii.gov/dbedt/erp/The_Environmental_Notice/2025-01-08-TEN.pdf

Please submit any comments by **February 21, 2025**. If no response is received by this date, we will assume your agency has no comments. Should you have any questions, please contact Darlene Nakamura directly via email at darlene.k.nakamura@hawaii.gov. Thank you.

BRIEF COMMENTS:

( ) We have no objections.
( ) We have no comments.
(___) We have no additional comments.
(☑) Comments are included/attached.

Signed: *Brian J. Neilson*
Print Name: Brian J. Neilson-Administrator
Division: Aquatic Resources
Date: 02/21/2025

Attachments
cc: Central File

JOSH GREEN, M.D.
GOVERNOR | KE KIA'ĀINA

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIA'ĀINA

STATE OF HAWAIʻI | KA MOKUʻĀINA ʻO HAWAIʻI
DEPARTMENT OF LAND AND NATURAL
RESOURCES DIVISION OF AQUATIC RESOURCES
1151 PUNCHBOWL STREET, ROOM 330
HONOLULU, HAWAII 96813

Date: 2/21/2025
DAR # AR6823

DAWN N.S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE
MANAGEMENT

RYAN K,P. KANAKA"OLE
FIRST DEPUTY

CIARA W.K. KAHAHANE
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION BUREAU
OF CONVEYANCES
COMMISSION ON WATER RESOURCE
MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES
ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

MEMORANDUM

TO: Brian J. Neilson
DAR Administrator

FROM: Haruko Mauro-Koike, Aquatic Biologist

SUBJECT: Review of DEIS for Honoapi'ilani Highway Improvements

Request Submitted by: Russell Y. Tsuji, Land Administrator

Location of Project: Ukumehame to Launiupoko, Lahaina, Island of Maui; Portions of TMK Plats: (2) 4-7-001, 4-8-0001, 002, 003,004, and Honoapi'ilani Highway ROWs

Brief Description of Project:

Honoapiʻilani Highway (State Route 30) provides the main access between communities along the west coast of Maui and the rest of the island and is subject to periodic flooding and coastal erosion. The primary purpose of this project is to provide a reliable transportation facility in West Maui by reducing the highway's vulnerability to coastal hazards. Specifically, the project proposes to relocate about 6 miles of the highway away from the coastline from approximately milepost 11, in the vicinity of Pāpalaua Wayside Park to Launiupoko, at milepost 17, the existing southern terminus of Lāhainā Bypass.

Comments:

☐ No Comments ☑ Comments Attached

Thank you for providing DAR the opportunity to review and comment on the proposed project. Should there be any changes to the project plan, DAR requests the opportunity to review and comment on those changes.

Comments Approved: _____ Date: 02/21/2025

Brian J. Neilson
DAR Administrator

DAR# AR6823

Comments

The project will cross two major streams—Ukumehame and Olowalu—but the Draft Environmental Impact Statement (EIS) does not adequately assess the potential impacts of the highway relocation on these streams. Both streams are home to endemic Hawaiian gobies, including the IUCN-listed Sicyopterus stimpsoni, and snails, which have been observed during the CWRM/DAR stream monitoring. As these species are amphidromous, they rely on healthy and continuous stream habitats for their life cycles. Therefore, we recommend that a more detailed analysis of impacts to the stream habitats be included in this EIS.

Additionally, the EIS does not clearly specify the type of stream crossing to be used. The impact on water flow and habitat connectivity will differ significantly depending on whether a culvert, bridge, or viaduct is employed. It is important to note that culverts, over time, can develop undercuts and erosion, which can obstruct the migration of stream species and disrupt habitat continuity. These potential issues should be avoided. There are also no clearly defined Best Management Practices (BMPs) for stream protection during construction.

The report identifies Alternative 2 as the preferred route for Olowalu and Alternative 1 for Ukumehame. However, in Table S-3, a new column labeled "Preferred Alternative" appears, which the score does not seem to align with Ukumehame's Alternative 1. Figure S-6 depicts the preferred alternative route, but it labels it as U-1 and O-2, making it difficult to clearly distinguish the modified section. According to Table S-3, the preferred alternative is intended to reduce impacts to the wetland, and we would like to see a clearer depiction of how this route has been modified from Alternative 1 on the map. Furthermore, it would be appreciated if wetland and other waterbodies are delineated in the map to assess the impact to the area more accurately.

Although O-3/4 and U-4 did not achieve the highest overall score, from an environmental perspective, these alternatives perform well by minimizing impacts to the wetland and preserving the vulnerable lower stream reach habitat. This habitat is crucial for two of our endemic goby species, Eleotris sandwicensis and Stenogobius hawaiiensis, which are unable to migrate to the upper reaches. Additionally, the sea level rise simulation indicates that certain sections of the preferred U1 route will be adjacent to or within the sea level rise exposure area, potentially increasing the risk of coastal hardening and erosion in the future.

JOSH GREEN, M.D.
GOVERNOR | KE KIA'ĀINA

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIA'ĀINA

DAWN N. S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAI'I | KA MOKU'ĀINA 'O HAWAI'I
DEPARTMENT OF LAND AND NATURAL RESOURCES
KA 'OIHANA KUMUWAIWAI 'ĀINA
LAND DIVISION

P.O. BOX 621
HONOLULU, HAWAII 96809

January 8, 2025

MEMORANDUM

FROM: ~~TO:~~ **DLNR Agencies:**
X Div. of Aquatic Resources (kendall.l.tucker@hawaii.gov)
___ Div. of Boating & Ocean Recreation
X Engineering Division (DLNR.ENGR@hawaii.gov)
X Div. of Forestry & Wildlife (rubyrosa.t.terrago@hawaii.gov)
X Div. of State Parks (curt.a.cottrell@hawaii.gov)
X Commission on Water Resource Management (DLNR.CWRM@hawaii.gov)
X Office of Conservation & Coastal Lands (sharleen.k.kuba@hawaii.gov)
X Land Division – Maui District (dlnr.land.maui@hawaii.gov)
X Aha Moku Advisory Committee (leimana.k.damate@hawaii.gov)

TO: ~~FROM:~~ Russell Y. Tsuji, Land Administrator *Russell Tsuji*
SUBJECT: **DEIS for Honoapi'ilani Highway Improvements**
LOCATION: Ukumehame to Launiupoko, Lahaina, Island of Maui; Portions of TMK Plats: (2) 4-7-001, 4-8-0001, 002, 003,004, and Honoapi'ilani Highway ROWs
APPLICANT: Hawaii Department of Transportation, Highways Division

Transmitted for your review and comment is information on the above-referenced subject matter. The DEIS was published on January 8, 2025, by the State Environmental Review Program (formerly the Office of Environmental Quality Control) at the Office of Planning and Sustainable Development in the periodic bulletin, The Environmental Notice, available at the following link:

https://files.hawaii.gov/dbedt/erp/The_Environmental_Notice/2025-01-08-TEN.pdf

Please submit any comments by **February 21, 2025**. If no response is received by this date, we will assume your agency has no comments. Should you have any questions, please contact Darlene Nakamura directly via email at darlene.k.nakamura@hawaii.gov. Thank you.

BRIEF COMMENTS:

( ) We have no objections.
( ) We have no comments.
( ) We have no additional comments.
(✓) Comments are included/attached.

Signed: *Dina Lau*
Print Name: Dina U. Lau, Acting Chief Engineer
Division: Engineering Division
Date: Feb 18, 2025

Attachments
cc: Central File

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/Russell Y. Tsuji
Ref: DEIS for Honoapi'ilani Highway Improvements
Location: Ukumehame to Launiupoko, Lahaina, Island of Maui
TMK(s): (2) 4-7-001, 4-8-001, 002, 003, 004, and Honoapi'ilani Highway ROWs
Applicant: Hawaii Department of Transportation, Highways Division

COMMENTS

The rules and regulations of the National Flood Insurance Program (NFIP), Title 44 of the Code of Federal Regulations (44CFR), are in effect when development falls within a Special Flood Hazard Area (high-risk areas). Be advised that 44CFR, Chapter 1, Subchapter B, Part 60 reflects the minimum standards as set forth by the NFIP. Local community flood ordinances may stipulate higher standards that can be more restrictive and would take precedence over the minimum NFIP standards.

The owner of the project property and/or their representative is responsible for researching the Flood Hazard Zone designation for the project. Flood zones subject to NFIP requirements are identified on FEMA's Flood Insurance Rate Maps (FIRM). The official FIRMs can be accessed through FEMA's Map Service Center (msc.fema.gov). Our Flood Hazard Assessment Tool (FHAT) (fhat.hawaii.gov) could also be used to research flood hazard information.

If there are questions regarding the local flood ordinances, please contact the applicable County NFIP coordinating agency below:

- Oahu: City and County of Honolulu, Department of Planning and Permitting (808) 768-8098.
- Hawaii Island: County of Hawaii, Department of Public Works (808) 961-8327.
- Maui/Molokai/Lanai County of Maui, Department of Planning (808) 270-7139.
- Kauai: County of Kauai, Department of Public Works (808) 241-4849.

Signed: _____
DINA U. LAU, ACTING CHIEF ENGINEER

Date: Feb 18, 2025

Comment Log Submission No. 71

JOSH GREEN, M.D.
GOVERNOR | KE KIA'ĀINA

DAWN N.S. CHANG
CHAIRPERSON

KENNETH S. FINK, M.D., MGA, MPH
AURORA KAGAWA-VIVIANI, PH.D.
WAYNE K. KATAYAMA
PAUL J. MEYER
LAWRENCE H. MIIKE, M.D., J.D.
V.R. HINANO RODRIGUES

CIARA W.K. KAHAHANE
DEPUTY DIRECTOR

STATE OF HAWAI'I | KA MOKU'ĀINA 'O HAWAI'I
DEPARTMENT OF LAND AND NATURAL RESOURCES | KA 'OIHANA KUMUWAIWAI 'ĀINA
COMMISSION ON WATER RESOURCE MANAGEMENT | KE KAHUWAI PONO
P.O. BOX 621
HONOLULU, HAWAII 96809

Feb 3, 2025

REF: RFD.6371.6

TO: Mr. Russell Tsuji, Administrator
Land Division

FROM: Ciara W.K. Kahahane, Deputy Director
Commission on Water Resource Management

SUBJECT: Honoapi'ilani Highway Improvements

FILE NO.: RFD.6371.6
TMK NO.: (2) 4-7-001, 4-8-0001, 002, 003,004

Thank you for the opportunity to review the subject document. The Commission on Water Resource Management (CWRM) is the agency responsible for administering the State Water Code (Code). Under the Code, all waters of the State are held in trust for the benefit of the citizens of the State, therefore all water use is subject to legally protected water rights. CWRM strongly promotes the efficient use of Hawaii's water resources through conservation measures and appropriate resource management. For more information, please refer to the State Water Code, Chapter 174C, Hawaii Revised Statutes, and Hawaii Administrative Rules, Chapters 13-167 to 13-171. These documents are available via the Internet at http://dlnr.hawaii.gov/cwrm.

Our comments related to water resources are checked off below.

- [ ] 1. We recommend coordination with the county to incorporate this project into the county's Water Use and Development Plan. Please contact the respective Planning Department and/or Department of Water Supply for further information.
- [ ] 2. We recommend coordination with the Engineering Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.
- [ ] 3. We recommend coordination with the Hawaii Department of Agriculture (HDOA) to incorporate the reclassification of agricultural zoned land and the redistribution of agricultural resources into the State's Agricultural Water Use and Development Plan (AWUDP). Please contact the HDOA for more information.
- [ ] 4. We recommend that water efficient fixtures be installed and water efficient practices implemented throughout the development to reduce the increased demand on the area's freshwater resources. Reducing the water usage of a home or building may earn credit towards Leadership in Energy and Environmental Design (LEED) certification. More information on LEED certification is available at http://www.usgbc.org/leed. A listing of fixtures certified by the EAP as having high water efficiency can be found at http://www.epa.gov/watersense.
- [X] 5. We recommend the use of best management practices (BMP) for stormwater management to minimize the impact of the project to the existing area's hydrology while maintaining on-site infiltration and preventing polluted runoff from storm events. Stormwater management BMPs may earn credit toward LEED certification. More information on stormwater BMPs can be found at http://planning.hawaii.gov/czm/initiatives/low-impact-development/
- [ ] 6. We recommend the use of alternative water sources, wherever practicable.
- [ ] 7. We recommend participating in the Hawaii Green Business Program, that assists and recognizes businesses that strive to operate in an environmentally and socially responsible manner. The program description can be found online at http://energy.hawaii.gov/green-business-program.
- [ ] 8. We recommend adopting landscape irrigation conservation best management practices endorsed by the Landscape Industry Council of Hawaii. These practices can be found online at http://www.hawaiiscape.com/wp-content/uploads/2013/04/LICH_Irrigation_Conservation_BMPs.pdf.

- [X] 9. There may be the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.
- [ ] 10. The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit is required prior to use of water. The Water Use Permit may be conditioned on the requirement to use dual line water supply systems for new industrial and commercial developments.
- [ ] 11. The Hawaii Water Plan is directed toward the achievement of the utilization of reclaimed water for uses other than drinking and for potable water needs in one hundred per cent of State and County facilities by December 31, 2045 (§174C-31(g)(6), Hawaii Revised Statutes). We strongly recommend that this project consider using reclaimed water for its non-potable water needs, such as irrigation. Reclaimed water may include, but is not limited to, recycled wastewater, gray water, and captured rainwater/stormwater. Please contact the Hawai'i Department of Health, Wastewater Branch, for more information on their reuse guidelines and the availability of reclaimed water in the project area.
- [ ] 12. A Well Construction Permit(s) is (are) are required before the commencement of any well construction work.
- [ ] 13. A Pump Installation Permit(s) is (are) required before ground water is developed as a source of supply for the project.
- [ ] 14. There is (are) well(s) located on or adjacent to this project. If wells are not planned to be used and will be affected by any new construction, they must be properly abandoned and sealed. A permit for well abandonment must be obtained.
- [ ] 15. Ground-water withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.
- [ ] 16. A Stream Channel Alteration Permit(s) is (are) required before any alteration can be made to the bed and/or banks of a steam channel.
- [ ] 17. A Stream Diversion Works Permit(s) is (are) required before any stream diversion works is constructed or altered.
- [ ] 18. A Petition to Amend the Interim Instream Flow Standard is required for any new or expanded diversion(s) of surface water.
- [ ] 19. The planned source of water for this project has not been identified in this report. Therefore, we cannot determine what permits or petitions are required from our office, or whether there are potential impacts to water resources.

- [ ] OTHER:

If you have any questions, please contact Ryan Imata of the Groundwater Regulation Branch at (808) 587-0225 or Katie Roth of the Planning Branch (808) 587-0216.

MA-25-120 AW

RECEIVED
LAND DIVISION
2025 FEB 14 PM 2:16
DEPT. OF LAND &
NATURAL RESOURCES
STATE OF HAWAII

JOSH GREEN, M.D.
GOVERNOR | KE KIA'ĀINA

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIA'ĀINA

DAWN N. S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RECEIVED
OFFICE OF CONSERVATION
AND COASTAL LANDS
2025 JAN -8 A 11:12
DEPT. OF LAND &
NATURAL RESOURCES
STATE OF HAWAII

STATE OF HAWAI'I | KA MOKU'ĀINA 'O HAWAI'I
DEPARTMENT OF LAND AND NATURAL RESOURCES
KA 'OIHANA KUMUWAIWAI 'ĀINA
LAND DIVISION

P.O. BOX 621
HONOLULU, HAWAII 96809

Comment Log Submission No. 72

January 8, 2025

MEMORANDUM

TO: **DLNR Agencies:**
X Div. of Aquatic Resources (kendall.l.tucker@hawaii.gov)
__ Div. of Boating & Ocean Recreation
X Engineering Division (DLNR.ENGR@hawaii.gov)
X Div. of Forestry & Wildlife (rubyrosa.t.terrago@hawaii.gov)
X Div. of State Parks (curt.a.cottrell@hawaii.gov)
X Commission on Water Resource Management (DLNR.CWRM@hawaii.gov)
X Office of Conservation & Coastal Lands (sharleen.k.kuba@hawaii.gov)
X Land Division – Maui District (dlnr.land.maui@hawaii.gov)
X Aha Moku Advisory Committee (leimana.k.damate@hawaii.gov)

FROM: Russell Y. Tsuji, Land Administrator *Russell Tsuji*
SUBJECT: DEIS for **Honoapi'ilani Highway Improvements**
LOCATION: Ukumehame to Launiupoko, Lahaina, Island of Maui; Portions of TMK Plats: (2) 4-7-001, 4-8-0001, 002, 003,004, and Honoapi'ilani Highway ROWs
APPLICANT: Hawaii Department of Transportation, Highways Division

Transmitted for your review and comment is information on the above-referenced subject matter. The DEIS was published on January 8, 2025, by the State Environmental Review Program (formerly the Office of Environmental Quality Control) at the Office of Planning and Sustainable Development in the periodic bulletin, The Environmental Notice, available at the following link:

https://files.hawaii.gov/dbedt/erp/The_Environmental_Notice/2025-01-08-TEN.pdf

Please submit any comments by **February 21, 2025**. If no response is received by this date, we will assume your agency has no comments. Should you have any questions, please contact Darlene Nakamura directly via email at darlene.k.nakamura@hawaii.gov. Thank you.

BRIEF COMMENTS:

( ) We have no objections.
( ) We have no comments.
( ) We have no additional comments.
(✓) Comments are included/attached.

Signed: Michael Cain
Print Name: MICHAEL CAIN
Division: OCCL
Date:

Attachments
cc: Central File

JOSH GREEN, M.D.
GOVERNOR | KE KIA'ĀINA

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIA'ĀINA

STATE OF HAWAI'I | KA MOKU'ĀINA 'O HAWAI'I
DEPARTMENT OF LAND AND NATURAL RESOURCES
KA 'OIHANA KUMUWAIWAI 'ĀINA
Office of Conservation and Coastal Lands
P.O. BOX 621
HONOLULU, HAWAII 96809

DAWN N.S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RYAN K.P. KANAKA'OLE
FIRST DEPUTY

CIARA W.K. KAHAHANE
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

REF:OCCL:AW

Corr. MA-25-120

MEMORANDUM

TO: Russell Y. Tsuji, Administrator
Land Division Administrator

FROM: Michael Cain, Administrator
Office of Conservation and Coastal Lands (OCCL)

SUBJECT: Draft Environmental Impact Statement (DEIS) for Honoapi`ilani Highway Improvements, Ukumehame to Launipoko, Lahaina, Island of Maui; Portions of Tax Map Keys (TMKs) (2) 4-7-001, (2) 4-8-001, (2) 4-8-002, (2) 4-8-003, and (2) 4-8-004.

The Department of Land and Natural Resources (DLNR), Office of Conservation and Coastal Lands (OCCL) is responding the request for comments on the DEIS for the proposed Honoapi`ilani Highway Improvements. The OCCL regulates land uses in the Conservation District. The preferred alternative as presented in the DEIS moves the existing highway out of the Conservation District and away from coastal hazards and sea level rise. According to the plans as presented in the DEIS, the intent of DOT is to leave the existing road and shoreline hardening structures in place, and to transfer ownership and maintenance responsibilities to Maui County to become a local access road. OCCL would like to see an assessment of the cost and long-term impact to the shoreline of removal of the existing road and all affiliated protective structures. Given the history and exposure of portions of the existing road to high waves, high tides and sea level rise, ongoing hardening and continual maintenance operations in the Conservation District may be required to maintain the road in service.

Portions of the old road are in the Limited Subzone of the Conservation District. Per HAR §15-5-12, the objective of the Limited Subzone is to "limit uses where natural conditions suggest constraints on human activities". The natural conditions at the location of the existing highway have necessitated the improvement plan and realignment of the road away from coastal hazards and sea level rise. As identified in the DEIS, approximately four of the six miles of highway proposed for relocation are in the sea level rise exposure area (SLR-XA) at a predicted 3.2ft of sea level rise. The DEIS acknowledges that continued use of the highway at its existing location would require ongoing maintenance work and hardening to achieve short-term fixes to

the chronic impacts of coastal hazards. Footnote 5 on page 2-12 of the DEIS states the following: "As part of the relinquishment process, HDOT and the FHWA must concur that the land is not needed for federal-aid Highway purposes in the foreseeable future, that the new roadway segment and its traffic operations would not be adversely affected by relinquishments, and that the lands are not suitable to restore, preserve, or improve the scenic beauty of the new roadway."

The lands which are currently occupied by the existing highway are suitable for restoration. Naturalization of the shoreline would improve public access, return public trust land to the public, and benefit reef health at the Olowalu reef by enabling the land to naturally filter freshwater runoff. Restoration may provide a more substantial storm and wave buffer for the areas of the realigned highway which will remain in the SLR-XA. Finally, the scenic beauty of the realigned road will be improved if the existing road is removed and restored to a natural beach profile.

Please contact Amy Wirts, University of Hawai'i Sea Grant Extension Agent and OCCL Coastal Lands Program Coordinator at (808) 587-0376 or by email at Amy.E.Wirts@hawaii.gov, should you have any questions regarding this matter.

JOSH GREEN, M.D.
GOVERNOR | KE KIA'ĀINA

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIA'ĀINA

DAWN N. S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

Comment Log Submission No. 73

STATE OF HAWAI'I | KA MOKU'ĀINA 'O HAWAI'I
DEPARTMENT OF LAND AND NATURAL RESOURCES
KA 'OIHANA KUMUWAIWAI 'ĀINA
LAND DIVISION

P.O. BOX 621
HONOLULU, HAWAII 96809

January 8, 2025

MEMORANDUM

TO: **DLNR Agencies:**
X Div. of Aquatic Resources (kendall.l.tucker@hawaii.gov)
___Div. of Boating & Ocean Recreation
X Engineering Division (DLNR.ENGR@hawaii.gov)
X Div. of Forestry & Wildlife (rubyrosa.t.terrago@hawaii.gov)
X Div. of State Parks (curt.a.cottrell@hawaii.gov)
X Commission on Water Resource Management (DLNR.CWRM@hawaii.gov)
X Office of Conservation & Coastal Lands (sharleen.k.kuba@hawaii.gov)
X Land Division – Maui District (dlnr.land.maui@hawaii.gov)
X Aha Moku Advisory Committee (leimana.k.damate@hawaii.gov)

FROM: Russell Y. Tsuji, Land Administrator *Russell Tsuji*
SUBJECT: DEIS for **Honoapi'ilani Highway Improvements**
LOCATION: Ukumehame to Launiupoko, Lahaina, Island of Maui; Portions of TMK Plats: (2) 4-7-001, 4-8-0001, 002, 003,004, and Honoapi'ilani Highway ROWs
APPLICANT: Hawaii Department of Transportation, Highways Division

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https://files.hawaii.gov/dbedt/erp/The_Environmental_Notice/2025-01-08-TEN.pdf

Please submit any comments by **February 21, 2025**. If no response is received by this date, we will assume your agency has no comments. Should you have any questions, please contact Darlene Nakamura directly via email at darlene.k.nakamura@hawaii.gov. Thank you.

BRIEF COMMENTS:

( ) We have no objections.
(☑) We have no comments.
( ) We have no additional comments.
( ) Comments are included/attached.

Signed: _____

Print Name: _____

Division: DLNR - MDLO

Date: 02/21/2025

Attachments
cc: Central File

From:	no-reply@wspis.com
Sent:	Thursday, February 20, 2025 8:07 PM
To:	Small, Matthew; Liebowitz, Peter; Bents, Jamie; honoapiilanieis@online.wspis.com; Mitchell, Andrew
Subject:	New Comment from HonoapiilaniHwyImprovements.com

First Name: Kathleen
Last Name: Rooney
Email Address: krooney@ulupono.com
Join Mailing List: True
Comment:
Ulupono Initiative appreciates the Hawaii Department of Transportation's work on this realignment project and generally supports the chosen alternative; we acknowledge the significant amount of care and time spent on this project to bring it to this point. We also appreciate the department's transparent approach on the website, particularly the explicit connection to the Olowalu project, as well as discussions on Maui County's role in the use of the old road. While acknowledging these efforts, we recommend — similar to our past comments — that consideration be made to strengthening the multimodal and active transportation components within the project framework. This could include any number of more robust commitments, including: • Consider modifying the current cross-section design to be more amenable to active transportation elements, such as a moving the roads more inward and including a multi-use path. • Strengthen financial commitments to the active transportation infrastructure. While the West Maui Greenway represents a promising initiative, securing dedicated funding would ensure its implementation. Similar funding considerations could benefit the Olowalu project, creating a comprehensive active transportation network. This list is not exhaustive, and Ulupono stands ready to collaborate on the exploration of these and other options with Hawaii Department of Transportation. Mahalo, Kathleen Rooney Director, Transportation Policy and Programs Ulupono Initiative

Comment Log Submission No. 74

From: TN JD <tnjd76@gmail.com>
Sent: Saturday, February 22, 2025 9:24 PM
To: Tatsuguchi, Ken <ken.tatsuguchi@hawaii.gov>; honoapiilanieis@online.wspis.com
Subject: [EXTERNAL] Maui Greenway Project and Realignment of the Honoapi'ilani Hwy Testimony

Aloha,

Comment Log Submission No. 75

I am writing to express my support for the proposed 6.5-mile mauka relocation of the Honoapiʻilani Highway, in conjunction with the Maui Greenway Project . Before moving to the islands in 2018, I had lived in two towns/cities (Boulder, CO and Melbourne, Australia) with amazing greenway infrastructure, and had travelled to several others (Austin, TX, Copenhagen, DEN, Sydney, AUS) I saw the benefits that the greenways brought to the communities where they were located. They were heavily utilized for commuting and exercise, but also created environmental enhancement and protection. The greenways created natural buffers and green spaces and reduced congestion, but also created a tighter knit sense of community and a peaceful environment for nearby home owners. 1

My dream is that Maui could become another model community which demonstrates the positive impacts of greenspace and greenways, and this is the perfect opportunity to begin making this happen. I feel like it could be a key component to recreating a sense of renewal on the West Side while also creating a sense of newness and hope in the community and island at large.

Further, this is a critical realignment that will safeguard a vital transportation corridor that serves as a lifeline for West Maui residents, workers, and visitors, addressing the escalating risks posed by rising sea levels and climate change. As we work toward a more resilient future, this project is a pivotal step in West Maui's recovery, resilience, and sustainability.

I respectfully urge the Hawaiʻi Department of Transportation (HDOT) to prioritize the following key elements within this project:

1. Utilization of the Old Highway 30 for West Maui Greenway Segments 6 and 7
    - The existing coastal highway presents an ideal route for a dedicated bike and pedestrian path.
    - Repurposing this scenic corridor as a multi-use trail is a cost-effective solution that supports safe, non-motorized transportation and recreation.
    - This approach would facilitate the implementation of Segments 6 and 7 of the WMG (as outlined on pages 111 and 51 of the WMG Master Plan), creating a continuous and connected path linking West Maui communities.

2. Alignment with Climate and Community Goals
    - Incorporating the WMG within the realignment project would align with Maui's commitment to climate resilience, as outlined in the Nā Wahine Climate Settlement Agreement.
    - A multi-modal transportation corridor, featuring pedestrian and bike-friendly infrastructure, supports efforts to reduce emissions, promote healthy lifestyles, and enhance disaster preparedness.
3. Community-Driven Design for Long-Term Benefits
    - By transforming the former highway into a recreational and commuting pathway, we can create a lasting community asset that bolsters economic recovery, and public health.
    - A dedicated bike and pedestrian trail would provide safe, scenic access to key cultural and natural landmarks, fostering community pride and environmental stewardship.

In summary, while I support the current realignment effort, I respectfully request that the HDOT integrates plans for the West Maui Greenway into the redevelopment of the former highway route. By repurposing this space for non-motorized transportation, we can build a legacy of sustainable infrastructure that meets the needs of future generations and supports West Maui's long-term recovery and growth.

Thank you for the opportunity to provide testimony.
Mahalo nui loa for your consideration.

--
Julie Durham
LMW, VSW
808-673-6970

Comment Log Submission No. 76

-----Original Message-----
From: Dr. Marion Ceruti <ceruti@earthlink.net>
Sent: Friday, February 21, 2025 5:26 PM
To: Tatsuguchi, Ken <ken.tatsuguchi@hawaii.gov>
Subject: [EXTERNAL] Proposal to install road mauka of Honoapi'ilani Hwy N of Papalaua on Maui

Aloha Mr. Tatsuguchi,

Mahalo for the opportunity to comment on the EIS for the proposed road project.

In general, the idea is good but care should be taken to provide sufficient exits and roads in the makai direction for beach access, to include better parking, particularly at the Ukumehame beach park, on the mauka side of the existing road, if possible.

Moreover, more and better parking is needed at the Ukumehame Firing Range[1] to keep users from having to park their cars in the mud puddles. This is a great opportunity to upgrade the parking at Papalaua to do something about the drainage problem that has plagued the area for years.

It might be necessary to relocate the nenes in the area temporarily, for their safety.

E Hana Kakou,

Dr. Marion Ceruti,
West Maui resident

Sent from my iPad

JOSH GREEN, M.D.
GOVERNOR

KEITH T. HAYASHI
SUPERINTENDENT

Comment Log Submission No. 77

STATE OF HAWAI'I
DEPARTMENT OF EDUCATION
KA 'OIHANA HO'ONA'AUAO
P.O. BOX 2360
HONOLULU, HAWAI'I 96804

OFFICE OF FACILITIES AND OPERATIONS

February 21 , 2025

Mr. Ken Tatsuguchi, PE
Hawaii Department of Transportation
Highways, Planning Branch
869 Punchbowl Street, Room 301
Honolulu, Hawaii 96813

Re: Honoapiilani Highway Improvements

Dear Mr. Tatsuguchi:

Thank you for your email dated January 6, 2025. Based on the information provided and despite the Lahaina Bypass Highway serving as an alternate route for Honoapiilani Highway, the Hawaii State Department of Education (Department) is concerned about commute times and traffic patterns for its students, parents, and staff as there are many that have been displaced to different parts of the island due to the West Maui Wildfires. With the uncertainty that still lies ahead, the Department requests that your staff and consultants meet with the administrators of Lahainaluna High, Lahaina Intermediate, and Nahienaena Elementary Schools to present traffic impacts leading to and from each of these campuses and specific timelines associated with the project.

Should you have any questions, please contact Cori China, of the Facilities Development Branch, Planning Section, at (808) 784-5080 or via email at cori.china@k12.hi.us.

We appreciate the opportunity to comment.

Sincerely,

Roy Ikeda
Interim Public Works Manager
Planning Section

RI:ctc
c: Rebecca Winkie, Complex Area Superintendent, Hana-Lahainaluna-Lanai-Molokai Complex Area
Facilities Development Branch

From: Dennis Eyler <denne712@aol.com>
Sent: Monday, February 10, 2025 2:26 PM
To: Tatsuguchi, Ken <ken.tatsuguchi@hawaii.gov>; honoapiilanieis@online.wspis.com
Subject: [EXTERNAL] H-30 Project DEIS

Comment Log Submission No. 78

Aloha,

I was able to attend the first four of the public presentation of the DEIS for this project on January 23. I have filled out the form that was handed out and I have attached a copy to this email.

My interest in this project is based on several things. 1

1. My wife and I have been regular visitors to Maui since the 1990's. In 2012, after I retired, we bought a residence here and since then, we spend several months of the year on the island.

2. We were shocked and saddened at what happened to Lahaina as a result of the fires. We know several people who lost their homes.

3. I would like to help in the island's recovery.

4. I spent my career as a traffic and highway preliminary design engineer, and I worked as an employee for 2 state transportation departments and then as a consultant for government agencies for 35 years and worked on highway projects in 6 different states. I have attached a copy of my resume.

5. Since the 1990's I have been involved with the development and implementation of projects meeting the design criteria of the Super-2 highway concept and also in the development and implementation of reduced conflict intersections (RCIs). The RCI concept utilizes the proven safety benefits of certain roundabout features but also strives to minimize the added travel time to the major roadway when it intersects with low volume minor roadways. I have attached a few of the technical papers I have presented on these topics. The most recent was at the University of Minnesota's Center for Transportation Studies annual meeting in 2023. It was on the subject of the Super-2 and in that presentation, I referenced the completed section of the Lahaina Bypass on pages 14 and 35.

6. I am also very impressed by the high daily traffic volumes carried by the existing facility. Of course, I also realize that the flows are fairly balanced directionally and that there are no high-volume crossing roadways due to the roadway following the coastline.

7. In viewing the various materials of this projects DEIS, I quickly concluded that the project as a whole is badly needed. The environmental issues are many and I certainly have no problem with the preferred alignment and its proposed limited access.

8. I do have some questions about the geometry that is proposed for those limited access intersections. I also realize that the figures in the DEIS are conceptual and not final.

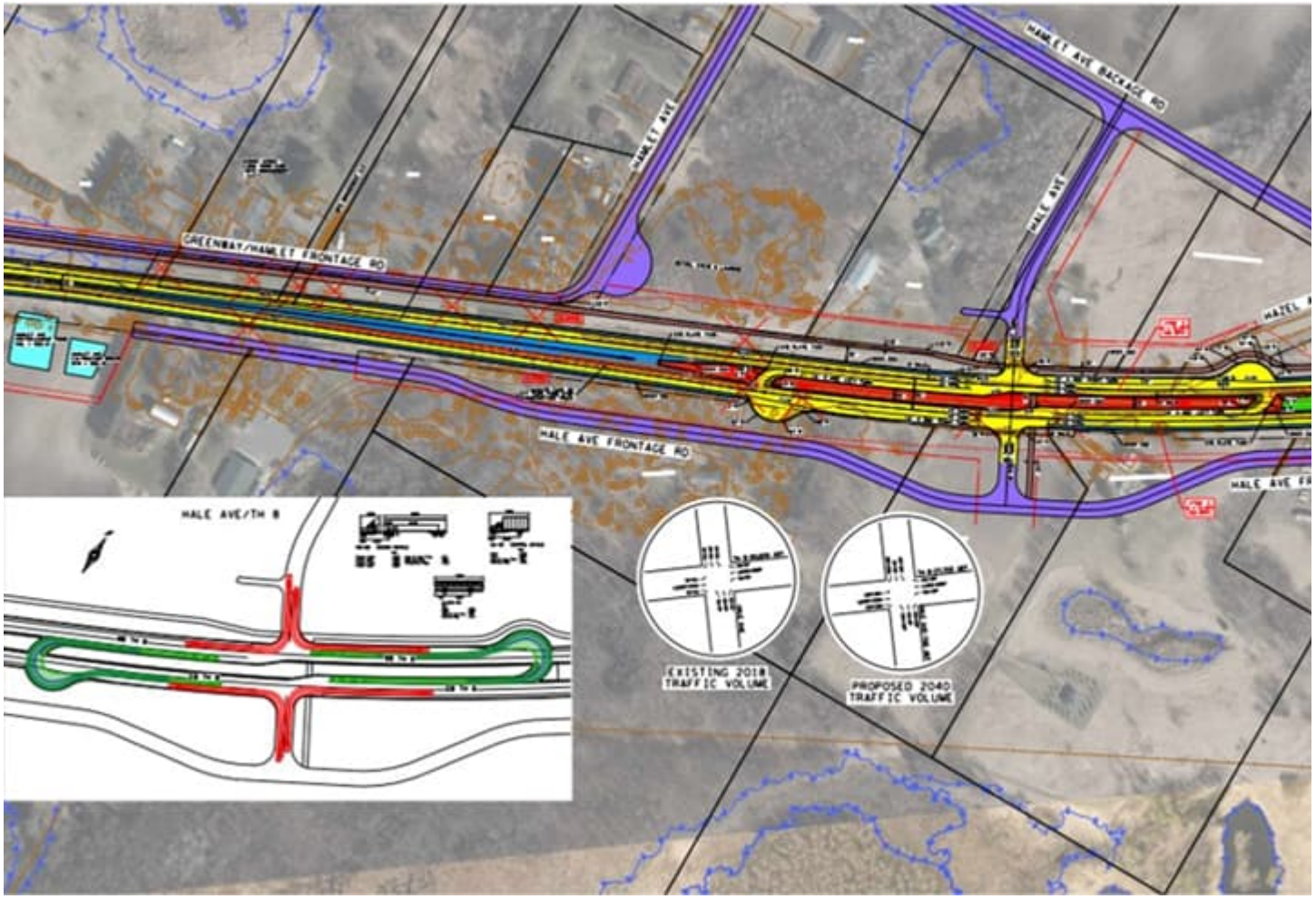
a. The use of left side acceleration lanes without sufficient length to allow entering traffic to get up to speed and the requiring those vehicles to merge right. In my experience left side merges and lane drops have proven to have higher crash rates. Having those entering left turns sit in the center of the roadway without any physical, lateral buffering space from traffic passing on both sides at higher speeds, would seem to be uncomfortable for the drivers and may result in sideswipe crashes. However, since there are many existing locations with left side merges on Maui, my concerns would be greatly lessened if the crash data shows that they perform safely on Maui.

9. The Reduced Conflict Intersection (RCI) design concept eliminates those problems and provides the following benefits. All conflict points involve traffic headed in on direction conflicting with another single traffic movement. At all conflict points the “threat” or priority traffic movement is always approaching from the left or from ahead, never from the right. Since drivers sit on the left sides of their vehicles, this provides good visibility when selecting a gap to enter or cross traffic. No left turns are required into higher speed, higher volume traffic flows. Those features provide safety advantages

similar to roundabouts. In addition, RCIs provide two stage crossings of the heavy, high-speed traffic movements and two stage left turns onto the major roadways for any length vehicle. Vehicles of any length are not required to cross both directions of the major roadway while requiring a gap in both directions.

10. The Minnesota DOT recently announced that on their rural divided highways, they will no longer construct full movement intersections without traffic signals or roundabouts being provided on day 1. Instead, they will use J-turns or Restricted Crossover U-turns (RCUTS), both of those designs meet the criteria of the RCI.

Here is a picture of a MnDOT J-turn for an intersection on a divided highway. Traffic entering from the minor road desiring to cross or turn or turn left, waits for a gap in traffic approaching from the left and then crosses the through lanes and enters the turn lane for the downstream U-turn. The turn lane length for the U-turn is based on speed and storage needs. At the U-turn intersection, a pavement “loon” or widening is provided to accommodate the turning path of the design vehicle making that U-turn. There are other possible designs based on speeds and major roadway traffic volumes.



There have been RCUT intersections built on high volume, high-speed roadways were traffic on the minor street turns right, merges, then weaves across to a downstream U-turn Lane. The distances needed for that weave are typically greater than 1700 feet. A J-turn on a high-volume, two-lane roadway would probably not need to use a design where entering traffic gets up to speed, merges, then exits, and slows to make the U-turn. With only one through lane, a gap in the traffic is likely to arrive due to a slow vehicle and the minor roadway$_3$vehicle desiring to cross or make a left onto the major roadway can easily get to the U-turn Lane.

Here is a typical sign used on the minor roadway approaches.



Here's an example of a full RCUT intersection. It's located at US-212 and MN-284 in Cologne, MN. This type of intersection is being used in Minnesota, Wisconsin, Maryland, North Carolina (they call them Super Streets) and Texas.



Here is a list of the attachments.

1. DEIS comment form

2. My resume.

3. The Super-2 presentation at the U of M CTS conference in 2023.

4. Alternative Intersection Designs Wis ACEC-2009

5. Sketches of possible Reduced Conflict Intersection designs for use of a “Super-2” roadway along with other information.

Look these materials over and use them as you desire.

I will not have any communications with the public regarding this material. I will always defer to the people responsible for operating the highways.

I will be on Maui and available to meet, if you so desire, until February 27th. I’ll be back on Maui during the first two weeks in June. If your consultant Jamie Bentz wants to contact me, when we are both in Minnesota, she is welcome to do so.

Mahalo for your efforts on this project. I am looking forward to its completion.

Dennis R. Eyler

763-744-7414

denne712@aol.com

Comment Form

Federal Highway Administration

Honoapi'ilani Highway Improvements DEIS

We want to hear from you! Please share your comments and questions with our team before February 24, 2025. More information on the Honoapi'ilani Highway Improvements project can be found at www.honoapiilanihwyimprovements.com. Thank you for your participation!

Aloha, my wife and I are part-time residents of Maui. We spend 3+ months of the year on island. I am also a retired traffic and highway preliminary design engineer. I am very interested in this project as well as the upcoming planned extension of the Lahaina bypass.
As a modest effort on my part to help in the recovery of the area after the Lahaina fire. I am offering my modest assistance, if desired. I have attached my resume and a few technical papers and presentations. Also attached is a more thorough description of my offer of assistance.

Providing your contact information below is optional. It will allow us to add you to the mailing/email list to receive future project information.

Name: Dennis R. Eyler

Address: Home – 2725 Oakview Lane, Maui – 3875 Lower Honoapi'ilani Road – B405

City: Home – Plymouth, MN 55441 State: Maui – Lahaina, HI Zip: 96761

Email: denne712@aol.com Phone: 763-744-7414

Share your comments and questions by handing in this form at the hearing, by sending this form via mail or email, or by calling Ken Tatsuguchi from the Hawaii Department of Transportation.

Ken Tatsuguchi, HDOT
Email: ken.tatsuguchi@hawaii.gov
Phone: 808-587-1830

Federal Highway Administration, Hawaii Division
Attention: Richelle Takara, Division Administrator Box 50206, 300 Ala Moana Blvd., Room 3-229, Honolulu, HI 96850

The questions below are **optional**, but intended to help our staff better understand what worked well and what improvements to consider for future public meetings.

How did you hear about this public meeting? *(please check)*

❑ Newspaper ☒ Email ❑ Community board ❑ Word-of-mouth ❑ Social media
❑ Other: _____

Was the information easy to understand and informative? ❑ Yes ❑ No

Please indicate which of the following best represents you:

❑ Local Resident ❑ Local Business/Industry/Trade Association ❑ Neighborhood Group
❑ Local Non-Profit Organization ❑ National Environmental Organization
❑ Local or State Government ❑ Federal or Tribal Government
☒ Other (please specify) Part-time resident

Answering the following questions is optional, but your response will be extremely helpful in ensuring the fairness and equity of HDOT's public involvement process. Submissions will be kept confidential and separate from any personally identifiable information.

What is your race?

❑ Black or African American ❑ American Indian or Alaskan Native ❑ Asian
❑ Hispanic or Latino ☒ White ❑ Native Hawaiian or Other Pacific Islander
❑ I prefer to self-describe: _____

What is the primary language spoken in your home?

☒ English ❑ Hawaiian ❑ Spanish ❑ Tagalog ❑ Vietnamese
❑ Other (Please specify): _____

Was project information translated into other languages appropriately?

❑ Yes ❑ No ❑ Specify: _____

Gender identity:

☒ Man ❑ Woman ❑ Non-binary ❑ I prefer to self-describe: _____

Do any individuals living in your home have a physical or mental impairment that substantially limits one or more major life activities?

❑ Yes ☒ No

Please suggest additional ways you think HDOT and FHWA can improve the inclusiveness of public outreach efforts. **Thank you for completing this survey!**

_____

_____

Dennis Eyler, retired PE, PTOE (registrations have lapsed)
Last employer - SRF Consulting Group, Inc. – Vice President -retired

Employment History

1967-68 - Maryland State Roads Commission-summer work on survey crew and as construction inspector
1969-1983 – Minnesota Department of Transportation: final design, traffic engineering, preliminary design, maintenance, highway safety analysis and 10 years as a District Traffic Signal and Lighting Engineer
1983 to 2023 - SRF Consulting Group – Principal and Vice President – In charge of traffic engineering and preliminary design concept development

Education

B.C.E., University of Minnesota - 1969
Post Graduate Courses

- Traffic Signals – FHWA sponsored short courses at Georgia Institute of Technology 1974 and 1975
- Traffic Safety Design – Texas Transportation Institute
- Highway/Railroad Grade Crossings –Northwestern University Traffic Institute
- Roundabout Design – Iowa State University – CTRE and Kittelson
- Interchange Design Workshop – Institute of Transportation Engineers

Registration - Minnesota (PE) No. 10792 and PE in Iowa - both lapsed
Certification - Professional Traffic Operations Engineer (PTOE) No. 576 - lapsed

Areas of Expertise

- Geometric Layout and Development
- Innovative Intersections and Interchanges
- Freeway Operations
- Urban Streets
- Transportation Corridor Studies
- Traffic Impact Studies
- Traffic Signal Design and Timing
- Traffic Simulation (VISSIM) - Signals, Roundabouts, LRT and Freeway Operations
- Intelligent Transportation Systems
- Highway/Railroad Grade Crossings
- Roundabout Planning and Preliminary Design

Professional Affiliations

Institute of Transportation Engineers - Fellow
ITS America
VISSIM User's Group
Transportation Research Board (TRB)

- Traffic Signal Systems Committee (past official committee member)
- Freeway Operations Committee, Geometrics Committee, Roundabout Committee

Mr. Eyler has more than 50 years of experience in traffic engineering and preliminary design. During his career he has demonstrated a high level of technical knowledge in these areas and an ability to use that knowledge to develop innovative solutions to complex transportation problems. Because of his extensive experience in traffic signal design and operations, preliminary design and traffic simulation, he has developed a full understanding of the relationship between intersection and interchange geometry and the operation of the traffic control devices at intersections and interchanges.
During his career he has served as a technical advisor in several areas, including Transportation Planning, Traffic Engineering, Intelligent Transportation Systems, Highway Engineering and Municipal Engineering.

The following is a list of selected non freeway projects, where Mr. Eyler has been involved with concept development and preliminary design.

- US 61 Bypass, Muscatine, IA – The project developed and evaluated various types of restricted crossover – U-turn designs (RCUT). This project was where the term "Reduced Conflict Intersection" (RCI) originated.
- Wisconsin STH 54 between Wisconsin Rapids and Plover – Concept development and evaluation of several possible RCUT locations
- Superior Street and Canal Park Drive in Duluth, MN – Conversion of 4 lane streets with parallel parking to a two-lane street with angle parking
- Projects with staged corridor development where the initial construction was a two-lane roadway later expanded to a four-lane divided highway. US 169 between Osseo and Champlin, MN, MN-101 between Rogers and Elk River, MN and MN-5 in Eden Prairie and Chanhassen, MN
- Stadium Road at Victory Drive in Mankato, MN – Alternatives evaluation, concept development, traffic simulation and preliminary design for roadway re-alignment to combine two "T" intersections into a single high-capacity roundabout

Freeway Interchange Projects

Mr. Eyler has been involved with concept development and preliminary design of more than 50 interchanges during his career. These are some worth noting.

I-494 at US 169 in Bloomington, Eden Prairie and Edina, Minnesota – Concept development and traffic analysis for a freeway-to-freeway interchange and 3 local access interchanges utilizing a total of 6 roundabouts at ramp intersections
I-35 at Dakota at County Roads, 50, 60 and 70, Reconstruction of 3 interchanges, in Lakeville, Minnesota
I-94 at Hennepin County Road 61 (Hemlock Lane), Maple Grove, Minnesota – Concept development and signal design for a high volume, local access interchange
I-35W at MN 62 (Crosstown Highway), Richfield and Minneapolis, MN – Alternatives development and analysis of a project to reconstruct a multiple interchange complex consisting of two directional interchanges and 5 access interchanges

US 169/MN 101 Bloomington Ferry Bridge Interchanges, Shakopee, MN – Concept development, freeway operations analysis for a freeway-to-freeway interchange and 4 service interchanges
MN 610 – A new freeway, Maple Grove and Brooklyn Park, Minnesota – Concept development for 2 systems interchanges and 4 service interchanges
I-90 at US14/61 in Dresbach, MN – Concept development for a complex interchange

Traffic Engineering Innovations

- 1975 – Started the widespread use of red left-turn arrows in Minnesota
- 1978 - Developed variable signal phase sequence control strategy with changeable lane use controls
- 1980 - Developed a traffic signal advance warning system that features "Prepare to Stop When Flashing" signs and flashers which was initially deployed at 5 intersections in the northern and southwestern suburbs of the Twin Cities.
- 1984 – For the City of Duluth, MN - designed one of the earliest central signal control systems which utilized "off the shelf" multiple traffic responsive master controllers operating in an overall organized pattern with a desk top computer as the system interface. The project also rebuilt over 50 individual signals.
- 1985 – Concept development and design of all of the traffic controls for a reversible HOV roadway running in the median of an at-grade roadway which initially passed through 5 signal-controlled intersections. It was known as the I-394 Interim HOV Lane (nick named the "sane Lane") and it helped manage traffic during the conversion of US 12 into I-394.
- 2007 – Alternatives evaluation, interchange concept development, and preliminary design of the signal controls for the Diverging Diamond Interchange (DDI) at I-394 and 34th Avenue in Bloomington, MN. This is the only DDI in the United States with an LRT line running through the interchange in the median.

Technical Papers Presented at National Conferences

TRB 2021- Compound Roundabouts (accepted for presentation, but unable to present due to COVID)
ITE 2019 – Median Reversible At-grade Toll Lane
TRB 2017 - Roundabout Ring Junction Interchange (I-494 at US 169)
ITE 2016 – Getting More Life from Old Diamond Interchanges
TRB 2011 – International Roundabout Conference – Other Geometric Factors Affecting Roundabout Capacity
TRB 2011 – The Reduced Conflict Intersection; also published by the National Academies of Science
FTOC 2008 – I-394 HOT Lane
TRB 2005 – The Arterial Interchange; also published by the National Academies of Science
ITE 2003 – Getting More Life from Old Cloverleaf Interchanges
ITE 2000 – The Reduced Conflict Intersection
ITE 1997 – Operating Two Adjacent Signals with One Controller
ITE 1994 – F.O.A.M. – A spreadsheet-based Freeway Operations Analysis Method
ITE 1986 – The I-394 Interim At-Grade Reversible HOV Lane

Technical Papers Presented at Regional and Local Conferences

2023 – University of Minnesota Center for Transportation Studies (CTS) – The Super-2
2018 – TRB Committee – Demand Based Signal Control for Restricted Crossover, U-turn Intersections
2012 – Image Sensing Systems - Brainstorming the Future of Roadway Transportation
2012 – TRB signal Systems Committee – Midyear meeting -The DDI Challenge
2011 – Midwest ITE – The Super Two
2011- Mid-Continent Transportation Research Symposium
Designing and Operating Intersections with Signals on High-speed Rural highways
2009 - ACEC/WisDOT Transportation Improvement Conference -Pointing to the Future Alternate Intersection Designs


2

The Super-2

DESIGN GUIDELINES FOR A SAFER, HIGH CAPACITY, RURAL, TWO LANE, AT-GRADE HIGHWAY

UNIVERSITY OF MINNESOTA CENTER FOR TRANSPORTATION STUDIES OCTOBER 2023

BY DENNIS EYLER AND ALEX POLETZ

Defining the Super-2

A set of design features for two lane highways to:

- **Maximize safety by reducing vehicle conflicts**
- **Increase capacity**
- **Provide reliable travel times**

It is not a two lane freeway

- It may be an interim phase to becoming a freeway
- It may be an interim phase to becoming a 4-lane expressway

Defining the Super-2

Design Guideline Goals

Handle traffic volumes of 8,000 to 20,000+

- Peak hour, peak directional flow of up to 1200+ vph

Safely handle traffic speeds of 50 to 70 miles per hour

Provide no direct property access

Limit full access to 1/2 mile or greater intervals

Provide full shoulders and clear zones

3 Primary Elements of a Super-2

Medians

Passing lanes

Reduced conflict junctions

Element 1

Medians to reduce conflicts

- Striped with a minimum width of 4 feet
  - May have a barrier
- Provide separation from opposing traffic
- No crossing center line to pass
- Prohibit lefts onto the Super-2 and crossings of the Super-2 except at controlled locations

Element 2

Passing lanes and auxiliary lanes

- Passing Lanes
  - Regularly spaced based on speeds & traffic makeup
  - Length - at least 40 seconds of travel time
  - Use on steep grades
- Auxiliary Lanes
  - Add capacity through junctions
  - Allow passing when leaving towns or other slow areas

Element 3

Reduced conflict junctions

- Reduced conflict intersection designs
  - **RCUTs** - Restricted Crossover U-turns
  - **J-turns** – Right turn followed by U-turn
  - **"T" intersections** - Certain designs
- Limited use of signals and roundabouts
  - Only at high volume crossing roads
- Low cost interchanges

Super-2 History

1940 – 1970 – High speed alignments & access management

1970 – 1990 – Two lane roads built as first phase of 4 lane expressway

1990 – 2000 – Striped medians & passing lanes – the name Super-2 is first used

2000 – today – More highways with Super-2 features

No full Super-2 has yet been built

However - US-1 south of Florida City, FL is very close

1940's to 1960's

Enhanced two lane rural roadways started to appear in the U.S. just after WWII.

Examples – Maryland - single roadways built for future divided highways

- **US 40 and US 15 near Frederick and US 29 south of Baltimore**

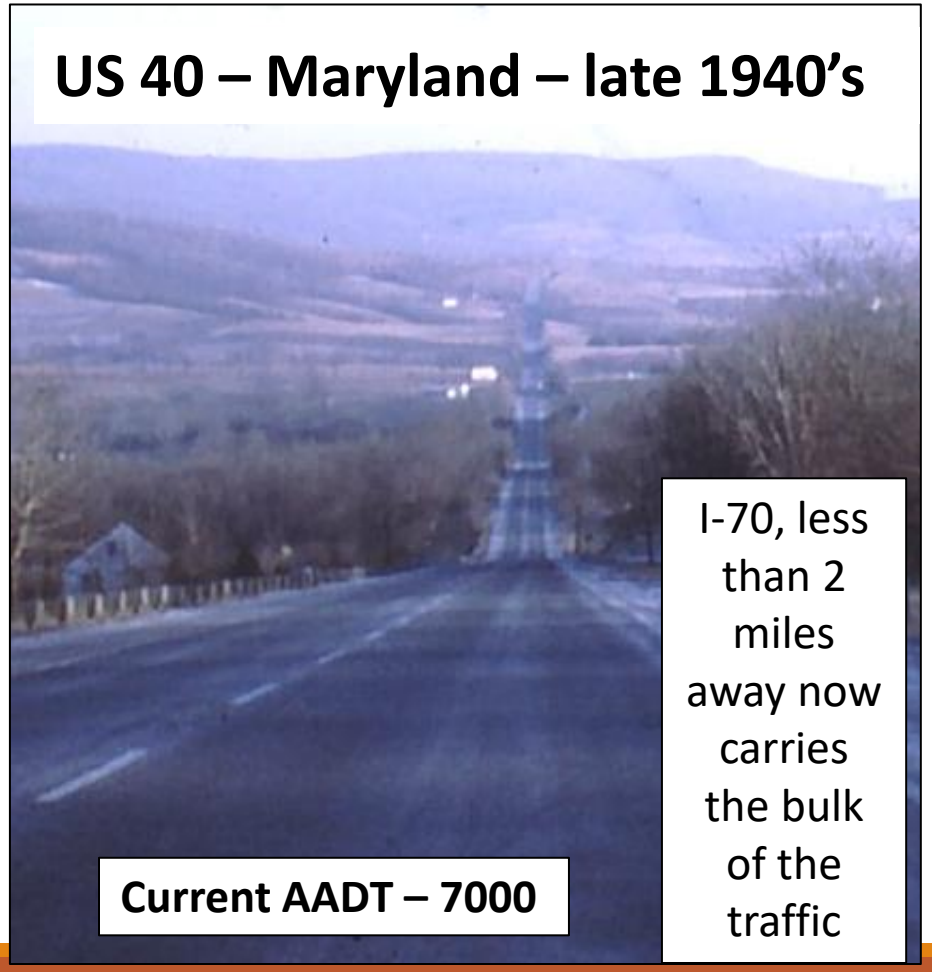
Features

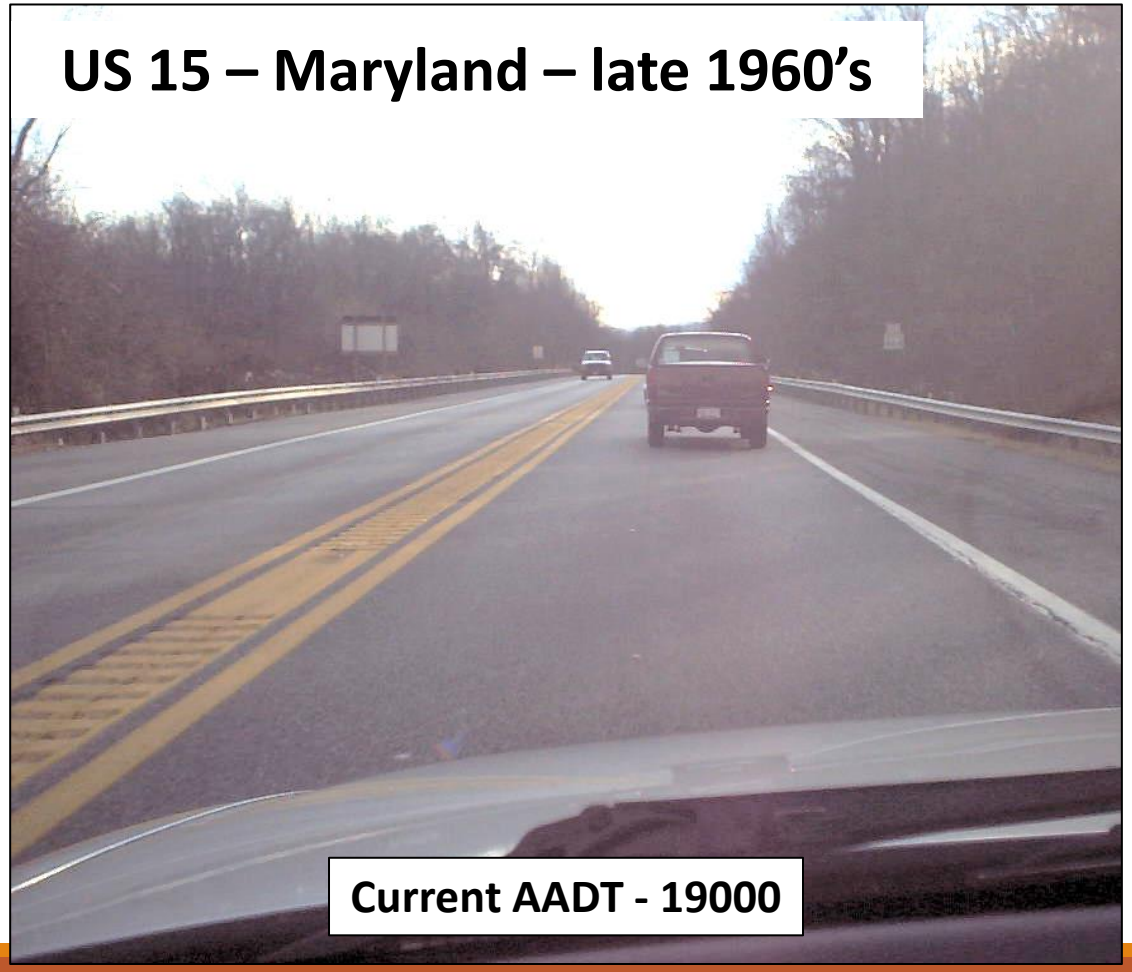
- **Limited access to key intersections, high-speed alignments, but no median**

Two lane designs - on low volume Interstates (ADTs less than 5000)

- **I-70 in Colorado and Utah, I-29 North of Grand Forks, I-95 in northern Maine and I-15 in Idaho and Montana. I-93 at Franconia Notch in New Hampshire is the last two lane Interstate. It has median guardrail.**

Early Examples





History - 1970's and 1980's

Minnesota - short segments of two lane expressways were built and designed to become one side of a 4-lane divided highway

- US 169 - Osseo to Champlin
- MN 5 west of I-494
- MN 101 north of Rogers
- MN 60 in southwestern Minnesota

Channelized intersections with signals, limited access, but medians only at intersections

History - 1990's and 2000's

Other states - enhanced two lane roadways

- **California - striped median buffer strips**
- **Texas - two lanes + one - with alternating passing lanes – named "Super-2"**
- **Maryland - MD-90 – The Ocean City Expressway – limited access with interchanges, signals and median barrier**

Blue Earth County - Mankato South Route (CSAH 90)

- **One side of a planned divided highway – future MN 60 bypass of Mankato**
- **A striped median was considered - not approved by State Aid**
- **Passing lanes were provided and there is a roundabout at the junction with MN 22**

History - 2000's to now

Other states build enhanced rural two lane roadways

- **Hawaii – Lahaina bypass - one side of future 4-lane divided highway**
- **Wyoming – Rawlins to Casper – two lane roadway with frequent passing lanes**
- **Minnesota - MN 7 - passing lanes and roundabouts**

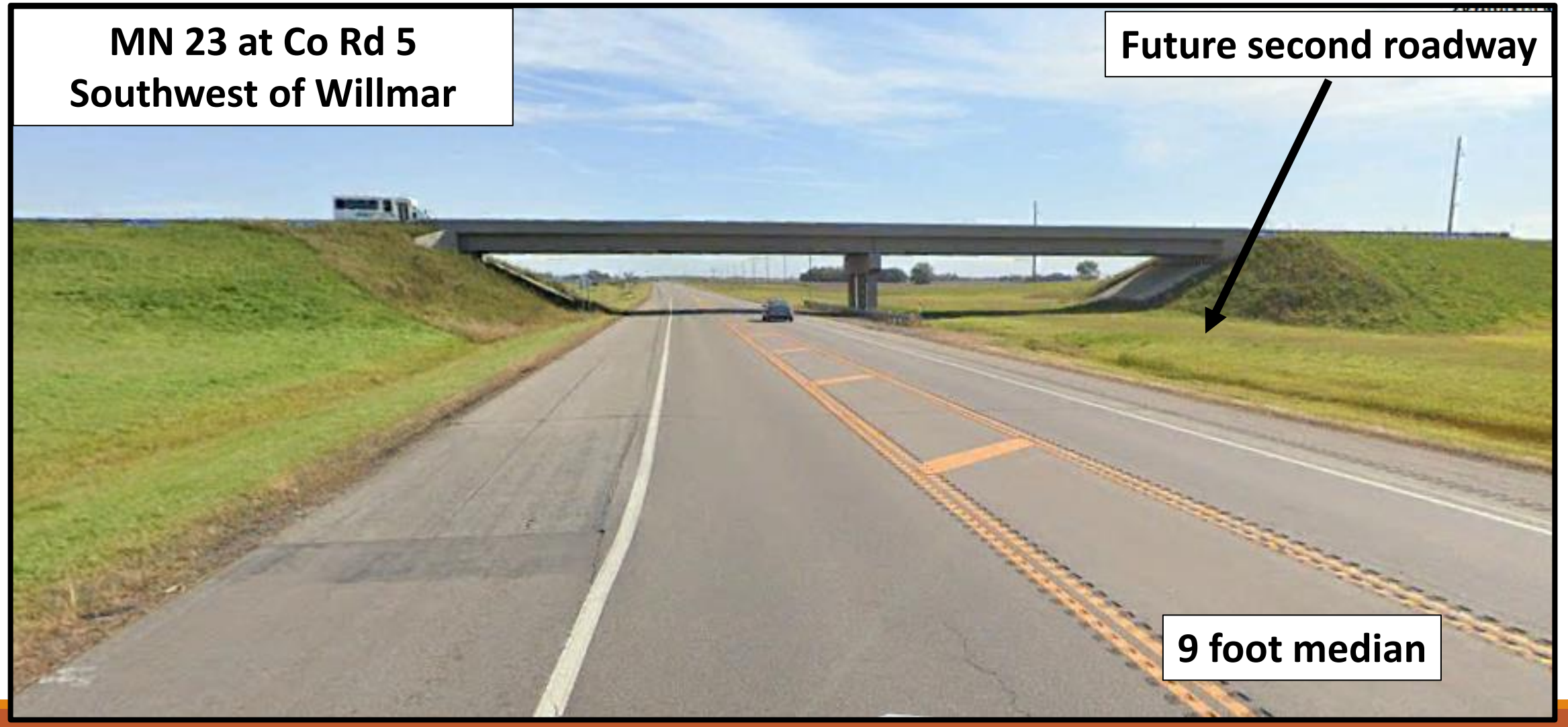
New Zealand starts to use striped medians and J-turns

Highway Capacity Software currently describes a Super-2 as a 3 lane road with alternating passing lanes – ***the Texas definition***

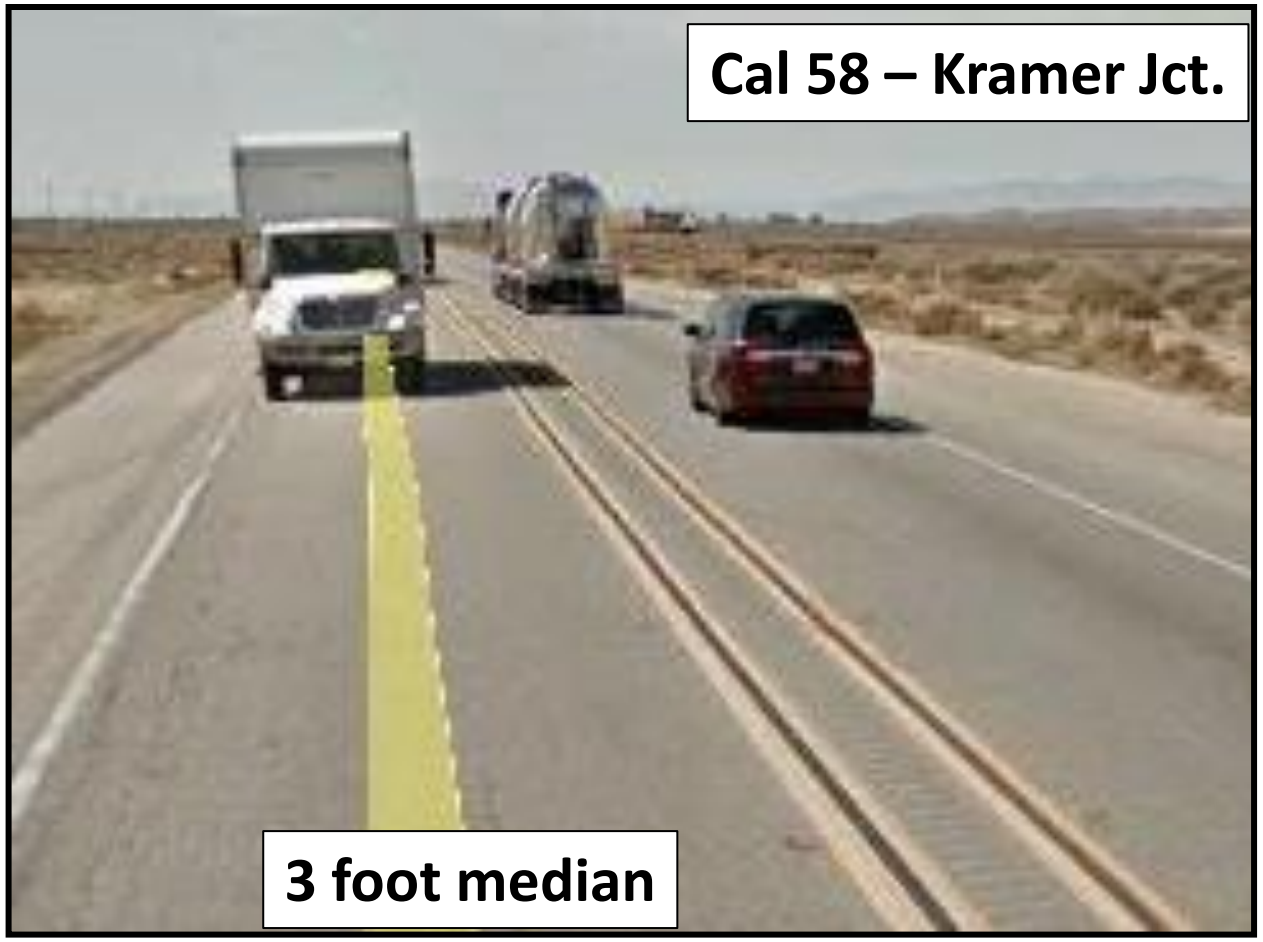
Examples of the Defining Elements

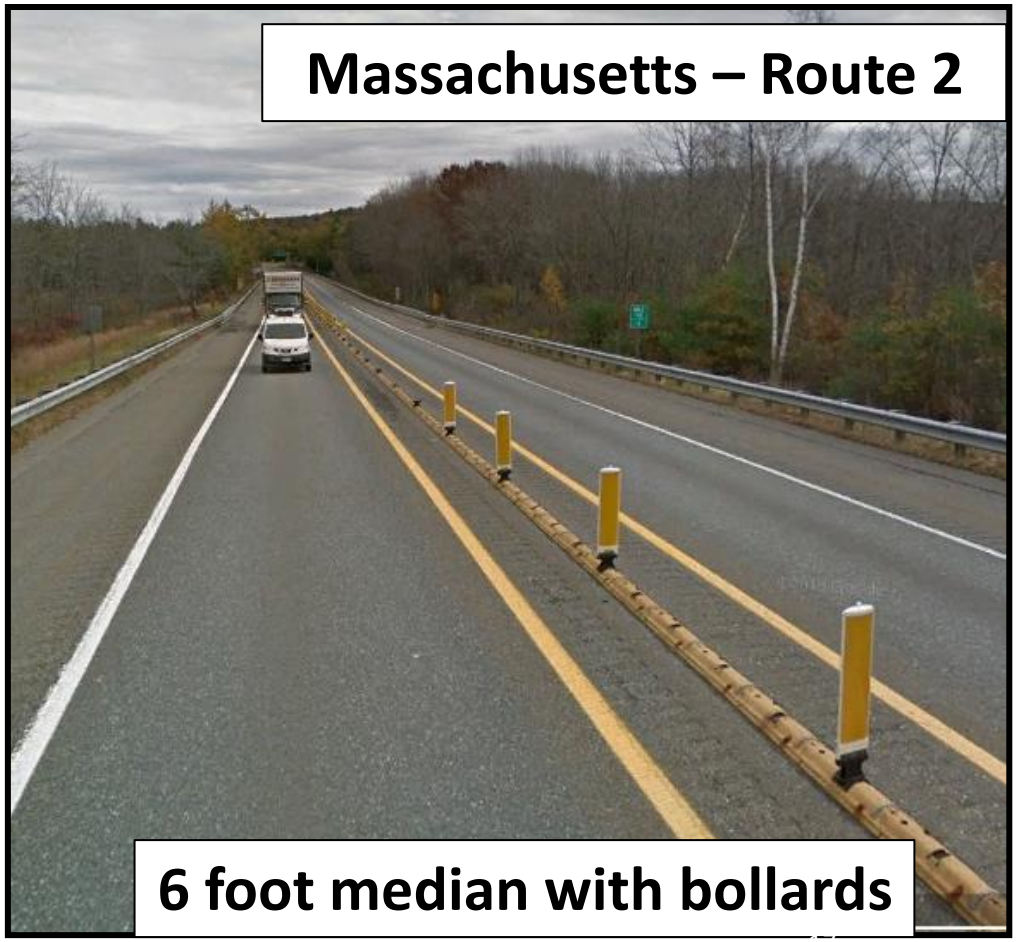
Medians
Passing lanes
Reduced conflict junctions

Defining Feature 1 - Medians



Median - Striped





Striped Median - New Zealand



U-turn on Route 2 in Clareville, New Zealand



Left side driving!



Striped median on Route 2 in Clareville, New Zealand

Median - Barrier



Median - Barrier

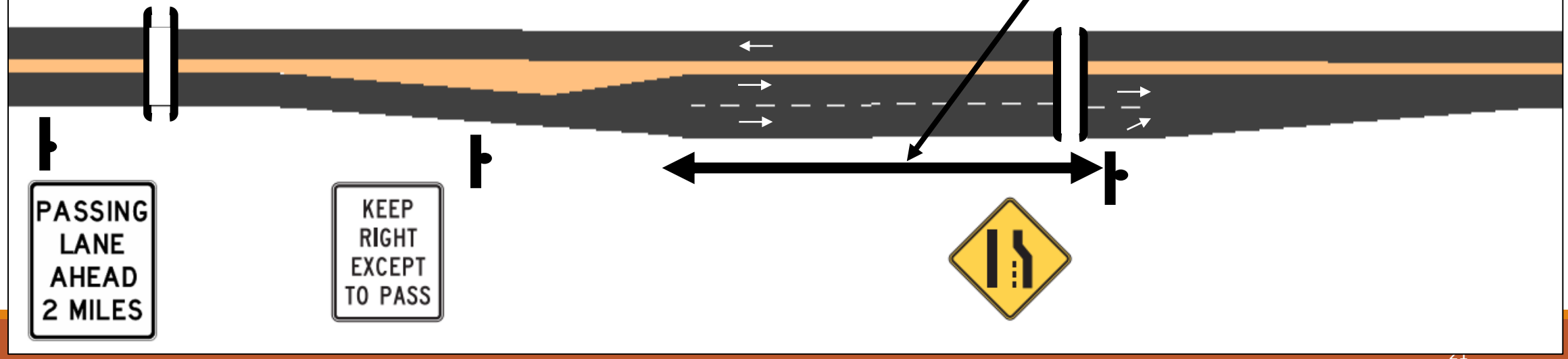


Defining Feature 2 - Passing Lanes

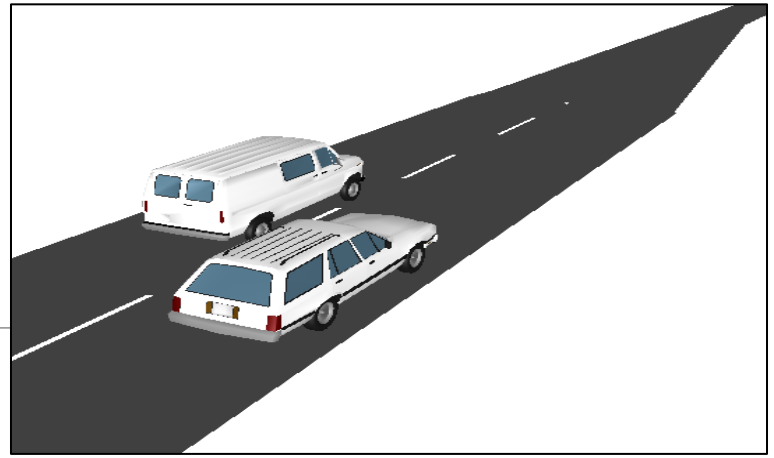
Direct all traffic into the right lane
End by dropping the right lane

Provide:
1. At regular intervals - based on traffic volumes and makeup
2. Leaving towns and other slow zones
3. On uphill grades

Length greater than 40 seconds of travel time at the speed limit



Passing Lanes



Why drop the right lane?

Drivers sit on left side of vehicles – in the right lane they are in a better position to see other traffic and adjust accordingly

If there is difficulty completing the merge, the vehicle on the right has the shoulder as an escape

With a left lane drop, the vehicle on the left may be forced into sudden braking, going into the median or into oncoming traffic

A right lane drop is identical to an entrance ramp entering a freeway and merging

Defining Element 3 – Reduced Conflict Junctions

Intersection designs to minimize conflict points

- **One to one simple conflicts** (unless signal controlled)
- **No median storage problems for long vehicles**
- **“Threats” only from the left or ahead, no “threats” from the right**

A “threat” to you, is from other traffic having the right-of-way

Reduced Conflict Intersections

MnDOT recently announced that they will no longer build 4 leg rural intersections with median openings allowing cross moves or left turns onto rural divided highways

- **Only J-turns or RCUTS**
- Signals, roundabouts and grade separations may be allowed at limited locations where traffic volumes justify

<u>That policy is consistent with the concept of the Super-2</u>

Super-2 - Junctions

Restricted Crossover U-turn or J-turn with 4 legs or 3 legs

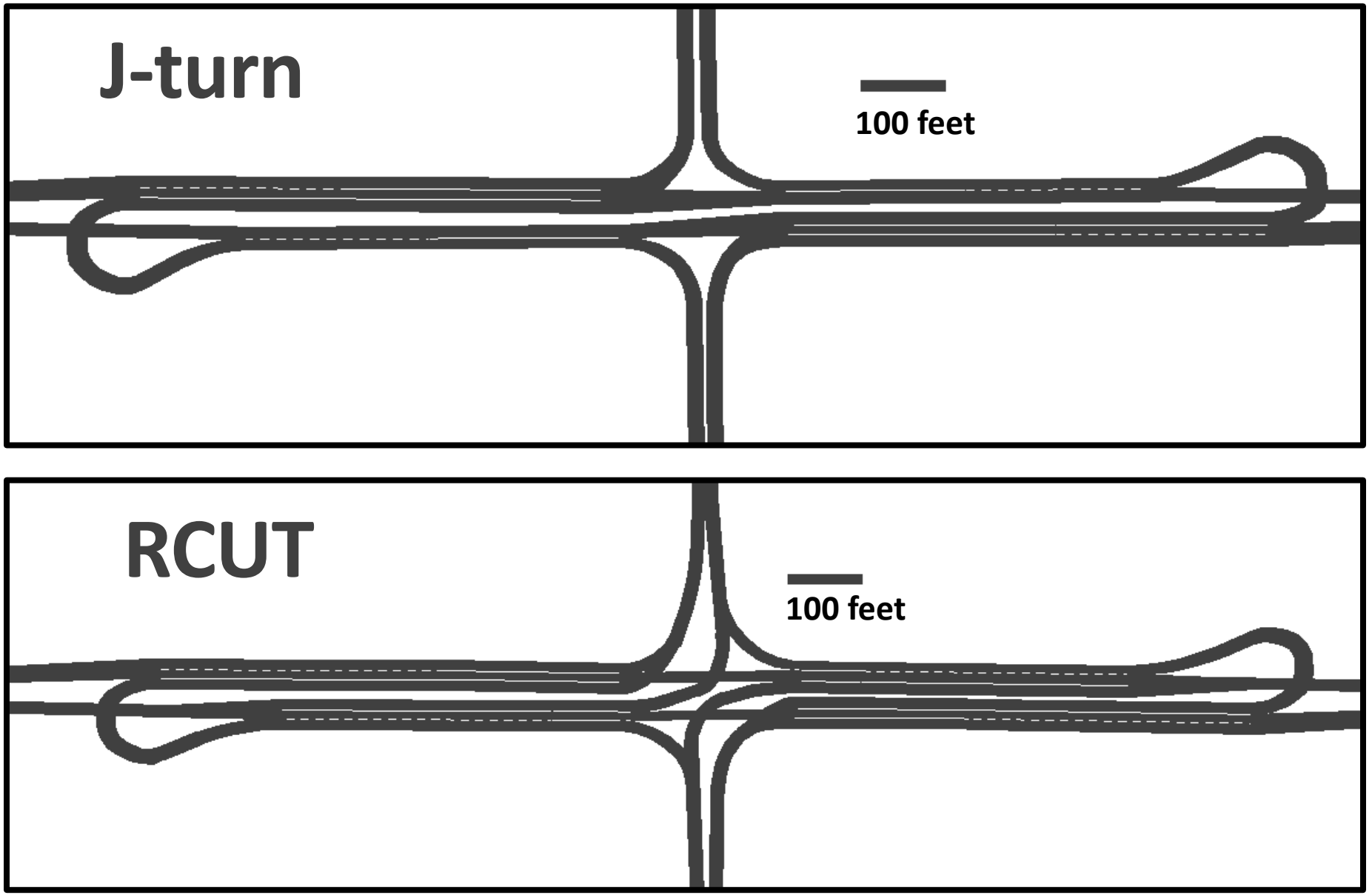
Through “T” intersection - with or without signals

Roundabout

- Right turn bypasses where needed
- Optional auxiliary through lane

Intersection with signal

- Left / through / right on each approach
- Optional auxiliary through lane

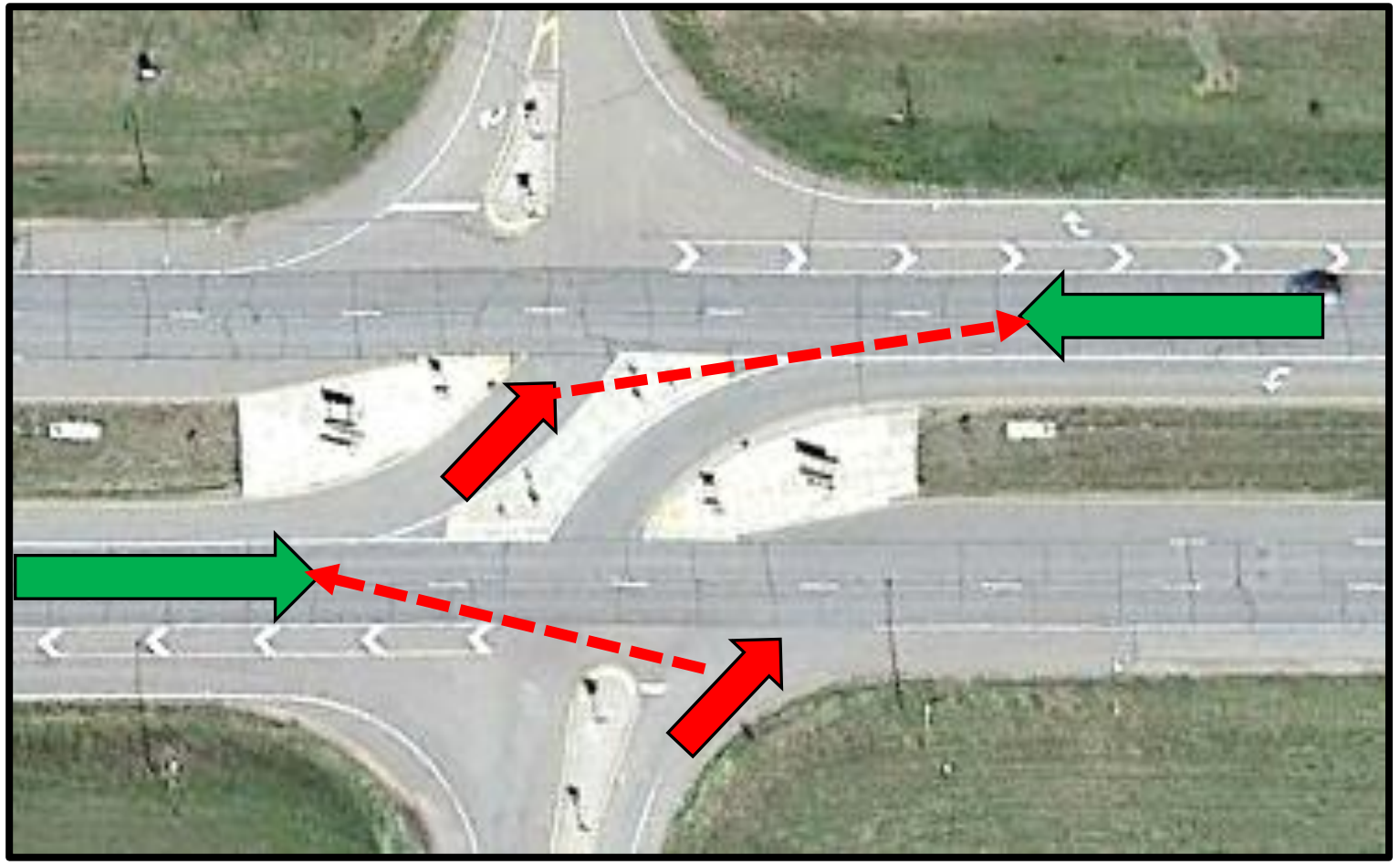

J-turn
100 feet
RCUT
100 feet

Reduced Conflict Intersections

One to one conflicts

RCUTs

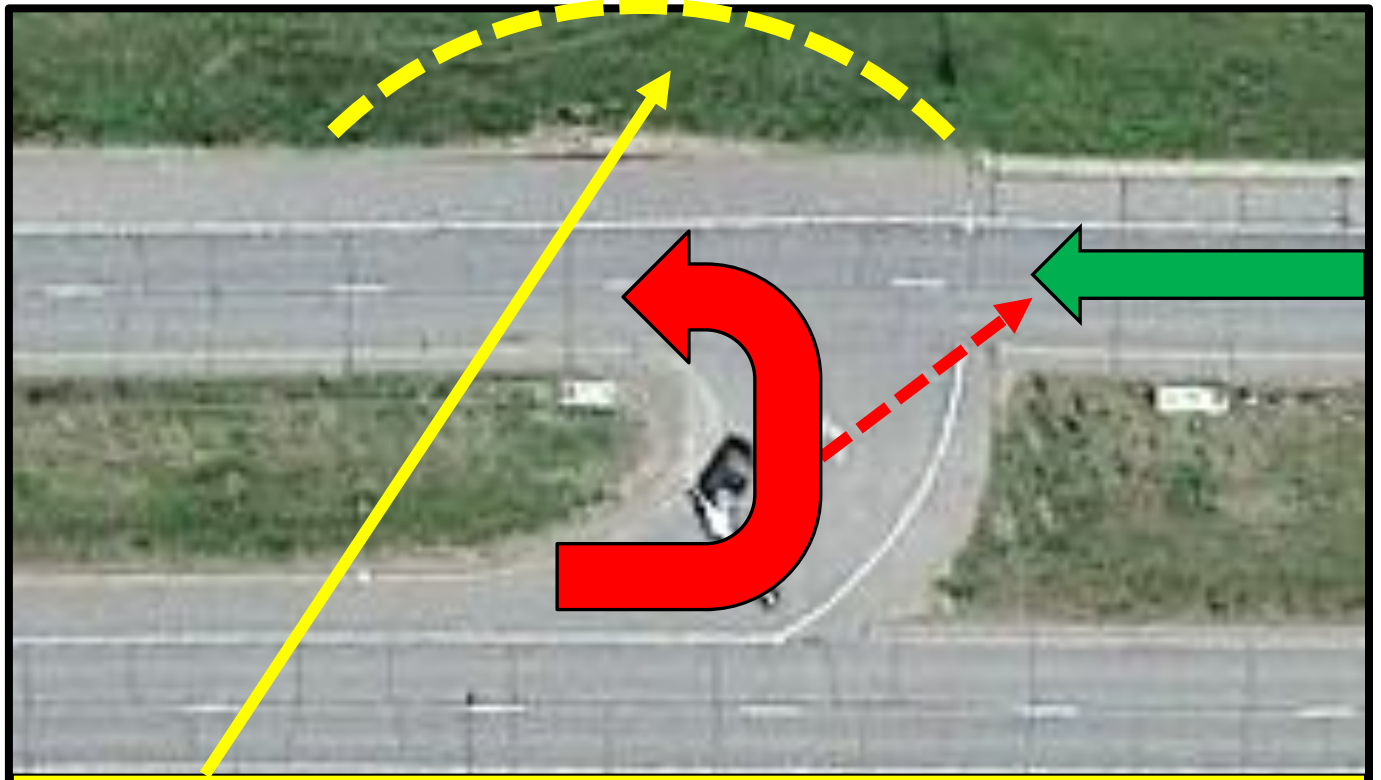
Lefts off and rights on



Reduced Conflict Intersections

One to one conflicts

J-turns or RCUT U-turns



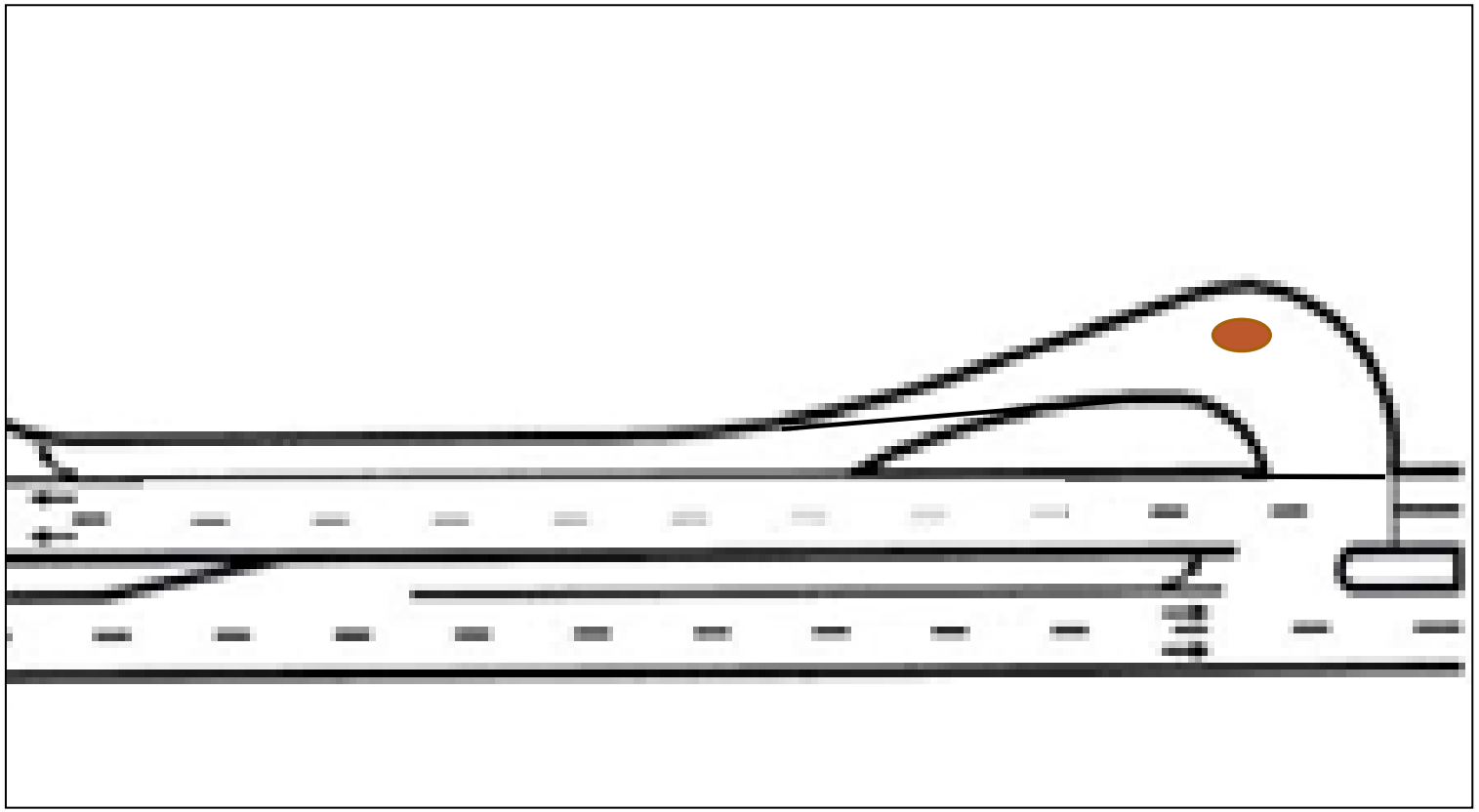
On a Super- 2, the narrow median will require a "loon" for large truck U-turns .

New Zealand U-turn – (reversed)

This shows a loon to accommodate trucks



Why are U-turn “bulb outs” called “loons”?

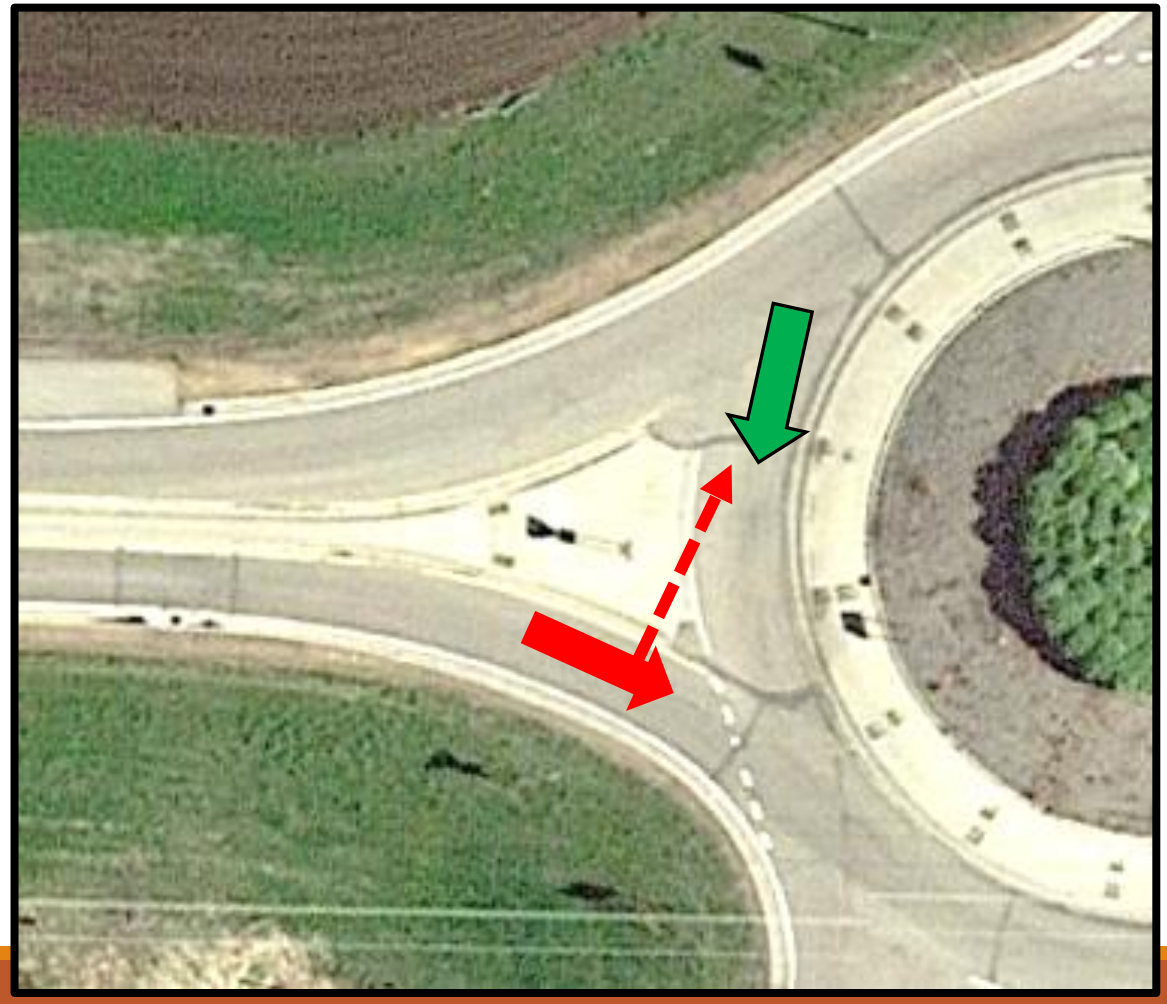


Reduced Conflicts

One to one conflict examples

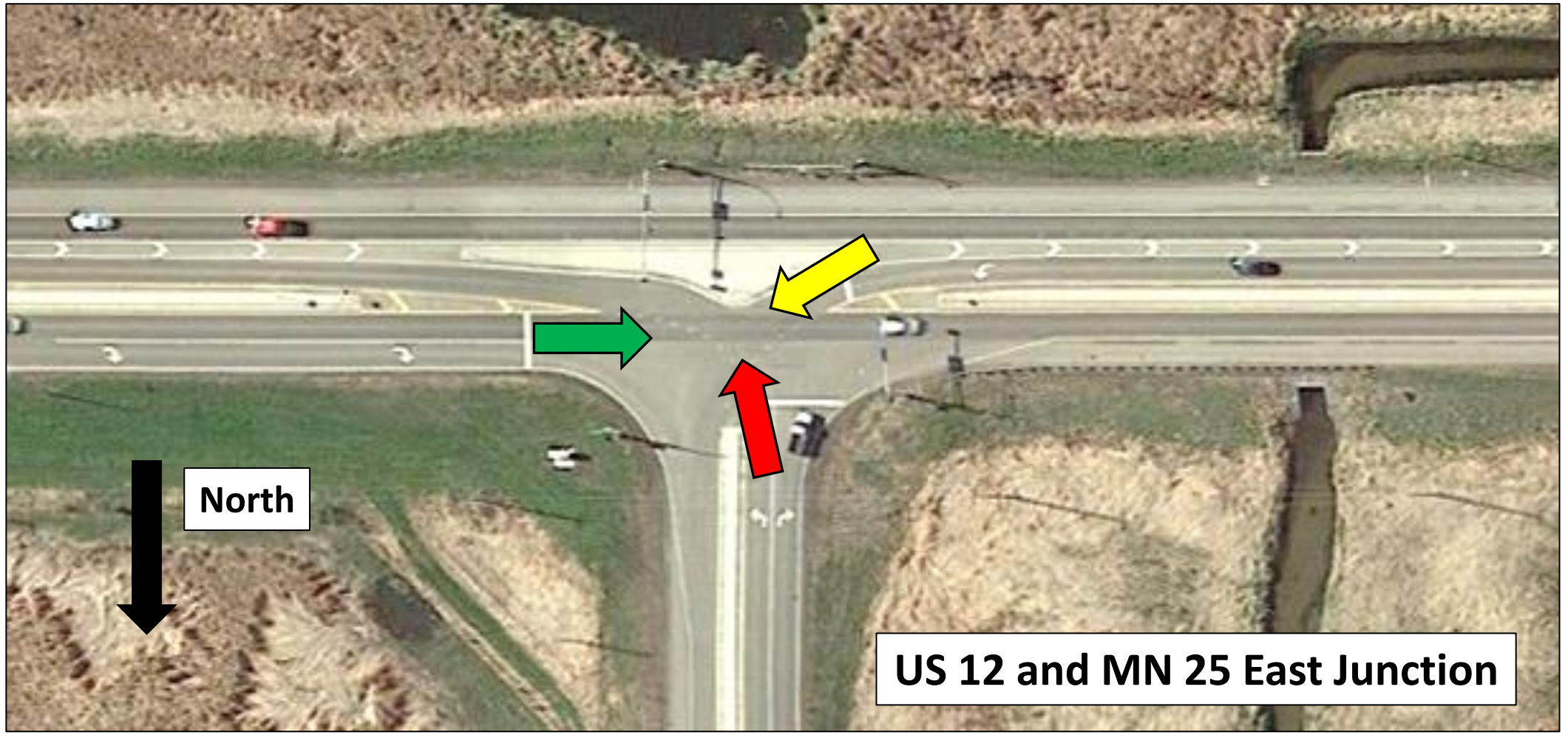
Roundabouts

Threats come from driver's side at low speed

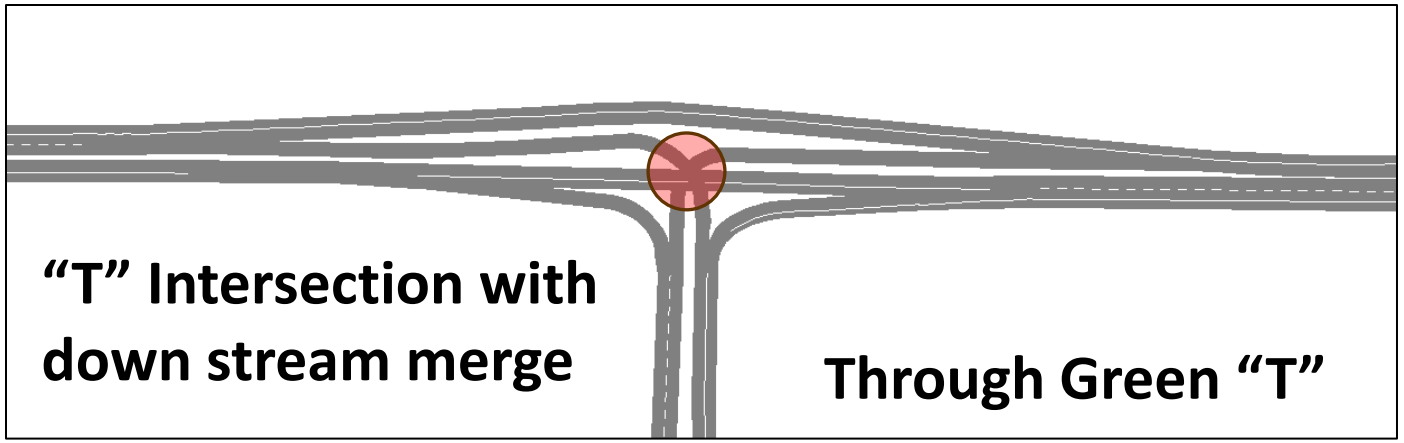


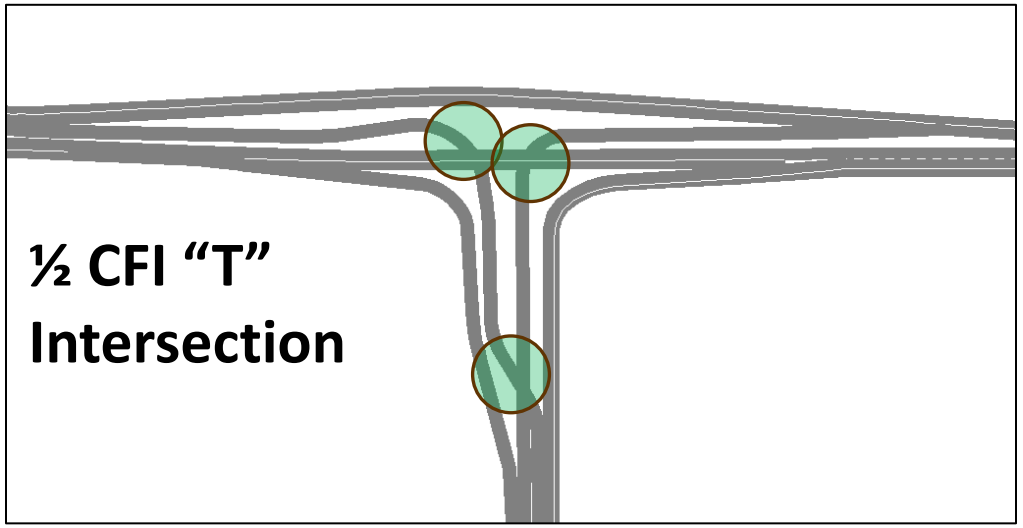
Through Green “T”

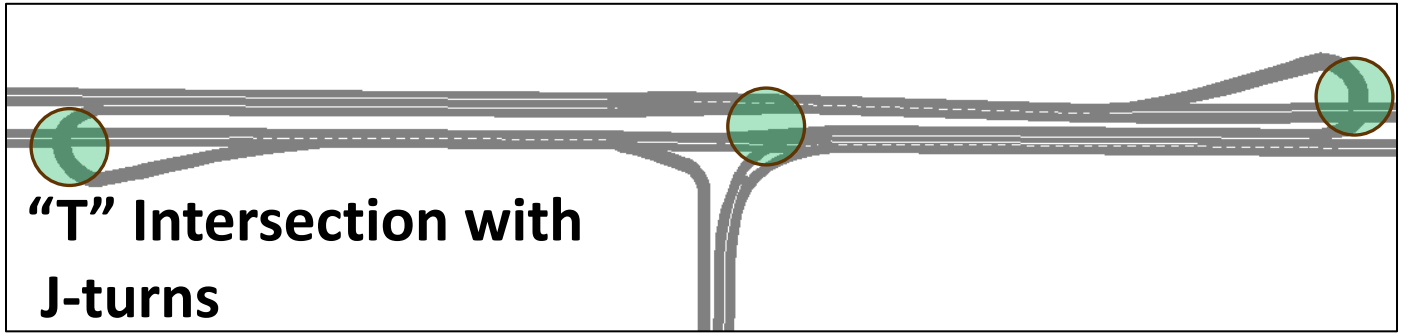
Side road driver has threats from two directions, but there is a signal



“T” Intersection Conflicts







Three way conflict point with threat from the right

Two way conflict point

Interchanges

Compact diamond

- Ramp intersection roundabouts or STOP signs

Quadrant

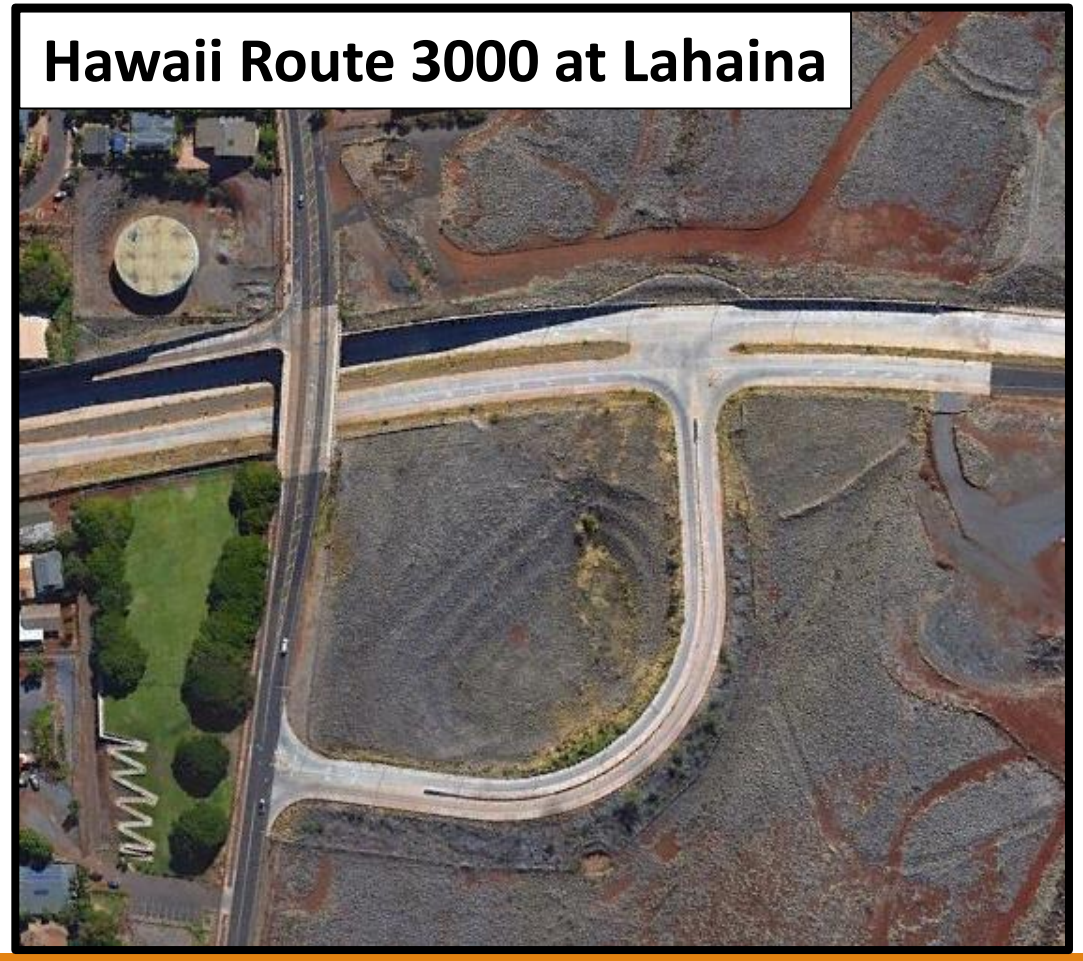
- Roundabouts or RCUT “T” intersections on the major roadway

“T” Interchanges

- ½ diverging diamond

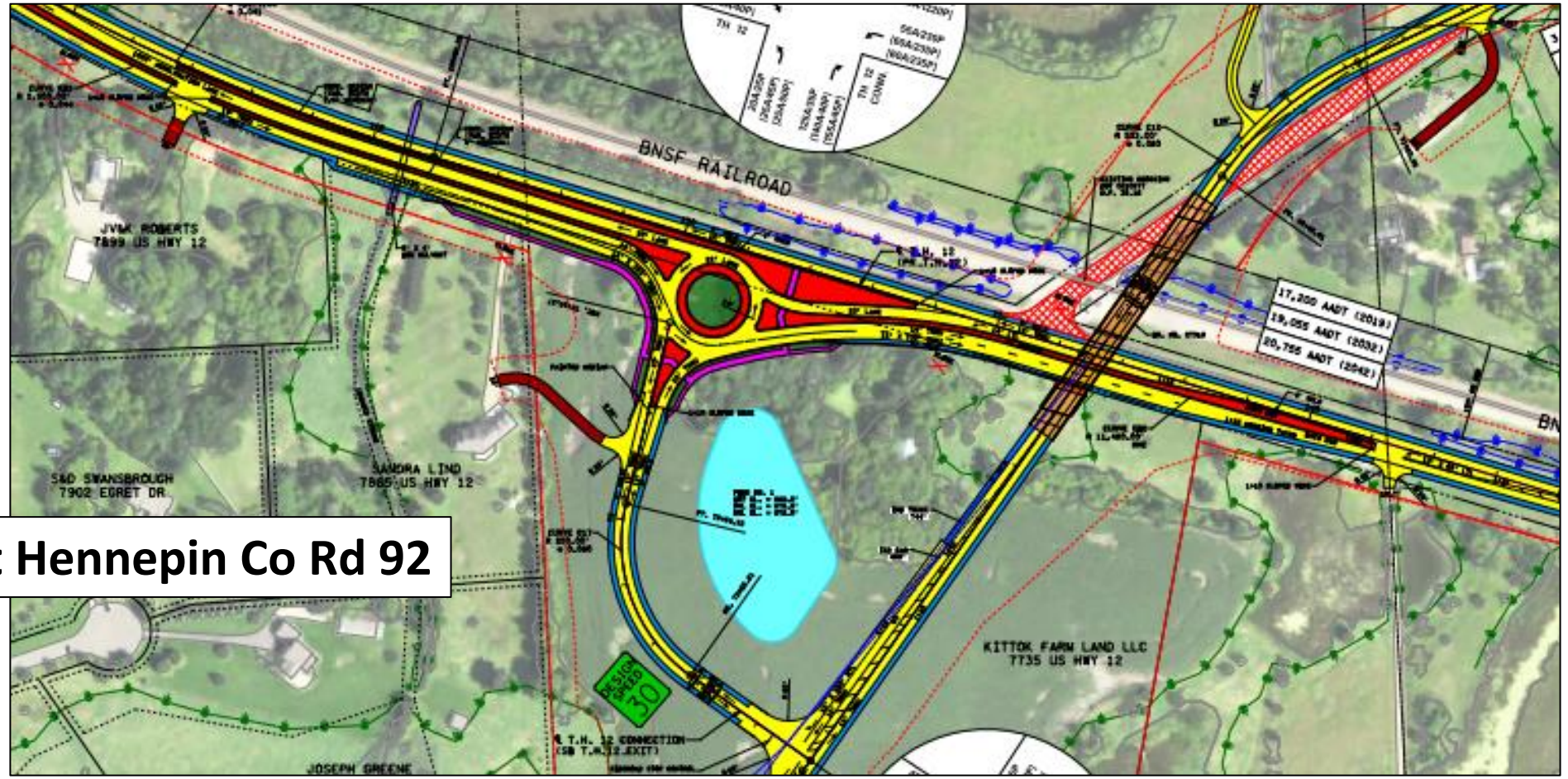
Four entrance ramp “windmill”

Quadrant Roadway Interchange



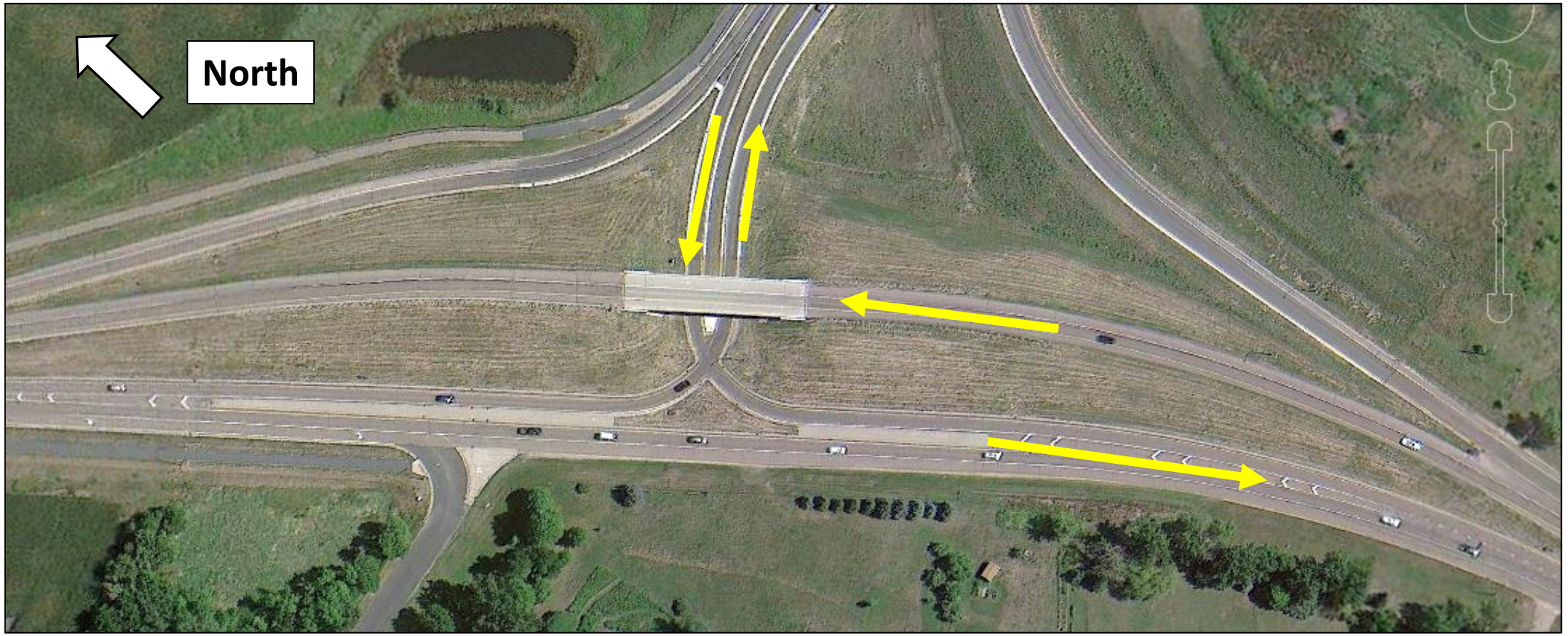


Quadrant Roadway Interchange

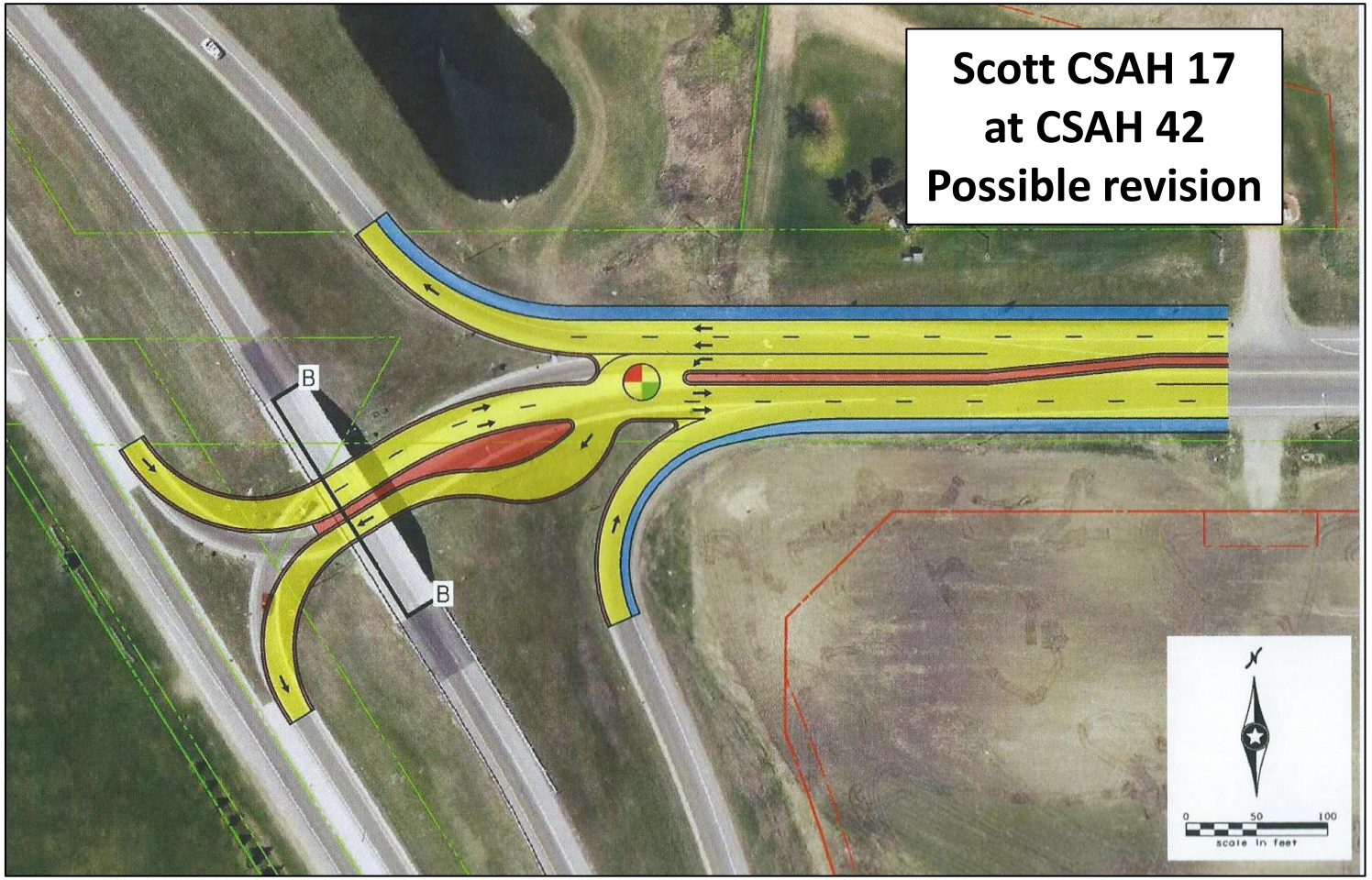


US 12 at Hennepin Co Rd 92

High “T” Scott Co Rd 17 at Co Rd 42



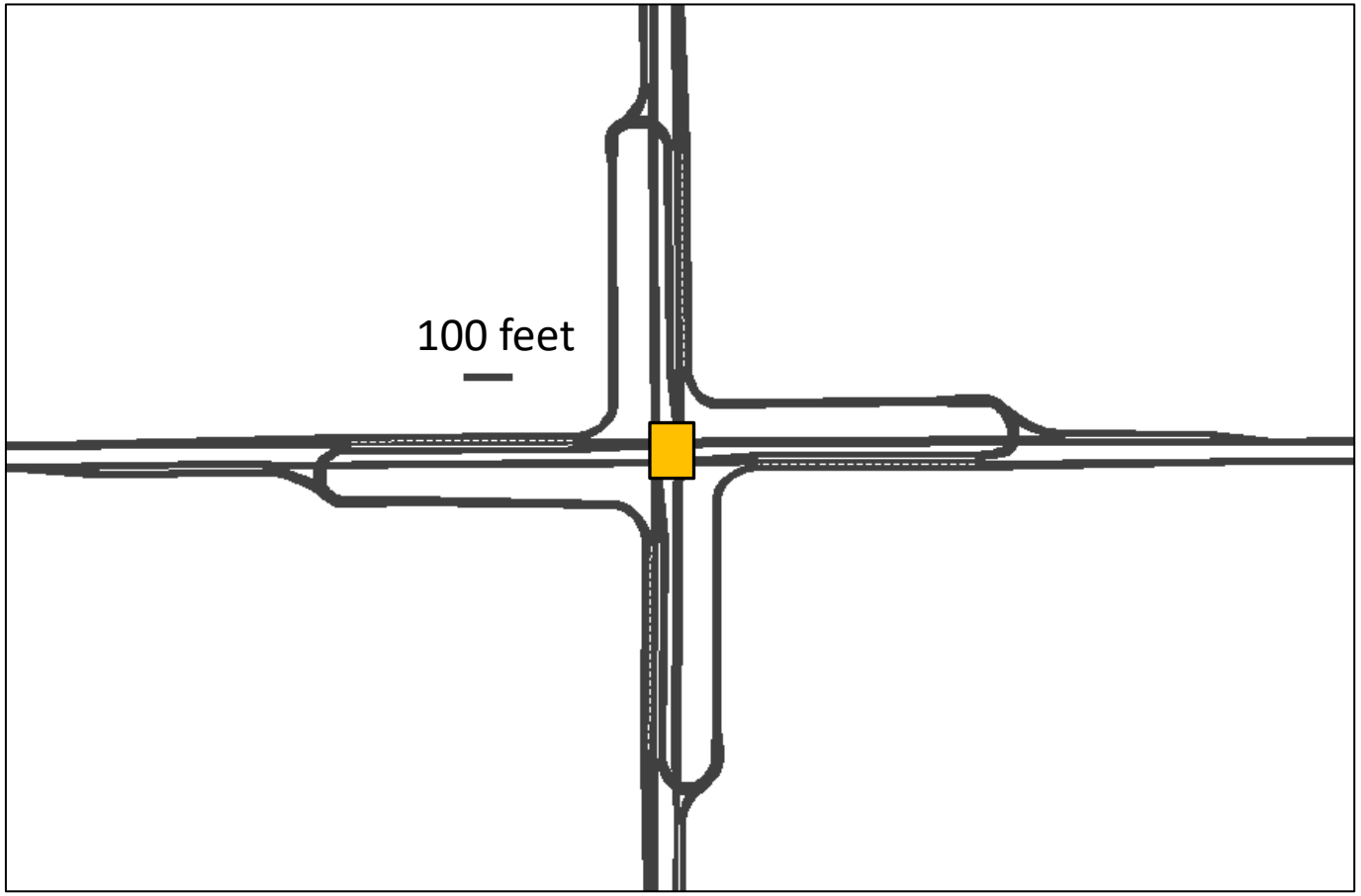
½ DDI or High “T” Alternative





B-W Parkway at Arundel Mills in MD

Interchanges – The 4 J-turn or Windmill

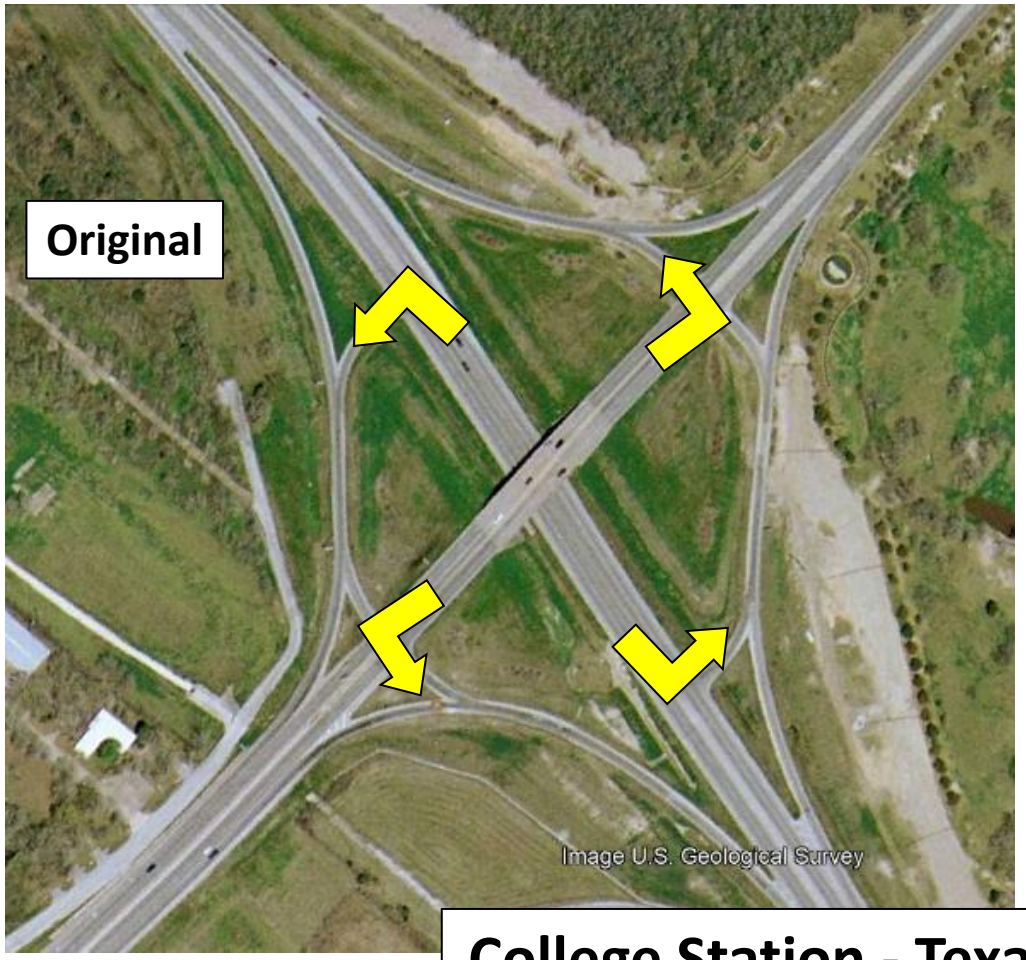


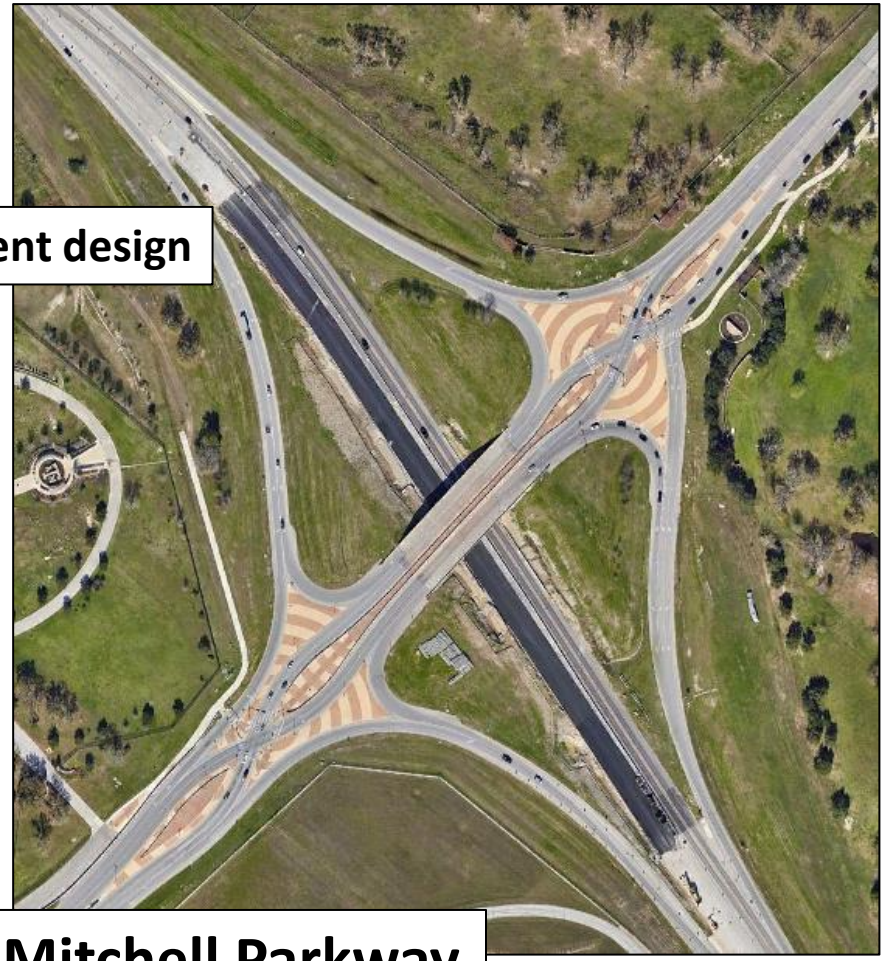
Possible use at the junction of two Super-2's

All conflict points are 1 to 1

1. **Through traffic on both roadways has priority**
2. **Left turns yielding to through**
3. **Right turns yielding to left turns**
4. **Entering right turns merging with through traffic**

Interchanges – Windmill





College Station - Texas 47 at Harvey Mitchell Parkway

Is US-1 in Florida a Super-2?



Previously a 4 lane undivided roadway

High crash rate with many severe crashes

Median barrier added – reduced to one lane per direction

20 miles long - 3 passing lanes per direction

Very limited roadside access

7 “T” intersections with through bypasses and lefts to add lanes

3 - very compact interchanges

AADT = 28,000

US-1 - Median Barrier



US-1 – “T” Intersection



Compact Interchanges

US-1 in Florida





US-1 - Compact Interchanges







Where do we go from here?

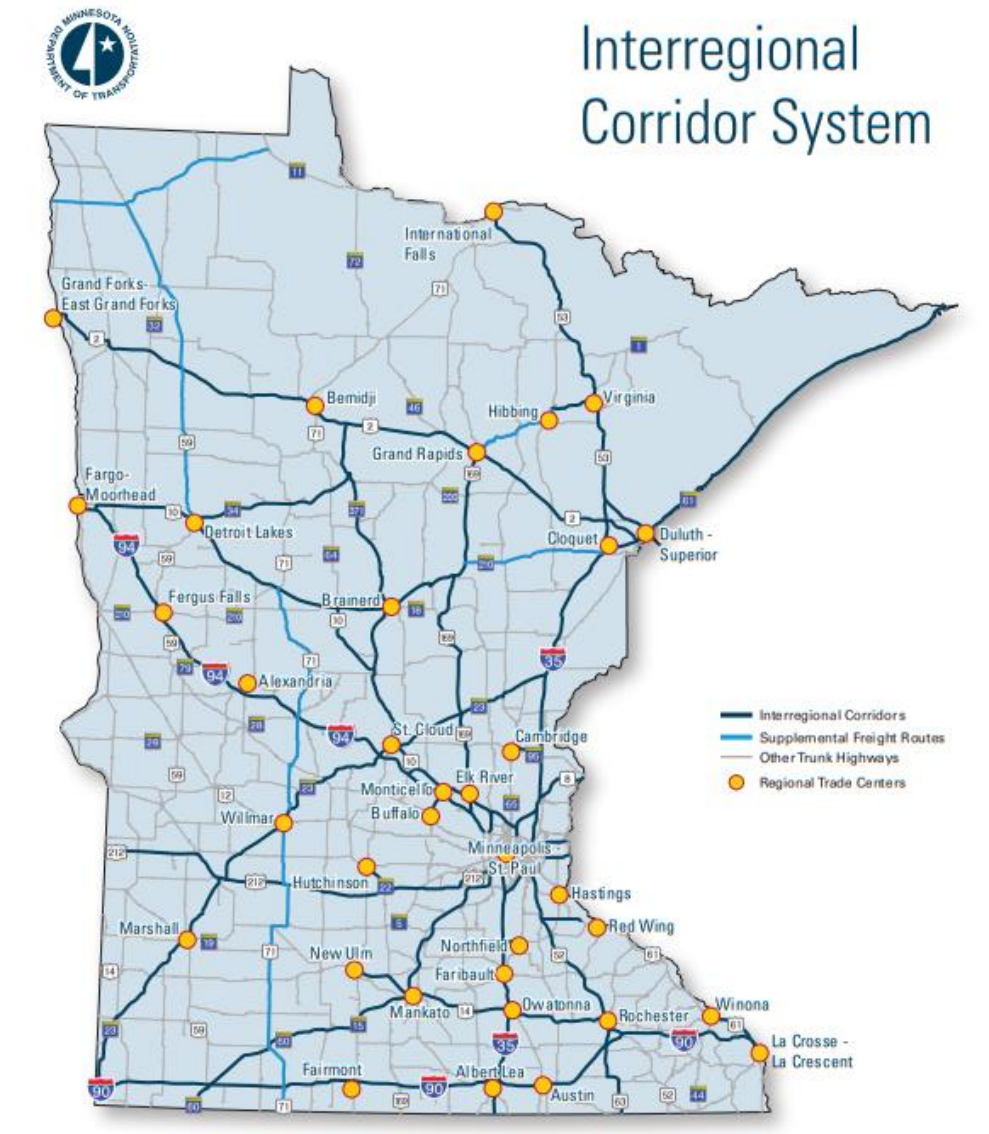
Research is needed

- To determine which median design to use for each situation
- Placement and design of passing lanes
- How to select the best junction designs

The best designs and methods of operation when signals are needed

The Super-2 should be designed to handle 20 year forecasts, but after that, can it be easily expanded?

Where do we go from here?



<u>What are candidate roadways in Minnesota?</u>

Two lanes roads which are currently part of the Minnesota Interregional Corridor System.

Two lane roads with recreational traffic

Commuter routes

Where do we go from here?

Opportunities to build a complete Super-2 corridor are limited

Short segments of Super-2 can increase safety and capacity and serve as early phases for future upgrading a corridor

Existing two-lane roadways where access management is not complete, elements of the Super-2 could be used

- Intersection designs
- Medians - minor access points become right on right off. Traffic goes to the nearest intersection designed to handle U-turns

Adding Signals to RCUTs and J-turns

RCUTs offer flexibility for adding signals

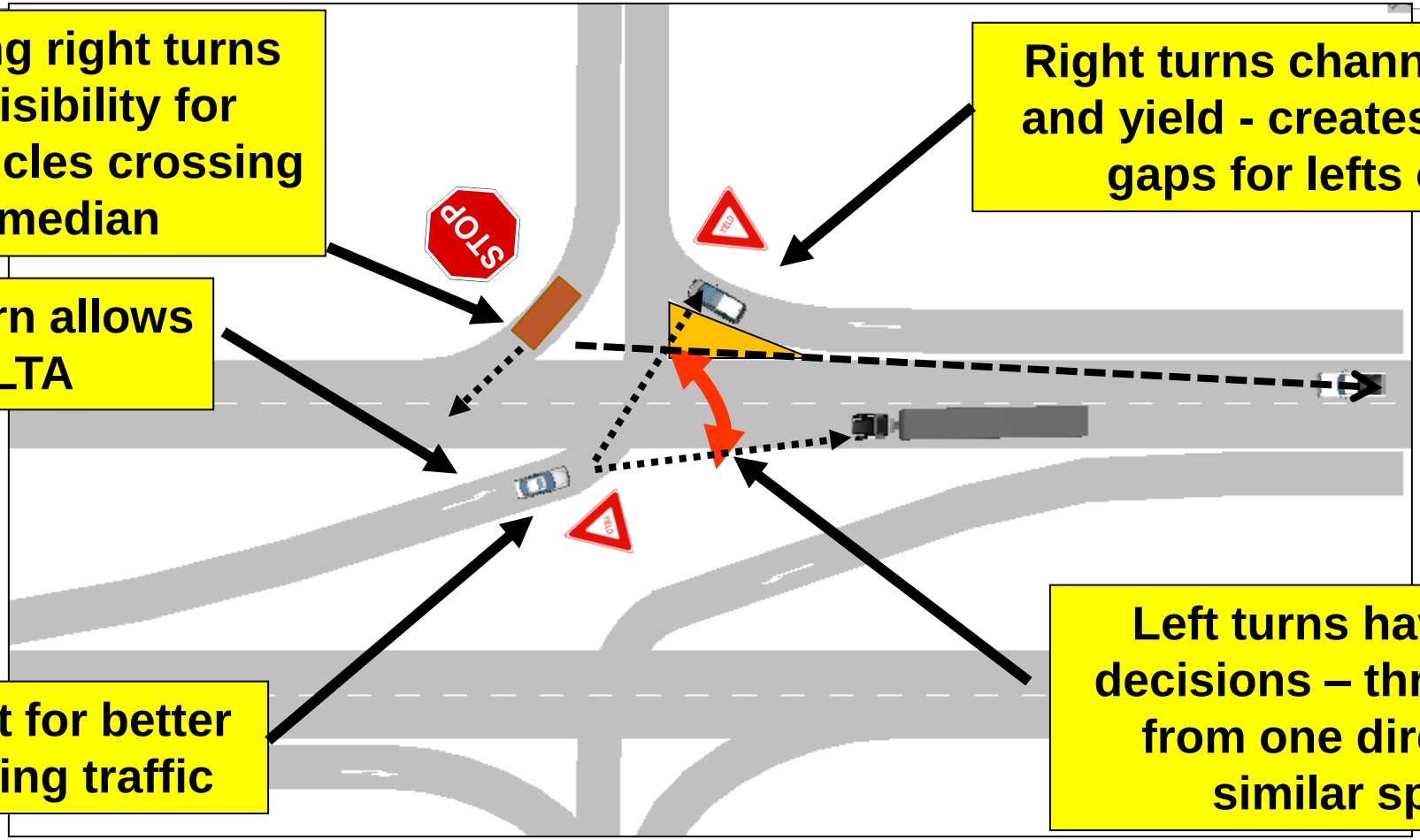
- Only 2 or 4 “nodes” - each with only 2 conflicting phases
- Only nodes needing signals would have them. Others remain with YIELD or STOP control.
- Signals in each direction can be timed as a one way street.
- FYLTA can be used for U-turn & left turn movements. GLTA called by delay or queue length.
- The signals would rest in mainline green and FYLTA

However at the RCUT with signals at MN 65 and Co Rd 22 in Anoka County

Mainline left turns are “bent” to become 90 deg. moves, not lefts

Side street approaches are dual right turns with “No Turn On Red”

RCUT Geometry for Demand Based Signals



Offset exiting right turns improve visibility for entering vehicles crossing to the median

Right turns channelized and yield - creates more gaps for lefts off

Keeping it a left turn allows for use of FYLTA

Left turns offset for better view of oncoming traffic

Left turns have easier decisions – threat comes from one direction at similar speeds

Evaluation of Junction Designs

VISSIM used to collect travel times for each of the 12 movements

- **J-turn**
- **RCUT**
- **Intersection with a signal**
- **Roundabout**

Volumes - both peak hour and 8th highest hour of an intersection meeting signal Warrant 1B - “interruption of continuous traffic”

The results for the 8th highest hour indicate what could be happening for the remaining 16 hours of the day

Peak Hour Travel Times

Peak Hour Travel Times	J-turn	RCUT	Intersection With Signal	Roundabout	At-grade diamond	At-grade loops
Total Travel Time (hours)	27.8	27.1	27.1	27.3	26.7	27.5
Average Travel Time For All Vehicles (seconds)	82.2	79.9	80.3	80.7	79.1	80.6
Average Travel Time For Mainline Through Vehicles	70.1	70.3	77.4	81.1	75.5	75.6
Travel Time For Left Turns From M.L.	121.3	84.0	91.2	80.1	107.8	116.2
Travel Time For Minor Street Through	144.1	142.1	98.7	81.9	88.1	88.2

8th Highest Hour Travel Times

	J-turn	RCUT	Intersection With Signal	Round-about	At-grade diamond	At-grade loops
Total Travel Time (hours)	15.0	14.6	14.5	14.4	15.0	15.1
Average Travel Time For All Vehicles (seconds)	79.9	77.8	76.9	79.0	75.9	76.8
Average Travel Time For Mainline Through Vehicles	68.5	68.4	73.8	78.5	71.7	71.4
Travel Time For Left Turns From M.L.	119.4	85.1	83.4	81.0	103.3	114.1
Travel Time For Minor Street Through	135.1	134.7	93.9	79.8	86.1	86.4

THE END

Email: Dennis_Eyler@yahoo.com





For best results - never drop the left lane!

ACEC/WisDOT Transportation Improvement Conference
Pointing to the Future

March 9-10, 2009
Revised in 2025

Alternate Intersection Designs

Traffic Operations

Dennis R. Eyler, SRF Consulting Group, Inc.



INNOVATIVE INTERSECTION DESIGNS

Wisconsin ACEC Meeting
March 9, 2009
Stevens Point

Dennis Eyler, P.E., P.T.O.E.

Vice President

SRF Consulting Group, Inc.

Presentation Goals

- Show examples of designs
  - Already in use
  - Designs being considered
- Explain features and issues
- Increase interest in their use
  - If not in whole, consider some features
- Provide contacts for information





Why New Designs?

Divided highway intersections often have problems

New designs needed to:

- Improve safety
- Help manage access
- Reduce need for signals
  - Improve mobility
  - Reduce user costs

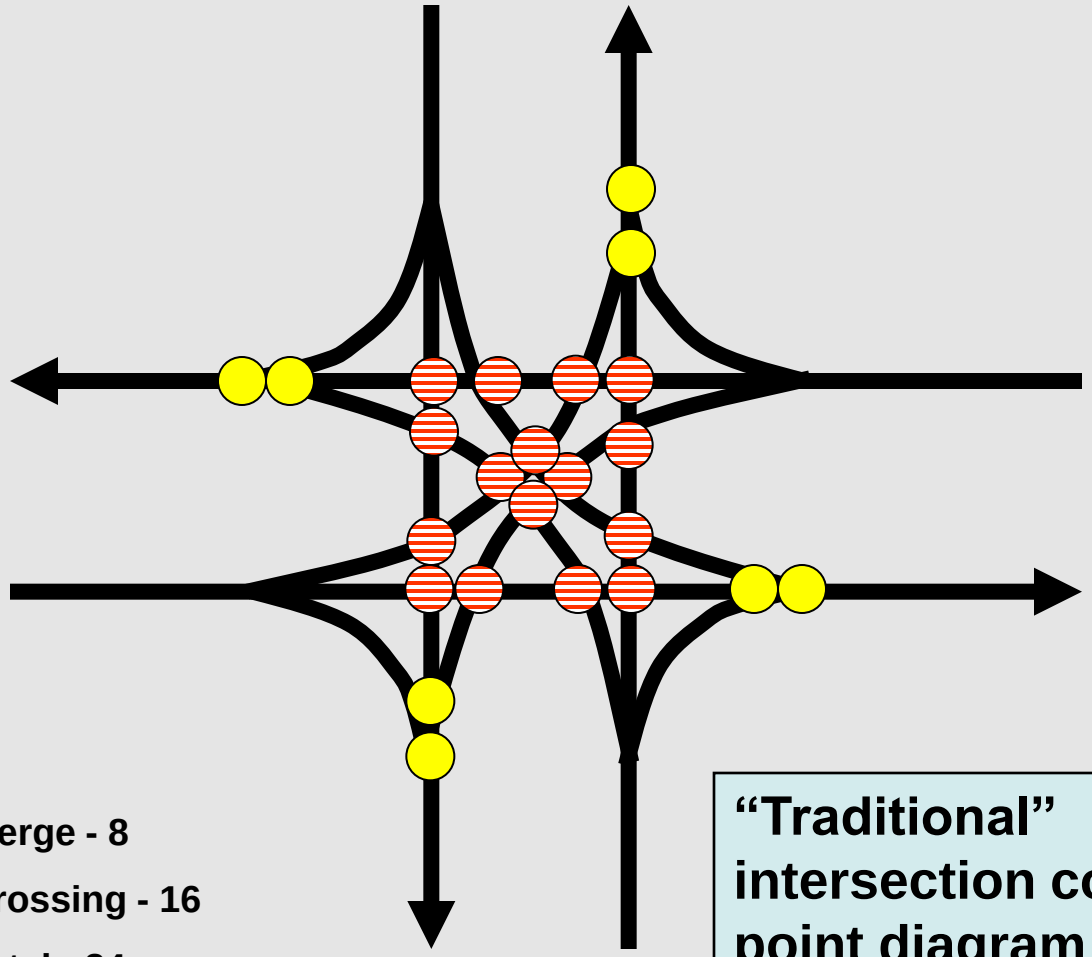
Several studies have been completed

Expressway Intersection Safety NCHRP 15-30



Slide - courtesy of Tom Maze – Iowa State CTRE

The problem:
Too many conflict points



Merge - 8

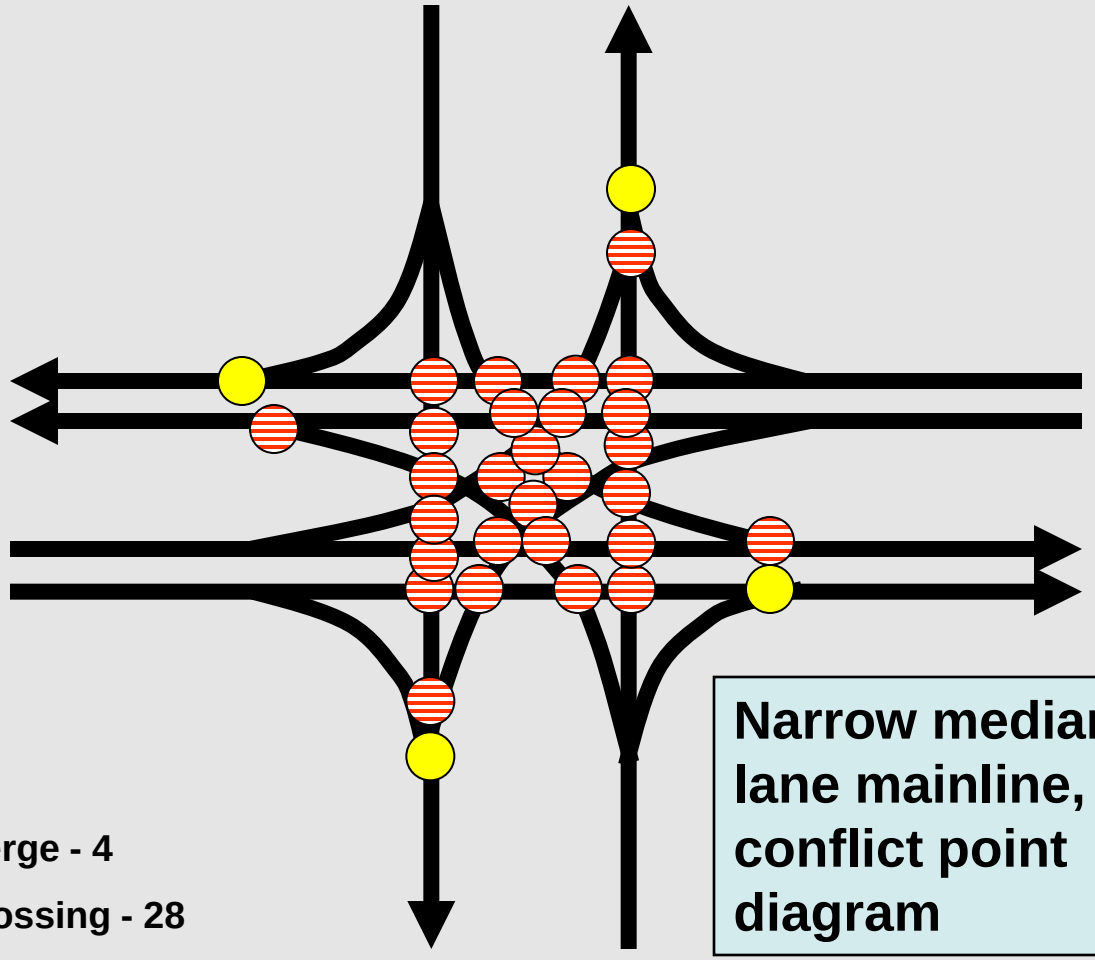
Crossing - 16

Total - 24

“Traditional” intersection conflict point diagram

However, it's actually worse





Merge - 4

Crossing - 28

Total - 32

Narrow median four lane mainline, conflict point diagram

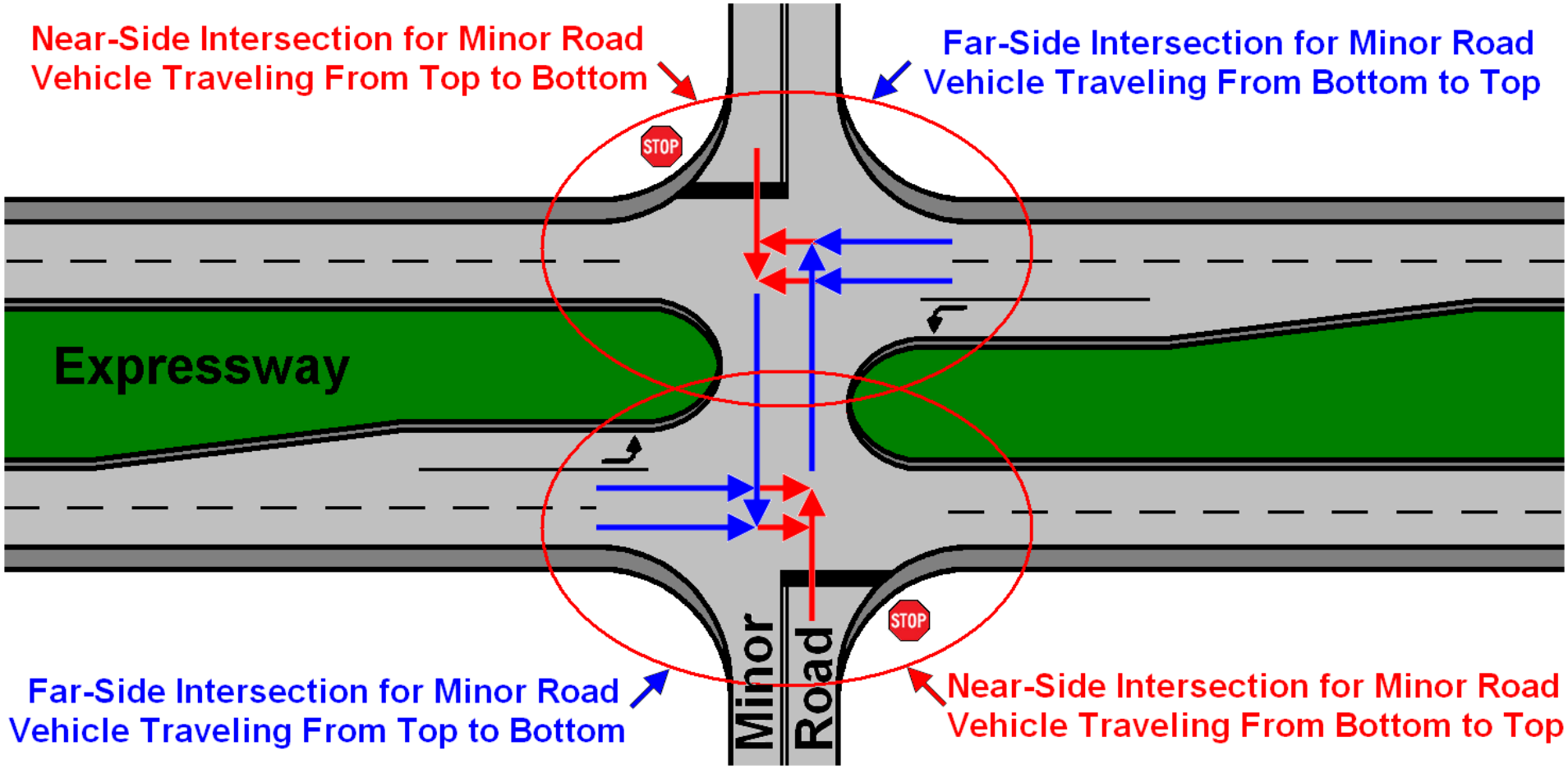


What are the operations problems with existing designs?

- **Too many crashes**
- Too many conflict points

Far-Side Right-Angle Crashes

More of a problem (62% to 38%)



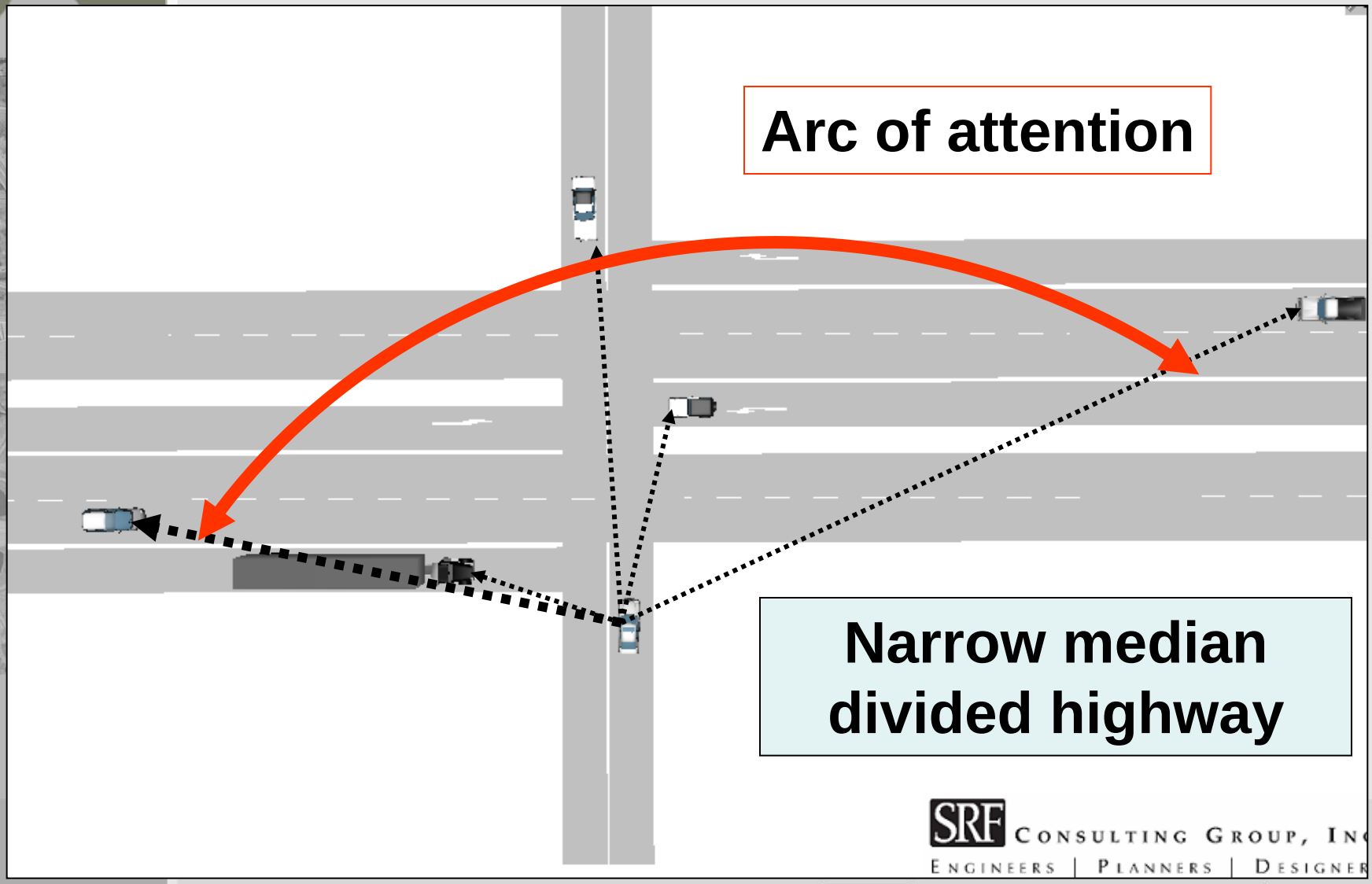
Slide - courtesy of Tom Maze



What are the problems with existing designs?

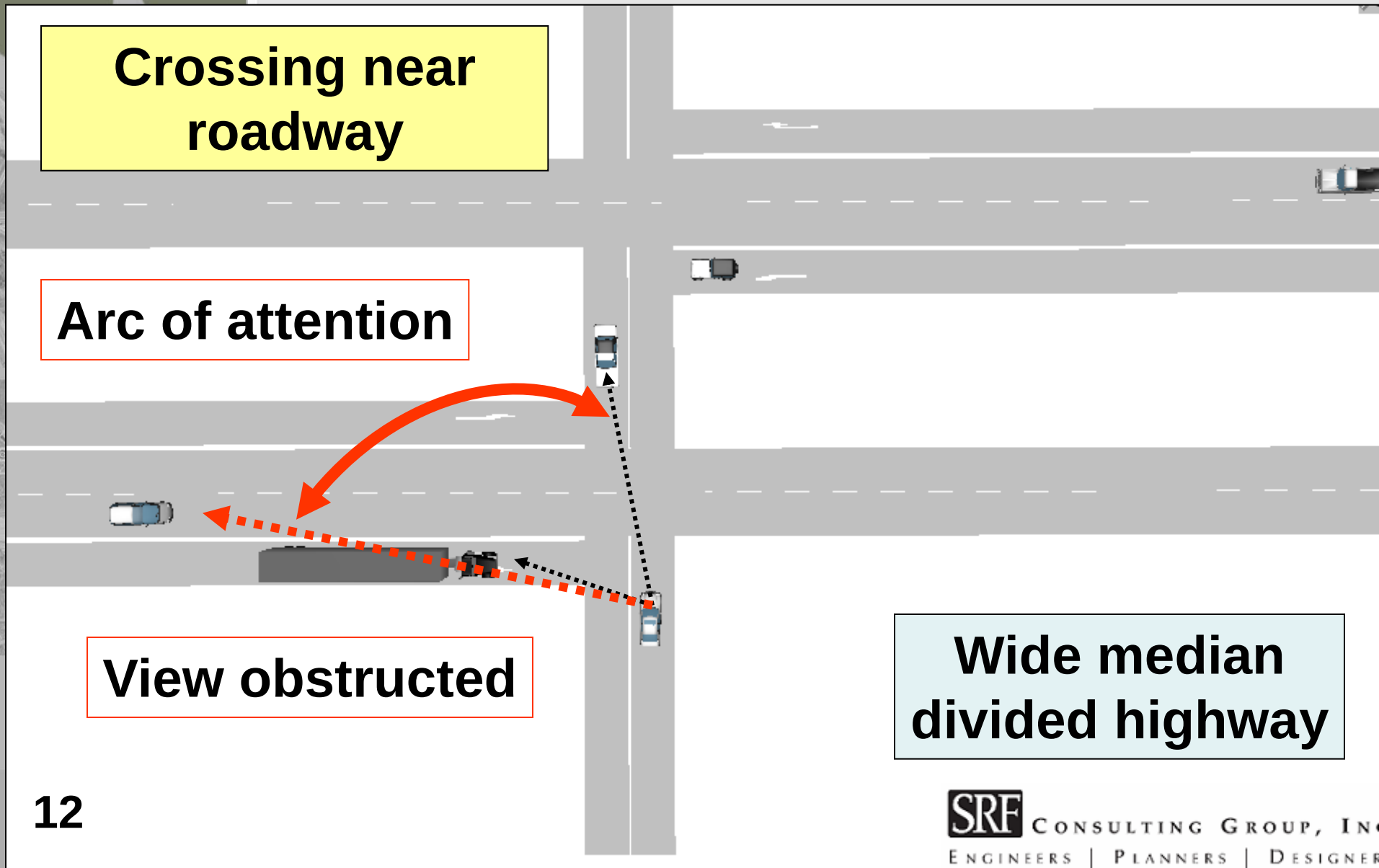
- **Driver overload – difficult decisions**
- Too many conflict points
- Too many crashes

Driver overload?



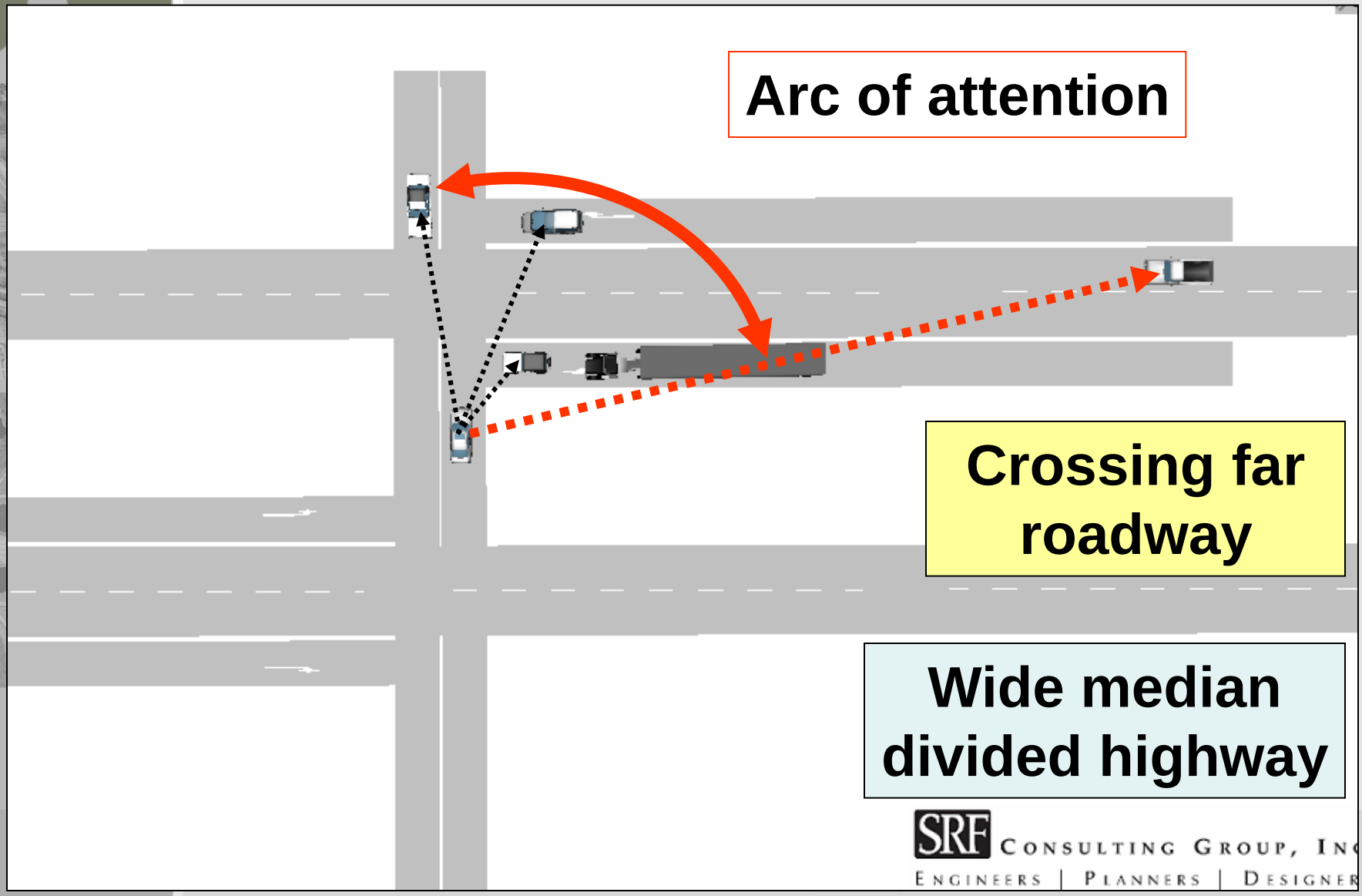
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Driver load reduced?



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Driver load reduced?



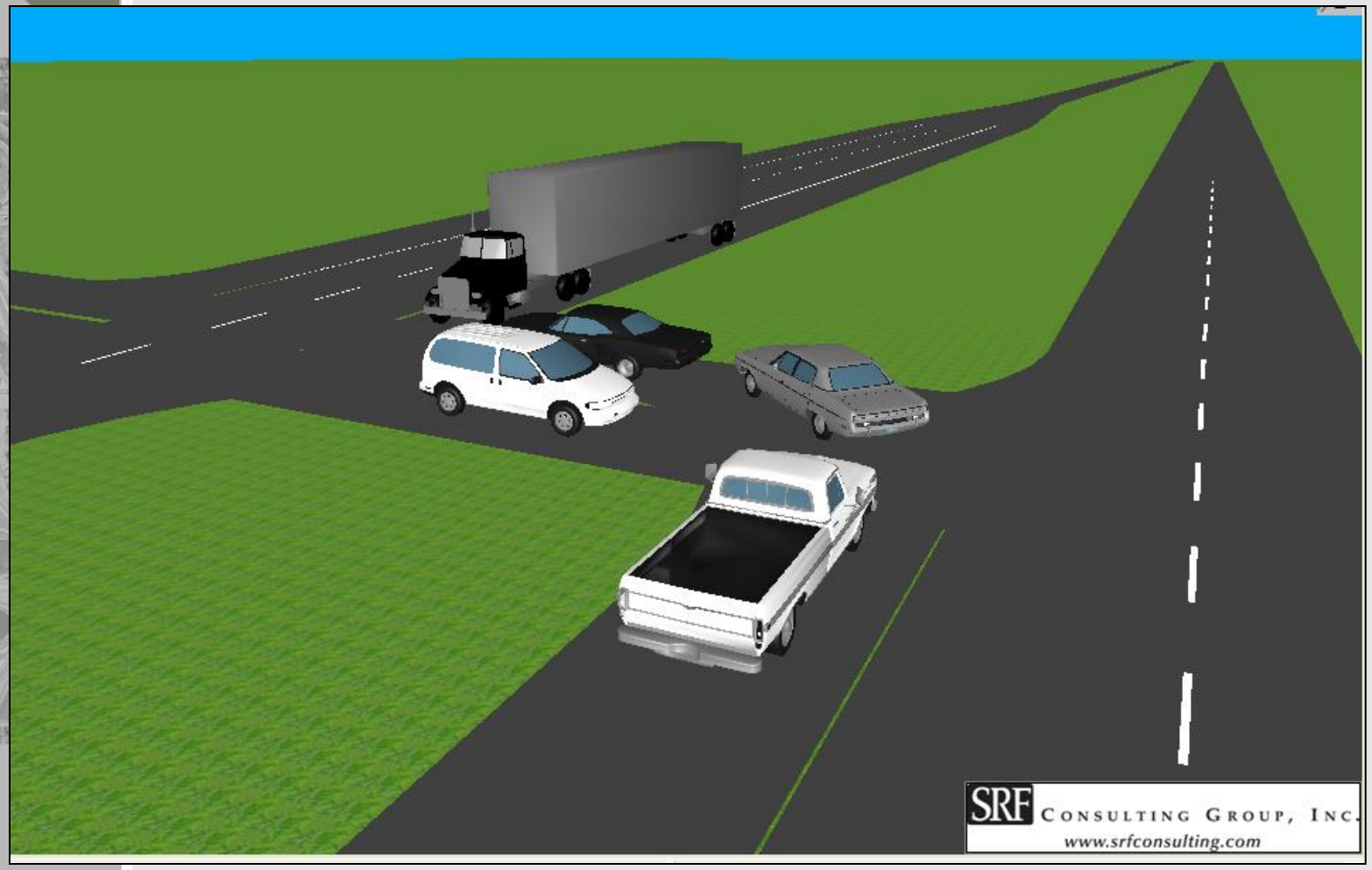
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What's wrong with existing designs?

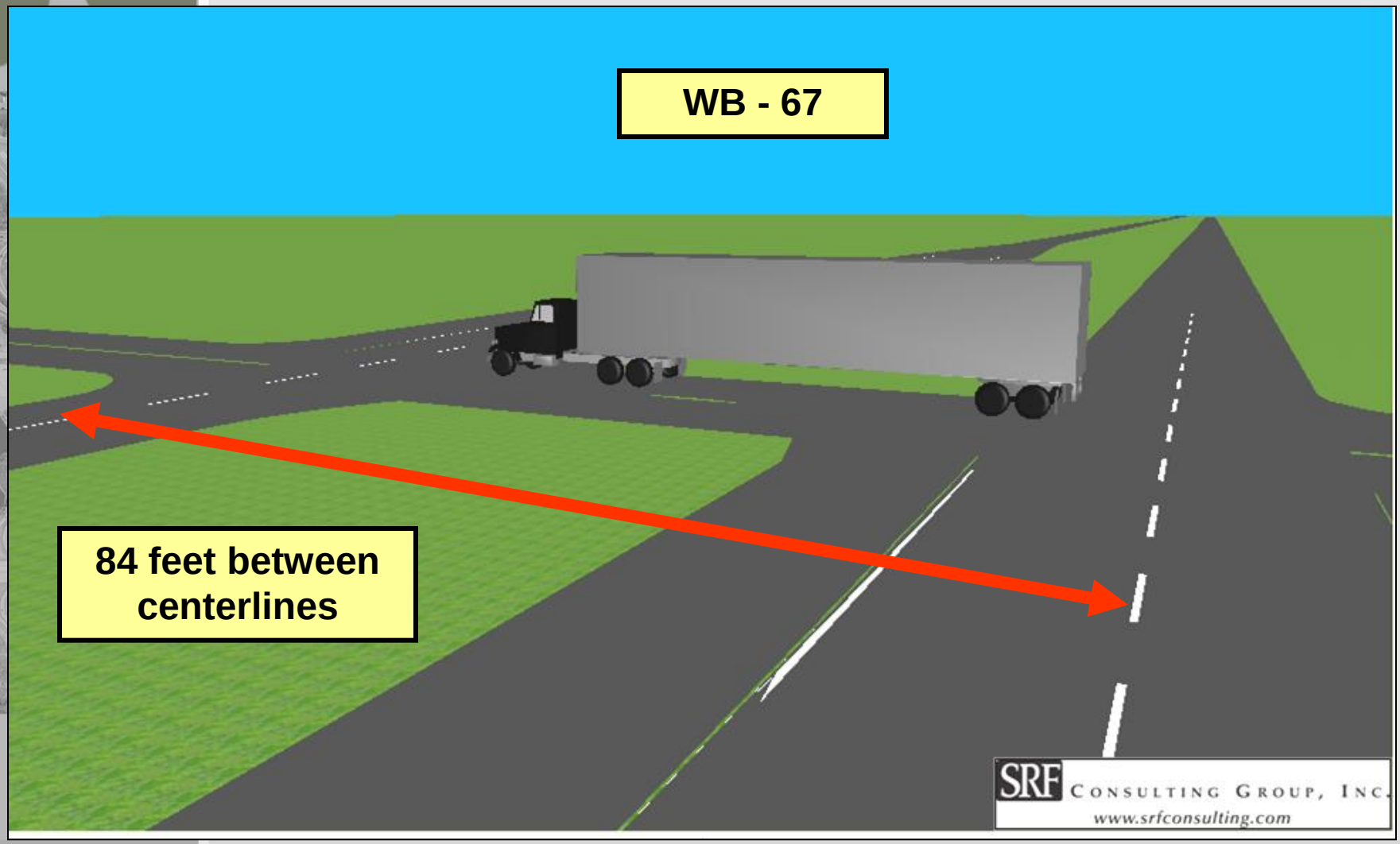
- **Existing designs can make things worse**
- **Trucks cannot be safely accommodated**
- Too many conflict points
- Too many crashes
- Driver overload – difficult decisions

Added conflicts



Trucks

Too long for storage in median





Goals for a safer design

- Alert drivers to intersection
- Reduce and simplify conflict points
  - One to one conflicting flows
  - “Threats” only from right or from ahead (driver sits on left of car)
- Improve driver decision making
- Provide safe storage <u>for any length vehicle</u> and more gaps with two stage crossing

What's a good example?



Roundabouts

- **Features**
  - Driver forced to notice intersection
  - "Threat" is always from left
  - One to one conflicts
- **Issues**
  - But the roundabout is there 24/7
  - Not efficient for rural expressways with high truck volumes
  - Closely spaced successive roundabouts on high-speed roads are annoying – *example: MoDOT limits roundabouts to one mile minimum spacing*

Roundabout Feature

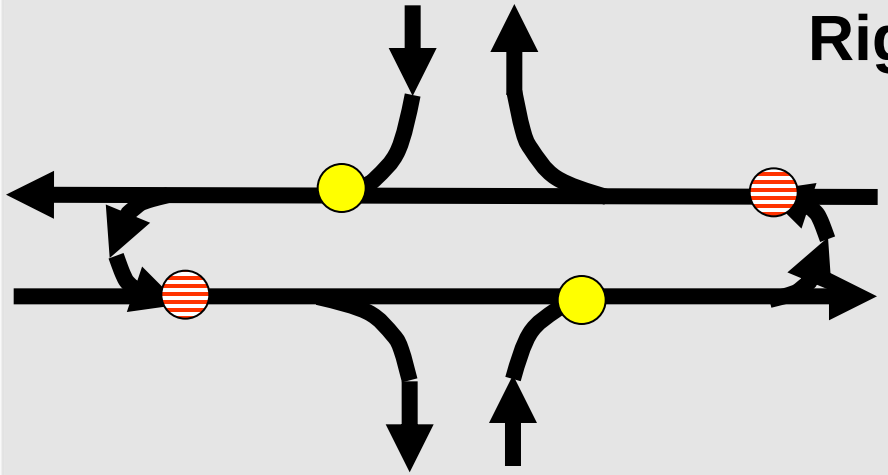


What are some alternative designs?



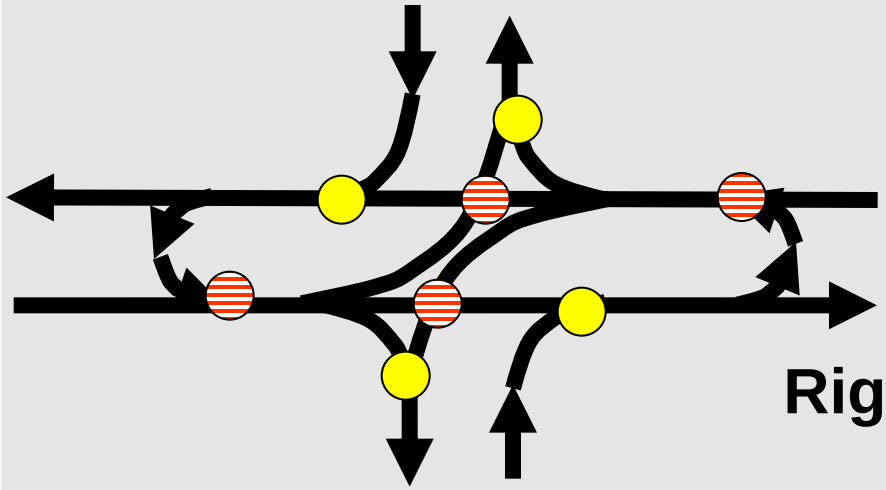
- **Right-in, right-out with U-turns or RCUTs**
- **The RCUT is the focus of today's presentation**
  - **Many studies have been done**
  - **Concept backed by FHWA**
  - **Some examples are in use**

Fewer conflict points



Right-in, right-out

"J-Turn" Intersection



"RCUT" Intersection

Right-in, right-out with lefts off



Design questions

- **Is mainline traffic free flow or pulsed flow?**
  - **Are there platoons from signals?**
  - **Or is mainline flow completely random?**

Pulsed flow issues

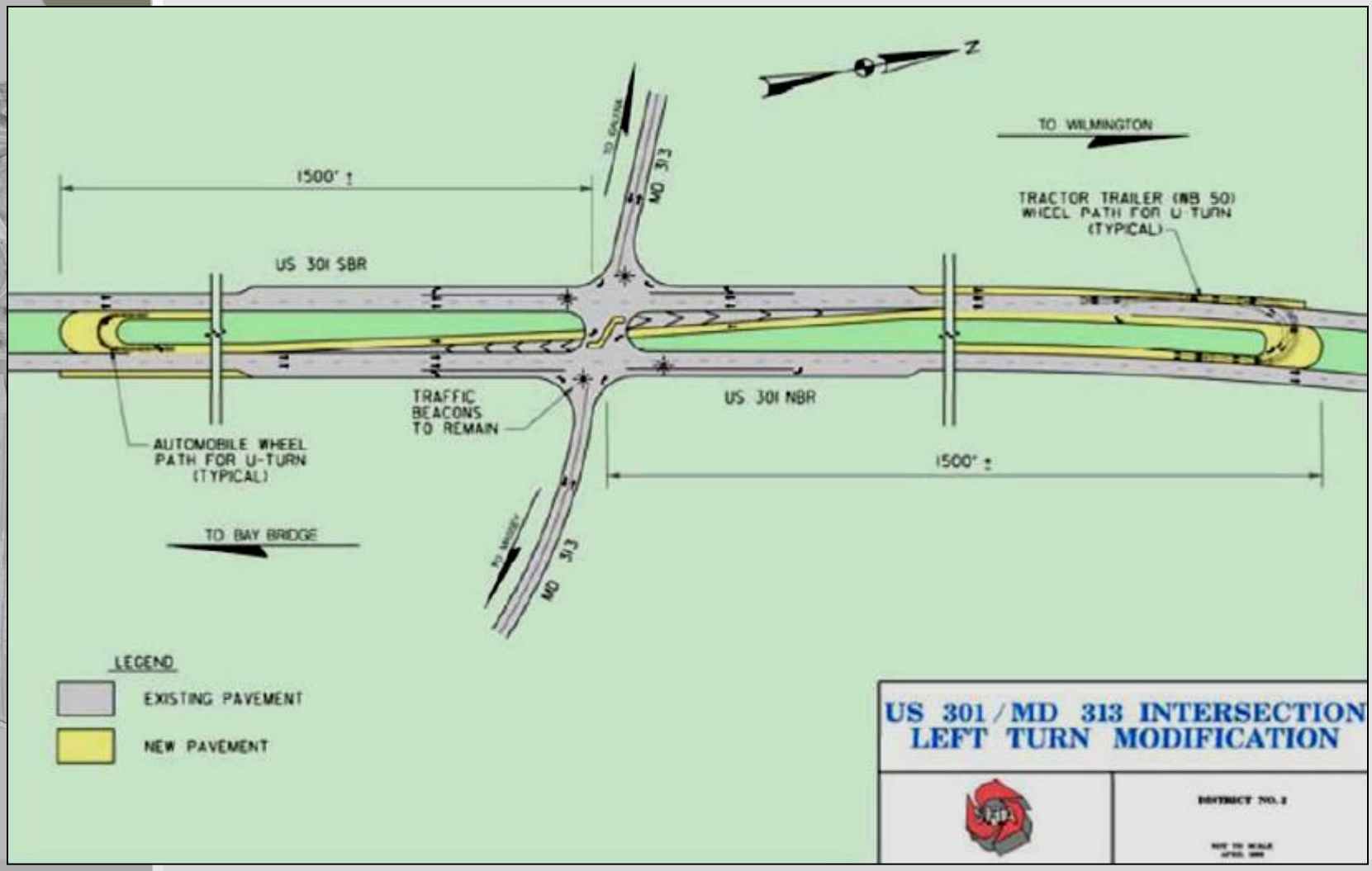
- **Upstream signals generate dense platoons**
- **Entering and weaving across several lanes may be difficult**
  - **Difficult through a platoon**
  - **Easy between platoons**
  - **Partial access intersections perform well near signals**
    - **Entry design should be yield, not merge when signals are around**



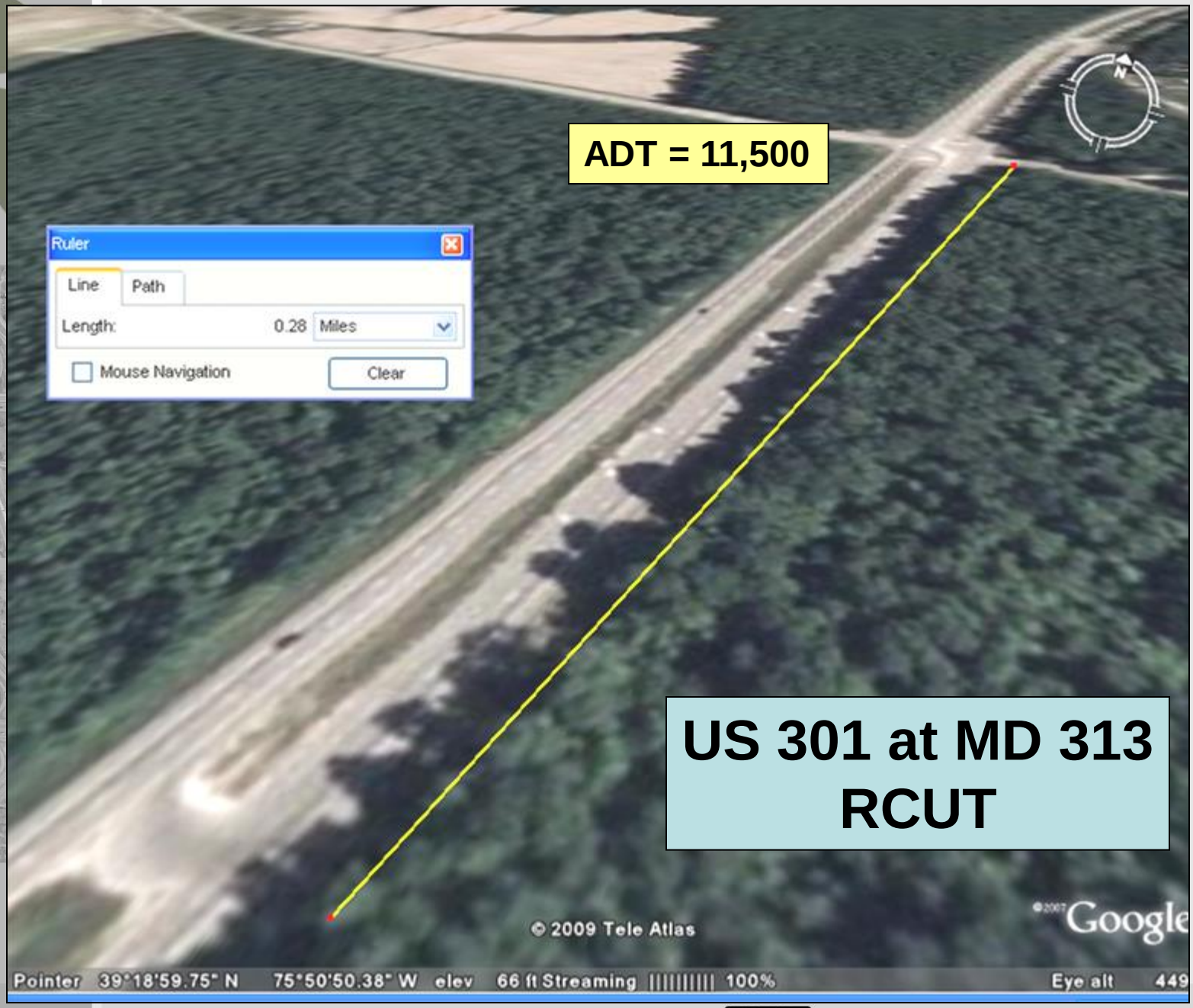
How far to U-turn

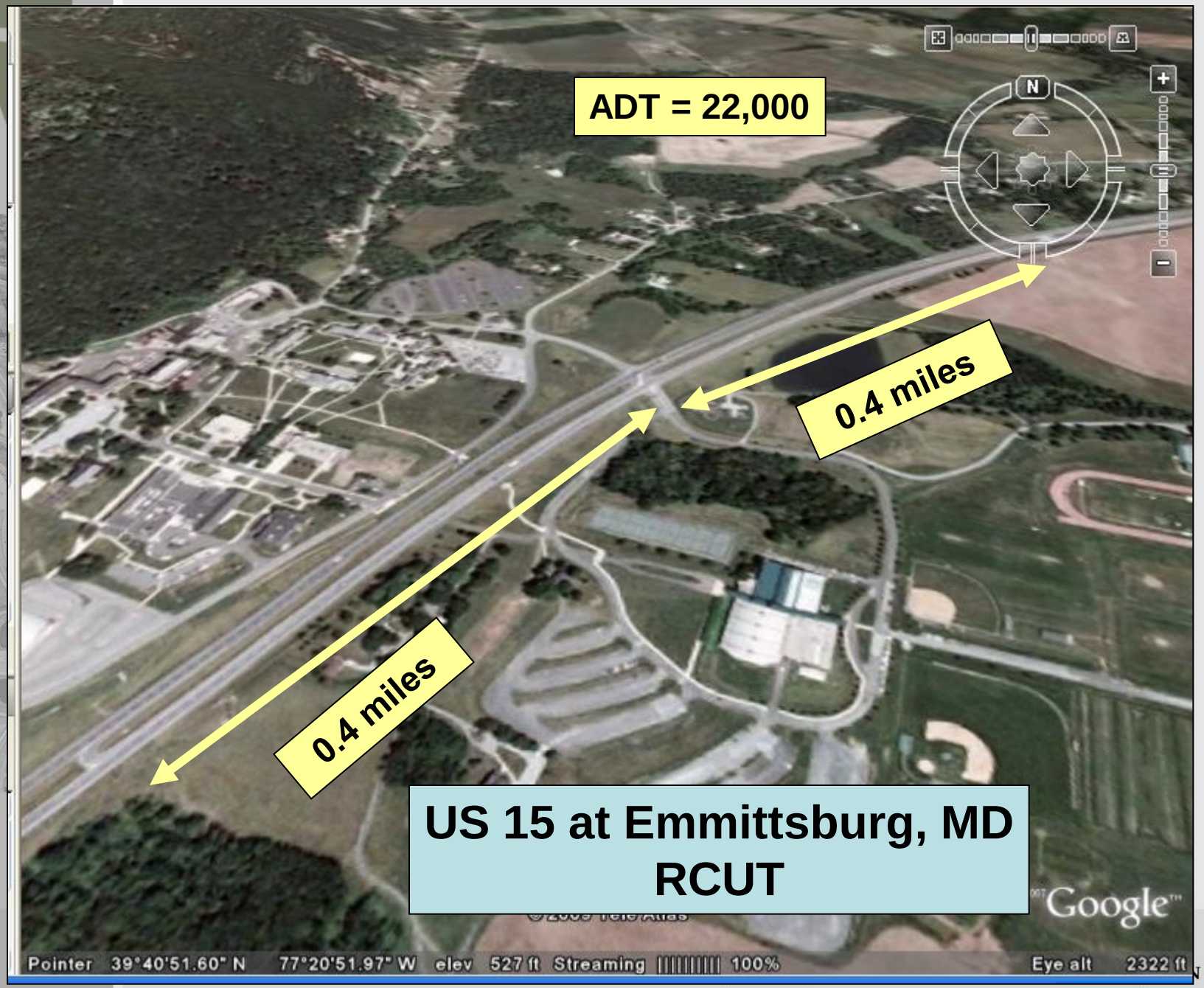
- **Weaving through platoons - 10 seconds per lane crossed**
  - **For a 55 mph - 1600 feet to cross two lanes to reach u-turn connection**
  - **Then 180 feet of taper and 300 feet of turn lane**
  - **Total = 2000 feet or more**
- **For lower volumes and "random" flow, 7 seconds per lane change may be adequate = ¼ mile**

Maryland RCUT Example

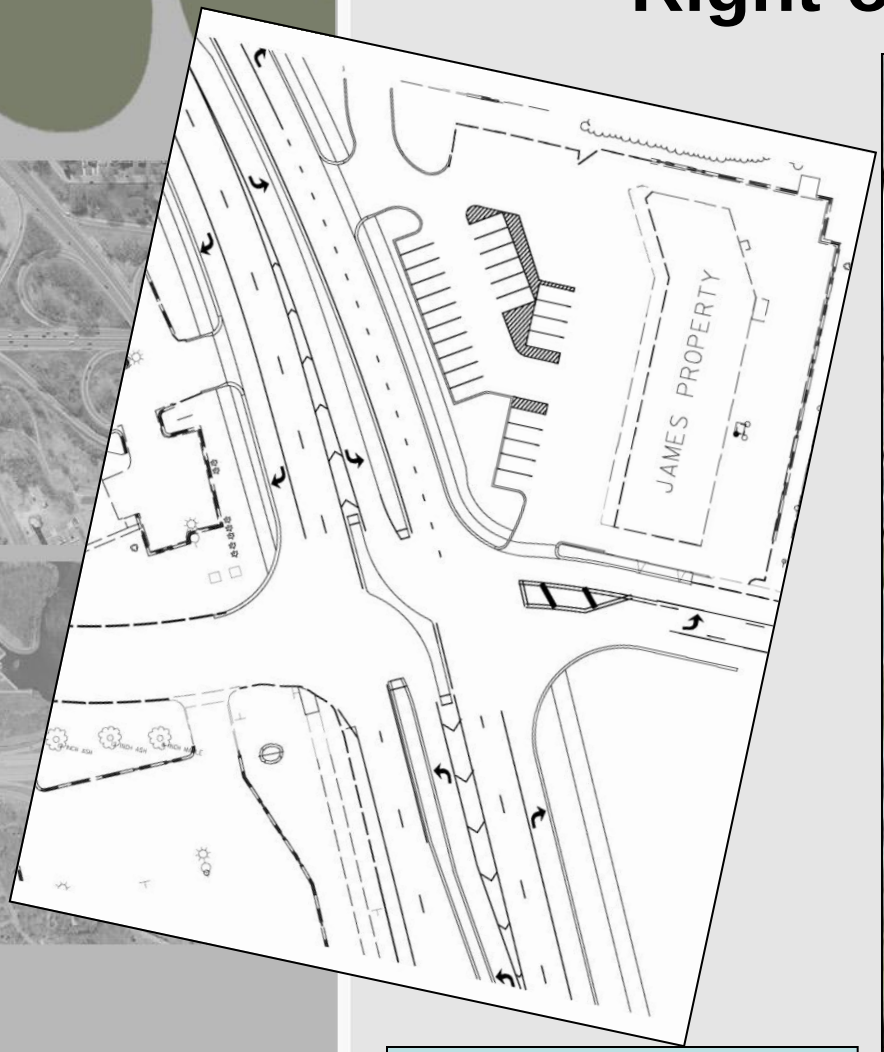


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ADT = 11,500
Ruler
Line
Path
Length:
0.28
Miles
Mouse Navigation
Clear
US 301 at MD 313
RCUT
© 2009 Tele Atlas
Google
Pointer 39°18'59.75" N 75°50'50.38" W elev 66 ft Streaming 100%
Eye alt 449


ADT = 22,000
0.4 miles
0.4 miles
US 15 at Emmittsburg, MD
RCUT
Google
Pointer 39°40'51.60" N 77°20'51.97" W elev 527 ft Streaming 100%
Eye alt 2322 ft

Close-up
Right-off, right-on, left off





Co Rd 50 at 175th
Lakeville, MN

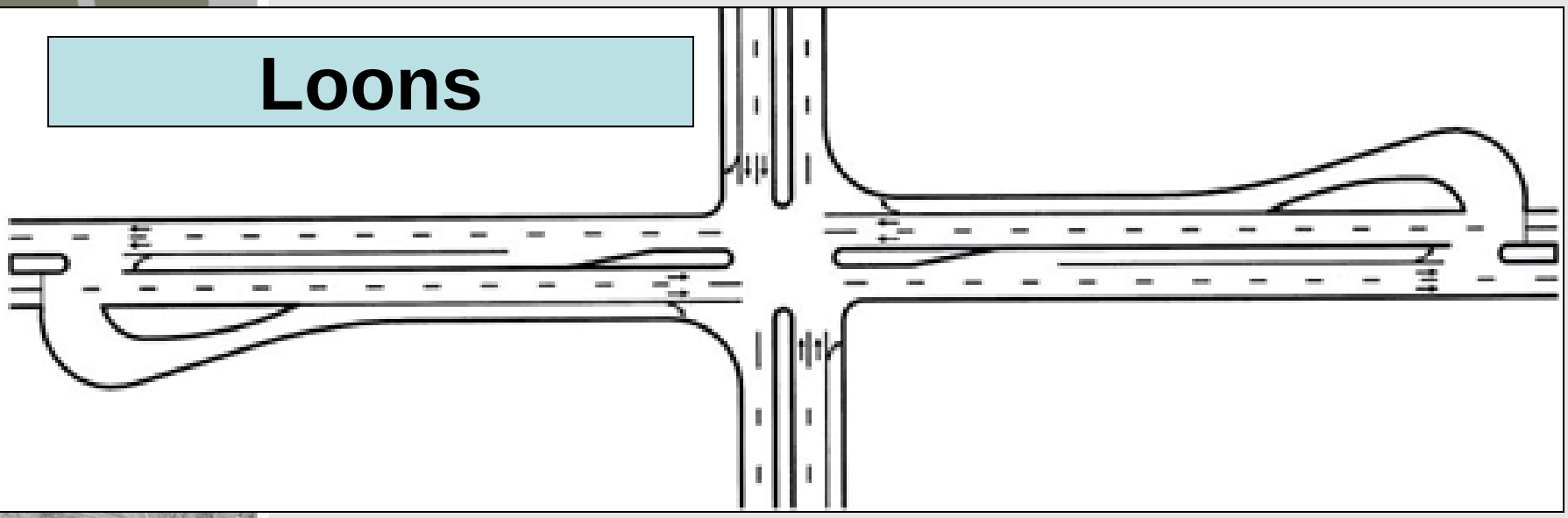
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Design Questions

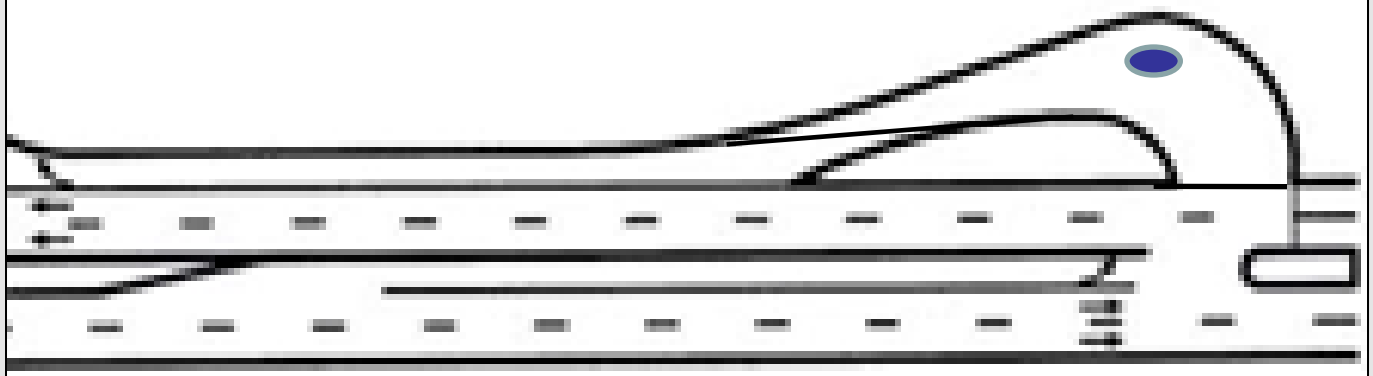
- **How should U-turns be handled?**
  - **Do we put u-turns into left oncoming lane and use inside acceleration lanes?**
  - **Or do we use "loons"?**
- **Is mainline traffic free flow or pulsed flow?**
- **How far to the u-turn connection?**

Loons

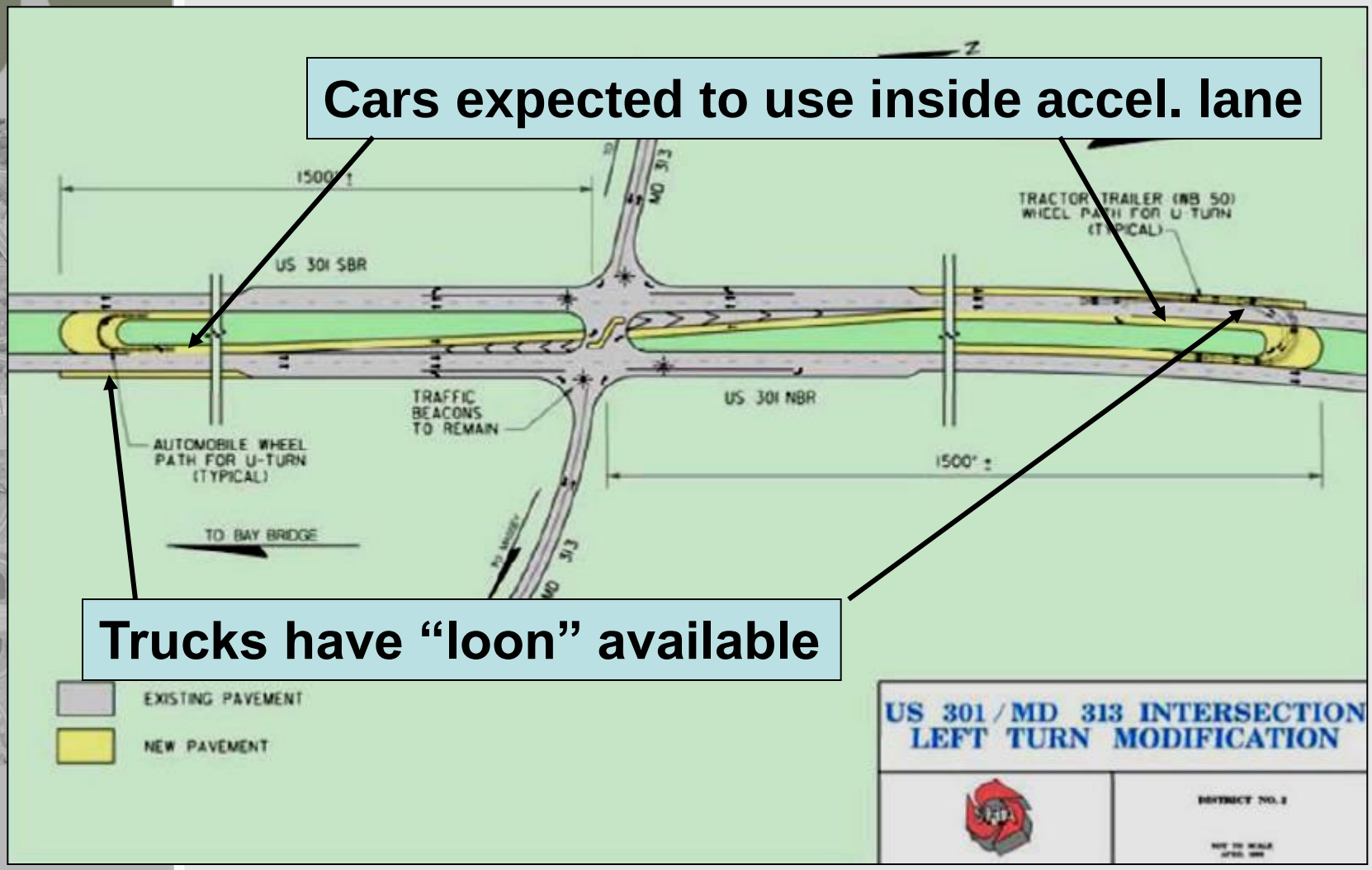


- Medians too narrow for truck U-turns
- U-turns directed to outside
  - Both lanes crossed
  - But smaller gap needed
  - Acceleration is in the right lane
  - Fewer impacts on through traffic
  - Next destination may be to right anyway

Why are they called “Loons”?



Maryland RCUTs Use Both

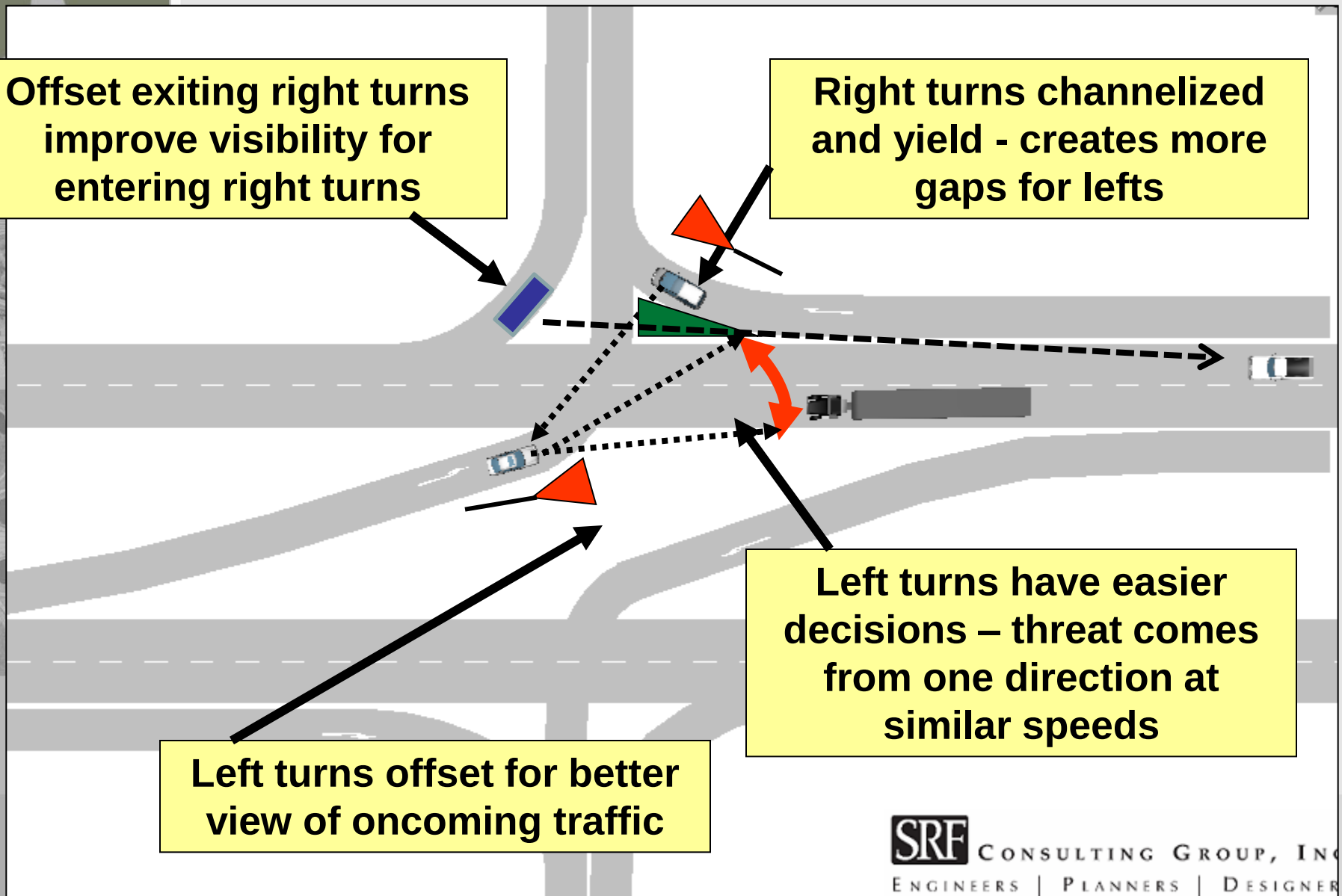




Design Questions

- **How are opposing right turns handled to benefit lefts?**
- **Is mainline traffic free flow or pulsed flow?**
- **How far to the u-turn connection?**
- **How should U-turns be handled?**

Opposing right turn treatment

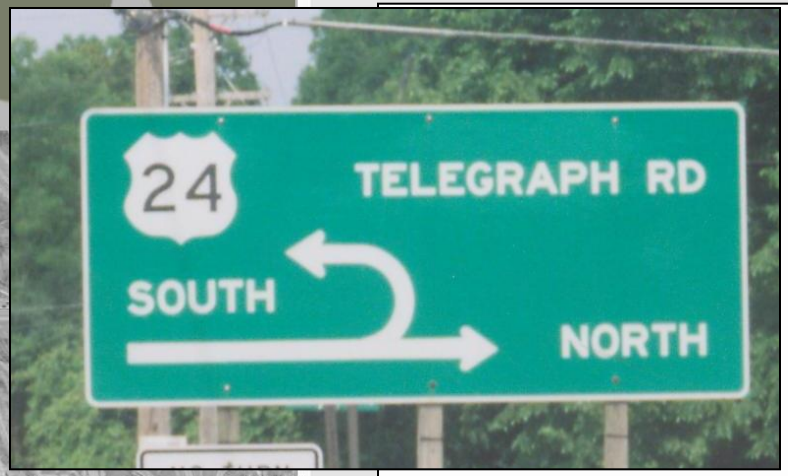


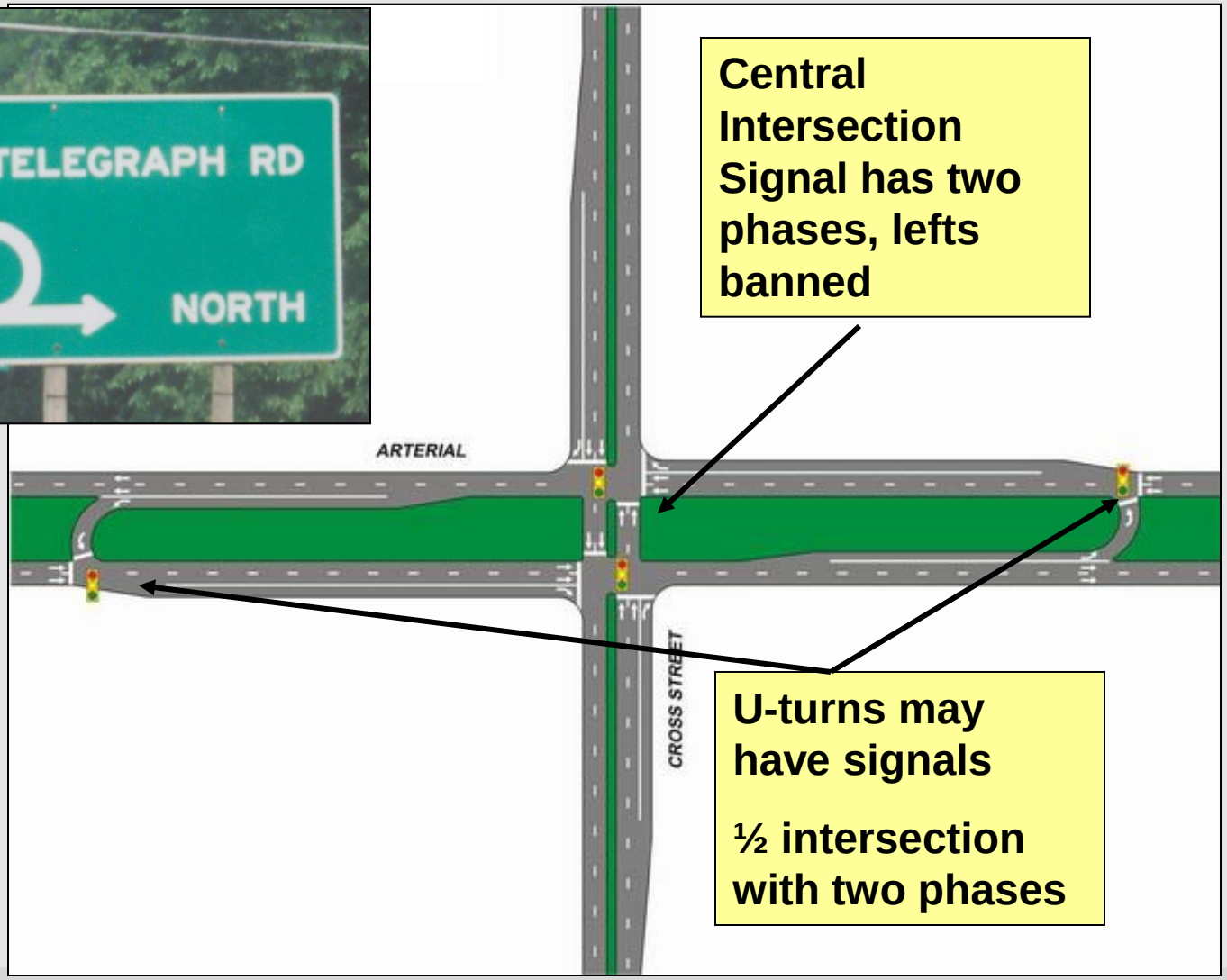
Other Innovative Designs



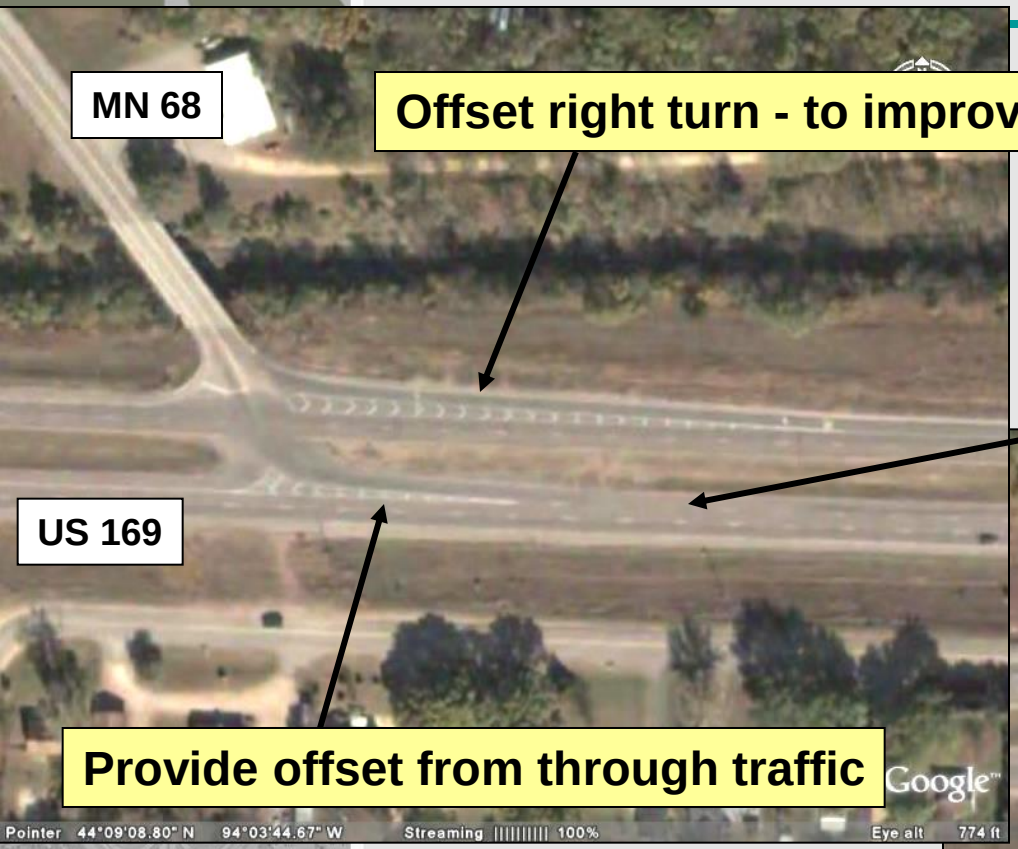
- Michigan U-turns
- Offset “Ts” with inside merges
- Compound Roundabouts
- Continuous Flow Intersection (CFI)
- Through-abouts
- Reduced Conflict (RCI)
  - RCUTS
  - J-turns

Michigan “U” Turns





Offset “Ts” With Inside merges

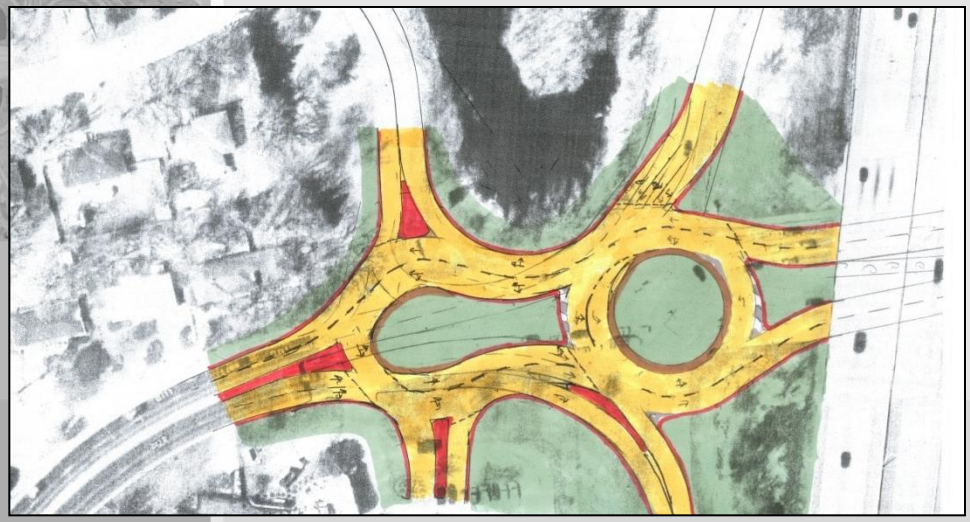


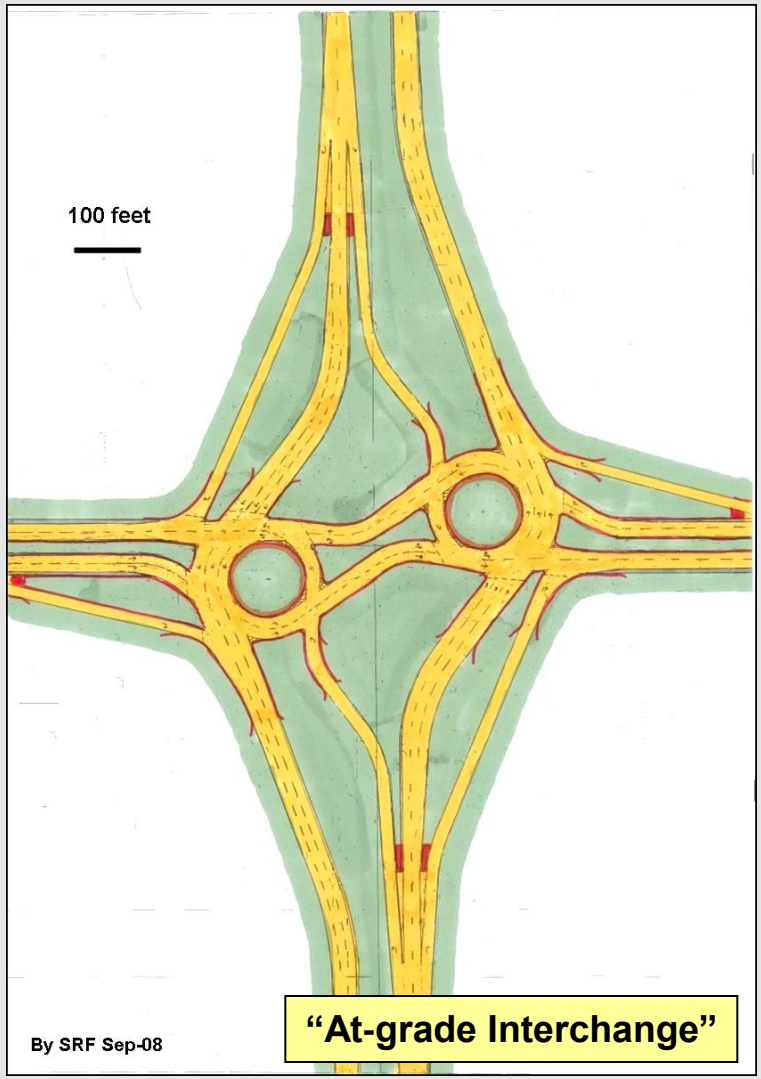


Compound Roundabouts



In U.K. - Image has been reversed



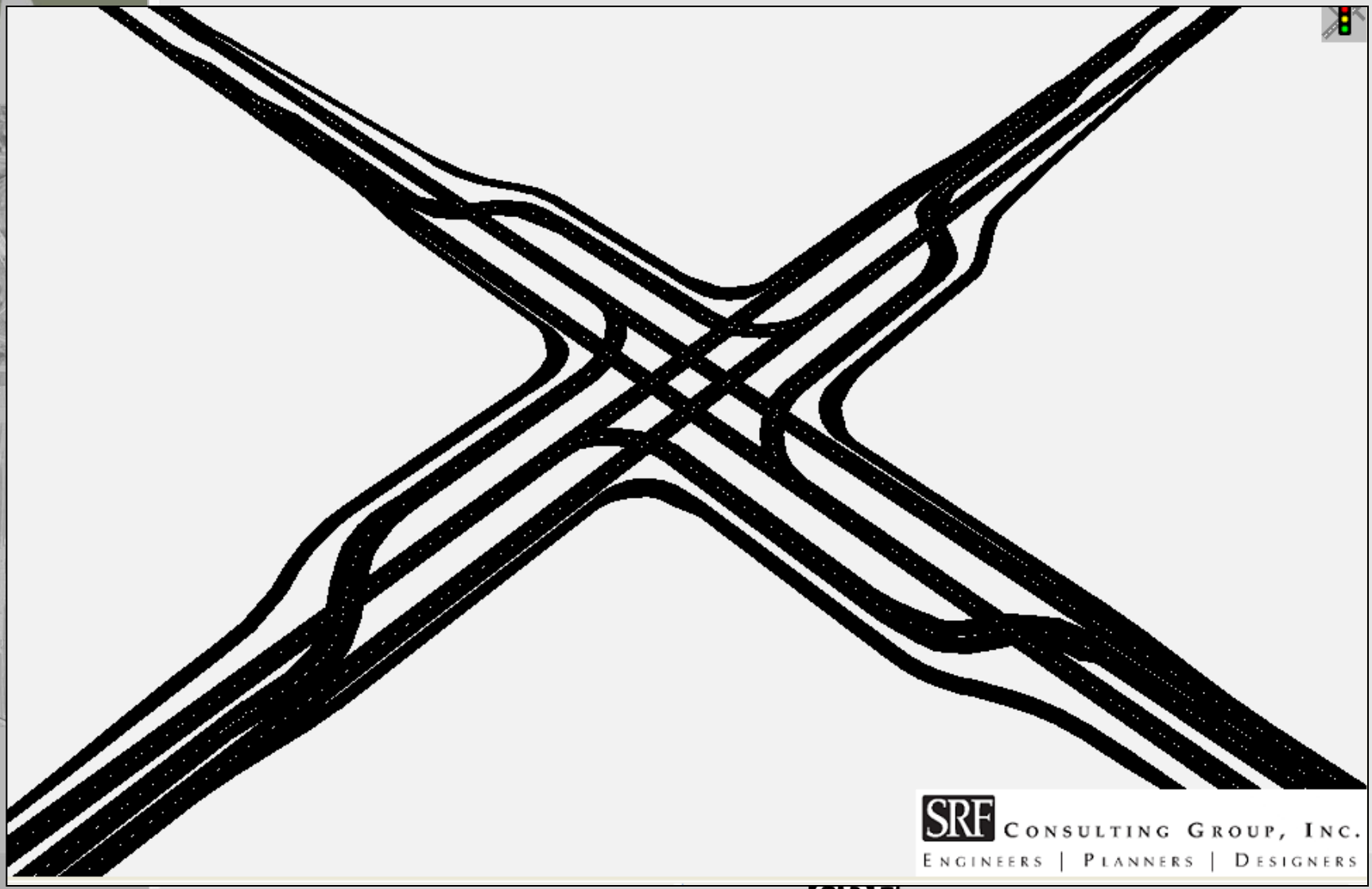


"At-grade Interchange"

SRF Consulting Group, Inc.

Continuous Flow (CFI)

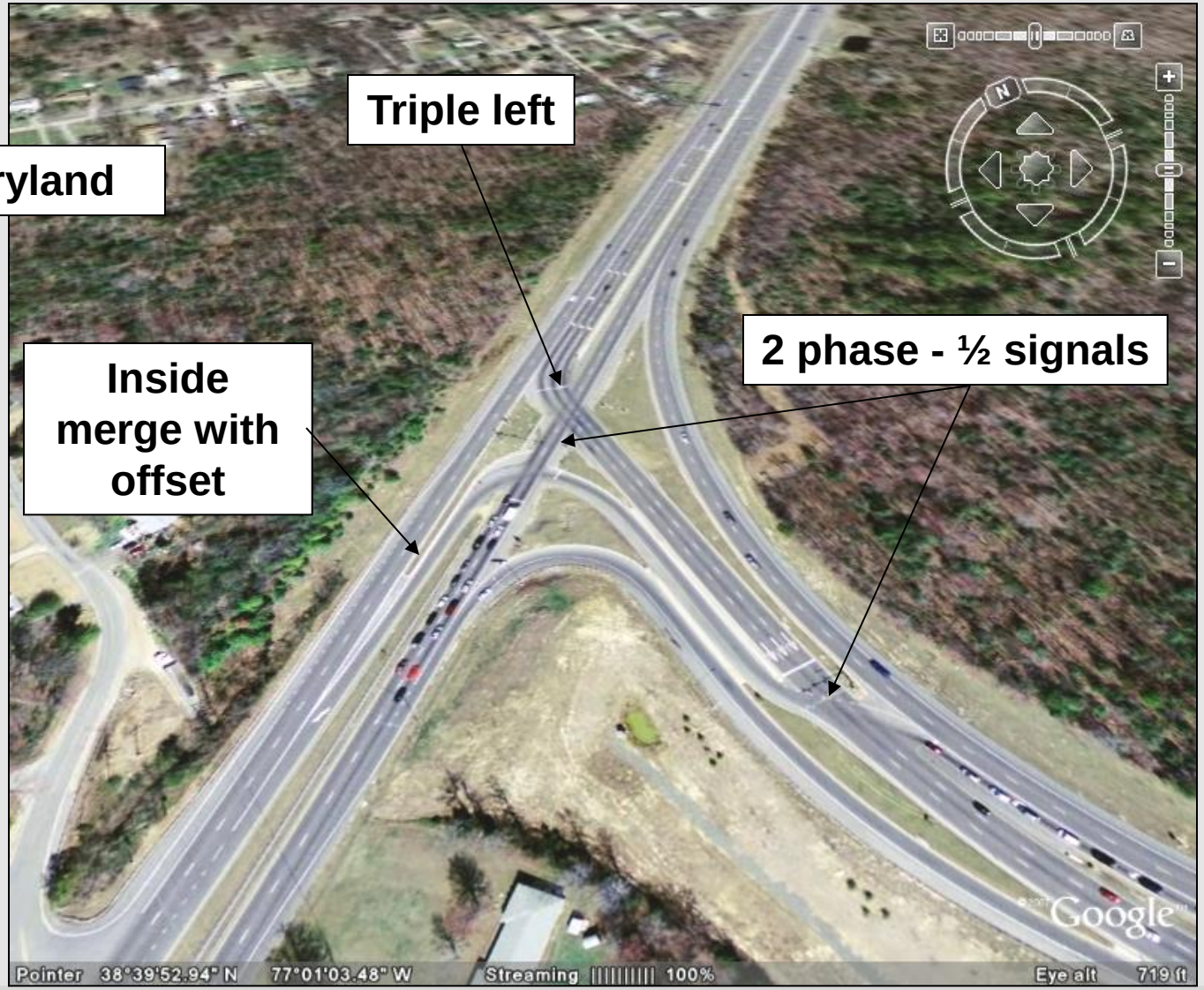
(or “Lefts in advance”)



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CFI "T"

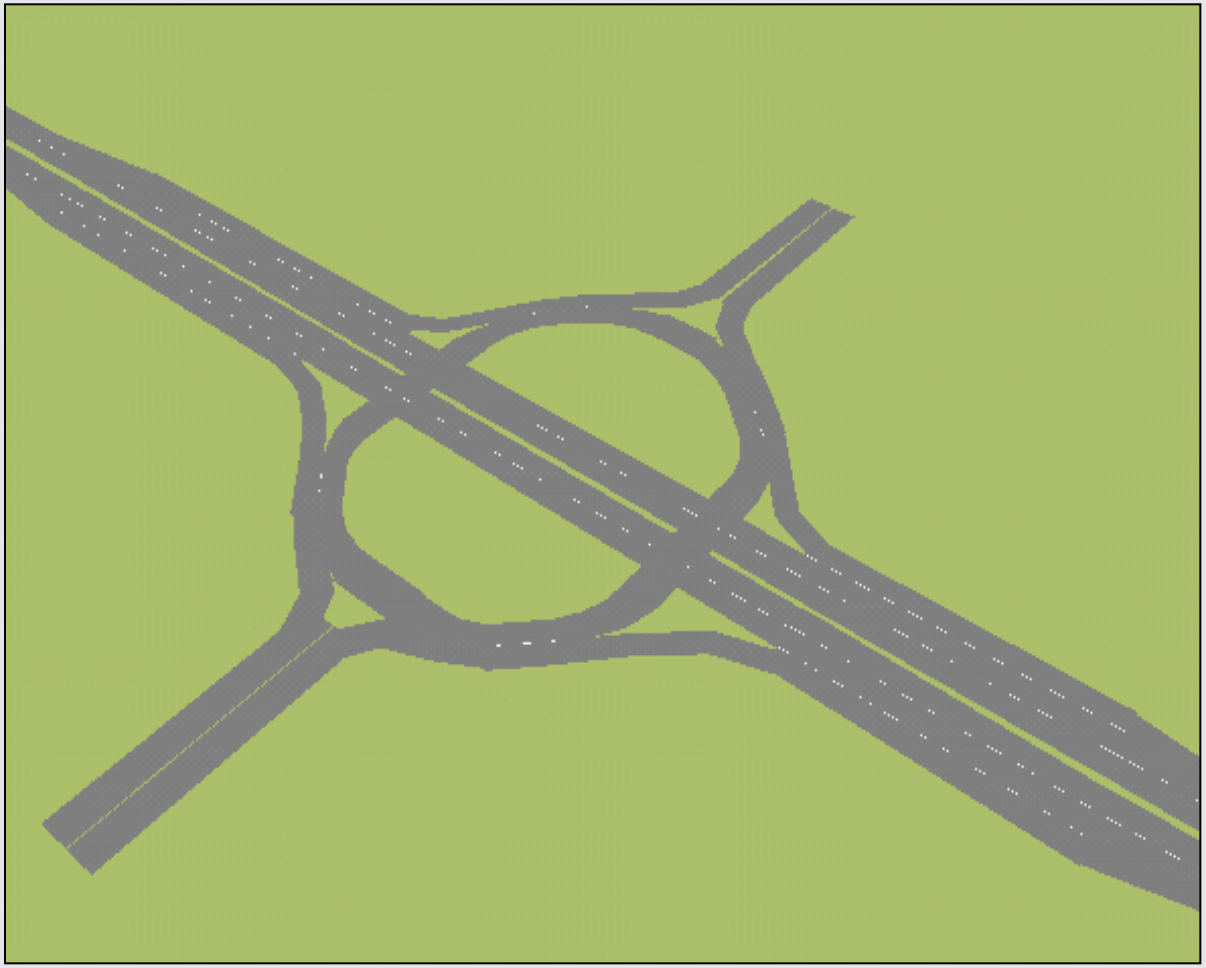
Located in Maryland



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Throughabout

- Favors mainline through traffic
- Others drive it as a roundabout
- Signals or STOP signs control the two crossings
- Popular in Spain and some in France
- One in Washington D.C. (with signals)



Throughabout

Located in Washington D.C.

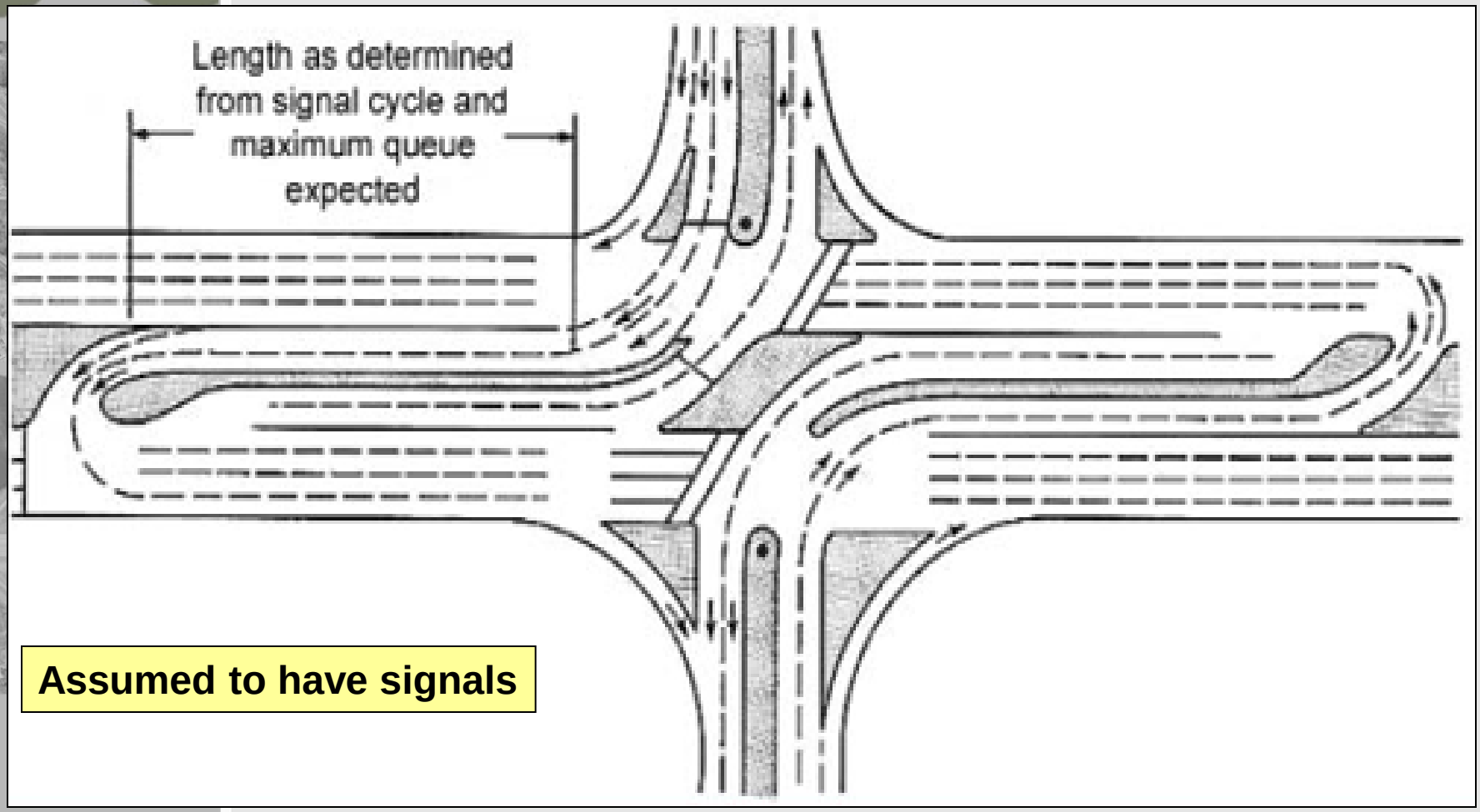


Can an efficient, safer intersection be created?

- The reduced conflict intersection – RCI
- Enhanced version of the “J” turn
- Features
  - Problem addressed at single location
  - Two stage crossing, long vehicle storage
  - Fewer, simpler conflicts
  - Loons for large vehicles turns onto mainline
  - No inside merges
  - No weaving
    - Entering traffic crosses directly to median on gaps across two lanes

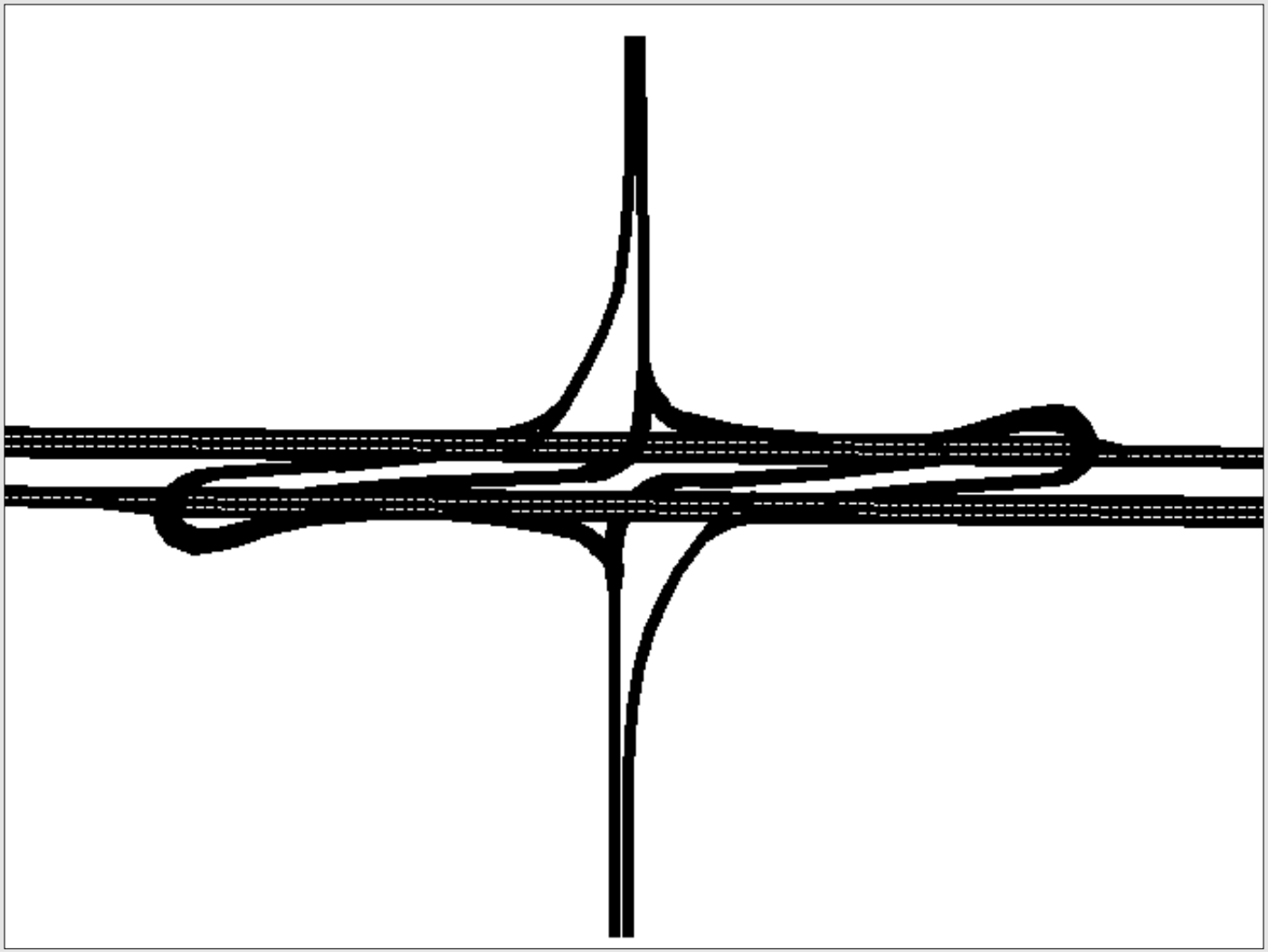


FHWA – RCI
(Super Street Intersection)



Assumed to have signals

RCUT



Recommendations and Observations

- **Separate and simplify conflict points**
  - **Try for only two conflicting flows**
- **Drivers look only to left or ahead**
- **Avoid drivers yielding to the right *(BTW, the rule of the right is wrong)***
- **Keep sight lines clear – offset mainline turns if possible**
- **Consider flows (pulsed or free)**
- **Watch weaving distances – provide 10 seconds per lane change**



Recommendations and Observations-continued

- Crash rates for side street left turns and side street through movements reduced by 20 to 60 percent when converted to “J” turns
- Use “loons” rather than inside merges



International Efforts at Reduced Conflict Intersections

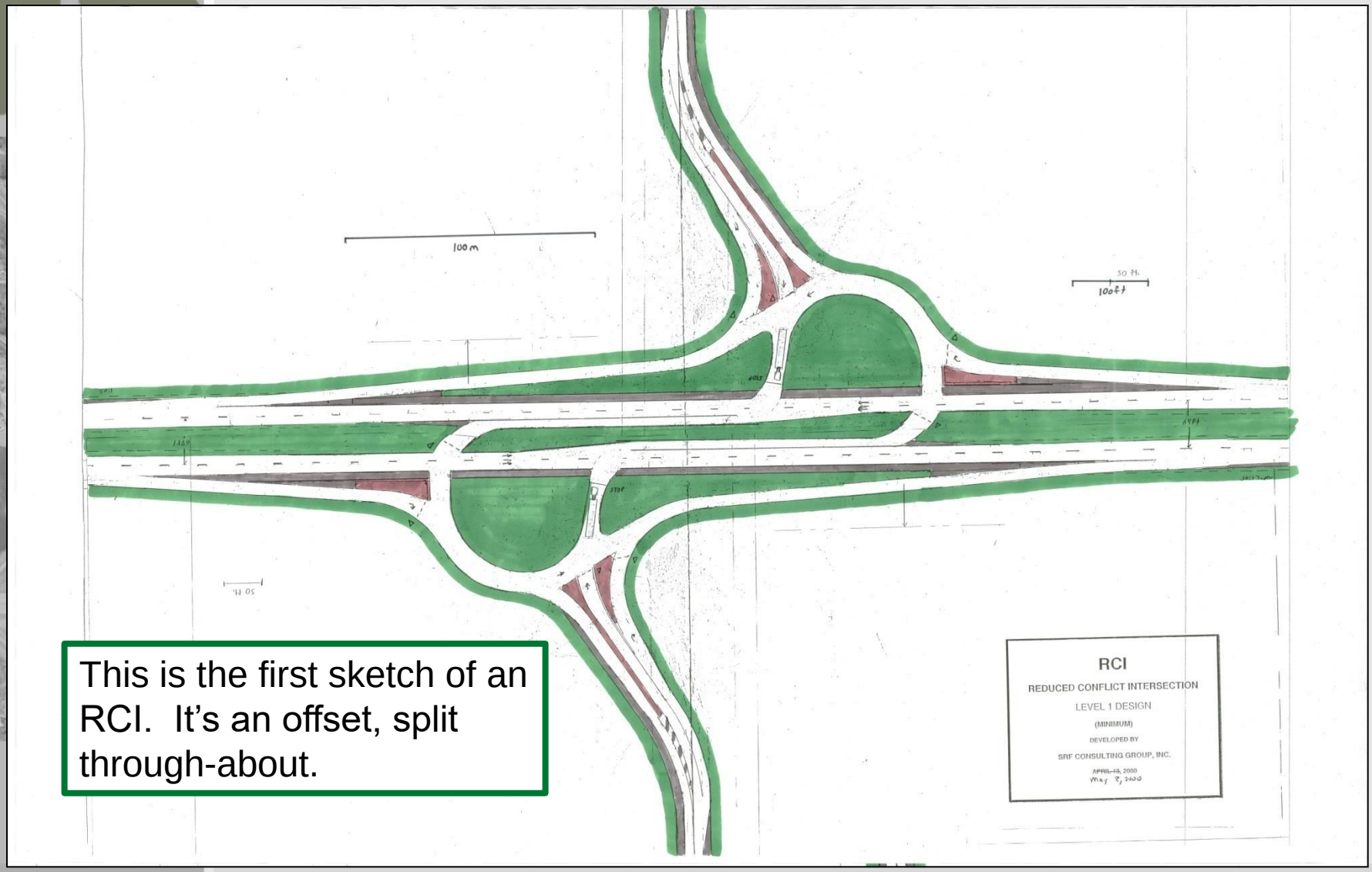


Great Britain – Compact Offset "T's"
(photo is reversed)

International Efforts at Reduced Conflict Intersections



RCI (1999)



This is the first sketch of an RCI. It's an offset, split through-about.

Resources

- **Dennis Eyler – SRF Consulting Group**
  - deyler@srfconsulting.com
- **Joe Bared – FHWA**
  - Synthesis of the Median U-Turn Intersection Treatment, Safety, and Operational Benefits
  - Joe.Bared@fhwa.dot.gov
  - http://www.tfhrc.gov/safety/inter.htm
- **Tom Maze**
  - tmaze@iastate.edu
- http://www.ctre.iastate.edu/educweb/expressway_intersections /
- **Joseph E. Hummer, PhD, PE -** Associate Professor
- Department of Civil Engineering - North Carolina State University
- Email hummer@eos.ncsu.edu
- **Josh Hochstein**
  - jlhoax@iastate.edu
- **Howard Preston** – CH2MHill
  - Howard.Preston@ch2m.com
- **Ingrid B. Potts Midwest Traffic Institute**
  - ipotts@mriresearch.org

Concept Drawings of Reduced Conflict Intersection (RCI) Designs for Use on a Super-2 Roadway

Dennis Eyler – October 2023

Standard 3-in, 1 out Intersection

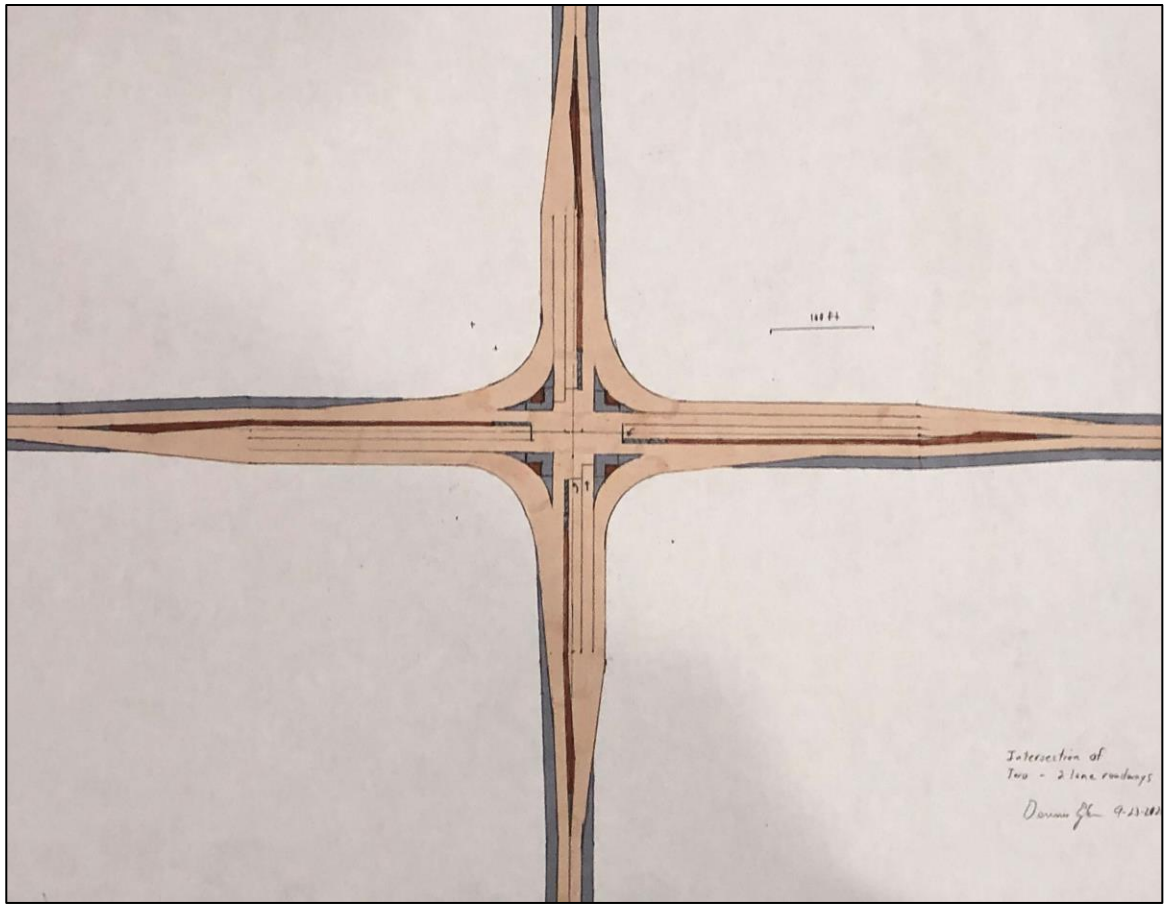
1. **A typical design for a rural intersection with two higher volume, two-lane roadways**
2. **It does not meet the design goals for the Super-2 concept.**

Features:

1. With STOP signs on the minor roadway, it doesn't disrupt the major highway traffic
2. You turn left to go left and you turn right to go right
3. Deceleration lanes for exiting traffic
4. Acceleration lanes for right turns onto the major roadway
5. No "locking up" of opposing left turns if median islands are correctly designed

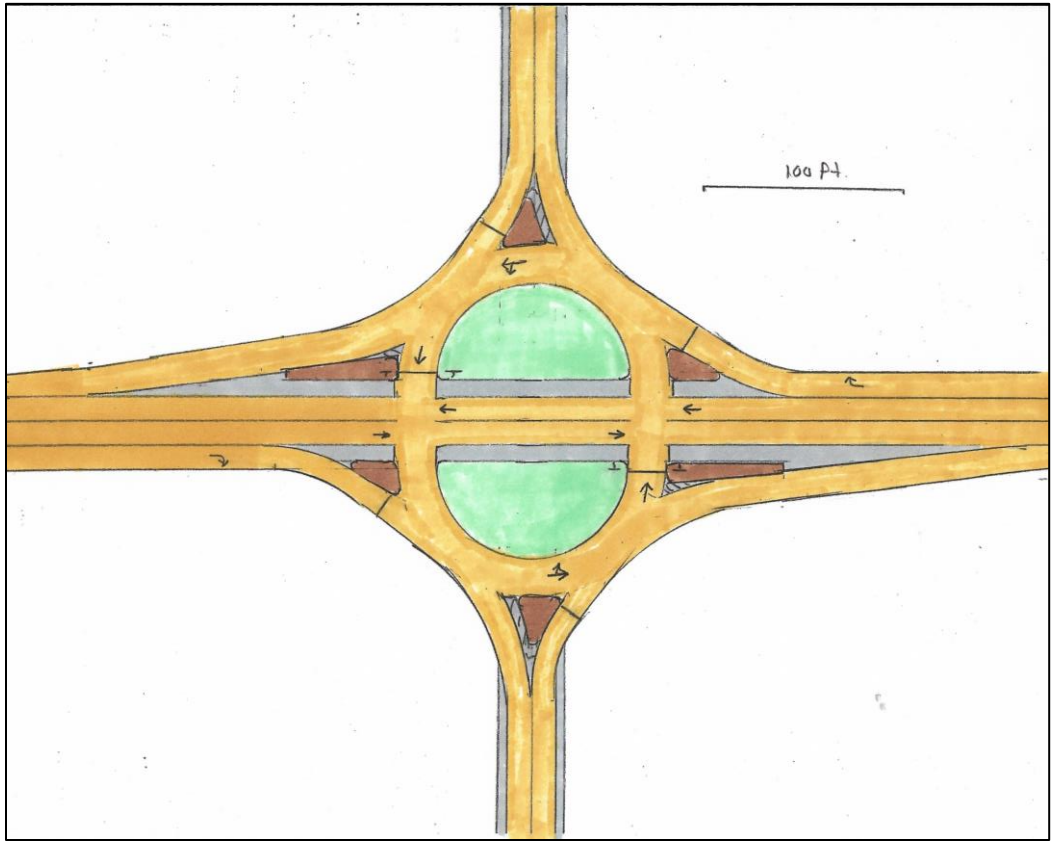
Issues:

1. Many conflict points
2. Several conflict points involve traffic approaching from 4 directions
3. A traffic threat comes from the driver's right
4. A two-stage crossing is not provided
5. Signals or all-way stops would be needed at lower volumes



Through-about

1. **This concept is popular for use at rural intersections in Spain and France.**
2. **It does not meet the design goals for the Super-2 concept.**



Features:

1. Does not “disrupt” the major highway traffic
2. Fewer conflict points than a standard intersection
3. Simpler conflict points
4. Deceleration lanes for exiting traffic
5. Acceleration lanes for all entering traffic which then also merges from the right
6. Less chance for STOP signs to be “blown”
7. No “locking up” of opposing left turns
8. Reduces the need for signals or all-way stops

Issues:

1. Minor roadway left turns and through movements have to watch two directions when selecting a gap to cross the major roadway
2. A traffic threat comes from the driver’s right
3. A two-stage crossing is not provided
4. Left turns from a heavy major roadway traffic flow must exit to the right then cross back through that flow
5. Unfamiliar to U.S. drivers and the intent of the geometry could be violated by illegal turns

Reduced Conflict Intersection 1999

1. **An early attempt to fix the problems of the through-about**
2. **It meets the design goals for the Super-2 concept.**

Features:

1. Does not “disrupt” the major highway traffic
2. Fewer conflict points than a standard intersection
3. Simpler conflict points and all threats are 1:1 and come from ahead or from the left
4. Deceleration lanes for exiting traffic
5. Acceleration lanes for all entering traffic which then also merges from the right
6. Less chance for STOP signs to be “blown”
7. No “locking up” of opposing left turns
8. Two stage crossings provided for any length vehicles
9. Reduces the need for signals or all-way stops
10. Lefts from the major roadway are to the left and do not need to pass through the heavy traffic they just left
11. Left turns from the major roadway have priority over exiting right turns



Issues:

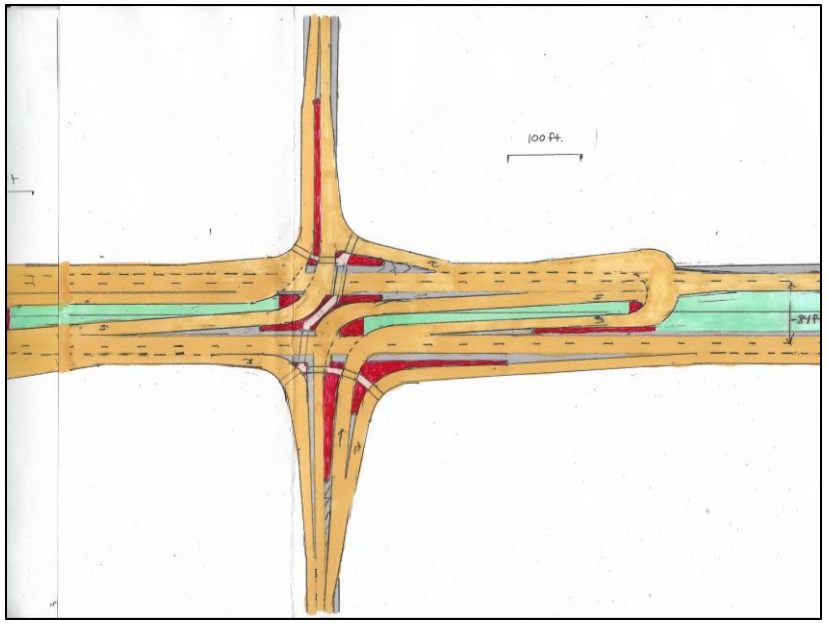
1. Space required
2. Costs

1. **It meets the design goals for the Super-2 concept.**

The Restricted Crossover – U-turn

Features:

1. Does not “disrupt” the major highway traffic
2. Fewer conflict points than a standard intersection
3. Simpler conflict points all threats are 1:1 and from ahead or from the left
4. Deceleration lanes for exiting traffic
5. Acceleration lanes for all traffic which also merges from the right
6. Less chance for STOP signs to be “blown”
7. No “locking up” of opposing left turns
8. Two stage crossings provided for any length vehicles
9. Reduces the need for signals or all-way stops
10. Lefts from the major roadway are to the left and do not need to pass through the heavy traffic they just left
11. Left turns from the major roadway have priority over exiting right turns
12. If signals are needed, they can be added to only the node where they are required



Issues:

1. Whether or not entry from the minor roadway should cross directly into the U-turn lane or whether the downstream U-turns should be reached by turning right, accelerating, merging, changing lanes while weaving through high-speed traffic and then decelerating in the U-turn lane. That design decision is also affected by the nature of the major roadway flow. Is it random flow at an isolated location, or is the intersection near signals which produce pulsed or platoon flow?

1. **It meets the design goals for the Super-2 concept.**

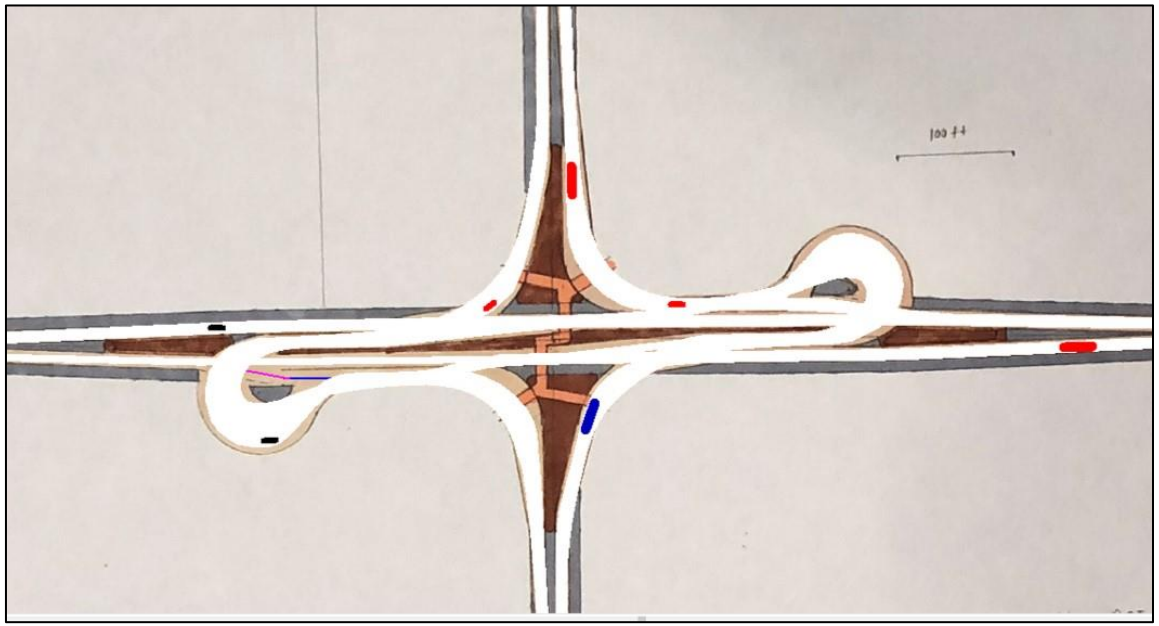
Features:

1. Minimal left turn lane lengths which assume some deceleration while still in through traffic

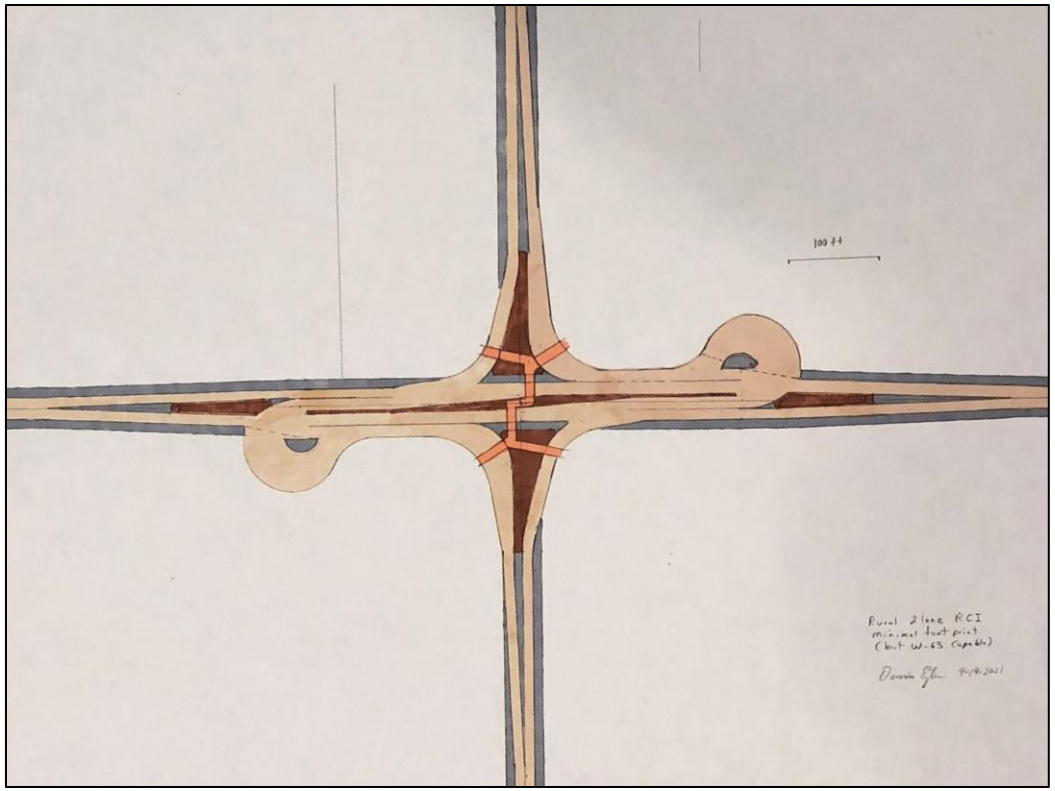
Issues:

1. Turn lane lengths
2. The size of the loons is determined by the design vehicle

WB-63 Truck tracking on the ultra compact RCUT



Ultra Compact Restricted Crossover – U-turn for a Two Lane Road

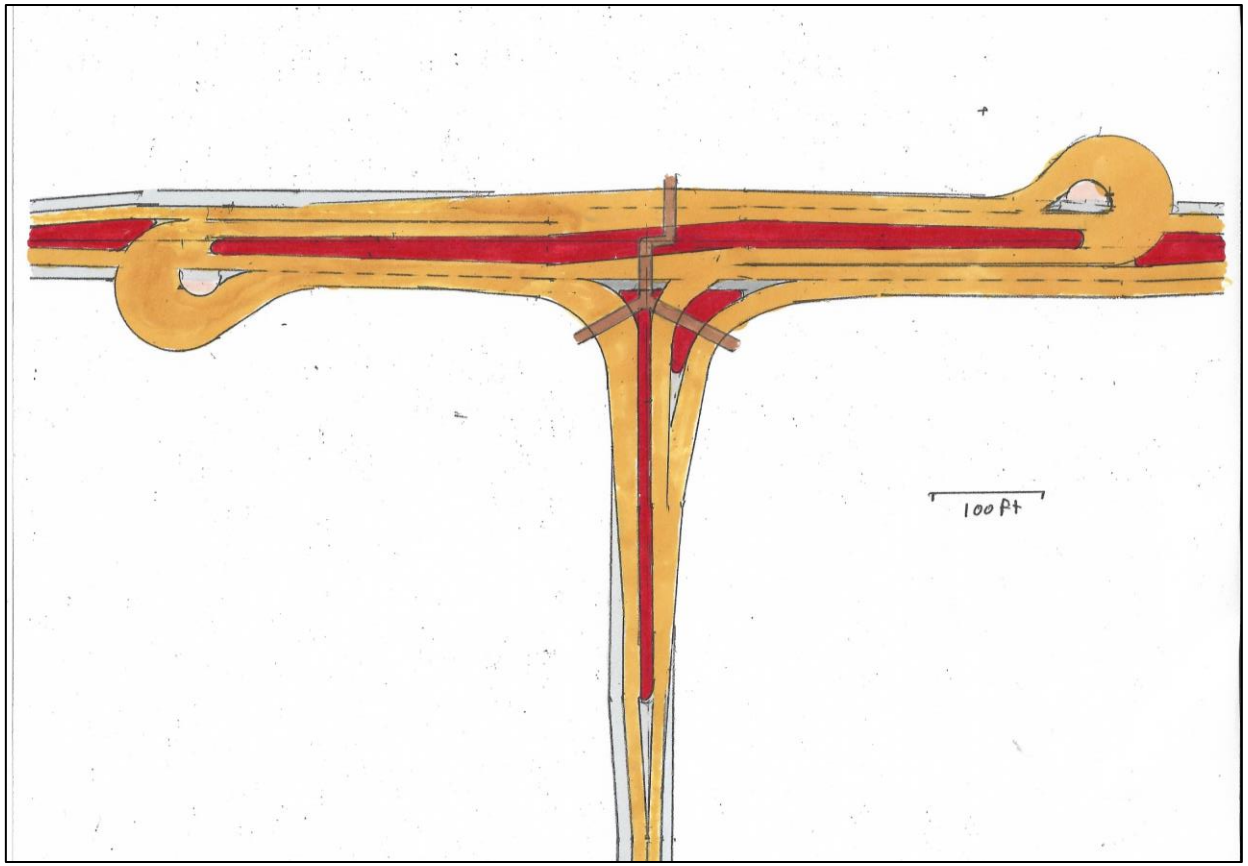


Restricted Crossover – U-turn for a “T” Intersection on a Two Lane Road

Example of a U-turn loon from New Zealand



Image has been reversed



Comparison of travel times for various intersection designs
Peak Hour

Peak Hour Travel Times	J-turn	RCUT	Intersection With Signal	Roundabout
Total Travel Time (hours)	27.8	27.1	27.1	27.3
Average Travel Time For All Vehicles	82.2	79.9	80.3	80.7
Average Travel Time For Mainline Through Vehicles	70.1	70.3	77.4	81.1
Travel Time For Left Turns From M.L.	121.3	84.0	91.2	80.1
Travel Time For Minor Street Through	144.1	142.1	98.7	81.9

Disclaimer: the author designed (including detector layouts and their functions) and timed the signals used for this comparison done in VISSIM with their RBC controller. Someone using software such as Synchro, may not get the same results.

Comparison of travel times for various intersection designs
8th Highest Hour

8th Highest Hour Travel Times	J-turn	RCUT	Intersection With Signal	Roundabout
Total Travel Time (hours)	15.0	14.6	14.5	14.4
Average Travel Time For All Vehicles	79.9	77.8	76.9	79.0
Average Travel Time For Mainline Through Vehicles	68.5	68.4	73.8	78.5
Travel Time For Left Turns From M.L.	119.4	85.1	83.4	81.0
Travel Time For Minor Street Through	135.1	134.7	93.9	79.8

MnDOT “T” intersection with left side acceleration lane



Comment Log Submission No. 79

From: Kim Falinski <kim.falinski@TNC.ORG>
Sent: Monday, February 24, 2025 4:06 PM
To: Tatsuguchi, Ken <ken.tatsuguchi@hawaii.gov>
Cc: Tamara Farnsworth <t.farnsworth@TNC.ORG>; Emily J. Fielding <efielding@TNC.ORG>
Subject: [EXTERNAL] Honoapi'ilani Draft EIS Comments

Hello Ken,

Please accept the following draft EIS comments from The Nature Conservancy, Hawai'i and Palmyra chapter.

Thank you, and please let us know if there are any questions we might be able to answer,

Kim

1

Kim Falinski
Coastal and Estuarine Scientist
kim.falinski@tnc.org
(808) 206-6565

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Hawai'i and Palmyra

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Tel (808) 537-4508
Fax (808) 545-2019
nature.org/HawaiiPalmyra

February 24, 2025

Hawaii Department of Transportation, Highways Division
Attention: Ken Tatsuguchi, Head Planning Engineer
869 Punchbowl Street, Room 301 Honolulu, HI 96813
Email: ken.tatsuguchi@hawaii.gov
Re: Comments on the Honoapi'ilani Highway Improvements Draft Environmental Impact Statement

Dear Mr. Tatsuguchi,

Thank you for this opportunity to provide comments on the Honoapi'ilani Highway Improvements Project (HHIP) Draft Environmental Impact Statement and the proposed preferred alternative, dated January 2025.

The Honoapi'ilani Highway from Ukumehame to Launiupoko in West Maui ranks as one of the most threatened highways in the state of Hawai'i because of rising sea levels, king tides, storm surges and other coastal hazards fueled by climate change. The Hawai'i Department of Transportation has prioritized this important road connecting central Maui to the growing West Maui community because of its risk from coastal erosion.

What we are working on

Our team at The Nature Conservancy (TNC) has been working on a ridge to reef approach to protecting and restoring the sensitive environments adjacent to the 939-acre Olowalu reef tract that involve working with community and government partners to establish a vision for a restored coastal area and watershed. We have been excited about the opportunity presented by the highway realignment to collaborate to protect key ecosystem functions. Our comments emphasize the need to protect the unique coral reef and future wetland extent, preserve Pāpalaua sediment retention basin and its sediment capture capacity, design ecologically sensitive stream crossings, and recommend a drainage plan that uses green infrastructure to filter and infiltrate stormwater.

With regards to the Honoapi'ilani Highway Improvement Project (HHIP), TNC is focused on three areas: 1) Reducing sedimentation to the coral reef; 2) Implementing a suite of mauka-makai protective and restorative interventions that protect the reef, wetlands and streams, and 3) Visioning, with Hawai`i Department of Transportation, Highways Division (HDOT), County of Maui, partners, and community the future of this existing Honoapi'ilani (makai) highway as a place where people and nature thrive. We see the opportunity to utilize nature-based solutions for preservation and restoration of the coral reef, shorelines, wetlands, recreational spaces, and infrastructure.. We have published several reports that may be useful: one on sediment sources, another on wetland extent, and a third on 2022 coral reef surveys.

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Founders: Samuel A. Cooke Herbert C. Cornuelle

Coral reef and wetland ecosystems are in need of protection

Coral reef ecosystems are key to protecting the shoreline from waves and storm impacts, including the current highway, and these systems are threatened by both global and local stressors. Recent studies show that coral larvae are struggling to find places to settle in the sedimented benthos, and that adult corals are subject to sediment and heat stressors. Coral cover remains reduced compared to the 2010s. Corals are not only organisms to protect, they also protect our coastal infrastructure from wave events and sea level rise (Storlazzi et al 2019). Once abundant wetlands in the area are important habitat for endangered waterbirds and plants and serve to provide hazard mitigation in coastal areas, such as absorption and filtering of surface waters and flood reduction. Upland forests both protect soils from erosion and provide essential groundwater recharge function to provide water for nature and people.

Sedimentation damages coral reefs

Sediment is one of the most pervasive and damaging threats to coral reef. A recent geomorphological survey by TNC demonstrated that the Pāpalaua watershed is the most degraded watershed in the area, and one of the largest contributors to sediments downstream. Upland shrublands have been decimated by fire and drought in the last twenty years, leading to orders of magnitude higher levels of erosion compared to previous centuries. Former native forest that grew on highly erodible soils in the upland bog have been lost, especially along the edges of the Pāpalaua and Manawaipueo stream basins. Data from the water quality monitoring group Hui O Ka Wai Ola show that all of the coastal areas in the Olowalu-Ukumehame region are above the state coastal turbidity standard, while Ukumehame stream has been highlighted since 2001 (and as recently as 2022) by the Hawai‘i Department of Health as an impaired stream because of turbidity.

What TNC is doing to help

Olowalu: The Road to Resilience - Community Design for the Existing Highway and Surrounding Areas
The planned HHIP provides opportunities to re-imagine the Olowalu-Ukumehame coastal corridor by incorporating park spaces, traditional biocultural practices, and nature-based solutions for coastal resiliency This project aims to strengthen coastal ecosystems, reduce pressures on the Olowalu-Ukumehame reef system, and improve resilience in the area that includes the existing roadway to adapt to climate change effects, including sea level rise. Through research, analysis, and engagement with stakeholders and community, TNC and University of Hawai`i Community Design Center are leading a process culminating in a conceptual design for local and state stakeholders as the effects of climate change threaten the shoreline.

Through the recently completed first phases of community engagement, specifically referencing the HHIP, we received comments from over 80 participants who voiced common concerns regarding disturbance of cultural resources or `iwi kūpuna as the preferred alternative is pursued; disturbance to Ukumehame Wetlands and native species by the preferred alternative; the desire for sustained access to the shoreline between the new alternative and the existing highway; and concerns around management and maintenance of the land areas between the “old” and the “new” roadways in order to prevent fire, illegal dumping and human encampments. We look forward to working together to help address some of these concerns as our respective projects progress.

We appreciate the ongoing support of HDOT as this project moves forward. For more information, please refer to the project engagement website at:
https://storymaps.arcgis.com/stories/2ba79613d0aa4da182fe9bc34cc10cc7

Collaboration on wetland and mauka restoration
A primary threat to reef health comes not from the sea but from the mountains above: sediment is carried in surface water from mauka lands impacted by non-native feral ungulates, poor land use practices, and fire. These stressors contribute to habitat degradation and erosion. The DLNR Division of Forestry & Wildlife (DOFAW) is embarking on a three-year NOAA Transformational Habitat project, "Olowalu Mauka to Makai," which will implement a full suite of ecosystem-based, mauka-to-makai conservation measures. With DOFAW, TNC will partner with Kipuka Olowalu and Coral Reef Alliance on projects including wetland restoration planning, sediment management, and community engagement, working to address threats and hazards throughout the Olowalu and Ukumehame ahupua`a.

This project is inter-related with and impacted by the realignment project, so we look forward to continued communication and collaboration with you as our projects progress.

For more information, please refer to: https://dlnr.hawaii.gov/dofaw/

Comments for the EIS

1. ***Protect Pāpalaua-Ukumehame wetlands***

The degraded wetlands of Pāpalaua and Ukumehame are important for both flood water and sediment retention, and have historically been a crucial part of the Ukumehame watershed hydrologic system. According to local knowledge-keepers, Ukumehame once had thriving wetlands that were home to endangered waterbirds like ae'o and 'alae 'ula, whose habitat along the leeward Maui coast has been reduced by agriculture, development and drought. The draft EIS highlights vestige native plant communities that are surviving in the reduced footprint of the former wetlands, including akulikuli, 'ae'ae, naupaka and milo. Sea level rise is expected to expand the area into where the bypass is proposed to go, and groundwater levels will rise.

We will be working with DOFAW on wetland restoration planning in two State parcels that will be affected by the bypass. We agree with the assessment of Ansari and Erickson documented in Section 3.9.3.1 of the prime wetland areas, and we ask you to also consider that ewe identified a broader buffer of wetlands in the regions (Maui Environmental Consultants, 2024).

We appreciate the comment that "new construction in wetlands and floodplains is to be avoided unless there is no practicable alternative to the construction." (3.9-24), and advocate for HDOT to make all efforts to reduce impact to current, former, and potential wetlands, and the proposed wetland restoration area.

We strongly advocate that the highway realignment include a viaduct to bypass the existing wetland areas. Wetland areas will likely expand in the future, and existing restoration planning would be adversely affected by the realignment without a viaduct. In particular, wetland birds would struggle to find habitat next to the highway. Efforts to avoid these vital wetlands, as habitats, ecosystems, and areas to retain land-based sediments and remove pollutants would align with the aims of the partners currently working in the area.



Ukumehame Wetlands, January 2024. Photo Credit: Dr. Kim Falinski, TNC

2. ***Reduce sediments and increase groundwater infiltration***

We commend efforts to reduce erosion during the project, and advocate for watershed-scale efforts to reduce erosion in the project area more broadly as a strategy to protect the reef. As identified in the draft EIS, the area is comprised of fine alluvial sediments, which are sensitive to disturbance and removal of vegetation. We hope to not only reduce short term sedimentation, but to create a landscape that is more efficient at reducing sediment in the longer term.

Maintain the efficiency of Pāpalaua Retention Basin

The maintenance and preservation of sediment retention basins is one of the key methods to hold back sediment in the near-term, as outlined by the West Maui Community Plan, and is the primary intervention needed for Pāpalaua.

The Pāpalaua basin serves as the primary retention basin for the Makiwa gulch intermittent stream. The basin has been shown to be a large contributor of fine sediments due to degraded upland conditions. The basin was installed in 1999, and has since filled with sediment above the original height of the standpipes, and has not received regular maintenance. It is at risk of overflow in every storm event, delivering sediment directly into coastal waters. For larger flows the basin is undersized. Additional retention capacity through maintenance and possible redesign is needed to prevent further ecosystem damage to the coral reef.

The proposed preferred alternative in Ukumehame reduces the footprint of the basin. Increased attention to replacing the sediment retention capacity is needed. We recommend considering drainage plans upland of the proposed bypass to serve as additional areas for retention. In addition, we would hope that the project would instigate a reconsideration of operations and maintenance of the existing basin, the redevelopment of culverts, and a re-design of the volume of the basin to make sure that it is the most efficient possible for protecting the downstream reef from sedimentation.



Coastal waters adjacent to Pāpalaua retention basin affected by the overflow of the basin during a 2-year storm event. Photo Credit: Jon Brito

Incorporate nature-based solutions alongside best practices for stormwater management
The proposed alternative builds would traverse the Olowalu and Ukumehame landscapes approximately along elevation. To address the main threats for the region – namely sedimentation to the reef and future drought/flooding cycles – best management practices for stormwater, groundwater and surface flows that exceed County design standards are needed to protect ecosystem health, along with operations and maintenance plans that are practicable and have clear ownership models.

In particular, we recommend that where possible, drainage swales that incorporate grasses and plants that can hold back sediment be used, or a similar nature-based alternative. If possible, the grading plans can include earthen berms to disperse water more broadly for infiltration. We recommend that the goal for the drainage system be to infiltrate water or deliver it to the wetland instead of shunting it quickly to the ocean. The conceptual study conducted (p. 3.9-25) was not included in the Appendices, so at this point it is not clear on how to collaborate to improve those BMPs to increase infiltration or sediment holding capacity.

The draft EIS refers to using 100-yr storms for bridges and 50-yr storms for culverts. It would be important to consider the effects of increased storm intensity, especially for culverts, and how this may impact overall sediment movement on the landscape. The 2018 floods in Kauai showed that large storm events can alter the coastal ecosystem trajectories for many years, if not decades (Rodgers et al 2021). Careful planning may be able to mitigate some of these concerns.

3. ***Stream crossing mitigation***

Ukumehame and Olowalu streams have been identified by the State of Hawai‘i Division of Aquatic Resources (DAR) as important for their aquatic species diversity, with over five species of native fish and invertebrates found in both streams. Hawai‘i’s native stream animals have amphidromous life cycles meaning that they spend their larval stages in the ocean (salt water), then return to freshwater streams to spend their adult stage and reproduce. Newly hatched fish larvae are carried downstream to the ocean where they become part of the planktonic pool in the open ocean. The larvae remain at sea from a few weeks to a few months, eventually migrating back into a fresh water stream as juvenile *hinana*, or post larvae. The ability for juvenile fish to migrate upstream is critical to population success. Minimizing long stretches of concretized stream and incorporating small pools and riffles with artificial materials would help to make sure larvae can make it upstream to their final habitat.

The draft EIS proposes that either “BMPs that have either been preapproved or coordinated with regulated agencies” be used to minimize water quality effect to the streams (p. 7-4) We would add, though, that the BMPs to assist o’opu migration may be different than those used to mitigate water quality impairment. Consultation with the Division of Aquatic Resources for guidance on best construction may be needed to make the stream habitat functional for Hawaii’s stream organisms.

We advocate that the alternative road scenario be carefully planned to ensure that key bridge crossings are ecologically sound for o’opu `akupa and other diadramous native species.



`O`opu `akupa (Eleotris sandwicensis), Hawaii’s only endemic eleotrid. Photo Credit: DLNR stock photo

Recommendations

Given the importance of the above factors, we make the following recommendations for mitigation measures:

1. **Preserve the maximum extent of former, current, and potential wetlands; (Section 3.9.8)**

We support the creation of a viaduct to reduce disruption to the wetland to support future wetland restoration actions on TMKs 48002002, 48002039 48002045, 48002046 and 48002047.

2. **Preserve the sediment retention capacity of Pāpalaua basin; (Section 3.11.7)**

Replace the area used by the bypass in Pāpalaua basin with improved functionality for the area that remains. Remove existing sediments after bypass construction. Improve efficiency by supporting or developing an operations and maintenance plan. Redesign basin to increase sediment retention and flood prevention capacity.

3. **Prioritize a drainage plan that uses green infrastructure to filter stormwater and increases groundwater infiltration (Section 3.12.6)**

Consider drainage systems on the upland side of the bypass that use nature-based approaches to capturing sediment and infiltrating groundwater, such as green-grey drainage swales and vegetated buffers for velocity dissipation.

4. **Build ecologically sensitive stream crossings at Ukumehame and Olowalu streams. (Section 3.9.8)**

If a stream needs to be hardened at the crossover, consider best practices for keeping stream cool, shaded, and oxygenated. The crossings at Olowalu, Ukumehame, and intermittent Pāpalaua streams must be carefully designed for water flow as well as preservation and maintenance of biological processes.

Summary

The Nature Conservancy is invested in working with community, State, and County partners on the restoration and revitalization of the Olowalu and Ukumehame ahupua‘a from mauka to makai. We look forward to working with you as a partner to ensure lasting benefits for people and nature.

Thank you for your consideration,

Emily J. Fielding
Hawai‘i Marine Conservation Director

Kim Falinski, PhD, PE
Coastal and Estuarine Scientist

cc: Federal Highway Administration, Hawaii Division
Attention: Ken Tatsuguchi, Head Planning Engineer
ken.tatsuguchi@hawaii.gov

RICHARD T. BISSEN, JR.
Mayor

SHAYNE R. AGAWA, P.E.
Director

ROBERT SCHMIDT
Deputy Director

MICHAEL KEHANO, P.E.
Solid Waste Division

ERIC A. NAKAGAWA, P.E.
Wastewater Reclamation Division

Environmental Protection &
Sustainability Division

Comment Log Submission No. 80



COUNTY OF MAUI
DEPARTMENT OF
ENVIRONMENTAL MANAGEMENT
2145 KAOHU STREET, SUITE 102
WAILUKU, MAUI, HAWAI'I 96793

February 24, 2025

Mr. Ken Tatsuguchi, Project Manager
State of Hawaii, Department of Transportation, Highways Division
869 Punchbowl Street, Room 301
Honolulu, Hawai'i 96813
ken.tatsuguchi@hawaii.gov

Dear Mr. Tatsuguchi:

SUBJECT: **HONOAPIILANI HIGHWAY IMPROVEMENTS DEIS COMMENTS**

Thank you for the opportunity to comment on the Honoapiilani Highway Improvements Draft Environmental Impact Statement (DEIS). The County of Maui, Department of Environmental Management has the following comments related to the Honoapiilani Highway Improvements DEIS:

- A portion of the proposed "common" route appears to encroach onto landfilled waste along the toe of closed Olowalu Landfill. Constructing structures and roadways on landfilled waste should be avoided. Please advise if this project does plan to place the improved highway on top of landfilled waste at the Closed Olowalu Landfill.
- The proposed route also appears to pass through the existing Olowalu Convenience Center (OCC) at the Closed Olowalu Landfill. OCC is the only recycling and waste transfer station for the West Maui community. Please advise if the OCC will be affected, and if so, the plan to relocate the OCC to another location to allow the County of Maui to continue providing this service to the local community.

Should you have any questions or comments, please contact Sage Kiyonaga, Solid Waste Engineer, at (808) 270-7941.

Sincerely,

for SHAYNE R. AGAWA, P.E.
Director, Department of Environmental Management

Comment Log Submission No. 81

From: Julie Parks <jparks@earthjustice.org>
Sent: Monday, February 24, 2025 1:32 PM
To: Gov.Transmit.Docs <transmit.docs@hawaii.gov>; Tatsuguchi, Ken <ken.tatsuguchi@hawaii.gov>; Small, Matthew T. <Matthew.Small@wsp.com>
Cc: Kaakua, Laura HE <Laura.HE.Kaakua@hawaii.gov>; Mahesh Cleveland <mcleveland@earthjustice.org>; Kylie Wager Cruz <kwager@earthjustice.org>
Subject: [EXTERNAL] Honoapi‘ilani Highway Improvements Project, West Maui: Ukumehame to Launiupoko—Draft Environmental Impact Statement

Aloha:

Earthjustice submits the attached public comments and Attachments A-E on the proposed Honoapi‘ilani Highway Improvements, West Maui: Ukumehame to Launiupoko (the “Honapi‘ilani Project” or “Project”), for which a draft environmental impact statement (“DEIS”) was published in The Environmental Notice on January 8, 2025.

Thank you.

Julie Powers Parks
Litigation Assistant
Earthjustice Mid-Pacific Office
808-599-2436

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EARTHJUSTICE

February 24, 2025

Electronically Submitted & Emailed

Governor Josh Green, M.D.
State of Hawai'i
transmit.docs@hawaii.gov

Ken Tatsuguchi
Department of Transportation, Highways Division
State of Hawai'i
ken.tatsuguchi@hawaii.gov

Matthew Small
WSP USA
matthew.small@wsp.com

Re: Honoapi'ilani Highway Improvements Project, West Maui: Ukumehame to Launiupoko—Draft Environmental Impact Statement

Dear Governor Green, Mr. Tatsuguchi, and Mr. Small,

Earthjustice submits the following public comments on the proposed Honoapi'ilani Highway Improvements, West Maui: Ukumehame to Launiupoko (the "Honapi'ilani Project" or "Project"), for which a draft environmental impact statement ("DEIS") was published in The Environmental Notice on January 8, 2025.

Earthjustice commends the Hawai'i Department of Transportation ("HDOT") for proactively responding to the climate crisis by undertaking the complex endeavor of realigning portions of the Honoapi'ilani Highway that are highly vulnerable to sea level rise and coastal hazards, and that serve as the main artery to West Maui in an area of high cultural, archaeological, ecological, and recreational significance. We also continue to value and acknowledge HDOT for its groundbreaking leadership and commitments to decarbonizing the state transportation system in accordance with state law and the landmark settlement in the youth-led climate lawsuit *Navahine F., et al. v. Dep't of Transp.*, 1CCV-22-0000631 ("*Navahine* Settlement"), appended hereto as Attachment A.

The Honoapi'ilani Project presents a historic opportunity for HDOT to create a best-in-class model for *adapting* to climate change (*i.e.*, sea level rise and coastal hazards), while at the same time also *mitigating* climate change by incorporating sensible bicycle and pedestrian-friendly measures that would ultimately reduce car traffic and greenhouse gas emissions, while

promoting public health and mobility for Hawai'i's residents. We offer these comments to enhance the Project's climate benefits, and to allow for full consideration of its climate-related impacts, mitigation measures, and alternatives through the environmental review process.

HDOT Should Disclose and Mitigate the Project's Climate Change Impacts, Consistent With the *Navahine* Settlement.

The *Navahine* Settlement contains provisions to decarbonize the state transportation system through HDOT's transportation projects and their prerequisite environmental review documents. These provisions are key components of the settlement's broader vision, commitment, and roadmap to achieve "zero [greenhouse gas] emissions across all transportation modes within the State," including from "ground transportation" under Haw. Rev. Stat. ("HRS") § 225P-8.[1] HDOT's environmental review of the proposed Honoapiʻilani Project should contain analyses and mitigation measures to reduce greenhouse gas emissions, consistent with the *Navahine* Settlement and state law.

For example, the *Navahine* Settlement requires HDOT to "implement policies and procedures to ensure that *Complete Streets improvements remain part of the project* throughout the planning and development process."[2] Hawai'i's Complete Streets statute requires HDOT to "adopt a complete streets policy that seeks to *reasonably accommodate convenient access and mobility for all users of the public highways*," including "pedestrians, bicyclists, transit users, motorists, and persons of all ages and abilities."[3] The mandate applies specifically to "new construction, reconstruction, and maintenance" of highways such as the Honoapiʻilani Project.[4] The Honoapiʻilani Project, as proposed in the DEIS, lacks any Complete Streets improvements for pedestrians, bicyclists, and transit users. The DEIS specifically states that "[t]he Project *does not include* bicycle lanes or other bicycle or pedestrian facilities for any of the Build Alternatives."[5] The DEIS further notes that once the realignment is complete, the affected portions of the existing Honoapiʻilani Highway will be deeded to County of Maui ("County")[6] for use in conjunction with the West Maui Greenway Plan for a coastal bicycle and pedestrian pathway from Līpoa Point to Ukumehame,[7] while acknowledging that "*formal plans have not been developed*."[8]

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[1] *See also Navahine* Settlement at 4.

[2] *Navahine* Settlement at 8 (emphasis added).

[3] HRS § 264-20.5(a) (emphasis added).

[4] *Id.* § 264-20.5(b).

[5] DEIS vol. 3 at 3.14-39 (emphasis added).

[6] DEIS Appendices at PDF 1871.

[7] West Maui Greenway Work Plan (2022) ("WMG Plan") at 7, https://mauimpo.org/west-maui-greenway-plan-0 (last visited Feb. 21, 2025).

[8] DEIS vol. 3 at 3.14-39 (emphasis added). We note that any such potential coastal bicycle and pedestrian pathway would be subject to the very sea level rise threats that the

Deeding the existing highway to the County without any certainty or commitments around what will happen to it afterward, while also building a new highway without any designated bike or pedestrian facilities, runs the risk of creating a second roadway or bypass without any Complete Streets accommodations on either. It would also impede compliance with the *Navahine* Settlement's requirement for HDOT to "complete the pedestrian, bicycle, and transit networks in coordination with the counties as contemplated under HRS § 264-142, with a goal of completing this work in five years."[9] Given that federal and other funding for the West Maui Greenway Plan is uncertain, HDOT should provide funding for the West Maui Greenway Plan Segments 6 and 7, which would be located on or along the portions of the existing highway that will be deeded to the County[10] and have not yet been funded. HDOT should also include a shaded, protected bike and pedestrian pathway through the center of the realigned highway to comply with the *Navahine* Settlement and Complete Streets mandate and ensure this $160.8M[11] Project contributes to decarbonizing the state transportation system. This pathway should provide for integration and linkages with the West Maui Greenway, in consultation with stakeholders. Indeed, providing bike and pedestrian facilities in *both* the original *and* realigned highways—both of which are contemplated to be (re)constructed in this case—would maximize multimodal accommodations and properly comply with the Complete Streets mandate and other state laws.

The *Navahine* Settlement further requires HDOT to "develop and implement an objective, ***scientifically-based methodology*** to assess and report the total, long-term [greenhouse gas] emission and [vehicle miles traveled] impacts of each infrastructure project,"[12] specifically for use in "preparing ***environmental review documents*** for its transportation projects."[13] Such analyses are not included in the DEIS.[14] Given that HDOT must develop and implement this methodology by April 2025,[15] any subsequent environmental review documents should disclose these Project impacts. HDOT should specifically consider and compare the greenhouse gas emissions and vehicle miles traveled impacts of (1) constructing the new

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Honoapi'ilani Project seeks to evade and, thus, would not provide a lasting accommodation for bike and pedestrian mobility and access.

[9] *Navahine* Settlement at 9; *see also* HRS § 264-142 (requiring HDOT to create a "contiguous network" of bikeways and walkways throughout each island, in coordination with the counties).

[10] WMG Plan at 111.

[11] DEIS vol. 1 at S-20.

[12] *Navahine* Settlement at 7 (emphasis added).

[13] *Id.* at 8 (emphasis added).

[14] The DEIS's treatment of "air quality" impacts does not contain this objective, science-based acknowledgement of the long-term impacts of capacity expansion and, instead, is limited to an unsupported conclusion that the Honoapi'ilani Project would reduce greenhouse gas emissions by increasing speeds, reducing congestion, and improving level of service, DEIS vol. 3 at 3.15-9, 3.15-15.

[15] *Navahine* Settlement at 7.

highway while closing or keeping the existing highway open to motorist traffic, and (2) including or omitting bike and pedestrian facilities on the existing and new highways. These analyses will enable full disclosure of the Honoapi'ilani Project's impacts, as well as informed consideration of mitigation measures and alternatives.

The *Navahine* Settlement further mandates that "***Level of Service is discontinued*** as a criterion for project prioritization,"[16] which goes hand-in-hand with the requirement to instead assess each project's greenhouse gas and vehicle miles traveled impacts. As the youth highlighted in *Navahine*, level of service, a metric assessing how quickly cars move along a roadway, "promotes projects that induce additional traffic and ultimately increase congestion over time and imposes blind spots and barriers against multimodal projects."[17] Any subsequent environmental review documents should avoid use of or reliance on level of service to evaluate the Honoapi'ilani Project.[18]

HDOT Should Disclose and Consider Alternatives that Account for Updated Sea-Level Rise Projections.

HDOT's stated purpose and need for realigning the Honoapi'ilani Highway is "to address existing coastal erosion and flooding vulnerabilities as well as future coastal erosion and flooding caused by anticipated sea level rise."[19] Indeed, around two-thirds of the highway span proposed for realignment "are considered exposed and potentially vulnerable to sea level rise."[20] HDOT acknowledges that, among a variety of potential hazards to transportation infrastructure in West Maui, sea level rise is "the most urgent," while the associated risks of passive flooding, storm surges, and coastal erosion are already occurring and predicted to worsen.[21]

To fulfill the Project's stated purpose and need to adapt to sea level rise, HDOT should disclose and consider alternatives that account for updated sea level rise projections. The alternatives considered in the DEIS are all based on the conservative assumption that ocean levels will rise by 3.2 feet by 2100.[22] More recent estimates, however, predict that sea level may

[16] *Id.* at 8 (emphasis added).

[17] Replogle Second Amended Expert Report at 33, appended hereto as Attachment B.

[18] Although HDOT does not include improving the level of service in the stated "purpose and need" for the Honoapi'ilani Project, the DEIS appears to continue to use this metric in evaluating the Project and its alternatives. *See, e.g.*, DEIS vol. 3, at 3.14-54.

[19] DEIS vol. 1 at 1-7.

[20] *Id.*

[21] *See id.* at 1-10.

[22] *See* DEIS vol. 3 at 3.13-3, 3.13-5.

rise by closer to 4 feet and by as much as 6 feet by 2100,[23] which would move the projected sea level rise inundation area further mauka. HDOT should disclose these updated sea level projections and consider alternatives that plan for and adapt to them. Along these lines, HDOT should consider the costs and risks of *underestimating* sea level rise, including the estimated costs of having to relocate the Honoapi‘ilani Highway again in the event of sea level rise exceeds 3.2 feet by 2100.

HDOT Should Disclose and Mitigate the Climate Change Effects from Leaving the Existing Highway In Place.

The DEIS acknowledges the harm that climate change and sea level rise are “already causing to the existing highway,”[24] but does not discuss how relinquishing the existing highway to the County will affect the environment. So long as the County keeps the existing highway in place and sea levels continue rising, the existing highway will increasingly serve as shoreline armoring that would harm beach and reef ecosystems, including monk seal habitat.[25] HDOT should, at minimum, consider these harmful effects and measures to mitigate them.

HDOT Should Disclose the Honoapi‘ilani Project’s Reasonably Foreseeable Growth-Inducing Effects

As discussed in our December 23, 2022 scoping comments, appended hereto as Attachment E, HDOT should disclose and analyze any reasonably foreseeable growth-inducing effects from the Honoapi‘ilani Project. For example, to the extent that any plans to develop Olowalu Town are still in the works and would be dependent on implementing the Honoapi‘ilani Project, HDOT must address these effects.[26]

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[23] State of Hawai‘i Office of Conservation and Coastal Lands, *Hawai‘i Sea Level Rise Vulnerability and Adaptation Report, 2022 Update*, at 28, appended hereto as Attachment C (“Agencies should incorporate the revised planning benchmarks [*i.e.*, 4 feet minimum scenario and 6 feet for public infrastructure projects] into adaptation planning to account for the more accurate regional projections prior to the availability of revised SLR-XA data as possible.”); *see also* National Oceanic and Atmospheric Administration, *Global and Regional Sea Level Rise Scenarios for the United States*, appended hereto as Attachment D (2022).

[24] DEIS vol. 1 at S-7.

[25] *See* DEIS vol. 3 at 3.10-11.

[26] *See, e.g.*, Haw. Admin. R. § 11-200.1-2 (requiring analysis of indirect effects, also termed “secondary effects” or “secondary impacts”); *Kia‘i Wai v. Dep’t of Water*, 151 Hawai‘i 442, 455, 517 P.3d 725, 738 (2022) (requiring disclosure and analysis of “reasonably foreseeable” growth-inducing effects); *Barnes v. U.S. Dep’t of Transp.*, 655 F.3d 1124, 1139 (9th Cir. 2011) (“agencies must analyze the impacts of the increased demand attributable to the [infrastructure project] as growth-inducing effects falling under [the National Environmental Policy Act’s] purview”).

We appreciate the opportunity to comment on the Honoapi‘ilani Project, which could be precedent-setting for proactively adapting to climate change, while incorporating sensible and timely design measures to reduce greenhouse gas emissions from transportation. Please contact us if you have any questions or would like to discuss this further.

Respectfully submitted,

/s/ Mahesh Cleveland
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Kylie Wager Cruz
Mahesh Cleveland
EARTHJUSTICE

Attachments (A – E)

cc: Laura Ka‘akua, State of Hawai‘i Department of Transportation

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IN THE CIRCUIT COURT OF THE FIRST CIRCUIT

STATE OF HAWAI‘I

NAVAHINE F., a Minor, by and through her natural guardian; et al., Plaintiffs, v. DEPARTMENT OF TRANSPORTATION, STATE OF HAWAI‘I, et al., Defendants.	) CIVIL NO. 1CCV-22-0000631) (Environmental Court))) JOINT STIPULATION AND ORDER) RE: SETTLEMENT; EXHIBIT “A”)) Judge: The Honorable John M. Tonaki)) Trial Date: June 24, 2024))))

ATTACHMENT A

JOINT STIPULATION AND ORDER RE: SETTLEMENT

WHEREAS, Plaintiffs Navahine F., a Minor, by and through her natural guardian; Kaʻōnohi P.-G., a Minor, by and through his natural guardian; Kawahineʻilikea N., a Minor, by and through her natural guardian; Mesina D.-R., a Minor, by and through her natural guardian; Kawena F., a Minor, by and through her natural guardians; Tyler L., a Minor, by and through their natural guardian; Rylee K., a Minor, by and through her natural guardian; Kaliko T., a Minor, by and through her natural guardian; Charlotte M., a Minor, by and through her natural guardian; Taliya N., a Minor, by and through her natural guardian; Kalālapa W.; Pahonu C., a Minor, by and through his natural guardian; and Brianna K., a Minor, by and through her natural guardian (collectively, "Youth Plaintiffs") and Defendants the State of Hawaiʻi, Governor Josh Green, the Hawaiʻi Department of Transportation ("HDOT"), and Edwin Sniffen, in his official capacity as HDOT Director (collectively, "Defendants"), have executed a Settlement Agreement, which is filed herewith as Exhibit "A";

NOW, THEREFORE, pursuant to the Settlement Agreement, the parties hereby stipulate and agree, and the Court orders, as follows:

1. The terms of the Settlement Agreement are approved as in the best interests of and fair to the Youth Plaintiffs.
2. Except as set forth in the Settlement Agreement, this Order and Settlement Agreement fully and completely resolve the claims asserted by Plaintiffs against Defendants in the Youth Plaintiffs' Complaint (Dkt. 1).
3. In the event a dispute arises regarding compliance with the terms of the Settlement Agreement, any party, having complied with the dispute resolution provisions set forth in section 10 of the Settlement Agreement, may bring an appropriate motion in this Court

under Case Number 1CCV-22-0000631 to enforce the Agreement. Unless otherwise directed by this Court, the moving party shall not commence a separate lawsuit to seek judicial resolution of such a dispute.

4. This Court shall reserve continuing jurisdiction solely to enforce the Parties' obligations under the Agreement until December 31, 2045, or the date upon which the Zero Emissions Target, Haw. Rev. Stat. § 225P-5, has been achieved, whichever is earlier.

5. This case shall automatically be dismissed on December 31, 2045, or the date upon which the Zero Emissions Target, Haw. Rev. Stat. § 225P-5, has been achieved, whichever is earlier.

DATED: Honolulu, Hawai'i, May 17, 2024.

ANNE LOPEZ
Attorney General of the State of Hawai'i

/s/ Isaac H. Moriwake
ISAAC H. MORIWAKE
KYLIE W. WAGER CRUZ
LEINĀ'ALA L. LEY
EARTHJUSTICE

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Attorneys for Defendants

APPROVED AND SO ORDERED:

DATED: Honolulu, Hawai‘i June 20, 2024

/s/ John M. Tonaki

JOHN M. TONAKI
JUDGE OF THE ABOVE-ENTITLED COURT

EXHIBIT A

EXHIBIT A

SETTLEMENT AGREEMENT AND RELEASE

This Settlement Agreement and Release (the "Agreement") is made and entered into by and between **Plaintiffs** Navahine F., a Minor, by and through her natural guardian; Ka'ōnohi P.-G., a Minor, by and through his natural guardian; Kawahine'ilikea N., a Minor, by and through her natural guardian; Mesina D.-R., a Minor, by and through her natural guardian; Kawena F., a Minor, by and through her natural guardians; Tyler L., a Minor, by and through her natural guardian; Rylee K., a Minor, by and through her natural guardian; Kaliko T., a Minor, by and through her natural guardian; Charlotte M., a Minor, by and through her natural guardian; Taliya N., a Minor, by and through her natural guardian; Kalālapa W.; Pahonu C., a Minor, by and through his natural guardian; and Brianna K., a Minor, by and through her natural guardian (collectively, "Youth Plaintiffs"), and **Defendants** the State of Hawai'i, Governor Josh Green, the Hawai'i Department of Transportation ("HDOT"), and Edwin Sniffen, in his official capacity as HDOT Director (collectively, "Defendants").

Youth Plaintiffs and Defendants shall be referred to collectively as the "Parties" and individually as a "Party."

RECITALS

WHEREAS, Youth Plaintiffs are thirteen youths represented by two non-profit, public interest law firms, Earthjustice and Our Children's Trust;

WHEREAS, Youth Plaintiffs filed a Complaint on June 1, 2022, captioned *Navahine F. et al. v. Hawai'i Department of Transportation et al.,* in the Circuit Court of the First Circuit, Case No. 1CCV-22-0000631, alleging violations of the constitutional public trust doctrine (Haw. Const. art. XI, § 1) and constitutional right to a clean and healthful environment (Haw. Const. art. XI, § 9) and seeking declaratory and injunctive relief;

WHEREAS, on April 17, 2023, Defendants filed an Answer denying liability;

WHEREAS, at the time the case commenced, Youth Plaintiffs were children, ages 9-18;

WHEREAS, Hawai'i jurisprudence recognizes that:

> "There is scientific consensus: anthropogenic global warming threatens the world's climate system. It raises the seas; it sickens the planet. It harms present and future generations." *In re Maui Elec. Co.,* 150 Hawai'i 528, 538 n.15, 506 P.3d 192, 202 n.15 (2022) ("*MECO*") (citing *Summary for Policymakers* in *Climate Change 2021: The Physical Science Basis*, IPCC (Valérie Masson-Delmotte et al. eds., 2021), https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM_final.pdf; *Summary for Policymakers* in *Climate Change 2022: Impacts, Adaptation and Vulnerability* at SPM-7-8, IPCC (Hans-O Pörtner et al., 2022), https://report.ipcc.ch/ar6wg2/pdf/IPCC_AR6_WGII_SummaryForPolicymakers.pdf);

"The people of Hawai‘i have declared ‘a climate emergency.’" *In re Haw. Elec. Light Co.*, 152 Hawai‘i 352, 359, 526 P.3d 329, 336 (2023) ("*HELCO*") (quoting S. Con. Res. 44, 31st Leg., Reg. Sess. (2021) ("2021 S. Con. Res. 44"));

"Hawai‘i faces immediate threats to our cultural and economic survival: sea level rise, eroding the coast and flooding the land; ocean warming and acidification, bleaching coral reefs and devastating marine life; more frequent and more extreme droughts and storms. For the human race as a whole, the threat is no less existential." *HELCO*, 152 Hawai‘i at 359, 526 P.3d at 336 (citing 2021 S. Con. Res. 44);

"HRS § 225P-5 mandates that we reduce emissions now, before the damage done to the environment is irreversible—before action becomes impossible for future generations." *HELCO*, 152 Hawai‘i at 358, 526 P.3d at 335;

"With each year, the impacts of climate change amplify and the chances to mitigate dwindle … ‘A stepwise approach is no longer an option.’" *HELCO*, 152 Hawai‘i at 359, 526 P.3d at 336 (internal citation omitted); and

WHEREAS, as a state agency, HDOT "must perform its statutory function in a manner that fulfills the State's affirmative constitutional obligations." *HELCO*, 152 Hawai‘i at 359, 526 P.3d at 336;

WHEREAS, an array of laws enacted by the Hawai‘i Legislature require the State to increase energy efficiency, develop an integrated multi-modal transportation system, and reduce greenhouse gas ("GHG") emissions, including transportation sector emissions specifically. *See*, *e.g.*, HRS §§ 196-9; 225P-5, -7, -8; 226-17, -18; 264-142, -143;

WHEREAS, Hawai‘i's Legislature has recognized that:

"[C]limate change is the overriding challenge of the twenty-first century" and "poses immediate and long-term threats to Hawai‘i's economy, public health, natural resources, environment, and way of life." 2022 Haw. Sess. Laws Act 238, § 1;

"[B]ased upon the scientific information and expertise available, Hawai‘i remains particularly vulnerable to the dangers of disaster occurrences as a result of the effects of global warming, thereby endangering the health, safety, and welfare of the [State's] people, warranting preemptive and protective action[.]" 2021 S. Con. Res. 44; and

"In order to achieve the goal of a fully decarbonized economy, the State needs to plan ahead and understand the steps that need to be taken to create a carbon-negative economy by 2045[.]" 2022 Haw. Sess. Laws Act 238, § 1;

WHEREAS, Hawai‘i's Legislature has further found that this "existential climate emergency threatens humanity and the natural world" and has requested "statewide collaboration toward an immediate just transition and emergency mobilization effort to restore a safe climate." 2021 S. Con. Res. 44;

WHEREAS, Defendants have taken efforts to make Hawai‘i a leader in reducing GHG emissions in the transportation sector, and are committed to taking further, ambitious steps to meet the State's targets set forth in HRS §§ 225P-5, -7, and -8;

WHEREAS, a 2023 study by EPA found that children are uniquely vulnerable to the impacts of climate change because of the natural physiology of their developing and growing bodies, and that climate change impacts experienced during childhood can have lifelong consequences. U.S. Environmental Protection Agency, *Climate Change and Children's Health and Well-Being in the United States*, EPA 430-R-23-001 (2023);

WHEREAS, experts state that the best scientific evidence today shows that correcting Earth's energy imbalance requires reducing atmospheric carbon dioxide to less than 350 parts per million this century;

WHEREAS, the Parties have agreed to fully and finally resolve Youth Plaintiffs' Complaint in exchange for certain commitments by Defendants related to reducing GHG emissions in the transportation sector; and

WHEREAS, by entering this Agreement, Youth Plaintiffs do not admit to any legal or factual deficiencies in their claims and Defendants do not admit to any liability or wrongdoing and do not concede any factual or legal issue alleged in the Complaint.

NOW, THEREFORE, in the interests of the Parties and the public interest, and to promote judicial economy, the Parties hereby stipulate and agree as follows:

RECOGNITION OF RIGHTS

1. Youth Plaintiffs have constitutional rights to a clean and healthful environment consistent with article XI, section 9 of the Hawai‘i Constitution:

> Each person has the right to a clean and healthful environment, as defined by laws relating to environmental quality, including control of pollution and conservation, protection and enhancement of natural resources. Any person may enforce this right against any party, public or private, through appropriate legal proceedings, subject to reasonable limitations and regulation as provided by law.

2. The State is committed to reducing GHG emissions from its statewide transportation system according to "the best available science" and the governing legal mandates to address climate change and protect the constitutional rights of Hawai‘i citizens. 2018 Haw. Sess. Laws Act 15, § 4.

3. The right to a clean and healthful environment under article XI, section 9 of the Hawai‘i Constitution as defined by laws relating to environmental quality "subsumes a right to a

life- sustaining climate system." *MECO*, 150 Hawai‘i at 538 n. 15, 506 P.3d at 202 n. 15; *HELCO*, 152 Hawai‘i at 359, 526 P.3d at 336.

4. The State has affirmative public trust obligations under article XI, section 1 of the Hawai‘i Constitution to conserve and protect "Hawai‘i's natural beauty and all natural resources, including land, water, air, minerals and energy sources" "[f]or the benefit of present and future generations."

5. The State's public trust considerations include "those related to protection of air and other trust resources affected by climate change[.]" *MECO*, 150 Hawai‘i at 538, 506 P.3d at 202.

6. "As trustee, the State must take an active role in preserving trust property and may not passively allow it to fall into ruin." *Ching v. Case*, 145 Hawai‘i 148, 177, 449 P.3d 1146, 1175 (2019) (citation omitted). "[A]n obligation to reasonably monitor trust property to ensure it is not harmed is a necessary component of this general duty[.]" *Id.*

7. Defendants, in establishing, maintaining, and operating the state transportation system, must preserve, protect, and maintain Hawai‘i's public trust resources and all Hawai‘i citizens' right to a clean and healthful environment.

8. 2018 Haw. Sess. Laws Act 15, section 4, requires Defendants to "expand strategies and mechanisms to reduce greenhouse gas emissions through the reduction of energy use, adoption of renewable energy, and control of air pollution among all agencies, departments, industries, and sectors, *including transportation*[,] . . . utiliz[ing] the best available science, technologies, and policies to reduce greenhouse gas emissions." (Emphasis added.)

TERMS AND CONDITIONS

NOW, THEREFORE, the Parties hereby promise, covenant, agree, and exchange mutual general releases as follows:

1. GHG Emission Reductions.

As required by HRS § 225P-8, HDOT will "take any actions necessary to achieve the goals established" in that section, specifically, "zero [greenhouse gas] emissions across all transportation modes within the State, including across all sectors of:

(1) Ground Transportation; and
(2) Sea and air interisland transportation."

The Parties agree that Defendants will establish in the GHG Reduction Plan discussed below the interim greenhouse gas emission reduction targets for 2030, 2035, and 2040 to achieve the goals established in HRS § 225P-5 "no later than 2045" in accordance with that section.

2. Greenhouse Gas Reduction Plan.

Within the legal and legislative parameters of the government process, which Youth Plaintiffs acknowledge, HDOT, in consultation with other state and local agencies, will develop and implement a concrete and comprehensive statewide plan ("GHG Reduction Plan") to reduce GHG emissions from the statewide transportation system on a timeline that complies with HRS §§ 225P-5, 225P-7, and 225P-8.

a. HDOT will complete the GHG Reduction Plan as soon as possible, but no later than one (1) year from the date of the last signatory to the Agreement ("Agreement Date").

b. Youth Plaintiffs and the public shall have at least thirty (30) days to provide feedback and comments on the GHG Reduction Plan, prior to the Plan becoming final, and sufficiently in advance for HDOT to address the feedback and comments.

c. After entry of the Parties' Agreement, Youth Plaintiffs shall have the opportunity to have an in-person meeting with the Director of HDOT and the Climate Change Mitigation and Culture Manager to discuss their comments and feedback on HDOT's GHG reduction measures.

d. The GHG Reduction Plan will acknowledge and act upon the responsibilities of the State, and HDOT as the State's head transportation agency, to play a lead role in decarbonizing the statewide transportation system, in coordination and partnership with other related agencies and entities and the private sector.

e. The GHG Reduction Plan will include consideration of plans and investments for infrastructure that may be necessary at harbors and airports to accommodate the full decarbonization of international aviation and marine transportation to the Hawaiian Islands.

f. The GHG Reduction Plan will set interim five (5) year GHG emissions reduction targets in the transportation sector through 2045, for the years 2030, 2035, and 2040. The plan will include different benchmarks for ground, air, and marine transportation, as necessary to reflect different technologies economically and technically viable in the three sectors.

g. HDOT will provide an annual update to the public, with notice specifically provided to Youth Plaintiffs through their counsel, on its progress in implementing the GHG Reduction Plan, achieving GHG emission reductions, and moving toward the upcoming GHG reduction interim target.

h. The public and Youth Plaintiffs will have at least thirty (30) days after receipt of each annual update to provide comments and feedback to HDOT. Upon request by Youth Plaintiffs, they shall have the opportunity to have an in-person or virtual meeting with the Climate Change Mitigation and Culture Manager to discuss their comments and feedback.

i. The GHG Reduction Plan will be updated on an ongoing basis, with a comprehensive review and update approximately every five (5) years, under the principle of continual performance feedback and improvement. Specifically, HDOT will review and reassess actions and strategies for ground, air, and marine transportation based on the best scientific information available, the progress to date, and the necessary adjustments to meet the upcoming five-year interim target.

j. Specific benchmarks and performance metrics to incorporate in the GHG Reduction Plan will include but not be limited to the following:

    i. Interim targets to reduce vehicle miles traveled ("VMT") and the number of single occupancy vehicles in the state's mode share, HRS § 264-143(a)(3), (4);

    ii. Interim targets to expand multimodal transportation options such as public transit, pedestrian pathways, and bikeways, HRS §§ 264-20.5(a), -142;

    iii. Interim targets to improve safety for pedestrians and cyclists and meet the Vision Zero Policy, HRS §264-143(a)(6);

    iv. Interim targets to electrify transportation and support expansion of the public charging infrastructure across the state, HRS §§ 226-17, -18;

    v. Interim targets to reduce petroleum use from ground transportation and increase the use of zero-carbon alternative fuels and electric vehicles in the ground, air, and marine transportation sectors, HRS §§ 226-17, -18;

    vi. Interim targets to convert to zero-emission technologies (whether electric or otherwise) all ground equipment at airports and harbors in the state, HRS §§ 225P-5, P-8.

k. To meet the interim targets set in the GHG Reduction Plan, HDOT will need at a minimum:

    i. Sufficient appropriations of funds by the Legislature;

    ii. Support and adoption by private stakeholders of zero emissions vehicles, sustainable aviation fuel, and other technologies;

    iii. Support by the counties for zero emissions vehicles, public transit, electric vehicle ("EV") charging, and other measures designed to decarbonize the transportation sector;

    iv. Land use and other planning to increase public adoption of multimodal transportation options;

    v. Support, planning, and adoption by other State departments, agencies, and

commissions to achieve the State's renewable energy and zero emissions transportation goals;

vi. Availability and delivery of new vehicles and technologies from private parties (such as medium- and heavy-duty electric vehicles);

vii. Public support, advocacy, and assistance in spreading awareness and education about Hawai'i's clean energy initiatives; and

viii. For the State's electrical energy to be generated using renewable energy sources according to the State's Renewable Portfolio Standards.

The GHG Reduction Plan will incorporate specific actions and strategies that HDOT will take in an effort to enable and support meeting the applicable needs set forth in sections k.i-viii above.

l. HDOT will develop and implement a program for public education, outreach and community engagement, and partnerships to support the GHG Reduction Plan and related transportation decarbonization work, emphasizing the role the public can play and maximizing awareness of clean transportation choices and opportunities. The Parties will partner in and contribute to the public education, outreach, and community engagement program.

3. Revised Transportation Programming and Budgeting Process.

a. To ensure funding is requested, available, and prioritized in alignment with decarbonizing the transportation system, HDOT will develop a process and criteria for evaluating, selecting, and prioritizing projects to include in the Mid-Range Transportation Plan ("MRTP"), Statewide Transportation Improvement Program ("STIP"), and multimodal plans, in accordance with the State's GHG mitigation and VMT reduction goals. HDOT will make information about this process and criteria readily available to the public.

b. The revised process and criteria for the MRTP and STIP will be in place and operational in time to apply to the next planning cycle beginning in April 2025.

c. HDOT will develop and implement an objective, scientifically-based methodology to assess and report the total, long-term GHG emission and VMT impacts of each infrastructure project ("the Methodology"). The Methodology will quantify these impacts where possible, using best estimates where necessary. HDOT will incorporate this Methodology into its planning process and into individual project and annual reports under HRS § 264-143.

d. HDOT will develop and implement the Methodology in no later than one year, in time for it to be incorporated in all proposals for the next planning cycle beginning in April 2025.

e. HDOT will also use this Methodology to assess GHG and VMT impacts in preparing environmental review documents for its transportation projects, and in commenting on environmental review documents for land use development projects.

f. HDOT will include climate change mitigation as a primary goal and objective within the MRTP and STIP process at the next planning cycle beginning in April 2025, to be implemented based on best available data from the GHG and VMT Methodology.

g. The revised process and criteria for the MRTP and STIP will make clear that the 2013 "Highways Division Project Prioritization Guideline" document is no longer valid, and Level of Service is discontinued as a criterion for project prioritization.

h. HDOT will produce an annual report compiling the individual project reports and detailing its progress in reducing GHG and VMT, including its quantitative analyses, as required by HRS § 264-143(c).

i. HDOT will incorporate the Complete Streets policy under HRS § 264-20.5 as a goal and prioritization criterion in the MRTP and STIP and require a documented Complete Streets assessment, including any exceptions to the Complete Streets policy, for each proposed project, starting from the upcoming MRTP and STIP planning cycle beginning in April 2025. HDOT will also implement policies and procedures to ensure that Complete Streets improvements remain part of the project throughout the planning and development process, and that information about Complete Streets improvements for each project is readily available to the public.

j. The GHG and VMT impact assessments, reports, and project scoring evaluations described above for each project and the MRTP and STIP as a whole will be publicly available in an easily accessible online format.

k. HDOT will include consideration of equity goals for each project at the planning stage and inclusion of an assessment of whether each project serves HDOT's equity goals in the reports prepared under HRS § 264-143. HDOT will mindfully prioritize the health and wellbeing of children, *see, e.g.*, HRS § 264-142(b)(1).

4. HDOT Leadership.

a. HDOT will create a lead unit, headed by a Climate Change Mitigation & Culture Manager, expressly charged with addressing climate change mitigation, within three months of this Agreement or as soon thereafter as the unit can be created. This lead unit will:

i. Work directly with HDOT Director, Deputy Directors, Climate Resiliency Managers from Airports, Highways, and Harbors to integrate and coordinate the mission of GHG reduction throughout HDOT.

ii. Lead and conduct a range of responsibilities intended to meet the goals and

targets set in HDOT's GHG Reduction Plan.

b. HDOT Highways will also create a position to oversee HDOT Highways' climate change mitigation and adaptation efforts at the program level. HDOT will also create a position to lead and coordinate efforts to ensure implementation of the Complete Streets policy, including the process improvements described above. HDOT will provide email notice to the Youth Plaintiffs, through their counsel, of the title of each position when the two positions described above are created.

c. HDOT will also establish a volunteer youth council to advise on HDOT's mitigation and adaptation commitments on a quarterly basis, with transparency about youth council recommendations and HDOT's responses. The inaugural volunteer youth council will be open to Youth Plaintiffs' participation through the regular application process and at least two of the youth council seats will be allocated to Youth Plaintiffs should they choose to apply. HDOT will provide email notice to the Youth Plaintiffs, through their counsel, when applications for the inaugural volunteer youth council open.

d. To promote decarbonization of transportation as a statewide priority, HDOT will develop, publish, and implement standards governing its external review requests. HDOT will apply the same standards used for internal HDOT projects in reviewing developer projects, including but not limited to: integration of multimodal transportation choices and connectivity of walkways and bikeways into new developments; assessment of the potential GHG and VMT impacts of proposed projects; and improvements for the construction of bikeways, pathways, transit stops, and public EV charging stations in new developments intended to mitigate the reasonably foreseeable impacts of the proposed project on the statewide transportation system, including GHG and VMT impacts.

5. Immediate Commitments.

a. To rapidly accelerate the expansion of the public EV charging network, Defendants will undertake an ambitious mobilization, including appropriate budgeting requests, in addition to implementation of HDOT's existing plan under the National Electric Vehicle Infrastructure (NEVI) Program, with an initial goal of investing a minimum of $40 million into public charging stations and charging infrastructure for state and county vehicles by 2030, subject to change as part of HDOT's GHG Reduction Plan.

b. To rapidly accelerate the expansion of multimodal transportation choices in line with the State's decarbonization goals and the accompanying co-benefits, Defendants will also undertake an ambitious mobilization, including budgeting requests, to complete the pedestrian, bicycle, and transit networks in coordination with the counties as contemplated under HRS § 264-142, with a goal of completing this work in five years.

c. HDOT will develop and implement policies intended to achieve zero emissions,

including policies designed to: (i) reduce VMT and the percentage of single occupancy vehicles on roads; (ii) electrify transportation, including all vehicles and facilities, and support expansion of charging infrastructure across the State; (iii) increase the use of zero-carbon alternative fuels and electric vehicles in the ground, air, and marine transportation sectors; (iv) expand multimodal transportation options by building the complete network of safe bicycle, pedestrian, and transit facilities; and (v) implement other strategies as needed to decarbonize the transportation sector in the timeframe set forth in HRS § 225P-5. HDOT will seek immediate opportunities to take actions to advance progress on these goals.

d. HDOT will also increase efforts to sequester more carbon, including by planting additional trees and shrubs on an annual basis to generate additional carbon sinks to drawdown carbon in the atmosphere, with a starting goal of planting at least 1,000 trees per year. When planting, HDOT will use native plants whenever feasible, and will not use invasive species.

6. Attorneys' Fees and Costs.

Each of the Parties shall bear and pay its own costs, attorneys' fees and any other expenses incurred or to be incurred in connection with this action, the released claims, the negotiation and preparation of this Agreement and/or the performance of this Agreement.

7. Notice.

Any notices required or provided for by this Agreement shall be in writing, via email or other means, and sent to the following:

a. for Defendants:

Ciara W.K. Kahahane
Deputy Attorney General
Department of the Attorney General
State of Hawai‘i
425 Queen Street
Honolulu, Hawai‘i 96813
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Our Children's Trust
P.O. Box 5181
Eugene, Oregon 97405
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Any Party may, by written notice to the other Parties, change its designated notice recipient or notice addresses provided above.

8. No Admissions.

The Parties and their counsel understand that this Agreement does not constitute an admission by Defendants of any current or prior violation of the Hawai'i Constitution or other violation of any law, or of any wrongdoing of any kind. This Agreement is for the purposes of resolving and settling all actual and potential disputes among the Parties to avoid further controversy, litigation and expense; provided, however, that this Agreement may be used in an action by a Party to enforce its terms and provisions.

9. Jurisdiction and Dismissal.

The Parties will prepare and file a Proposed Order for signature and entry by the Court that (i) approves the terms of the Agreement as in the best interests of and fair to the Youth Plaintiffs, (ii) declares that Plaintiffs' Complaint is fully and finally resolved, and (iii) reserves jurisdiction solely to enforce the Agreement and provides for the automatic dismissal of the case as provided herein.

The Parties agree that the Court will retain continuing jurisdiction to enforce the Parties' obligations under the Agreement until December 31, 2045, or the date upon which the Zero Emissions Clean Economy Target (HRS § 225P-5) has been achieved, whichever is earlier. This case will be automatically dismissed the sooner of December 31, 2045, or the achievement of the Zero Emissions Clean Economy Target.

This Agreement shall not be amended, supplemented, or modified other than in a writing executed by both Parties and approved by the Court.

10. Dispute Resolution.

Unless otherwise expressly provided for in this Agreement, the dispute resolution procedures of this Section shall be the exclusive mechanism for resolving disputes arising under this Agreement. The Parties shall attempt to resolve any disagreements concerning this Agreement expeditiously and informally, pursuant to the following procedures:

a. A Party first must notify all other Parties in writing when a dispute or concern arises and request an opportunity to discuss the disputed issues or concerns; each Party agrees in good faith to make a concerted effort to resolve the dispute or concern through direct

negotiations without the need for judicial intervention or mediation;

b. If the Parties are unable to resolve the dispute within a two-week period of time, or longer upon agreement of the Parties, and upon written notice to all Parties, all Parties agree to select a mediator, or ask the court to appoint a mediator, and to notify the mediator and work cooperatively with the mediator to reach agreement; and

c. If no mutually agreeable resolution is reached within a 30-day period from the first mediation session, either Party may bring a motion in this Court under Case Number 1CCV-22-0000631 to enforce the Agreement.

Each side agrees to bear its own attorneys' fees and costs in connection with the dispute resolution process, including bringing a motion to enforce the Agreement.

11. Joint Press Conference.

On a mutually agreed upon date, HDOT, Defendant Sniffen, and Plaintiffs agree to hold a joint press conference at which a representative from the Office of Governor Green will be present, and the Parties agree to issue a joint press statement as the initial announcement of the successful resolution of this case by the Parties. The Parties agree not to disclose or speak to the media about the Agreement until such mutually agreed upon date.

12. Additional Terms.

a. The Parties recognize that HDOT's authority has limitations, and that HDOT cannot take any actions beyond the scope of the authority allocated to it under federal law and the laws and Constitution of the State of Hawai‘i. Nothing in this Agreement is intended to or does obligate HDOT to perform any task outside of the law or the scope of its authority or take any action that infringes on the legislature's authority. Nor does this Agreement impose on Defendants any obligations to expend funds in furtherance of any action beyond those funds that are appropriated by the legislature, or otherwise available to HDOT, and are legally available for such action. HDOT will make best efforts to secure funding from the legislature and the federal government, and make rule and policy changes as it deems necessary to meet the terms of this Agreement.

b. Other than Defendants' obligation to perform the specific actions in this Agreement by the deadlines set forth herein, nothing in this Agreement shall be construed to limit or modify any discretion accorded to Defendants under the Hawai‘i Constitution, Hawai‘i law, the Hawai‘i Administrative Procedure Act, or general principles of administrative law in taking the actions that are the subject of this Agreement.

13. Interpretation and Construction.

The Parties agree that this Agreement shall constitute a complete and final settlement of all claims in the Complaint, and all prior and contemporaneous negotiations and understandings between the Parties shall be deemed merged into this Agreement. The Parties treat this

Agreement as jointly drafted, and any rules of construction that construe any ambiguities against the drafting Party shall be inapplicable in any dispute concerning the interpretation of this Agreement.

14. Severability.

Each term and provision of this Agreement shall be considered severable and divisible from every other term and provision, and the invalidity or unenforceability of any one term or provision shall not limit the validity and enforceability, in whole or in part, of any other term or provision hereof.

15. Execution of Agreement.

This Agreement may be executed in counterparts, and electronic or facsimile signatures will be treated the same as original signatures. It shall become effective on the date of the last execution. The attorneys signing below represent that they have reviewed the full Agreement with their clients, have obtained the express written consent of their clients under HRS § 605-7, and are authorized to execute this Agreement.

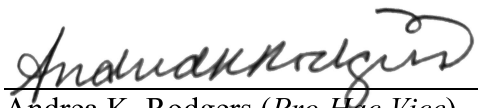
IN WITNESS WHEREOF, the Parties agree to the terms set forth herein as evidenced by the signature of their authorized representatives below.

ATTORNEYS FOR PLAINTIFFS



Date: May 16, 2024

Isaac H. Moriwake
Managing Attorney
Earthjustice



Date: May 15, 2024

Andrea K. Rodgers (*Pro Hac Vice*)
Deputy Director, U.S. Strategy
Our Children's Trust

ATTORNEY FOR DEFENDANTS

Anne E. Lopez

Date: May 16, 2024

Anne E. Lopez
Attorney General
State of Hawai‘i

SECOND AMENDED EXPERT DISCLOSURE REPORT

Michael Replogle

Principal, Replogle Consulting;
Founder, former Board President, and Senior Advisor of the Institute for Transportation and Development Policy;
Co-founder and former Board Chair of the Partnership on Sustainable Low Carbon Transport Foundation;
Former Deputy Commissioner for Policy of New York City Department of Transportation

Navahine F., a Minor, by and through her natural guardian, et al.
v.
Department of Transportation, State of Hawai'i, et. al.

Civil No. 1CCV-22-0000631

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ATTACHMENT B

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AASHTO:	American Association of State Highway and Transportation Officials
ADA:	Americans with Disabilities Act of 1990
ADB:	Asian Development Bank
CCICED:	China Council for International Cooperation and Economic Development
CIP:	Capital Improvement Program
CO DOT:	Colorado Department of Transportation
CRS:	Carbon Reduction Strategy
DBEDT:	Department of Business, Economic Development and Tourism
DOE:	United States Department of Energy
DOT:	Department of Transportation
EPA:	Environmental Protection Agency
EV:	Electric Vehicle
FHWA:	Federal Highways Administration
FTA:	Federal Transit Administration
GHG:	Greenhouse Gas
HCEI:	Hawai‘i Clean Energy Initiative
HDOH:	Hawai‘i Department of Health
HDOT:	Hawai‘i Department of Transportation
HOV:	High-Occupancy Vehicle
HSEO:	Hawai‘i State Energy Office
HSTP:	Hawai‘i Statewide Transportation Plan
ICCT:	International Council on Clean Transportation
IIJA:	Infrastructure Investment and Jobs Act
ITDP:	Institute for Transportation and Development Policy
IVHS:	Intelligent Vehicle Highway Systems
LiDAR:	Light Detection and Ranging
LOS:	Level of Service
LRTP:	Long-Range Transportation Plan
MDB:	Multilateral Development Bank
MN DOT:	Minnesota Department of Transportation
MODA:	Multi-Objective Decision Analysis
MPO:	Metropolitan Planning Organization
MRTP:	Mid-Range Transportation Plan
MSTRS:	Mobile Source Technical Review Subcommittee
NCHRP:	National Cooperative Highway Research Program
NEVI:	National Electric Vehicle Infrastructure

NHS:	National Highway System
NYC DOT:	New York City Department of Transportation
PPR	Project Programming Request
SLoCaT:	Sustainable Low Carbon Transport
SmartTRAC:	Smart Transportation Rank Choice
STAR:	Sustainable Transport Appraisal Rating
STIP:	Statewide Transportation Improvement Program
TIP:	Transportation Improvement Program
TRUE:	The Real Urban Emissions Initiative
VMT:	Vehicle Miles Traveled
ZET:	Zero Emission Target
WA DOT:	Washington Department of Transportation

1. EXECUTIVE SUMMARY

I, **Michael Replogle**, have been retained by counsel for the youth Plaintiffs to provide opinions and conclusions about the Hawai‘i State Department of Transportation’s (HDOT’s) plans, programs, and practices that have long exacerbated and, absent a fundamental and urgent shift in direction, will continue to exacerbate the high levels of greenhouse gas (GHG) emissions from the State of Hawai‘i’s (State’s) transportation system. As fully detailed below in the description of my qualifications, I have decades of experience in the transportation field, including an entire career of working with and within transportation agencies and expert organizations, and as a transportation agency administrator myself for the New York City Department of Transportation (NYC DOT).

Section A of my expert report explains how state Departments of Transportation (DOTs) like HDOT are in the driver’s seat for reducing GHG emissions from their state transportation systems. As the State’s head transportation agency, HDOT plays a leadership role in currently maintaining the high emissions from the status quo “legacy” transportation system, when it instead must play a leadership role in implementing a transformative shift in its organizational structure and culture, plans, programs, and practices to decarbonize the transportation sector and meet the State’s climate mitigation mandates. As has recently been reported:

> State governments play key roles when it comes to setting the pace (Bradbury et al., 2023) for reducing greenhouse gas (GHG) emissions from transportation—the largest source of climate pollution in the U.S. The investment decisions made at state and local levels directly affect levels of pollution from transportation, and those decisions will be an important factor determining the emissions outcomes (Georgetown Climate Center, 2021) of federal transportation policy. Investments in low-carbon transportation options, like public transit, electric vehicles, bike lanes, and pedestrian infrastructure, can accelerate progress toward meeting state and federal climate goals. On the other hand, spending transportation dollars on projects that expand roadway capacity tends to lead to additional driving (Volker and Handy, 2023), known as “induced travel,” which makes it more difficult to meet those critical goals.
>
> (Georgetown Climate Center, 2024).

This is not a recent realization. For more than a decade, federal-level agencies and expert authorities have emphasized the state DOTs' key role in reducing transportation sector emissions and have offered guidance and resources to state DOTs, including HDOT, to lead them forward, but HDOT has instead continued its business-as-usual path.

Section B shows how HDOT, in performing its foundational responsibilities of planning the State's transportation system and programming the State's transportation infrastructure investments, perpetuates the status quo GHG-intensive transportation system. In particular, even though all state DOTs, including HDOT, operate under a performance-based framework that includes goals, objectives, targets, metrics, and organizational structures and protocols for performance, HDOT does not have performance measures for reducing GHG emissions from the transportation sector. HDOT has no comprehensive transportation decarbonization plan, and its existing transportation system planning instead continues the status quo of increasing GHG emissions. HDOT's programming function for funding its transportation projects and programs also perpetuates this status quo by disregarding GHG reduction as a prioritization criterion and performance metric.

Section C establishes how HDOT's systemic practices prioritize programs and projects that increase GHG emissions. HDOT's project prioritization criteria and performance metrics explicitly favor projects that increase GHG emissions over transportation alternatives that decrease emissions. Conversely, HDOT does not track and report its performance on reducing GHG and vehicle miles traveled (VMT). (**Subsection 1**). It has not established any objectives, targets, or plans for the recognized strategies for decarbonization, particularly the mass electrification of transportation and the building of the statewide electric vehicle (EV) charging infrastructure. (**Subsection 2**).

Instead of advancing decarbonization, HDOT continues its system of prioritizing traditional vehicle-capacity-expansion projects, which exacerbates the ongoing trend of increasing VMT and the resulting GHG emissions. (**Subsection 3**). HDOT has long been informed and directed to reduce VMT, yet has disregarded this responsibility. (**Subsection 4**).

In the absence of any HDOT reporting on the VMT and GHG impacts of its transportation infrastructure program, I conducted an independent evaluation of HDOT's highway capital improvement budgets over the last 11 years. My analysis indicates that HDOT has directed most funds toward projects that increase VMT (33%) or have no impact on VMT (61%), and only a minimal

remaining share toward projects that reduce VMT or GHG emissions (4% total). This shows that the State's engine of transportation infrastructure spending continues to drive toward ever-increasing VMT and GHG emissions. (**Subsection 5**).

Section D documents how HDOT's plans, investments, and actions for "multimodal" options (i.e., the full range of transportation modes including low-carbon alternatives and "active" mobility though human exercise) limit the public's transportation choices, keep people in their cars, perpetuate a car-centric system, and increase emissions. HDOT has left the statewide pedestrian infrastructure vastly unfunded, undeveloped, and unsafe for decades. It has also deprioritized the statewide bicycle infrastructure for decades and will leave this network vastly incomplete. It has idly sat by during the extreme collapse in public transit ridership over the past decade across the state. And it fundamentally undermines Hawai'i's "Complete Streets" mandate, which requires HDOT to design and build roads for all transportation modes by all people of all ages and abilities.

Section E explains that the handful of activities—largely limited to HDOT's internal vehicle fleet, facilities, and operations—that HDOT has raised as examples of its "initiatives" to reduce GHG emissions, simply underscore the fundamental defect in HDOT's approach to transportation decarbonization. In short, HDOT remains focused on its ad hoc, piecemeal measures at the margins, rather than systems-level transformation at the scale and pace necessary to meet the State's declared "climate emergency" and established decarbonization mandates. So long as HDOT treats GHG mitigation as an ancillary, discretionary consideration limited to the agency's internal activities, rather than establishing it as a core part of its governmental mission, HDOT and the State will remain off track from the direction necessary to decarbonize the transportation sector.

I conclude that HDOT's planning, implementation, and management of the state transportation system is perpetuating the legacy of dependence on fossil fuels and is thereby escalating climate pollution and harms to the youth Plaintiffs. Hawai'i's current transportation system, which is almost exclusively powered by fossil fuels, is not an inevitable consequence of history, but a direct result of decisions and actions taken by Defendants that are continuing today. The mandated decarbonization of the transportation sector will not happen without HDOT's and the State's active leadership to rapidly transform its legacy transportation system and practices to achieve a clean, decarbonized transportation network of the 21st century. Yet, based on my review of all the information discussed below and my professional experience working with and

within DOT organizations, it is my opinion that HDOT remains fundamentally misaligned as an institution with fulfilling the State's comprehensive decarbonization vision and mandates; moreover, this condition shows no foreseeable prospect of changing any time soon without some form of intervention.

2. BACKGROUND AND QUALIFICATIONS

I am a transportation engineer and an experienced government transportation executive and policy specialist with decades of knowledge and expertise in the transportation field. I currently serve as the principal of Replogle Consulting, an independent consultancy offering services for both the public and private sectors related to transportation policy, strategy, implementation, and impact assessment.

From 2015 to 2021, I served as Deputy Commissioner for Policy of NYC DOT, where I was responsible for developing and implementing long-term agency strategy, guiding a workforce of more than 5,000 staff, a $1.1 billion annual operating budget, and a $33 billion 10-year capital program. NYC DOT manages 6,300 miles of roadways, 12,000 miles of sidewalks, 800 bridges, and the Staten Island Ferry. I produced the agency's *Strategic Plan 2016: Safe, Green, Smart, Equitable,* and the transportation element of the *New York City's Roadmap to 80x50*, a plan to achieve an 80% reduction in GHGs by 2050 and to increase the combined share of trips by walking, cycling, and public transport from 65% to 80% by 2050. Those planning elements, while aimed at 80% reductions based on a now-dated 2016 directive, are similar to and consistent with goals to fully decarbonize transportation sectors as Hawai‘i requires by 2045.

I managed many successful NYC DOT initiatives designed to reduce GHGs and improve traffic safety. I advanced wider deployment of bus priority treatment, with more than 50 miles of new bus lanes, including the path-breaking 14th Street busway, which accommodates trucks and drop-offs while accelerating bus travel times. I received the International Transport Forum's Global Award for our Vision Zero policies which cut traffic deaths by 25% and pedestrian deaths by 40% in 4 years while expanding use of walking and cycling. My design of New York's Open Restaurants program proved popular and in a matter of weeks turned 10,000 parking spaces into outdoor cafes, saving 100,000 jobs during Covid. I helped secure 500 additional protected bike-lane-miles and 100 miles of Open Streets. I oversaw and shaped the expansion of CitiBike to 40,000 shared bicycles, from 6,000 when I started, as well as the introduction of electric bikes

into the bikesharing fleet, working through an innovative public-private partnership. I developed *Electrifying New York: An Electric Vehicle Vision Plan for New York City* (NYC DOT, 2021a), as well as successful pilot programs for EV charging which are now being taken to scale.

Under my management, the agency launched several other pilot programs which have now been enlarged and made into permanent programs, including car, scooter, and dockless bike-sharing, off-hours delivery incentives, e-cargo bike deliveries, and e-truck loading zones. I modernized the agency's asset management and project prioritization budgeting systems. I advised the New York Metropolitan Transportation Council and New York City agencies on how to improve GHG inventories and appraisal methods for transportation. I also worked closely with sister agencies, including the Metropolitan Transportation Authority and Port Authority of New York New Jersey, shaping congestion pricing, camera-based traffic law enforcement, climate adaptation, and air quality policy, as well as consideration of multi-billion-dollar mega-projects, such as the Port Authority Bus Terminal, Gateway Tunnel, and coastal resilience initiatives. I shaped the City's federal transportation policy and grant application preparations, inclusive transport, and intelligent transportation.

I have been appointed to serve on numerous federal advisory committees on transportation issues. In 2023, I was reappointed to a second three-year term on the U.S. Environmental Protection Agency (EPA) Mobile Source Technical Review Subcommittee (MSTRS), part of the Federal Clean Air Act Advisory Committee. Through MSTRS quarterly meetings, I advise EPA's Office of Transportation and Air Quality and Office of Policy. I have also served appointments as a member of: (1) the Federal Travel Model Improvement Program Advisory Panel, a joint advisory committee giving guidance to the U.S. Department of Transportation, Department of Energy (DOE), and EPA in their research, development, and training programs related to transportation, land use, and emission computer modeling; (2) the EPA MOVES Review Work Group, offering guidance on development of EPA computer models used for transportation emissions analysis; (3) the U.S. DOT Advisory Committee on Transportation Statistics; (4) the U.S. DOT Intelligent Vehicle Highway Systems (IVHS) Architecture Advisory Panel; (5) the EPA Freight, Economy, and Environment Working Group; and (6) the Transportation Research Board (National Academies) Task Force on the Effects of Added Highway Capacity on Energy and the Environment. I was a Liaison to the Energy and Transportation Task Force of the President's Council for Sustainable Development, developing scenarios and recommendations for the White House.

I have also led and advised non-governmental expert organizations on transportation. I am a member of the Advisory Committee of The Real Urban Emissions Initiative (TRUE), a partnership of the FIA Foundation and the International Council on Clean Transportation (ICCT) with a shared interest in cleaning up vehicles and improving urban air quality. In 2010, I co-founded the Partnership on Sustainable Low Carbon Transport (SLoCaT), which brings together multilateral development banks (MDBs), United Nations agencies, non-governmental organizations, industry associations, and others to advance climate and sustainable development goals. Under my leadership, as Chair of the SLoCaT Board of Directors from 2012-16, we secured and monitored implementation of a $185 billion 10-year commitment from the eight largest MDBs to more sustainable transport.

I founded the Institute for Transportation and Development Policy (ITDP) in 1985 and over the years have served as its Board President, Managing Director for Policy, and currently as Senior Advisor and Director Emeritus. In my ITDP work, I have advised many senior national, state, provincial, and city government officials in the U.S., Canada, Europe, China, Mexico, Indonesia, and Brazil, particularly on strategies to plan and evaluate projects, policies, and programs for their GHG, air quality, equity, and economic benefits and costs. I helped the organization become a catalytic player in advancing bus rapid transit, bike-sharing systems, traffic safety, compact transit-oriented development initiatives, better transport project and program appraisal, and other policy reforms in dozens of countries worldwide.

I also served as Transportation Director for the Environmental Defense Fund from 1991-2008, shaping transportation and environmental laws and advising governments on city planning, transport management and finance, and air quality/environmental analysis, working in dozens of cities across the U.S. and the world. I advised US DOT, EPA, and many state DOTs and Metropolitan Planning Organizations (MPOs) about transportation strategies to protect public health by reducing air pollution and GHGs. I was especially involved in transportation and air quality planning processes in many metropolitan areas in this country and in Mexico, including helping to redirect transportation spending from road expansion to transit, traffic safety, road maintenance, walking, and cycling.

I was an architect of and leading member of the Steering Committee for *Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions* (Cambridge Systematics, Inc., 2009), a study supported by the Federal Highway Administration, Federal Transit

Administration, EPA, and industry and non-governmental organizations. The analysis was later turned into a report to the U.S. Congress. The work estimated the degree to which the U.S. could cut GHG emissions through 50 different policies and strategies. I also developed the ITDP report, *A Global High Shift Scenario: Impacts and Potential for More Public Transport, Walking, and Cycling with Lower Car Use* (Replogle, 2014), which evaluated GHG reductions, costs, and benefits of plausible shifts in investments across the world and laid the foundation for follow-up studies, including most recently the *Compact Cities Electrified* (ITDP, 2023) series, which investigates national, state, and regional opportunities for GHG mitigation and co-benefits for equity and economic development.

My work over the years has included advising international-level organizations. As a consultant to the Asian Development Bank (ADB), I evaluated the carbon footprint of its transport projects and programs over the preceding decade and developed the Sustainable Transport Appraisal Rating (STAR) Tool,[1] an app for evaluating prospective projects and programs at ADB. These achievements shaped ADB's sustainable transport initiatives, for which I was named the ADB Partner of the Year in 2015. As a consultant and advisor to the Global Environmental Facility, a worldwide multilateral environmental fund including 186 member countries, I developed the *Manual for Calculating Greenhouse Gas Benefits of Global Environment Facility Transportation Projects* (Hook et al., 2022), and the related *Transportation Emissions Evaluation Models for Projects* (ITDP, 2015). These tools are widely used across the world.

In 2013, I was appointed Visiting Professor at the China Academy of Transportation Sciences in Beijing after several years advising the Beijing City Government on transportation and encouraging them to adopt parking and car-use management reforms. A joint European Union-Government of China organization, the China Council for International Cooperation and Economic Development (CCICED), appointed me to a panel which produced a CCICED report, *Promoting Urban Green Travel* (CCICED, 2013), which was presented to the China State Council in 2014 and helped shape national transportation policy to foster GHG reduction. Many of the recommendations were adopted as national policy.

I hold honors undergraduate civil engineering and sociology degrees and an MSE in civil and urban engineering from the University of Pennsylvania. In 2021, I held a faculty appointment at New York University's Wagner School of

[1] https://tpassess.adb.org/index.html

Public Service. A more detailed summary of my qualifications, including my publications, is contained in my curriculum vitae, **Attachment 1**.

The opinions set forth in this report are my own and not the opinions of any of the institutions with which I am otherwise affiliated. My opinions are based on my education and experience and the data and facts available to me at the time of writing, as referenced in this report. Should additional relevant or pertinent information become available to me, I reserve the right to supplement the discussion and findings in this report. I have not provided expert opinion testimony in any cases during the previous three years.

In preparing this report, I reviewed a number of documents, data, and studies in forming my opinions and conclusions in this case, all of which are identified in **Attachment 2**. My findings are also based on my experience as a transportation policy expert and consulting with other transportation policy experts who have similar expertise in transportation policy and decarbonization of transportation systems. It is common practice in my field to confer with others who are engaged in similar types of work. The methodology I used in evaluating HDOT's funding priorities is set forth in **Attachment 3**. The legal authority that I reviewed in preparing this report are included in **Attachment 4**.

I have received $10,000 in compensation for consulting services to inform the discovery process and any settlement discussions. I have prepared my expert report and will testify at trial on a *pro bono* basis, given the financial circumstances of these young Plaintiffs and the urgent need for the judiciary to understand the mechanisms to decarbonize the transportation system to address the climate emergency that is harming these youth Plaintiffs.

3. EXPERT OPINIONS

A. The Hawai‘i Department of Transportation Must Play a Lead Role to Reduce Greenhouse Gas Emissions from the Statewide Transportation System.

State DOTs are the lead agencies responsible for funding, planning, building, and operating the transportation systems in each state. The state DOTs in each state, including HDOT in Hawai‘i, led the creation of their legacy state

transportation systems, and they will also need to lead the creation of the clean, decarbonized transportation systems of the future.

The State of Hawai‘i has committed to net negative emissions by 2045 and a 50 percent reduction by 2030 (HRS § 225P-5), including the specific goal of "decarbonizing the transportation sector" (HRS § 225P-7). For the State to meet this important goal, HDOT must take an active lead role in decarbonizing the transportation sector, as part of a whole-of-government commitment across all sectors. Conversely, the State cannot realistically hope to achieve its decarbonization goals unless HDOT is fully aligned with achieving these goals both internally throughout its organization and externally with the whole state government.

For more than a decade, federal-level agencies and expert authorities have emphasized the key role of state DOTs in reducing transportation sector GHG emissions. These agencies and organizations have offered guidance and resources to state DOTs, including HDOT, to assist them in fulfilling this responsibility. HDOT has been aware and informed of this need to shift its planning and operations, but it still has not taken even the first recommended steps to begin the transformative changes necessary within its organization and throughout the state transportation system and, instead, continues to build infrastructure to support the legacy fossil fuel system.

1. *Background on HDOT's Lead Role and Responsibility in Planning and Building the Statewide Transportation System*

Hawai‘i, like other states, has established its DOT as one of the "principal departments" in the state government structure. (HRS § 26-4). As its statutory mission, HDOT "shall establish, maintain, and operate transportation facilities of the State, including highways, airports, harbors, and such other transportation facilities and activities as may be authorized by law." (HRS § 26-19).

The governance structure and process for the transportation system is similar in each state. As a foundational responsibility, state DOTs make transportation system investment decisions directing the flow of public infrastructure funding for the statewide transportation system.

Transportation infrastructure investments comprise a major share of every state's annual capital improvement program (CIP) budget. HDOT's budget share is included in the Governor's proposed budget for the administration, which is

ultimately approved by the Legislature. In Hawai‘i, for example, the transportation CIP budget has averaged around $700M per year over the past decade, comprising about half of the state’s total CIP budget. In FY 2024, the transportation CIP budget is more than a billion dollars ($1,165,238,000), around 55% of the total state CIP budget of $2.11B. (State of Hawai‘i, 2022).

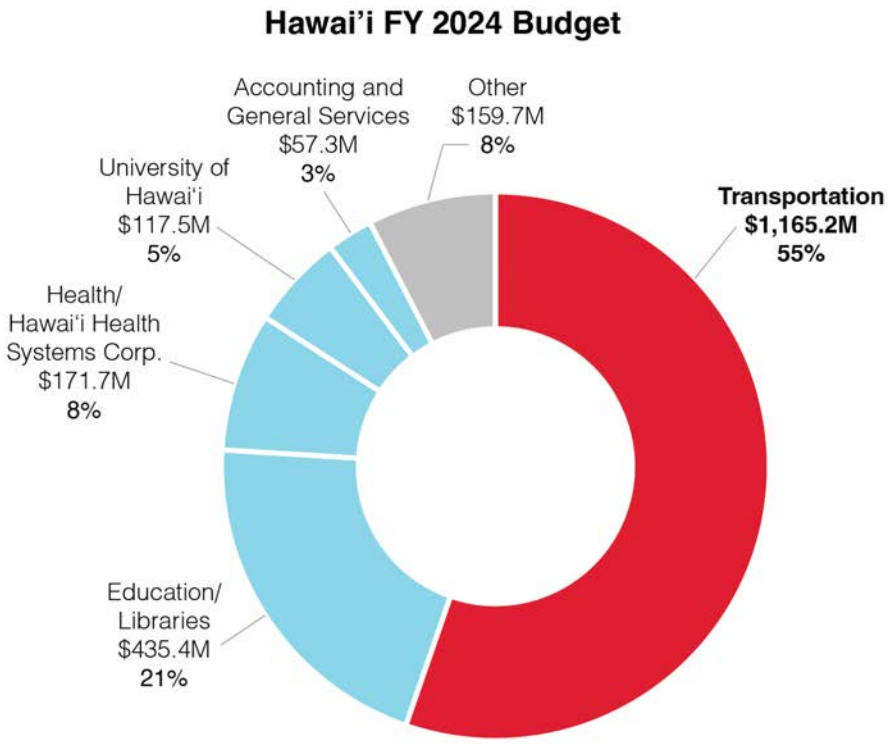


Figure 1. Source: (State of Hawai‘i, 2022a).

Transportation Planning

Planning is at the heart of the state DOT’s administration of the transportation infrastructure system. In their oversight role, state DOTs maintain and coordinate a network of plans spanning a range of time horizons and transportation modes.

At the highest level, the state DOT must provide a **statewide transportation plan** establishing the State’s strategic vision and direction for its overall transportation system investments over a period of at least 20 years. Hawai‘i has established this statewide planning requirement in state statute. HRS § 279A-1 mandates a “comprehensive, multi-modal statewide transportation

planning process." The coordination of the plan is "the primary responsibility of the department of transportation."

In Hawai‘i, the Legislature has mandated that the statewide transportation plan "shall be directed toward the ultimate development of a balanced, multi-modal statewide transportation system that serves clearly identified social, economic, and environmental objectives" and shall include national and state highways, airports, harbors, surface mass transit, and major county roads. (HRS § 279A-2(a)). The plan shall "[i]nclude projected transportation needs for a six-year period and a schedule of priorities" for investments over a 20-year period. (HRS § 279A-2(b)(1)). HDOT must update this information annually. (HRS § 279A-2(c)).

Based on this mandate, HDOT has produced the Hawai‘i Statewide Transportation Plan (HSTP). Currently, a draft version of HDOT's *Hawai‘i Statewide Transportation Plan 2045* dated November 2022 is posted on HDOT's website. (HDOT, 2022a). The prior HSTP is dated 2011. (HDOT, 2011). HDOT describes the HSTP as "the overarching policy document that guides the system-level and master plans of the three primary modes of transportation." (HDOT, 2022a, 2022b).

State DOTs are also required by federal law to develop a "long-range statewide transportation plan" covering at least a 20-year period. (49 U.S.C. § 5304(f)). In Hawai‘i, the current long-range plan for ground transportation is the *Statewide Federal-Aid Highway 2035 Transportation Plan.* (HDOT, 2014). This 2014 long-range transportation plan (LRTP) "addresses future land transportation needs for freight, motorists, transit, bicyclists, and pedestrians" through 2035. HDOT is currently working on an update to this plan (Tatsuguchi Tr. 31:22-23), but no draft has been released to the public, and it is unknown when the update will be complete.

Transportation Program Investments

Building on the long-range plans, state DOTs also must conduct a "programming" function of developing a **statewide transportation improvement program** (STIP) that covers a period of four years and must be updated every four years. (49 U.S.C. § 5304(g)). The STIP designates the state's priority list of transportation projects intended to be funded during that period. The STIP includes all projects in the state that receive federal funding support. The STIP must be "fiscally constrained," meaning that it is not an open wish list,

but rather reflects select priority projects that can be implemented with total available revenue sources.

In essence, the STIP is the short-term budget and action agenda that implements the LRTP. The STIP thus must be consistent with the LRTP and advance the goals and strategies presented in the LRTP. In Hawai‘i, the most recent STIP is the FY 2022-2025 (+2) STIP approved on November 23, 2021 (HDOT, 2021a), and most recently approved as amended on September 12, 2023 (HDOT, 2023a).

Through this planning and programming process, the Federal Highways Administration (FHWA) and the Federal Transit Administration (FTA) of the U.S. DOT provide funding to state DOTs to build, maintain, and improve the state surface transportation systems. These federal funds comprise a substantial portion of state transportation budgets. In Hawai‘i, for example, my review of the historical data for the last decade (further discussed in section C.5 below) indicates that federal funds comprise a little over half (~51%) of the State's transportation CIP budgets.

As the lead administering agencies for each state, the DOTs have broad discretion and flexibility in deciding how to spend the federal transportation funds for state, regional, and local projects. Most federal transportation funding is distributed through formula grant programs that allocate funds under designated formulas in the law considering population, road mileage, and other factors. Such formula funding allows state DOTs to use the funds for a wide range of transportation investments—including plans, strategies, and projects to reduce GHG emissions. (Georgetown Climate Center, 2023). The federal government also provides competitive discretionary grant programs tied to specific purposes, including measures to reduce GHG emissions, which states can apply for and be awarded based on merit.

The primary responsibility of state DOTs for spending and directing the flow of federal transportation funding has never been more significant than at this moment in history. The comprehensive federal Infrastructure Investment and Jobs Act (IIJA) passed in 2021 (also known as the Bipartisan Infrastructure Law), dedicates record amounts of transportation infrastructure funding over five years through these channels. The IIJA authorizes more than $1.2 trillion in infrastructure spending, mostly for transportation, which is the largest federal transportation funding authorization in history. (U.S. DOT, [BIL/IIJA]; U.S. DOT, [BIL]). The state DOTs are on the frontlines for the nation in deciding how these funds will be spent. (AASHTO, 2021; Georgetown Climate Center, 2023).

HDOT's decisions today and in the next several years will chart the future for the state's transportation systems for decades to come.

In their lead role, state DOTs combine these federal funds with state government funds to produce an overall state transportation capital improvement program (CIP) and budget. In Hawai‘i, HDOT develops its annual CIP budget for statewide transportation infrastructure investments, which the Governor includes in the administration's proposed budget and the Legislature approves. The CIP budget includes the federally funded projects in the STIP, as well as projects funded solely by the state.

DOTs also work with Metropolitan Planning Organizations (MPOs), which are local and regional policy boards that provide recommendations in the transportation planning process. Federal law requires MPOs to be established in areas with populations over 50,000. MPOs are also required to develop a long-range plan and a transportation improvement program (TIP), similar to the statewide plan and program. The TIP is incorporated into the STIP. The State of Hawai‘i has designated MPOs on the islands of O‘ahu and Maui. (HRS §§ 279D-1 to -11). While MPOs are a federal requirement, they function as local governance entities and are established under Hawai‘i state law and through cooperative agreements between the state and county governments.[2]

In sum, the state DOTs function as the control hubs for planning, budgeting, spending, and allocating the enormous, continuous pipeline of government funding for the transportation infrastructure system. They orchestrate the flow of the billions of dollars of transportation funding based on their governing vision, goals, and priorities for the system. In addition to their fundamental responsibility to establish the statewide transportation infrastructure plan and program, state DOTs have comprehensive responsibilities to manage, operate, and coordinate the state transportation system that they build.

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[2] State DOTs institutionally play a dominant role in the MPO process. Thus, "State DOTs can strongly influence TIP development to consider GHG emission reduction through their guidance to the MPOs in their State." (NCHRP, 2022a). State DOT officials serve as members and advisors of the MPOs. DOTs also provide guidance and administrative and technical support to the MPO, and their institutional background and leverage over the funding flows give them an outsized influence in the MPO process. In Hawai‘i, HDOT provides broad administrative and technical support to the MPOs, and it commands more extensive personnel and budget resources than its regional and local partners. Further, most of the MPO board members are political appointees including elected and sister agency officials, whereas HDOT members of the MPO board and technical advisory committee are full-time employees in the transportation field.

2. *HDOT Has Impeded Achieving Reductions in GHG Emissions from the Statewide Transportation System.*

As the federal government has emphasized, **state DOTs play a "key role in implementing activities to reduce transportation-related greenhouse gas emissions, including on-road emissions."** (U.S. GAO, 2023). The FHWA highlights the "essential role" of state DOTs in "implementing policies, programs, and projects that can reduce GHG emissions." "By incorporating greenhouse gas (GHG) analysis into transportation planning, agencies can act now to help decrease future emissions." Such action "can lead to better transportation program and project decisions" and is a "critical step" toward meeting GHG reduction goals. (U.S. DOT, Integrating GHG Assessment).

In my opinion, basic planning to achieve the GHG emissions required by law is the essential first step for HDOT; but in my review of HDOT's practices, programs, and projects, as well as its own statements, HDOT is not planning for how each of its actions and its statewide transportation system can and will reduce GHG emissions. Instead, HDOT continues to plan for perpetuating the legacy fossil-fuel-dependent transportation system for decades. As just one prime example, HDOT's draft HSTP analyzes five "alternative futures," including a "business as usual" future with continuation of a fossil fuel transportation system. This should not be an option for consideration in Hawai‘i, even as an "alternative," because decarbonization of transportation is a legal requirement. (HDOT, 2022b). Even more importantly, the HSTP doesn't identify and adopt strategies for timely and comprehensive decarbonization of transportation through substantial mode shifting, VMT reduction, and much more rapid electrification of light-duty, medium-duty, and heavy-duty vehicles.

For decades, the federal government and associated transportation organizations have been publishing resources to guide DOTs with strategies to decarbonize the transportation sector. For example, the FHWA has offered state DOTs extensive resources to "address GHGs in the planning process based on vetted, state-of-the-practice examples." These resources include "specific analytic tools, methods, and frameworks to support target setting and GHG estimation that can be integrated with existing planning products," such as the statewide transportation plans and programs. "Currently available tools and best practices related to GHG analysis and target setting will allow all agencies, regardless of technical capacity or size, to take steps toward integrating the consideration of GHG emissions into existing planning structures." State DOTs can "align GHG reduction goals with strategies to meet targets and make progress," by "considering GHG emissions at every step in the transportation

planning and decision-making process." (U.S. DOT, Integrating GHG Assessment).



Figure 2. Source: (U.S. DOT, Integrating GHG Assessment).

Below are a handful of examples, dating back more than 15 years, of GHG reduction resources and opportunities that HDOT should have, but has not, implemented in the transportation sector:

- In **2006**, the National Cooperative Highway Research Program (NCHRP) issued *Assessment of Greenhouse Gas Analysis Techniques for Transportation Projects*, which was requested by the American Association of State Highway and Transportation Officials (AASHTO) and "provide[d] practical information to help transportation practitioners better understand the available [GHG] analysis techniques for transportation analysis." (ICF, 2006).
- In **2009**, the NCHRP, again at AASHTO's request, issued Strategies for Reducing the Impacts of Surface Transportation on Global Climate Change: A Synthesis of Policy Research and State and Local Mitigation Strategies, advising that "[c]limate change is likely to have more impact on the future of surface transportation than any other issue" and flagging the state DOTs "need to support major GHG reductions." It reviewed strategies and scenarios for GHG reduction and identified several state DOTs (CA, NY, OR) taking the initiative to address GHG "in the planning, implementation, and operation of their transportation networks." (Burbank, 2009).

- In **2012**, the National Academies of Sciences published *Incorporating Greenhouse Gas Emissions into the Collaborative Decision-Making Process*, as well as the accompanying *Practitioner's Guide* for state transportation agencies "involved in transportation planning and decision making who wish to consider GHG emissions in a systematic and thoughtful manner." The report recognized "these agencies will be heavily involved in efforts to mitigate GHG emissions from surface transportation sources," and "[s]uccessful strategies and plans will result from incorporating GHG emissions into their transportation planning and decision making"; and the guide provided a framework for GHG analysis and strategies for GHG mitigation. (NAS, 2012).
- In **2013**, the FHWA issued *A Performance Based Approach to Addressing Greenhouse Gas Emissions through Transportation Planning*, a "resource for State DOTs and MPOs interested in addressing GHG emissions through performance-based planning and programming" to "support investment choices and enhance decision-making." The handbook explained the various steps for integrating GHG analysis into state transportation planning, including: identifying performance measures; setting targets; analyzing strategies, developing plans and programs, and prioritizing projects; and monitoring and reporting on progress. (Grant et al., 2013a).
- Also in **2013**, the FHWA issued its *Handbook for Estimating Transportation Greenhouse Gases for Integration into the Planning Process*, "intended to help state DOTs and MPOs of all sizes and capabilities understand possible approaches, data sources, and step-by-step procedures for analyzing GHG emissions for use in the transportation planning process." It provided a "practical resource for state DOT and MPO staff" to implement and integrate such GHG analysis in transportation system planning. (Grant et al., 2013b).

Many of these resources from a decade or more ago cited examples of state DOTs and MPOs that were implementing recommended actions at that time. Hawai‘i was not among the states mentioned, and its transportation sector has been called out for "lagging behind" other sectors. (HCEI, 2011; HCEI, 2015).

A stark example of HDOT's perpetuation of its business-as-usual conduct occurred when the NCHRP—which is a joint national-level program between state transportation officials, the FHWA, and the National Academy of Sciences—developed a guide entitled *Reducing Greenhouse Gas Emissions: A Guide for State DOTs* ("*State DOT Guide*" or "*Guide*"), (NCHRP, 2022a), and an

accompanying report entitled *Methods for State DOTs to Reduce Greenhouse Gas Emissions from the Transportation Sector* ("*Report*"), (NCHRP, 2022b).

The *State DOT Guide* "presents methods for State [DOTs] to reduce [GHG] emissions from the transportation sector." **The *Guide*'s expressed purpose includes enabling state DOTs "to assess GHG emissions, evaluate GHG reduction opportunities, and develop action plans," and "understand how they can address GHGs through all stages of their activities."** It focuses less on "technical resources (data and computational tools)," which are already reasonably available—and more on "institutional procedures and practices," to "direct a State DOT on how to integrate GHG considerations across its spectrum of activities." (NCHRP 2022b).

Based on my review of the *Guide*, it provides a comprehensive and definitive resource on the best practices for implementing the necessary institutional changes in state DOTs to meet GHG reduction goals and decarbonize the transportation sector. HDOT, however, continues its status quo transportation practices that produce rising GHG emissions.

As the *Guide* and *Report* make clear, **"[g]iven the substantial contribution of the transportation sector to emissions, the State DOT should play a lead role in a State's GHG reduction effort."** (NCHRP, 2022a) (emphasis added). Further, the entire DOT organization internally "must be coordinated to address GHGs":

- "First and foremost, strong direction from leadership is required for a concerted and sustained effort."
- Further, "if anything is going to be done to address any overarching issue within a DOT context, some organizational unit with motivated staff must lead and still others must deliver in cooperation with other parts of the agency."
- Beyond this leadership structure, however, "[c]omplex operations like GHG reduction require many organizational units to operate in a concerted manner, and each must be trained, equipped, and directed to play its role within the constraints of competing priorities and available resources." (NCHRP, 2022b).

Based on my institutional experience with transportation agencies and organizations, I am familiar with these principles and am also familiar with the term "**community of practice**" to describe comprehensive organizational

alignment with a priority goal. It starts with leadership, but is ultimately owned by everyone in the organization, at the level of organizational identity and culture. Nothing less is required for a state DOT like HDOT to meet the pace necessary to decarbonize its state transportation system.

HDOT has no such organizational framework for decarbonizing the state transportation system. Instead, HDOT has sought to hire an outside consultant to do the work to develop carbon reduction and quantification methods. HDOT identified the need for this work "over a year ago," in response to minimum conditions for federal transportation funding. (Tatsuguchi Tr. 42:12-18). Yet, as of late 2023, the consultant still had not been hired, no work had begun, and HDOT did not have a sense of when the work would be completed. (HDOT Tr. 70:15-71:18).[3] Further, relegating work as important as transportation sector decarbonization to external consultants, without establishing dedicated internal organization and personnel structures, is not a signal of commitment or a formula for progress in any organization, especially a large and multi-layered organization like a state DOT.

HDOT, in fact, has been aware of and involved in this *State DOT Guide* project over the course of the past five years. As part of this project, NCHRP sent surveys to the state DOTs in the fall of 2018 to identify their levels of engagement in addressing GHG emissions. (NCHRP, 2022b). Earlier that year, the Hawai‘i Legislature had established the Zero Emissions Target in HRS § 225P-5.

[3] "HDOT Tr." refers to the deposition transcript of HDOT's designated 30(b)(6) witness in this case, HDOT Director Edwin Sniffen.

HDOT's responses to the survey included:

NCHRP Survey Responses

Survey Question	HDOT Response
Does your agency have a policy or policies related to GHG emissions reduction?	**No**
Has your agency developed an inventory of GHG emissions (carbon footprint) for its own operations?	For Honolulu International Airport only
Has your agency developed a transportation-sector GHG inventory and/or forecast for the State, or worked with a partner agency to develop one?	For Honolulu International Airport
Has your agency established long-range transportation plan (LRTP) goals, objectives, and/or performance measures related to GHGs?	**No**
Does your agency consider GHG impacts in transportation improvement program (TIP), State TIP, and/or other capital programming evaluation?	**No**
Does your agency consider GHG impacts in project development and alternatives analysis?	**No**
Does your agency externally communicate progress regarding plans or projects which contribute to achieving GHG targets or goals?	**No**
What GHG assessment tools or methods (if any) have been applied by your agency?	**None**
How adequate are existing resources for supporting your agency's current and expected consideration of GHG issues?	Need better analytical tools (or information about tools). Need technically knowledgeable staff.
Would your agency be interested in participating in additional activities of this research project, including workshops to develop and review GHG resources, and/or implementation support of GHG analysis methods?	**Possibly interested**

Table 1. Source: (Appendix A in NCHRP, 2022b).

All of HDOT's answers confirm its actions to continue the fossil fuel transportation system instead of shifting to the philosophy of GHG reduction.

The NCHRP also convened individual workshops with a select handful of DOTs to test and implement the Guide. HDOT was one of four state DOTs with whom NCHRP arranged such a workshop. The Hawai‘i workshop was held virtually in January 2021. It included HDOT staff, as well as representatives from other state agencies, county governments, and MPOs. (NCHRP, 2022b).

In its summary of the Hawai‘i workshop, the *Report* related, “HDOT anticipates that, without concerted action, the percent of net emissions in Hawai‘i attributed to the transportation sector will only continue to rise” (emphasis added). The workshop participants generally rated HDOT’s GHG engagement as Level 2 out of 4: “having taken some actions, but still with much more that could be done.”[4] (NCHRP, 2022b).

HDOT anticipates that, without concerted action, the percent of net emissions in Hawai‘i attributed to the transportation sector will only continue to rise.

In a workshop poll, over half of the Hawai‘i participants expressed that the *Guide* would be only “somewhat” useful, in comparison to about a third who felt it would be “very” useful. The *Report* surmised that this response “may be due to the relatively low portion of participants from HDOT compared to counties/cities, MPOs, and other agencies, who are not the primary audience of the guide.” Further highlighting HDOT’s business-as-usual mindset, the workshops also included an opportunity for additional post-workshop technical assistance, but requests for such assistance “were more limited than anticipated”: “None of the agencies requested specific follow-up assistance with technical items (data, analysis, etc.).” (NCHRP, 2022b).

Proposed next steps for action were provided to HDOT staff for review, and are reproduced from the *Report* in Table 2 below. Based on my review of available information, since this workshop **three years ago**, HDOT has done little or nothing to follow up on these steps to reduce GHG emissions within the transportation sector and change its current operations from the status quo:

[4] For reference, Level 1 is “new to the topic,” Level 3 is “measuring and planning our actions and engaging others,” and Level 4 is “taking action and tracking progress internally and with partners.”

2021 NCHRP Workshop HDOT Next Steps

Action/Responsibility:	Timeframe	As of 2024…
Action 1: Create an executive charter that establishes a task force or working group that meets regularly (e.g., monthly) to identify action items and report on progress. This group should be charged with investigating, assessing, reporting on, and implementing GHG emission reduction measures for all direct and indirect DOT-related GHG emissions. This group should include key staff representing all of the agency's divisions/functional areas. **Responsibility:** Executive Leadership.	One month	Although the suggested one-month timeframe for implementation has long expired, HDOT admitted it has **NOT** taken the first action of instituting an executive charter and management group to address GHG reduction. (HDOT Tr. 83:1-16).
Action 2: Functional area leads should work with their staff to complete the self-assessment(s) included at the end of their area's relevant section(s) of the guide. Share recommended actions with GHG task force; get executive buy-in where needed; and set a process/timeline for checking in on progress. **Responsibility:** Functional area leads included in GHG task force.	Two months	HDOT has **NOT** conducted any of the self-assessments to inform and implement necessary action steps and assign responsibilities. (Defs' Resp. to Req. for Prod. No. 89).
Action 3: Continue working with the Statewide Climate Coordinator and other agencies to develop a roadmap for the State to achieve the State's goal of a zero-carbon economy by 2045. To the extent it is not being done already, representatives(s) of HDOT should meet regularly with the Statewide Climate Commission and other agencies to communicate what HDOT is doing and can do to estimate and reduce GHGs from the transportation sector. Identify how HDOT and other State agencies can work together and support each other to get to the 2045 goal. **Responsibility:** Statewide Climate Commission and HDOT climate or other designated lead per task force.	Ongoing	HDOT has **NOT** taken action to estimate and reduce GHG from the transportation sector, much less to communicate and coordinate its work with other agencies. As of late 2023, HDOT has **NO** plans to inventory emissions and will **NOT** do so until it receives feedback from the Hawai'i State Energy Office (HDOT Tr. 81:1-16), but HDOT would **NOT** consider any recommendations received from the Hawai'i State Energy Office (HSEO) binding unless HDOT decided itself to formally adopt it (HDOT Tr. 67:5-20).
Action 4. Develop an inventory of existing data collected by HDOT and analysis tools that can support: a quantification of GHG emission effects of ongoing and to-be implemented HDOT programs and projects; a more detailed inventory and forecast of GHG emissions from transportation sources and sources; and future analysis of GHG reduction strategies. Develop a plan and timeline for quantifying and reporting on emissions. Coordinate with partner agencies (e.g., MPOs) as needed for sharing of data and tools. **Responsibility:** Planning lead, working with environment and with support from other functional areas, including sustainability coordinator for operations, construction, and maintenance, or other designated lead per task force. This could be examined further to be included in the ongoing Hawai'i Statewide Transportation Plan update.	Four months	HDOT has **NOT** developed an inventory of data and analysis tools to support the quantification of GHG impacts of HDOT programs and projects and analysis of GHG reduction strategies. (HDOT Tr. 85:13-86:1). In 2024, it is still **NOT** quantifying and reporting GHG emissions.

Table 2. Source: (pp. D-15 to16 in NCHRP, 2022b).

In sum, HDOT must play a lead role to fulfill Hawai'i's mandate to decarbonize its statewide transportation system. For more than a decade, federal-level agencies and expert authorities have recognized and emphasized the state DOT's key role in reducing transportation sector emissions and have offered guidance and resources—of which the *State DOT Guide* and associated workshop for Hawai'i and HDOT is just another example. But HDOT has continued down

its well-trod path of planning and implementing a system that increases GHG emissions, impairing the environmental future of the young plaintiffs in this case.

B. HDOT's Basic Planning and Programming Perpetuate the Status Quo Statewide Transportation System that Increases GHG Emissions.

Despite its essential lead role in reducing GHGs from the state transportation system, HDOT's existing transportation system planning and programming do not incorporate and effectuate GHG reduction as a priority goal and performance output. Instead, HDOT's planning continues a business-as-usual fossil-fuel-based transportation system. This institutional bias continues into HDOT's programming function, where GHG emissions are also not considered and addressed at the funding and implementation level.

1. HDOT Omits GHG Reduction in Its Performance Framework Governing Its Planning and Programming

As a fundamental starting point, for HDOT to mobilize and act on its mandate to reduce GHG emissions and decarbonize the state transportation system, it must establish an organization-wide GHG performance framework. As the *State DOT Guide* explains, a GHG performance framework would include:

1. **Goals** of the policy (e.g., reduce GHG emissions from the transportation sector).
2. **Objectives** for the policy (e.g., how the State DOT plans to reduce GHG emissions).
3. **Targets** for near-, mid-, and long-term emission reductions (e.g., a percentage reduction in GHG emissions by certain future years from a base year for the state transportation sector).
4. **Performance measures** to gauge the State DOT's progress in meeting its goal and targets.
5. **Protocols** for how the State DOT will **communicate and update the policy and report progress** (in plans, program and project documentation, project-level reporting, a performance dashboard, task force meetings, etc.)**.**

6. **Identification of which functional group(s)** within the State DOT **is responsible** for leading policy implementation and coordinating with other groups.

This performance-based framework is an established, foundational practice for state DOTs. All DOT organizations, including HDOT, govern their planning and operations based on this framework, which is also known by other names, including the "performance feedback loop," the "plan-implement-evaluate-act" cycle, and the "continuous improvement" system. "And if GHG mitigation is to prosper within the DOT management system, it should use the system" to drive its performance in reducing GHG emissions. (NCHRP, 2022a).

HDOT is fully aware of these performance-based principles, but chooses not to implement them to replace the legacy transportation system with the decarbonized system necessary to protect the children in this case from the harms from GHG pollution. In its annual reports on its operations to the Legislature under Act 100 (1999),[5] HDOT lists its goals for the Highways Division. For each goal, the reports include a link to a graphic that shows HDOT's "performance feedback loop,"[6] which is the very framework described above:

[5] Act 100 requires all agencies to report annually on their operations to the Legislature. Currently, HDOT produces its Act 100 reports for the Highways Division in website format. (HDOT, Act100 Report Portal). It also submits a separate Act 100 report document that includes the Airport and Harbors Divisions. (HDOT, 2023c).

[6] See, e.g., Highways Division Act 100 report under the "Improve Safety" Goal.

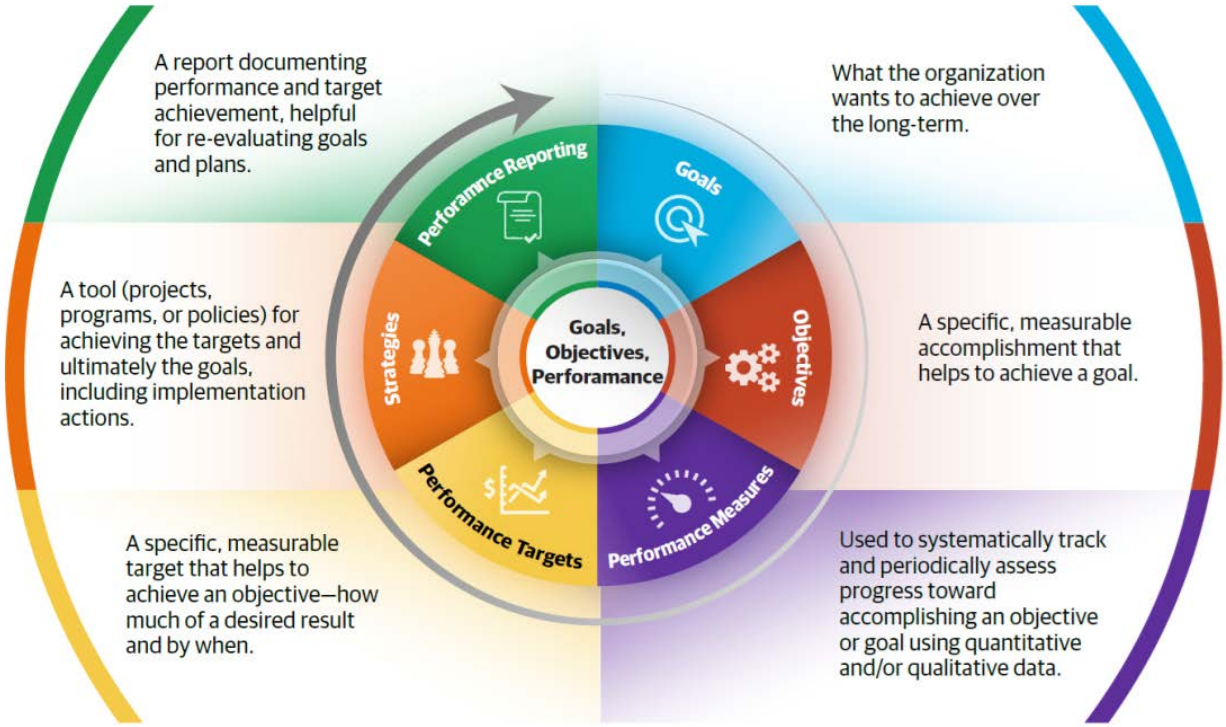


Figure 3. Source: (performance feedback loop graphic from HDOT, 2023d) (misspellings in original).

Further, HDOT's Act 100 reports identify the Highways Division's six "highest priority goals" and provide objectives, performance measures, and targets, as summarized in the following table, none of which include decarbonization as a highest priority goal. (HDOT, 2023c).[7]

[7] Similarly, HDOT's Act 100 reports for its Airport and Harbors Divisions do not include mandates for reducing GHG from the transportation sector. (HDOT, 2023c). In fact, the Harbors Division's goals refer to "[s]upporting the State's energy goal of 70% clean energy"—instead of the 100% clean energy mandate established in 2015 (Act 97, HRS § 269-92). Thus, the Harbors Division's stated goal is almost a decade out of date, apart from not mentioning transportation decarbonization at all.

HDOT Highway Division Six "Highest Priority Goals"

Highest Priority Goal:	Objectives	Targets	Performance Measures
Improve Safety	1. Reduce fatalities and serious injuries on Hawai'i's Highways and bridges. 2. Reduce fatalities and serious injuries of non-motorized modes	Serious injuries: CY 2023: 363 CY 2022: 427 CY 2021: 427 CY 2020: 401 CY 2019: 432 Fatalities: CY 2023: 0 (actual 94) CY 2022: 0 (actual 116) CY 2021: 103 CY 2020: 101 CY 2019: 110	Number of fatalities Rate of fatalities Number of serious injuries Rate of serious injuries Number of non-motorized fatalities and non-motorized serious injuries
Foster System Preservation	1. Improve pavement conditions 2. Improve bridge conditions 3. Preserve and improve other assets	Federal Highways Administration 2-Year Targets for Interstate/Non-Interstate NHS: Good Condition: 25%; Poor Condition: 4% Federal Highways Administration 2-Year Bridge Condition Targets: Good Condition: 25%; Poor Condition: 4%	Pavements by condition Bridges by condition
Improve System Efficiency	1. Improve system efficiency		Travel Time Reliability
Multi-Modal Integration	1. Invest in bicycle and pedestrian improvements 2. Improve bicycle and pedestrian safety, access and network connectivity		Bike and ped expenditures Number of projects with bike and/or ped improvements Bike and ped facilities
Encourage Economic Vitality	1. Improve travel time reliability for trucks		Truck travel time reliability index (TTTR) Estimate of new jobs supported in calendar year
Improve Resiliency	1. Improve resiliency by incorporating design adaptation standards 2. Increase redundancy in the transportation system		Percentage of projects with a resiliency component

Table 3. Source: (HDOT, 2023d; HDOT, 2023c).

As a threshold problem, HDOT has not set any targets to achieve any goals or objectives for decarbonizing the state transportation system. "[N]umerical targets or other measurable values facilitate future assessments of whether overall goals and objectives—such as reducing [GHG] emissions—were achieved, because comparisons can easily be made between projected performance and actual results." (U.S. GAO, 2023). In other words, measurable targets establish commitments and ensure accountability. HDOT, however, has

established no such targets for GHG reduction in any of its planning, programming, and operations.

In particular, as of late 2023, HDOT had no position as to the amount of GHG emissions that must be reduced from the transportation sector to achieve the 2045 decarbonization deadline. (HDOT Tr. 233:23-234:2). Nor has HDOT established any specific targets indicating *how* it will meet this mandate (for example, through electrification, reduction of vehicle miles traveled, and increased share of travel by walking, cycling, public transport, and shared modes). Further, based on best practices, such targets should include interim benchmarks to ensure HDOT is making timely and measurable progress toward its goals. HDOT has no such guideposts for performance.

In contrast to HDOT, other state DOTs have committed to reducing GHG emissions from the transportation sector as an established part of their DOT mission. The DOTs in California, Colorado, Minnesota, Oregon, and Washington, for example, have set performance frameworks for GHG reduction, including goals, objectives, targets, and performance measures. (NCRHP, 2022b). These DOTs made these commitments and started taking action up to a decade or more ago, during the same time that HDOT has had to take action for Hawai‘i, but HDOT has instead stuck to the same planning performance frameworks that keep the legacy system locked in.

Thus, as of 2024—the halfway point between the enactment of the 2045 Zero Emissions Target (ZET) and the interim limit of 50 percent reduction by 2030—**HDOT still has not established a performance framework for reducing GHG emissions from the transportation sector**. Instead, its performance priorities preserve the legacy transportation system. This inevitably produces poor performance by HDOT on reducing GHG emissions in its essential planning and programming functions, to the detriment of the children plaintiffs in this case.

2. *HDOT's Transportation Plans Perpetuate a Fossil Fuel-Based Transportation System.*

Transportation infrastructure investments take advance planning, and infrastructure investment decisions made today set the course and the resulting impacts for decades into the future. Thus, to decarbonize the state transportation system, DOTs must fully align their planning functions and work products with that goal. No state, including Hawai‘i, could hope to reach a goal like the ZET

without systematic and successful transportation systems planning for GHG reductions.

The NCHRP *State DOT Guide* emphasizes the importance of incorporating GHG reduction goals in DOT system-level transportation planning. The GHG emissions from a state DOT's own internal operations (e.g., its in-house vehicle fleet, building operations, and project construction activities), while important, do not cover the full scope of the emissions from the overall transportation system that HDOT oversees. The DOT's "[s]ystems-level policies and investments affect overall travel patterns and transportation technologies and therefore provide the greatest opportunity to reduce transportation GHG emissions." Thus, a committed plan for system-level transportation decarbonization should include: developing an inventory and baseline of transportation sector emissions; setting goals and targets for reductions; and identifying and evaluating strategies to achieve the goals and targets, including alternatives. (NCHRP, 2022a).

In my expert opinion with decades of experience, to decarbonize the transportation system, state DOTs must begin at the system level of high-level planning, then carry through these plans to all its implementation activities for the transportation system, including project programming and prioritization, development and design, and operations and maintenance. The DOTs must also proactively coordinate its transportation system planning with the planning work in other sectors (e.g., electric system planning to support the mass electrification of vehicles and integrated land use and transportation planning to reduce VMT). As of 2024, HDOT has done none of this.

Examples of HDOT's high-level planning documents include the HSTP and LRTP discussed above. Neither of these documents contain systematic GHG reduction as a governing principle for HDOT's system-wide planning. They remain focused on perpetuating, rather than transforming, the current system. Regarding GHG reduction, HDOT admitted it has various individual "initiatives" it is pursuing (e.g., electrifying its internal fleet, using carbon-injected concrete, and allowing EVs to utilize the HOV lane),[8] but "plans[,] not necessarily." (HDOT Tr. 64:17-25). HDOT's planning documents "are general in nature" and "really don't dictate or indicate the climate mitigation measures that we take." (HDOT Tr. 75:3-76:5).

As of 2024, HDOT is still in the process of amending its highest-level plans, in which the agency says that GHG reduction "will be looked at" for inclusion as

[8] See Defs.' Answer to Interrog. No. 5 and Response to Req. for Produc. No. 5.

a priority goal. (Tatsuguchi Tr. 83:17-85-6). HDOT's HSTP, which "establishes the framework to be used in the planning of Hawaii's transportation system," includes under its "Environment" goal the "Objective" of "Support the statewide goals of carbon neutrality and 100% clean energy by 2045." (HDOT, 2022a). By HDOT's own definition in its "performance feedback loop" (HDOT, 2023d), this vague intention to support statewide goals is not an objective: it is neither "specific," nor "measurable," nor an actionable "accomplishment." Likewise, the LRTP references only climate *adaptation* (not decarbonization) with respect to climate change, coined as "Promote long-term resiliency" under a broad goal of "Environment and Sustainability," with only passing mention of "considerations to reducing contributions to climate change from transportation facilities." (HDOT, 2014).

As another example of how HDOT perpetuates business as usual in its high-level planning, in its 2023-25 biennium budget to the Legislature, HDOT provides a "Program Plan Narrative" for each of its airport, harbor, and highway facilities. (State of Hawai'i, 2022b). No mention of GHG reduction or the State's decarbonization mandates appears anywhere in these narratives. GHG reduction is not mentioned under the discussion of "Key Policies Pursued." It is not even mentioned under "Major External Trends Affecting the Program," although the narratives under this section refer to many other federal and state environmental requirements besides those relating to climate mitigation or decarbonization.

As late as November 2023, HDOT was taking an overtly passive and inactive posture toward shifting its basic planning functions to reduce GHG emissions. HDOT does not do its own inventory of GHG emissions or its own projections of future emissions. (HDOT Tr. 31:12-17). HDOT is aware that multiple State entities have opined on the necessary strategies and goals for the State to reduce GHG emissions from the transportation sector. (HDOT Tr. 111:15-19). Yet, despite reports from the state Department of Health (HDOH) indicating that "Hawai'i is currently not on track to meet the 2030 or 2045 statewide emissions targets" (HDOH, 2023), HDOT is not aware of any changes it has made to its existing policies based on this information (HDOT Tr. 27:23-28-6).

Rather than taking the necessary responsibility for GHG reduction planning, HDOT stated it was waiting for the HSEO to issue a pathways report in the beginning of 2024. But HDOT "wouldn't consider it binding" unless HDOT opts to adopt it. (HDOT Tr. 67:5-20). Rather, HDOT's position is that it has the discretion whether or not to follow HSEO's recommendations, "to the extent we are not directed by the governor or by the legislature." (HDOT Tr. 68:5-13).

In sum, based on my experience working with other DOTs, such a status quo approach by HDOT is an abdication of the state DOT leadership and whole-of-government commitment necessary to achieve Hawai‘i’s mandates to decarbonize the transportation sector and the entire state. HDOT’s approach guarantees that transportation sector emissions will continue at business-as-usual levels, and Hawai‘i will not meet its GHG reduction mandates, harming the children plaintiffs in this case.

3. HDOT Prioritizes Fossil Fuels in Its Transportation Programming.

Programming is the pivotal stage of implementing higher-level plans and assigning transportation infrastructure funding to a select list of programs, projects, and strategies. As explained above, in this stage, projects are prioritized and approved in the STIP. HDOT’s programming serves as the critical decision point for advancing projects and combining them into the overall program for investments in the transportation system. Thus, “[t]he programming stage offers an important opportunity for the State DOT to play an active role in reducing GHG emissions from the transportation sector.” (NCHRP, 2022a). HDOT’s programming, however, continues to perpetuate a transportation system that increases GHG emissions, for the reasons set forth below.

First, HDOT does its programming without including GHG reduction as a performance goal, criterion, or measure. HDOT admits it has “no process in place for measuring progress” on clean transportation goals. (HDOT Tr. 203:6). In its biennium budgets to the Legislature, HDOT includes a list of performance measures for each of its airport, harbor, and highway facilities. (State of Hawai‘i, 2022b). GHG reduction appears nowhere in these lists.

This continuation of the legacy transportation system without performance measures for transportation decarbonization poses a fundamental barrier to progress. As a practical principle, you cannot manage what you do not measure. This certainly applies to progress on GHG reduction given its basis in hard science and data.

For HDOT’s programming function to work in support of, rather than against, the goal of reducing GHG emissions, HDOT must include GHG reduction as a criterion for project prioritization and selection. HDOT does not do this. I have reviewed HDOT’s STIP document (HDOT, 2024). It provides a mere laundry list of projects, with no transparent information and analysis on how

HDOT selected and prioritized the projects.[9] In particular, it includes no reference to GHG reduction as a factor in prioritizing projects for implementation, let alone one that is weighted as a high priority in line with the State's decarbonization commitments. In my expert opinion, the STIP thus works against decarbonization, not toward it.

Second, HDOT's evaluation and prioritization of projects does not include GHG impacts. HDOT is "not currently" assessing the GHG emissions from each project (HDOT Tr. 32:19-23), nor does it quantify emissions reductions from its projects (HDOT Tr. 131:24-132:6). The head of HDOT's Planning Branch, which conducts HDOT's planning and programming, admits that HDOT "cannot identify . . . how to reduce long-term carbon emissions" in prioritizing projects because it "do[es]n't have the data." (Tatsuguchi Tr. 200:10-25). This perpetuates the ongoing prioritization of projects that increase GHG emissions.

Third, HDOT does not track, quantify, and report the GHG impacts of its projects. The Hawai'i Legislature specifically mandated HDOT to report on GHG reductions for each project and program year; yet three years later, HDOT is still moving projects forward without GHG reporting. (HRS § 264-143). As a result, HDOT perpetuates the legacy system and prevents any transparency for the public and accountability by the agency.[10]

In contrast to HDOT, other state DOTs incorporate GHG reduction into their programming process, evaluate and report the GHG impacts of projects and the overall program, and require consistency with state GHG reduction goals. Massachusetts's DOT, for example, requires the STIP/TIP to be consistent with the state's GHG reduction target; subjects all projects to a GHG assessment of whether they increase, decrease, or have no impact on GHG emissions; and requires the GHG impacts of the program to be evaluated and reported during each STIP/TIP cycle. (NCHRP, 2022b). Oregon's and Virginia's DOTs also

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[9] The STIP includes a "Project Criteria Color Key" that includes seven generalized categories: System Preservation; Safety Improvements; Congestion Mitigation; Modernization; Enhancement; Human Services Transportation Program; and Transit. These are not criteria for project scoring and selection. They refer only to general classifications of projects, which collectively could encompass the entire range of possible projects. They do not indicate why and how the specific projects were included and prioritized.

[10] HDOT created Project Prioritization Requests (PPRs) where a question was added: "Is the project likely or unlikely to reduce carbon and/or greenhouse gas emissions? Explain." However, HDOT does not have a protocol for answering this question or a method for evaluating the GHG emissions for a given project. As a result, for capacity projects, the answer was always "Likely" with the justification that the project would "increase operational efficiency, thereby reducing congestion and vehicle emissions." (HDOT, SmartTRAC Project Proposals). In reality, as discussed further below, building more capacity for cars results in more demand and increases, rather than decreases, GHG emissions without other methods in place for electrifying the transportation system.

incorporate GHG emissions in their STIP planning and project selection process. (FHWA, 2022; NCHRP, 2022b). The Colorado DOT actually terminated highway expansion projects and redirected the funds to non-GHG increasing alternatives. (Miller, 2022). Meanwhile, as of this report in 2024, HDOT's programming is still stuck in the past century, prioritizing infrastructure that promotes the use of fossil fuels and increases GHG emissions.

In sum, in my review of HDOT's planning and program implementation, HDOT continues to perform these functions without regard for GHG impacts, which is contrary to achieving the Legislature's decarbonization mandates. Ultimately, without any rudder or radar for reducing GHG emissions, HDOT's planning and programming is bound to stray from this goal, harming the future environment for the child plaintiffs in this case.

C. HDOT's Systemic Practices in Prioritizing and Funding Projects and Programs Increase GHG Emissions.

1. HDOT Continues to Apply Outdated Criteria and Metrics That Increase GHGs.

Rather than incorporate GHG emissions reductions throughout its planning and programming, HDOT prioritizes projects that increase emissions, either through investing in roadway capacity expansion projects, or prioritizing projects that reinforce the legacy infrastructure built for fossil fuel vehicles over projects for alternative low-carbon modes of transportation. HDOT's planning and programming, in short, exemplify the traditional, one-directional "predict and provide" model of transportation system planning, in which the agency projects continual growth in traditional highway usage, then plans to expand the capacity of the system to accommodate that growth. This traditional approach directly feeds the vicious cycle of escalating traffic and its societal costs and inequities and is fundamentally misaligned with the mandate to decarbonize the transportation system.

Project Prioritization

HDOT's *Highways Division Project Prioritization Guideline* document, which it maintains on its website (HDOT, 2013a), establishes the following list of priorities, which shows that HDOT prioritizes projects that work toward

increasing GHG emissions, such as traditional capacity expansion projects, over projects that work toward reducing GHG emissions, such as bicycle and pedestrian projects:

- "First Priority" includes: "Mandated Projects" (e.g., ADA and EPA requirements); "Safety Projects" (e.g., hazards, guardrails); and "System Preservation Projects" (e.g., bridge repairs, "roadway upgrades (no additional capacity").
- "Next Priority" includes: "Congestion Relief Projects" (e.g., traffic signals, operation improvements); and "Modernization Projects, such as": "Interim Capacity Improvement (road widening)" and "Regular or New Capacity Improvement (new roads or major widening)."
- And the last category, called "**Other Priority**," includes: "Highway Planning and Research"; "Non-highway Improvements" (e.g., baseyards, buildings); "**Bicycle/Pedestrian Facilities**"; "Beautification/Landscaping"; and "Other miscellaneous projects."

HDOT's prioritization guidance reflects the traditional model focusing on road widening as a core part of HDOT's mission, while relegating non-vehicular options to a later, "other" category. This prioritization framework is outdated, inconsistent with decarbonization, and explicitly thwarts the need to reduce GHG, by promoting roadway expansion over multimodal options such as bicycle and pedestrian facilities.

HDOT is continuing to incorporate this capacity expansion bias in its recently developed criteria to guide its Mid-Range Transportation Plan (MRTP), which is a new process that HDOT initiated to "bridge the gap" between the LRTP and the shorter-term STIP. (CH2M, 2020). Experts worked with HDOT to develop a project evaluation framework to utilize when prioritizing projects for the MRTP, called "Smart Transportation Rank Choice" or Smart TRAC, which included a scoring system giving points for "projects likely to significantly reduce long-term carbon emissions." HDOT, however, chose to "significantly deviate[]" from Smart TRAC and instead adopted a different framework that continues to prioritize vehicle-centric projects over reducing emissions, which it calls "MODA." (Haw. Climate Comm'n, 2022a). HDOT explained that it simply abandoned the Smart TRAC framework because HDOT currently "cannot identify . . . how to reduce long-term carbon emissions" and does not "have the information to determine it . . . and give it any points." (Tatsuguchi Tr. 200:4-21).

Performance Metrics

As another example of applying outdated project prioritization criteria, HDOT also continues to use traditional performance metrics for evaluating projects that are tied to accommodating the use of fossil fuels, rather than expanding transportation choices. Specifically, the use of metrics such as "Level of Service" (LOS)[11] promote the traditional bias in favor of accommodating motor vehicles and expanding roadway capacity and should be discontinued, as HDOT has been repeatedly advised. As the Hawai'i Climate Change Mitigation and Adaptation Commission ("Climate Commission")[12] recognizes, because a car-centric metric like LOS "does not reflect a project's environmental impacts, it is not a useful measure for measuring progress toward climate goals." Further, it promotes projects that induce additional traffic and ultimately increase congestion over time and imposes blind spots and barriers against multimodal projects. (Haw. Climate Comm'n, 2022a).

Nearly a decade ago, the Hawai'i Clean Energy Initiative (HCEI) specifically recommended that HDOT: "Replace the Level of Service (LOS) measurement of vehicle flow currently used in environmental impact assessments for potential infrastructure projects with VMT." (HCEI, 2015). Similarly, in 2016, experts worked with HDOT to produce a *Practical Solutions Action Plan*, which identified the need to "provide clear guidance on the use of LOS" and adopt a "new approach," including "replacements for LOS like vehicle miles traveled." (HDOT, 2016). It does not appear that HDOT followed this advice because, in 2022, the Climate Commission again recommended that HDOT "shift from level of service (LOS) and other performance metrics centered on car mobility in investment prioritization frameworks to metrics focused on increasing transportation choices."[13] In response to these recommendations, HDOT

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[11] LOS measures vehicle throughput for an intersection or roadway and typically does not consider non-vehicle modes.

[12] The Legislature established the Climate Commission in 2017 to perform a range of duties, including "provide policy direction, facilitation, coordination, and planning among state and county agencies, federal agencies, and other partners as appropriate"; "establish climate change mitigation and adaptation strategies and goals to help guide planning and implementation statewide"; and "make recommendations for how to meet or exceed Hawaii's state mitigation goals and . . . adopt a liberal approach in preparation, so as to minimize future risk to the people and environment of Hawaii." (Act 32 (2017); HRS § 225P-3).

[13] HDOT officials have stated variously that HDOT has stopped using LOS to prioritize projects (HDOT Tr. 208:19-20) and still uses LOS to determine congestion and identify capacity projects (Tatsuguchi Tr. 80:7-16). Such discrepancies indicate that HDOT still needs to "provide clear guidance on the use of LOS." (HDOT, 2016). HDOT has not produced such guidance (HDOT Tr. 144-22-25), and its practices remain undefined and inaccessible.

expressed "significant concerns," indicating ongoing resistance to such reform. (HDOT, 2022d).

Numerous HDOT documents show that HDOT continues to use LOS as a performance metric. For example, in a Project Programming Request (PPR) form for a major highway widening project, HDOT insists that without the project, "congestion will remain unresolved and will reduce the Level of Service" for the highway. (HDOT, 2022e). Likewise, in the comments HDOT makes on various proposed development plans and projects and their associated transportation infrastructure improvements, it focuses on LOS as the guiding standard.[14]

In my expert opinion, HDOT's continued use of LOS, instead of other performance metrics suited to gauge GHG emission reductions, such as Vehicle Miles Traveled (VMT) and analysis of induced demand,[15] demonstrates HDOT's perpetuation of a legacy transportation mindset and outcomes.

No Transportation GHG Emission Performance Tracking and Reporting

In contrast with its continued priorities and metrics favoring GHG increases, HDOT lacks any protocols for tracking and reporting progress on GHG reduction. Such reporting is not only a fundamental prerequisite for ensuring progress, but also a specific requirement for HDOT in its statute. The Hawai'i Legislature has expressly mandated that HDOT report on its performance and progress on specific goals, including: "Reduce carbon emissions and greenhouse gasses," as well as "Reduce vehicle miles traveled." (HRS § 264-143(a), (b)). "For each project planned by [HDOT]," HDOT "shall create a report detailing" how it implemented these goals, or "any necessary deviations from the goals . . . and the reasons for those deviations." (HRS § 264-143(b)). HDOT must also submit an annual report to the Legislature that includes the reports for each project, as well

HDOT lacks any protocols for tracking and reporting progress on GHG reduction.

[14] Specifically, HDOT requires that developers "shall mitigate all . . . transportation impacts to maintain the operating Level of Service (LOS)" and "may be required to provide mitigation improvements to improve the State facilities" to meet LOS standards. (HDOT, 2021b). Based on LOS analysis, HDOT directs developers to work with HDOT planning engineers to provide highway improvements. (HDOT, 2020).

[15] VMT analysis "can directly capture the value of benefits that are not considered in traditional vehicle [LOS] or travel time analysis," such as improvements to multimodal networks, lower environmental impact including GHG emissions, improvements to health and safety, and reduced public and private costs. (Haw. Climate Comm'n, 2022a).

as a "progress update outlining the department's success in meeting the goals." (HRS § 264-143(c)).

The Legislature established this reporting requirement in Act 131 in 2021. Nonetheless, three years later, HDOT is still not reporting on GHG and VMT reductions. As of late 2023, HDOT admitted it is not measuring GHG impacts for each project and is "still working on that." (HDOT Tr. 265:4-13). HDOT has also contrarily asserted that the reporting mandated by Act 131 is covered by HDOT's Act 100 reports. (Defs.' Resps. to Reqs. for Produc. Nos. 15 & 16). Yet, again, HDOT's Act 100 reports do not include any reference to the goals of reducing GHG and VMT, much less any information and analysis on how HDOT is implementing and meeting these goals.

HDOT's Act 100 reports also do not include the required reports on compliance with these goals for *each* of its projects, or any deviations from these goals and the reasons for the deviations, as required by HRS § 264-143(b). They also do not provide any overall progress update on HDOT's success in meeting these goals, as required by HRS § 264-143(c). In sum, HDOT's disregard of the GHG impacts of its projects and overall operations defeats public transparency and accountability and disregards the Legislature's specific mandates for such performance reporting.

In parallel with HDOT's comprehensive abdication of its duty to establish a performance framework to meet Hawai‘i *state* decarbonization mandates, the agency has only recently begun steps to develop some piecemeal elements in response to much more limited *federal* requirements. Yet, even on that front, HDOT has already missed a major deadline and has shown none of the focus and commitment that best practices require.

In November 2021, the federal government passed the IIJA, which required state DOTs to provide a "carbon reduction strategy" as a minimum condition for the IIJA funding. The law included minimal requirements for the strategy such as "support efforts to reduce transportation emissions" and "identify projects and strategies to reduce transportation emissions," without setting any performance standards or targets. (23 U.S.C. 175(d)). Yet, despite being given two years to comply, HDOT failed to meet the deadline of November 15, 2023; no drafts of the strategy had been prepared by then; and HDOT did not have a sense of when that work would be completed. (HDOT Tr. 71:16-72:6). Many other states, in contrast, were able to meet the deadline and obtain the available federal funding. (WSDOT, 2023; OTC, 2023).

In April 2024, it came to my attention that HDOT had recently issued its *State of Hawai'i Transportation Carbon Reduction Strategy* (CRS) document. As an initial note, HDOT appears to have backdated the document "November 2023," although as stated HDOT had admitted at that time that it would not be meeting the deadline. (HDOT Tr. 71:16-72:6). The document is called an "Initial draft" and also indicates a "Plan expansion" is scheduled for "June 2024." (HDOT, 2023h).

Even though HDOT had two full years to develop its CRS, its currently submitted document comprises a mere 14 pages of content, including tables and pictures. In comparison, other states' CRS submissions illustrate that they are well ahead of Hawai'i in planning and mobilizing to reduce transportation GHG emissions and have submitted far more extensive CRS documents detailing transportation GHG reduction targets, plans, and programs that are already in place and underway. (E.g., CO DOT, 2023; WA DOT, 2023; MN DOT, 2023).

In terms of actual content, HDOT's CRS simply recites the same list of piecemeal activities that HDOT is currently doing. (See Section E below). It offers no unifying vision, plan, or framework at the system level. It intimates no ideas or aspirations for how any of these individual projects may be scalable to achieve rapid sector-wide progress on reducing GHG emissions. It includes no goals, objectives, targets, standardized performance measures at the individual project and aggregate program level—i.e., none of the essential elements of the established DOT performance-based framework.

Perhaps the most problematic aspect of HDOT's CRS, however, is that it includes **numerous *roadway capacity expansion projects* as "carbon reducing" strategies**. Several expert transportation organizations have been raising the alarm on states using federal IIJA funds to double down on traditional roadway expansion projects, with one organization calling this trend a "***climate time bomb***." (Salerno, 2024) (emphasis added). Decades of peer-reviewed scientific studies have established that expanding road capacity proportionately increases VMT and the resulting GHG emissions. (See section C.3 below).

Under the heading "Reduce Emissions," HDOT's CRS features four projects—"Interstate Route H-1 East Bound Improvements" (O'ahu); and "Farrington Highway Widening" (O'ahu); "Puunene Avenue Improvements" (Maui); "Honoapiilani Highway Realignment" (Maui)—that explicitly expand roadway capacity as their principal purpose and result. Three of these projects (H-1 Eastbound; Farrington Highway; and Puunene Avenue) were included among the nine projects that transportation experts analyzed for the Climate

Commission. This analysis found that the nine projects would add 144 million VMT and 1.65 million tons of GHG emissions, equivalent to 19% of the state's current total transportation emissions. (RMI, 2022; section C.3 below).

I am not aware of any analysis that HDOT has conducted on the VMT and GHG emissions impacts of any of these capacity expansion projects. Based on the science of roadway expansion impacts and the Climate Commission's publicly provided analysis, however, HDOT's bid to promote these projects as pillars of its "Carbon Reduction Strategy" should cause grave concerns that HDOT is building its own "climate time bomb" in Hawai'i.

The IIJA, indeed, ties its Carbon Reduction Program funding to projects that "*support the reduction of transportation emissions*," listing numerous eligible categories, none of which include capacity expansion projects. (23 U.S.C. § 175(c)(1)) (emphasis added). Further, the list of eligible projects explicitly *excludes* capacity expansion projects, in allowing projects that improve traffic flow (e.g., traffic management and operations) but do "***not result in the construction of new capacity***." (23 U.S.C. § 175(c)(1)(L)) (emphasis added). HDOT's inclusion of its capacity expansion projects in its CRS, therefore, flies in the face of the federal Carbon Reduction Program's exclusion of such projects and its express purpose to reduce transportation emissions.

On November 22, 2023, the U.S. DOT (FHWA) finalized a rule establishing a GHG performance measure based on the percent change in vehicle emissions on the mainline highways of the National Highway System (NHS)[16] in relation to a baseline year of 2022. (88 FR 85364). The rule requires state DOTs to establish declining emission targets for two and four years in the future and gives a deadline of February 1, 2024 to set the targets. The US DOT considered the GHG performance measure as only a "first step toward reducing GHG emissions." The federal rule does not mandate what the targets must be, only that they "aim to reduce emissions over time." It also covers emissions on only the subset of roads in the NHS, and not the entire statewide transportation system. It does not include any penalties for non-compliance. This recent rule, in sum, sets a minimum federal floor requirement to take just a first step of setting some initial GHG reduction targets, which is no substitute for the comprehensive performance framework needed to fulfill Hawai'i's state decarbonization mandates.

[16] The NHS includes freeways and main highways, which constitute only a partial subset of the State's roadways that HDOT oversees.

The discussion around this rule to set a GHG performance measure at the federal level dates back to the Obama administration, which originally issued a similar rule seven years ago in 2017. The Trump administration rescinded the rule, and the Biden administration revived it in 2022. Thus, HDOT has known for years that, even at the federal level, the government has recognized the need to start requiring minimal first steps toward reducing transportation sector emissions.

Nevertheless, HDOT has already missed a deadline on the federal side, and it is nowhere near to reaching a level of diligence and progress on par with meeting Hawai‘i’s far more extensive decarbonization mandates. Instead, HDOT’s abdication of its duty and perpetual delays over these years simply underscore how much time and ground HDOT has already lost and must now recover. In 2024, HDOT still has no organizational structure and direction to implement Hawai‘i’s GHG reduction directives.

2. HDOT Diminishes and Disregards System-Wide Electrification.

In particular, HDOT has not used its authority to facilitate electrification of the transportation system, one of the most important decarbonization strategies. Electrifying transportation is the foundation to decarbonize the system, yet HDOT has no comprehensive targets or plan to accomplish that objective. HDOT’s current program for building charging infrastructure for electric vehicles assumes 45% fossil-fueled vehicles in the state in 2045, which is not an objective or target that comports with the State’s net-zero mandate. (HDOT, 2022a). HDOT has also not identified any objectives for increasing the use of alternative fuels in transportation, another key decarbonization strategy.

Through my previous leadership position in New York City’s DOT, I have direct experience in developing a DOT vision and action plan for electrification, which we set forth in *Electrifying New York: An Electric Vehicle Vision Plan for New York City*. (NYC DOT, 2021a). This plan offers an example of a DOT embracing its essential government leadership role in enabling the electrification of transportation.

NYC DOT recognized that in addition to continuing to expand multimodal options,[17] it also "must do its part" to help drivers switch to electric vehicles by building out a public charging network. NYC DOT found that the local EV market was ramping up too slowly, lagging behind California and European peers, and that the lack of charging infrastructure remains one of the most significant barriers because it suppresses demand for EVs, which in turn discourages private sector investment in EV charging. Thus, "the next few years represent a critical opportunity to accelerate EV adoption," in which the DOT can "fill this need by providing and incentivizing EV charging infrastructure," which helps seed the market and spur investment in a comprehensive charging network.

NYC DOT recognized its plan as "a critical step in catalyzing a local EV market and fundamentally transforming how drivers get around our city." It "will require a transformative public investment over a short period of time," to scale up the early groundwork laid by other agency efforts. The DOT also recognized its government role in ensuring that the charging infrastructure is distributed equitably and not just concentrated in higher-income areas.

NYC DOT's plan committed to a list of coordinated and complementary actions. These included setting near-term targets of 2025 and 2030 for investments in: expanding the city-operated fast charging (level 3) network; equipping 40% of the spaces in municipal parking lots and garages with level 2 chargers; and creating a network of thousands of curbside charge points, including an innovative plan to enable plug-in charging from the streetlight infrastructure. The DOT recognized these targets, which "require immediate and significant action," are a critical step to meeting GHG reduction goals, but just the first step, on which the DOT will build by seeking further partnerships with other government agencies and the private sector.

HDOT, in contrast, has taken a passive and reactive approach to building the statewide EV charging network. Rather than taking initiative to fulfill the State's decarbonization mandates, HDOT has only moved in reaction to bare minimum federal-level requirements imposed as a condition for funding and, even then, has sought substantial exemptions and years of delay. The National Electric Vehicle Infrastructure (NEVI) program required HDOT to undertake an initial minimum phase of installing fast charging facilities. HDOT's proposal, submitted in 2022, included only eight fast charging stations, requested exemptions from the

[17] This work includes expanding on hundreds of miles of bike and bus lanes; improving the most successful bike share program in the Western Hemisphere; and making walking safer and more convenient by shortening crossings, widening sidewalks, and installing pedestrian facilities. "As a result, more New Yorkers can leave their cars at home, or choose not to buy them at all."

requirements to install five others, and planned the addition of ten level 2 stations over the next five years. The "Vision" of HDOT's NEVI "plan" is a network of charging stations "that result in the transition of the majority of light-duty vehicles from internal combustion engines to electric vehicles by 2045." (HDOT, 2023b; HDOT, 2022i). In other words, by the 2045 deadline for statewide decarbonization, HDOT envisions only a majority of light-duty vehicles to be electric. None of this "vision" is connected to or supported by any plan or analysis for decarbonizing the transportation sector. These internal assumptions for continued widespread fossil fuel reliance will not decarbonize the transportation system by 2045 or thereafter.

HDOT has taken this passive and reactive approach toward even its own facilities. In recent years, HDOT built two brand new consolidated rental car parking garages at its Oʻahu and Maui airports, but did not include any electric charging facilities—or even "make ready" installations such as wiring, panels, and other components—to enable EV charging. (HDOT, 2019). As a result, all the necessary equipment will now need to be retrofitted at some later time, at much greater expense. Based on my professional experience, including my work as a transportation administrator developing NYC DOT's EV vision and plan, HDOT's actions and decisions on these facilities demonstrate an astonishing lack of foresight and alignment on the State's clean energy and climate mandates.

3. *HDOT Prioritizes Road Capacity Expansion, Which Increases VMT and GHG Emissions.*

HDOT has also not established any objectives and targets for reducing vehicle miles traveled (VMT), which has long been recognized as another key GHG reduction strategy for Hawaiʻi to accelerate decarbonization and achieve many other co-benefits for people's cost of living, quality of life, and safety, public health, equity, and the economy. (Act 131, 2021). Rather, HDOT continues its legacy institutional practices that increase VMT, along with the resulting GHG pollution and the many other costs and inequities of ever-expanding vehicle traffic.

VMT, which measures vehicle travel in a region over a given time period, is a standard proxy for transportation-related GHG emissions. (Haw. Climate Comm'n, 2022a). For over two decades, the State of Hawaiʻi has emphasized and recommended VMT reduction as a "core strategy" and "key measure" for decarbonizing transportation and meeting the State's clean energy goals, since it is an area over which the State "has direct control." (DBEDT, 1998; HCEI, 2011;

HCEI, 2015; Haw. Climate Comm'n, 2022a). The Legislature has specifically directed HDOT to "Reduce vehicle miles traveled." (HRS § 264-143(a)(3)).

This recognition of the need to reduce VMT, and in turn GHG emissions, however, stands in contrast with the performance of the State—including its head transportation agency HDOT—on actually committing to, planning for, implementing, and achieving such reductions. Importantly, **HDOT has affirmatively planned for a 10% increase in VMT on state roads and highways over the next eight years in its latest budget**. (Haw. Climate Comm'n, 2022a). VMT data from the state Department of Business, Economic Development and Tourism shows that VMT remains persistently high and has not declined to levels in accordance with even the initial targets the State set years ago in the HCEI.[18] In its own budget documents, HDOT planned for VMT, and thus GHG emissions, to continue to increase through 2027. (State of Hawai'i, 2020).

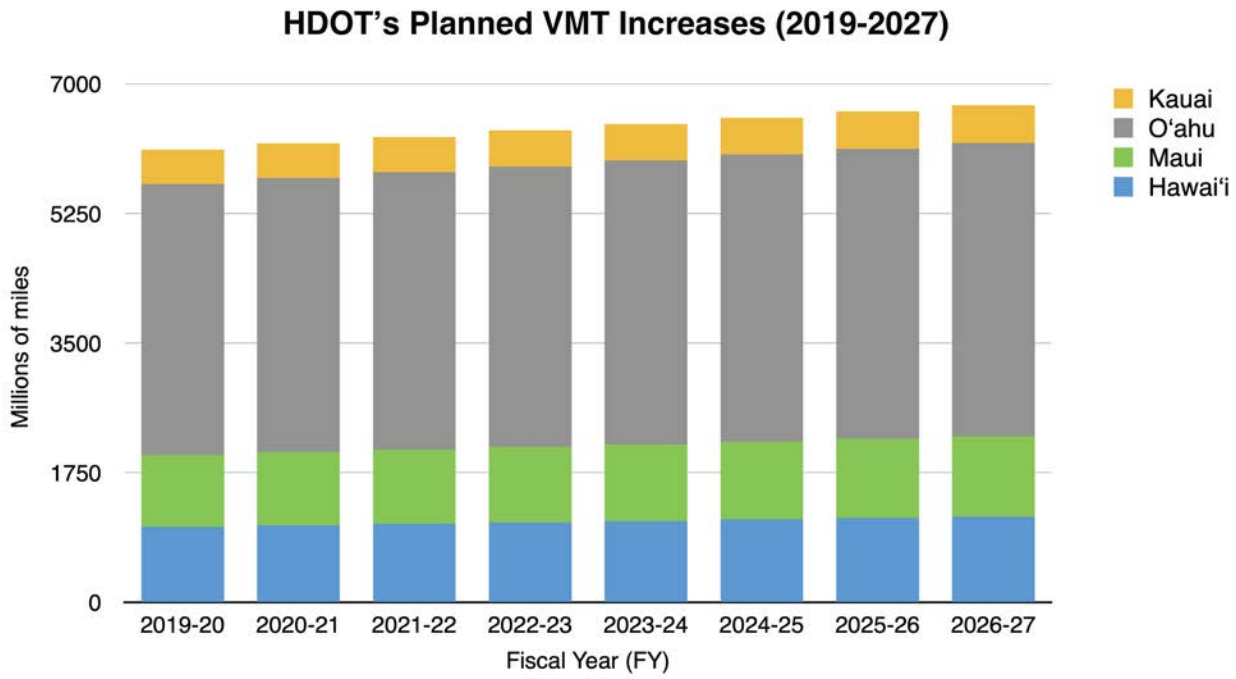


Figure 4. Source: (State of Hawai'i, 2020).

In addition, in 2022, the Hawai'i State Climate Commission (see footnote 12 above) reported that "**VMT in Hawai'i has increased almost 40% over the last 25 years and is projected to continue to increase without intervention**" (emphasis added). Since the year 2000, both total VMT and per-capita VMT have

[18] Based on a document produced in discovery it appears HDOT's tracking of VMTs is consistently lower than DBEDT's. (HDOT, Statewide AVMT).

increased. VMTs do not increase without support from HDOT. In the legacy system it operates, when VMTs increase, so do GHG emissions. The Climate Commission has identified these historical and ongoing VMT increases as "a barrier to Hawai'i achieving its legislative climate action goals." According to the State's own findings, "**[t]o achieve Hawai'i's negative carbon emissions goal by 2045, VMT cannot continue to grow**." (Haw. Climate Comm'n, 2022a) (emphasis added).

HDOT, for its part, at least agrees that reducing VMT is a means to reduce GHG emissions. (HDOT Tr. 112:5-7). Yet, **HDOT has continued its legacy system that increases VMT; has done little or nothing to drive progress on the key, mandated goal of reducing VMT; and has undermined this goal in many critical respects.**

The State's legacy transportation system and practices impose a significant barrier to achieving the necessary, urgent progress on reducing GHG emissions. Specifically, the century-old transportation system model is geared toward expanding road capacity for cars, which directly increases VMT and the resulting GHG emissions. The Hawai'i Legislature in Act 131 provided critical findings on this problem that are worth reviewing in full because they accurately reflect the established understanding and best available science in this field:

> **Merely adding lanes to reduce traffic does not address Hawaii's most pressing traffic, safety, health, and other issues**. In fact, it can often make them worse. Studies show that the traffic benefits of spending tens of millions of dollars adding lanes to accommodate more cars are often eliminated in just a few years by additional cars incentivized to fill that space. Those funds could have had a more significant and longer-lasting benefit if they were expended to address other issues, such as expanding options for people to commute by public transportation, biking, or walking, especially for those in low-income communities (emphasis added).
>
> **(**Act 131 (2021)).

In line with the Legislature's express findings, the Climate Commission has recognized that "BUILDING MORE ROADS LEADS TO MORE TRAFFIC AND GREENHOUSE GAS EMISSIONS" (Haw. Climate Comm'n, n.d.) (emphasis in original). In 2022, the Commission worked with transportation experts at RMI to estimate the long-term impacts of nine major HDOT roadway expansion projects. As summarized in the following table, the analysis indicated

that the projects planned and prioritized by HDOT would add 144 million VMT (equivalent to an additional 11,100 cars on the road) and 1.65 million tons of GHG emissions (equivalent to 19% of the state's current total transportation emissions).

Climate Commission Analysis of HDOT Road Expansion Projects (2022)

Impacts	Units
Lane-miles	38 lane-miles
VMT	144 Million
Gallons of Gasoline Eq.	5.6 Million
Cars Eq.	11,100 Cars
Emissions Eq.	1.65 MMT CO2e

Table 4. Source: (Haw. Climate Comm'n., n.d.)

"Studies consistently show that increased capacity induces additional VMT." (Handy & Boarnet, 2014a). This direct relationship between expanding road capacity and increasing VMT—also known as "induced demand"—has been documented in an extensive body of research spanning the better part of a century. (Volker & Handy, 2022) (surveying seminal studies). This body of work includes empirical and econometric analysis and peer-reviewed publications examining decades of data across broad and diverse geographies and controlling for other factors. The science is widely accepted as establishing the "Fundamental Law of Road Congestion," in which VMT increases proportionately with road capacity expansion and eliminates much or all of the traffic congestion benefits of the added capacity over time, within as soon as five years. (Duranton & Turner, 2011; Cervero & Hansen, 2002; Handy & Boarnet, 2014a; Handy & Boarnet, 2014b; Volker et al., 2020). This impact feeds a negative feedback loop exacerbating all the costs of the legacy transportation system dependent on fossil fuels that the Hawai‘i Legislature recognized.

Further, **once road expansion is installed, the VMT increases are locked in**—unless and until additional work may be undertaken to undo the induced demand impacts, such as road congestion charges or reallocation of roadway capacity for other modes. The science confirms that the expanded capacity will be filled, and adding alternative transportation options, such as transit, will not limit the VMT impacts of the road expansion. (Duranton & Turner, 2011). Thus, given the decades-long lifespan of roadway investments, the resulting VMT and GHG increases will persist in counteracting the climate benefits of other transportation system improvements well into the future, absent extra interventions to counter the impacts.

These lasting climate consequences of HDOT's infrastructure decisions to prioritize capacity expansion over infrastructure needs for alternative modes of transportation underscore the need to examine and address the VMT impacts now, before the impacts are locked in for future generations. Indeed, based on the established science and the findings of Hawai'i's own Legislature, Climate Commission, and State Energy Office, this need to address capacity expansion, induced demand and VMT impacts is not, or should not, be unknown or in dispute by the State and its HDOT. The actions of HDOT, however, have not matched these understandings and requirements.



Figure 5.

4. HDOT Has Known, Yet Disregarded and Resisted, the Need to Reduce GHG Emissions by Reducing VMT.

The State and HDOT have long been aware of the need to reduce VMT, which in turn has been shown to reduce fossil-fuel reliance and GHG emissions. For years, HDOT has been repeatedly informed and directed to take actions to reduce VMT, yet has disregarded these recommendations and requirements. For example:

- In 1998, the State produced its Hawai‘i Climate Change Action Plan, advising that "[t]hose measures that show the greatest energy-saving potential in the short- and mid-term operate by reducing total regional VMT through travel mode shifts away from single occupant vehicles, or by decreasing the need for travel." (DBEDT, 1998).
- Reducing VMT has likewise been a long-standing centerpiece of the federal Highway Performance Monitoring System, which guides how HDOT should spend federal transportation dollars. FHWA has declared that "reducing vehicle miles traveled (VMT) is an official goal of the U.S. Government policy," which dates as far back as the Clinton administration's 1993 Climate Change Action Plan and is recognized in numerous federal laws relating to clean air and transportation efficiency and equity. (FHWA, n.d.).
- In 2011, the HCEI, a joint program between the State of Hawai‘i and U.S. Department of Energy, identified the reduction of VMT as a "core strategy" that was "critical to the success" of the State meeting its goal of 70% reduction in petroleum use for ground transportation by 2030. (HCEI, 2011).
- In 2015, HCEI produced another report admitting that progress in the transportation sector had "not met expectations," recognizing "the need for a renewed effort," and identifying several strategies that could be implemented to reduce VMT. (HCEI, 2015). The state energy office issued the report as a "first step" that included "nearly two dozen tactics to be pursued now," as well as "enabling actions" for longer-term tactics. (HCEI, 2015).
- The Hawai‘i Legislature established the ZET in 2018 (Act 15, HRS § 225P-5); the specific goal of "decarbonizing the transportation sector" in 2021 (Act 74, HRS § 225P-7); and, also in 2021, Act 131, which mandated HDOT to "Reduce vehicle miles traveled" and "Reduce carbon emissions and greenhouse gasses" when "planning, designing, and implementing ground transportation infrastructure for each project," and requiring HDOT to report on these goals for each project and for its overall program in each year (HRS § 264-143).

- Also in 2021, the US Climate Alliance, which includes the State of Hawai‘i as a member, supported Smart Growth America and the State Smart Transportation Initiative to produce a report, Drivers of VMT and Priority Reduction Strategies. (SSTI, 2021). The project’s purpose was to provide “short-term direct technical assistance” to nine select states, including Hawai‘i, to support efforts to reduce VMT. The report provided analysis of VMT trends and key strategies for VMT reduction in Hawai‘i. Its findings included:
    - VMT in Hawai‘i increased by 39% since 1994, including around 8% between 2009-17. But more than 60% of personal trips are under five miles and account for up to 20% of VMT, which “presents important opportunities for more trips to be made by walking, biking, and transit, under the right policies and investments.”
    - “There is great potential in Hawai‘i to focus on VMT reduction efforts” by state and local governments, including HDOT. Priority strategies included, for example, reining in spending on road expansion, and investing in broader and safer transportation options such as transit, bike, and pedestrian improvements.

Despite all this, at the end of 2023, **HDOT admitted it still has not adopted a goal or target for VMT reduction**. (HDOT Tr. 126:25-127:12). Further, its head of Planning for highways was **“not sure” that the Legislature had ever directed HDOT to reduce VMT**. (Tatsuguchi Tr. 69:3-6).

In January 2022, the long-running calls for the State and HDOT to reduce VMT prompted the Climate Commission—of which the HDOT Director is a member—to issue a *VMT Reduction Toolkit and Policy* by its consultants. (Haw. Climate Comm’n., 2022b). This material was then incorporated into a comprehensive guide on VMT reduction dated December 2022, entitled *Investing in Transportation Choices: Recommendations for Safe, Sustainable, Affordable and Reliable Mobility* (“*Transportation Choices*”). The report found: “**State goals will not be achieved without a reduction in ground transportation emissions. Continued increases in [VMT] will prevent Hawai‘i from achieving its adopted carbon net negative by 2045 climate action goal.”**

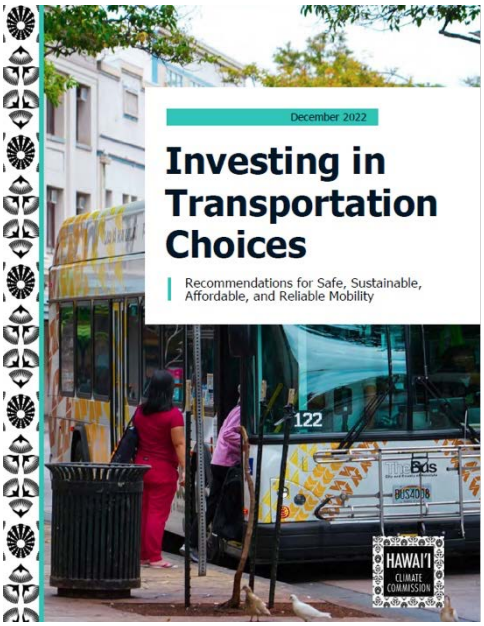


Figure 6. Investing in Transportation Choices Report Cover.

Transportation Choices provides extensive recommendations for "near-term steps that Hawai'i state departments can implement to initiate and sustain progress toward VMT reduction." Many of these recommendations speak directly to HDOT's governance role, yet have not been implemented.

Transportation Choices Recommendations

Recommendation	Implemented?	Source
Articulate a Goal and Champion Investing in Transportation Choices		
Develop and adopt a statewide VMT reduction target.	No	*HDOT Tr. 126:25-127:12; 168:12-20*
Develop and implement a strategy to integrate VMT into project-level analysis and decision-making for land use and transportation projects.	No	*HDOT Tr. 138:2-10*
Establish a VMT reduction coalition across State agencies.	No	*HDOT Tr. 128:22-129:10*
Track Progress: Produce an annual multi-departmental report that measures the effectiveness of VMT policies.	No	*HDOT Tr. 129:11-21; Shishido Tr. 59:18-21; Dill Tr. 113:12-17*
Measure VMT impacts and establish standards of performance for VMT impacts.	No	*HDOT Tr. 130:14-23*
Require induced demand and VMT analysis for transportation projects.	No	*HDOT Tr. 145:5-22*
Realign Funds and Spending to Support Policies, Programs and Projects that Reduce VMT and Support Mode Shift		
Direct investments in transportation and land use towards projects that reduce the energy intensity of mobility through the expansion of transportation choices.	No[3]	*[see section C.5 below]*
Give people in Hawai'i more safe, affordable, reliable, inviting and convenient choices to get around by funding the completion of our pedestrian, bicycle, transit and green networks.	No	*[see section D below]*

Table 5. Source: (Haw. Climate Comm'n., 2022a and cited testimonies).

In sum, HDOT has simply chosen not to examine the VMT impacts of its road expansion projects and continues to implement its plans and programs so as to exacerbate GHG emissions, harming the young people who are plaintiffs in this case. Further, **HDOT's pushback against the Climate Commission's efforts to encourage VMT reduction indicates a critical lack of alignment in the Hawai'i State government**. At the most fundamental practical level, Hawai'i cannot achieve its goal of decarbonizing the transportation sector if its lead transportation agency HDOT is perpetuating the legacy system and refuses to take its leadership role in decarbonizing the transportation system. In my expert

opinion, VMT will continue to rise under HDOT's legacy plans, programs, projects, budgets, and operations. That means GHGs will continue to rise as well.

5. *HDOT's Transportation Investments Reflect the Institutional Bias Toward Projects That Increase VMT And GHG Emissions.*

HDOT agrees that "the projects HDOT funds reflects HDOT's priorities." (HDOT Tr. 146:7-9). Based on my review of transportation infrastructure budgeting documents, HDOT has created a transportation project funding framework that does not consider VMT reduction and instead prioritizes projects that increase VMT. This in turn has produced a system that is geared toward increasing GHG emissions.

The Climate Commission confirms the "Current Situation" is that "Transportation investments and land use[19] plans increase VMT." It thus recommends that HDOT "**Realign Funds and Spending to Support Policies, Programs and Projects that Reduce VMT and Support Mode Shift**." (Haw. Climate Comm'n, 2022a) (emphasis added).

As discussed above in section C.1, HDOT does not consider and report the impacts of its projects on GHG emissions or VMT, despite specific direction by the Legislature to do so. In the absence of such basic information, I conducted an independent review of the State's transportation infrastructure budgets to assess the priorities of these budgets in relation to Hawai'i's decarbonization goals. The methodology for this review is included in **Attachment 3** to my expert report.

The following table summarizes the aggregate totals for the 11-year dataset:

[19] HDOT acknowledges it "plays a role with respect to land use decisions" that can impact VMT (HDOT Tr. 76:17-19) and is "able to influence" the decisions that developers make. (HDOT Tr. 125:10-14). Among other measures, it is able to leverage or deny its support for projects and refuse to fund transportation infrastructure for developments that are inconsistent with the State's goals. (HDOT Tr. 123:23-126:8). HDOT, however, has not objected to a project on the ground that it would increase VMT (HDOT Tr. 136:4-6)—which is unsurprising since HDOT does not consider or analyze VMT reduction in the first instance. In fact, of the numerous HDOT comment letters I have reviewed in preparing my report, not once has HDOT objected to a project on the ground that it would increase VMT. (HDOT, Comment Letters).

VMT Impact and Budget Share Aggregate Totals, 2013-2023

VMT Impact, Totals 2013-2023:	Budgeted Amount (Federal)	Budgeted Amount (State)	Total Budgeted Amount
VMT Increasing •	$950,388,000	$2,127,065,000	$3,077,453,000
VMT Neutral •	$3,184,431,200	$1,837,296,200	$5,021,727,400
VMT Decreasing •	$100,984,800	$106,572,800	$207,557,600
VMT Neutral with GHG Reduction •	$90,402,000	$59,884,000	$150,286,000
Insufficient Information Provided •	$86,624,000	$67,893,000	$154,517,000
Total Budgeted Amount	**$4,412,830,000**	**$4,198,711,000**	**$8,611,541,000**

Table 6. Source: (Attachment 3).

My review and analysis of these comprehensive data produced the following findings:

First, looking at the average of the annual percentage shares for each category over the entire 2013-2023 period, HDOT's highway capital improvements budgets allocated the vast majority of its funds (94%) for projects that increase VMT (33%) or have no impact on VMT (61%); and a minimal remaining share for projects that either reduce VMT or are VMT neutral but reduce GHG emissions (2% each, totaling 4%). The 33% share of VMT-increasing projects is more than eight times the 4% share of VMT- or GHG-reducing projects.

Moreover, even the 61% share of VMT-neutral projects can be seen as a "lost opportunity" for prioritizing more funds toward projects that reduce GHGs. (Rubin et al., 2023). As further discussed below, Hawai'i's "Complete Streets" mandate requires HDOT to include multimodal improvements for all users and modes in its road construction and maintenance projects. (HRS § 264-20.5). The mandate's intent "is to redesign Hawai'i's built environment to support active transportation." (Univ. of Hawai'i at Mānoa, 2011). Yet, from 2013-23, only a 2% budget share was allocated for VMT-reducing projects supporting other transportation modes. In terms of number of projects, only 15% of the total budgeted projects (279 of 1,872 projects) included a pedestrian or bicycle component. **These findings indicate that the overwhelming share of funds and projects continue to be directed toward supporting motor vehicle travel, and that compliance with the Complete Streets mandate remains the rare exception, rather than the rule.**

The chart below shows the budget share averages between the various categories based on their VMT and GHG impacts:

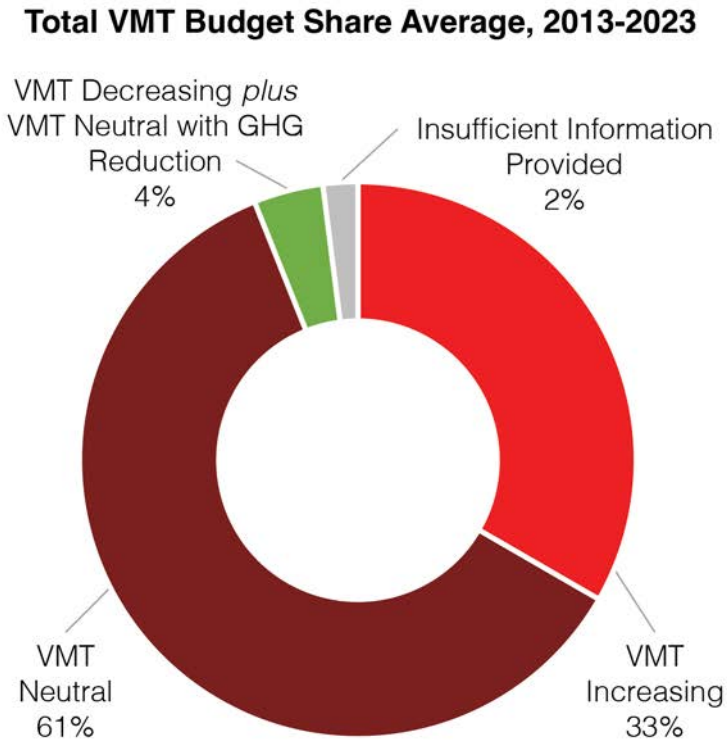


Figure 7. Source: (Attachment 3).

Further, looking at state funds specifically (apart from federal funding), HDOT directed an even greater share of funds toward projects that increase VMT—41%, versus 33% of the combined federal and state funding. This is significant and telling because federal funding can come with conditions potentially limiting HDOT's discretion on how it can spend the funds, but state funding has no such restrictions (and instead should be directly aligned with the State's decarbonization mandates). Thus, the state funding shares provide a more direct indication of HDOT's funding priorities, which actually show an even greater bias toward VMT-increasing projects. The following chart shows the overall breakdown of state funding:

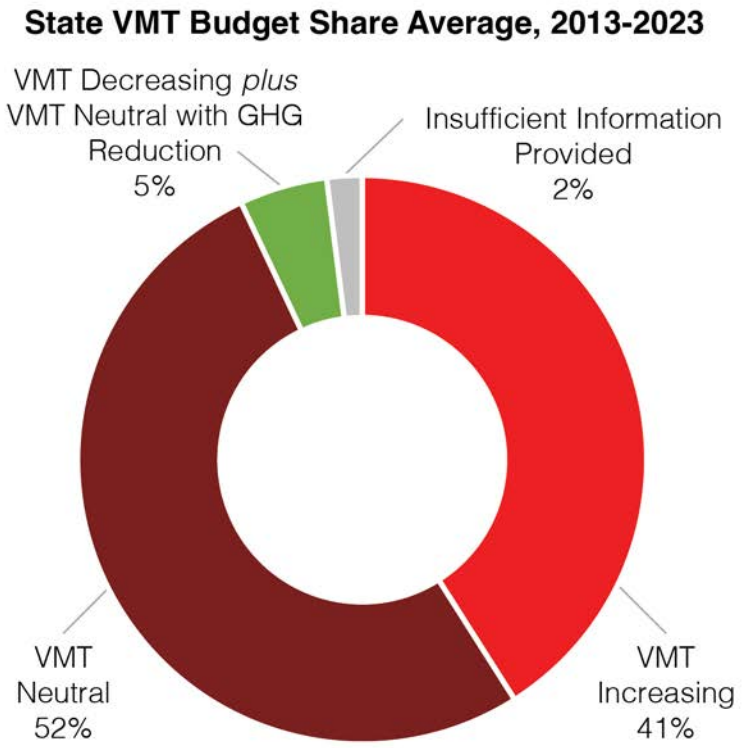


Figure 8. Source: (Attachment 3).

In addition to these findings on the overall budget priorities, I also observed several recent developments of concern. First, in 2019 and 2020, **following the enactment of the ZET in 2018, there was a dramatic spike in budget allocations for VMT-increasing projects, reaching a peak for the 11-year period.** In those years, VMT-increasing projects occupied 56% and 68% of the total budget share, respectively. Most recently, in 2023, only 0.4% of the HDOT's highway infrastructure budget was allocated to projects that reduce VMT ($2.97 million out of $716.02 million).

Also in 2023, the number of projects falling in the unidentifiable "insufficient information" category markedly increased, to 9% of the total list. This effectively blocks any public review of these funding commitments, at a time when public transparency and accountability is more critical than ever, particularly with the massive infusion of federal transportation funding now flowing to HDOT under the federal IIJA. This decline in transparency raises even more concerns given the Legislature's directives requiring more transparent

evaluation and reporting of HDOT's projects; yet the level of transparency in HDOT's budgets has headed in the opposite direction.[20]

Given the urgency of the climate crisis, HDOT needs to dramatically shift this pattern of priorities without delay. It also should reevaluate and redirect projects currently in the funding pipeline before they are built and cause GHG increases for years to come. In 2016, HDOT's *Practical Solutions Action Plan* recommended that "HDOT should establish a formal process to revisit and audit project purpose and need" to determine whether they should remain in the STIP given current priorities—which now expressly include the need to reduce VMT and GHG.

The Climate Commission agrees, recommending that "Projects not yet built that are currently included in the STIP that will increase VMT must be considered for revision or removal in future versions of the STIP if Hawai'i is to reach state and county climate goals." "The next STIP is scheduled for approval by 2025, providing a key opportunity to ensure the new list of projects does not induce increases in VMT and expands transportation choices." (Haw. Climate Comm'n, 2022a).

In sum, my analysis of HDOT's transportation infrastructure budgets confirms what one would expect based on HDOT's historical and ongoing institutional practices. HDOT's transportation funding commitments favor the legacy transportation system that increases emissions and defeats the State's decarbonization mandates.

[20] Transportation experts at the Ulupono Initiative, a Hawai'i-based policy firm, have conducted similar analysis of Hawai'i transportation budgets. In 2021, Ulupono provided the O'ahu MPO with analysis of its proposed TIP, raising concerns that 38.2% of HDOT's requested funding was for new roadway capacity. In particular, $308 million was being proposed for eight roadway projects that would produce an estimated 65 additional million miles of VMT. Of the $308 million, only $12 million or 4% was from federal sources, so these were mostly state funds that could be flexibly used for other, GHG-beneficial purposes. (Rooney, 2021). I note that the 38% figure for VMT-increasing projects from Ulupono's analysis is comparable to the 33 to 41% figures from my 11-year analysis of HDOT's CIP budget. Again, the disparity between these figures and the 4% share of funding for VMT-reducing projects shows the scale of the shift needed to conform the State's transportation funding with its mandates to reduce VMT and GHG and decarbonize the transportation sector.

D. HDOT's Plans, Investments, and Actions for Pedestrian, Bicycle, and Public Transit Networks Limit Transportation Choices and Increase GHG Emissions.

In addition to prioritizing traditional vehicle-centric travel modes, HDOT's transportation program has limited the expansion and growth of alternative transportation choices that reduce GHGs, such as bike, pedestrian, and transit projects. HDOT's historical institutional practices have produced a statewide highway system that provides people with about 177 bikeway miles, 168 sidewalk-path miles, and approximately 9,800 vehicular lane miles (HDOT, 2023e), "signaling that vehicle accessibility outpaces multimodal accessibility." (Haw. Climate Comm'n, 2022a). As one predictable output of this system, in 2021 a super majority (67.2%) of the statewide population in Hawai'i drove alone to work, while only 4.4% walked, 0.8% biked, and 4.9% used transit. Further, since 2013, the number of people who use non-driving modes of transportation has stagnated or eroded, with the percentage of people who drive alone to work increasing about 1.3% per decade. (USA, Hawaii Commuter Transportation).

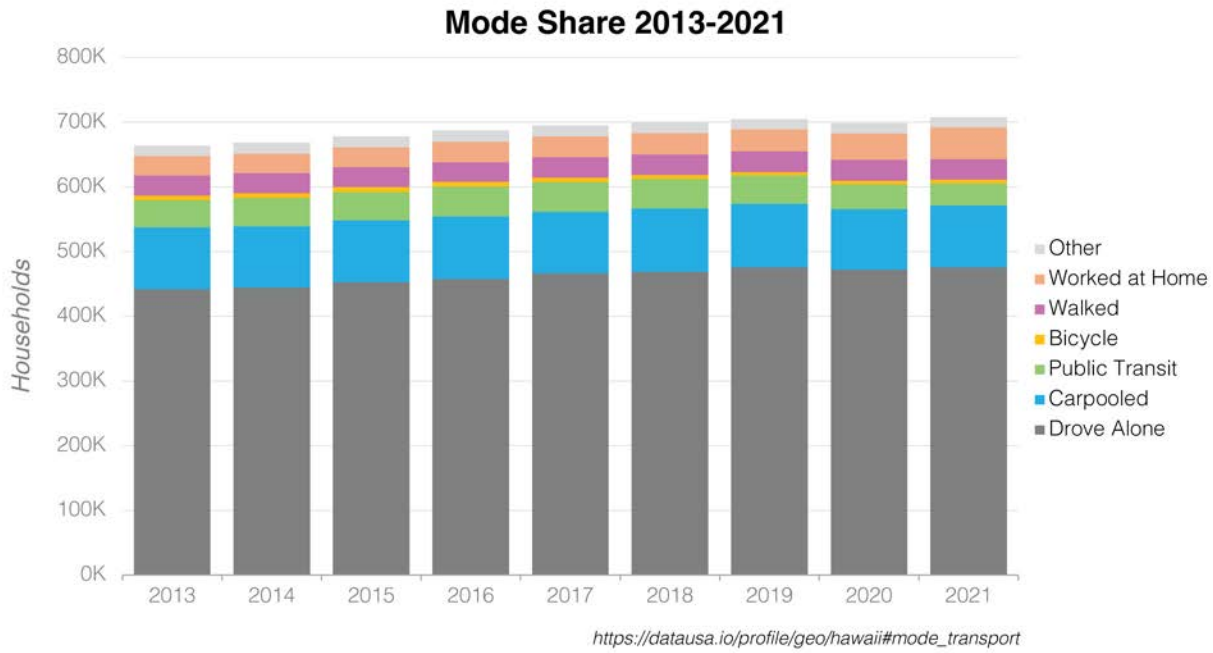


Figure 9. Source: (Data USA, n.d.).

The Hawai'i Legislature has mandated that HDOT "develop and implement a plan for the establishment" of a "contiguous network . . . connecting communities throughout each island" for each of three transportation modes, "in which intersections with other modes . . . shall be minimized." (HRS § 264-142(a)). These networks include:

- "motor vehicle highways," in which "priority and preference for access shall be given to public mass transportation";
- "bicycle and electric bicycle highways or pathways," which "shall be separated and protected from vehicular traffic by physical or natural barriers or by meaningful distance or elevation"; and
- "pedestrian highways or pathways," which also "shall be separated and protected from vehicular traffic by physical or natural barriers or by meaningful distance or elevation."

HDOT must also coordinate with the counties to "develop a comprehensive plan for the establishment" of a "contiguous network of bicycle and pedestrian pathways" connecting public schools and libraries, commercial business and shopping hubs, residential areas, and transportation infrastructure. (HRS § 264-142(b)).

In establishing this mandate, the Legislature emphasized the costs of the legacy "car-centric" transportation system, and the savings and benefits of shifting to other modes such as walking, biking, and transit. This shift "will reduce the cost of living, improve the quality of life for local residents, and stimulate the economy." Instead of spending more money on highway capacity projects, "[t]hose funds could have had a more significant and longer-lasting benefit if they were expended on other issues, such as expanding options for people to commute by public transportation, biking, or walking, especially for those in low-income communities." (Act 131, § 1).

Similarly, the Climate Commission has recommended that HDOT: "Give people in Hawai‘i more safe, affordable, reliable, inviting and convenient choices to get around by funding the completion of our pedestrian, bicycle, transit and green networks." The "Current Situation," however, falls far short: "**There are inadequate multimodal networks to support mode shift**" (emphasis added). The necessary "Next Steps" thus include: "**Prioritize projects that enhance active transportation networks** over new roadway capacity projects, and within multimodal roadway projects, **prioritize pedestrian, bicycle, and transit elements** over vehicle elements"; and "**[C]omplete and fully fund historically underfunded active transportation networks**" (emphasis added). These steps "will provide economic, public health, and environmental dividends for years to come and help Hawai‘i meet its climate and clean energy goals in a resilient and equitable manner." (Haw. Climate Comm'n, 2022a).

The expansion of transportation choices and uses depends on the public infrastructure provided by government, based on the planning and programming implemented by HDOT. Public infrastructure investments channel and drive public choices, whether it is roadway capacity expansions that produce more VMT, or investments in expanded options that reduce VMT. To enable and encourage a shift to non-vehicular modes, people need (and want) complete and connected networks, safety, convenience, and comfort. The Legislature recognized this in establishing Act 131. The Climate Commission also recognizes this principle that "[r]oad capacity expansion projects induce new VMT by making it easier to drive more, **whereas pedestrian, bicycle, and transit projects reduce VMT by making it easier to drive less**" (emphasis added). Thus, "[a] robust, equitable, and interconnected active transportation network that includes greenways, where residents and visitors can safely and comfortably make the choice to walk, roll, ride a bike, or take transit for all or many of their daily needs is **essential to achieving VMT reductions and making progress towards climate goals**." (Haw. Climate Comm'n, 2022a) (emphasis added).

As the Smart Growth America-sponsored *Drivers of VMT* report found, about 30% of trips in Hawai'i are under one mile, and about 60% are under three miles; moreover, up to 20% of total VMT is for trips under five miles, and about 30% is for trips under 10 miles. Hawai'i's geography thus presents prime opportunities for shifting to other modes under the right investments and priorities. (SSTI, 2021). This shift will not occur, however, under HDOT's current vehicle-centric legacy system.

In my experience with the NYC DOT, I saw how the agency's commitment to stop expanding highways and instead convert road space to protected bike lanes, bus lanes, wider sidewalks, and plazas increased the city's sustainable mode share (trips by walking, cycling, and transit) to 65% today, an almost 10% increase from levels in the 1980s and 90s. Further, in 2018, the NYC DOT adopted an 80% sustainable mode share goal as part of its climate action plan and reaffirmed that goal in the City's 2023 sustainability plan. HDOT, in contrast, has not established any such objectives and targets for expanding the share of trips made by walking, cycling, public transit, and other shared modes and has not prioritized and invested in building out the State's mandated pedestrian, bicycle, and transit networks.

1. *HDOT Has Left the Statewide Pedestrian Infrastructure Vastly Unfunded and Undeveloped for Decades.*

HDOT's pedestrian infrastructure planning includes the *Statewide Pedestrian Master Plan* (2013b) and *Hawai'i Pedestrian Toolbox* (2013c). As the Toolbox correctly recognizes, "If more people walk and use other forms of transportation besides motor vehicles for their trips in Hawai'i, less greenhouse gas emissions will occur, reducing the potential effects of climate change." Yet, HDOT does not match this recognition of GHG benefits with actual progress in achieving them.

First, HDOT is installing pedestrian infrastructure at a glacial pace. The 2013 Pedestrian Master Plan identified 31 "prioritized" projects statewide. More than 10 years later, only 15 have been funded and implemented. (Defs.' Answer to Interrog. 24). Of the 16 projects not yet implemented, HDOT has only budgeted to complete three of them in the next five years. (Defs.' Answer to Interrog. 26). In other words, HDOT has taken more than a decade to implement less than half of the projects in its Pedestrian Master Plan. It is unknown when the Pedestrian Master Plan will be fully implemented.[21]

The actual miles of pedestrian installations show a similar picture. HDOT only started tracking and reporting statewide pedestrian facilities in 2019. (Defs.' Resp. to Req. for Produc. No. 44). Between 2019 and 2023, HDOT added only about 10 miles of sidewalk paths in the State—compared to an increase of 54.5 statewide lane mileage between 2019 and 2022, more than a 5x difference (Figure 10). (STPO, 2016; HDOT, RFP 46(ii); HDOT, 2023e).



Figure 10. Miles of sidewalk paths for years 2019 to 2022. (HDOT, Sidewalk Path Miles; HDOT, Red-PM-Facility Chart)

[21] Ulupono Initiative commented on the draft HSTP, requesting that HDOT add language that it would complete implementation of the priorities from the Statewide Pedestrian Master Plan. (Ulupono Initiative, 2023). In response, HDOT simply stated it would keep the language that it would "continue to implement." (HDOT, 2023f).

HDOT reports that the number of crosswalks for pedestrian access in the state has not changed from 2019 to 2023 and remains at 2,052 (Figure 11). (HDOT, Ped-PM-Facility_Chart). Just looking at O‘ahu as an example, there are 901 “missing walkways” in the pedestrian network for the City and County of Honolulu alone, and 36.2% of O‘ahu roads do not have any walkways at all. (City & County of Honolulu, 2022). Figure 11 shows the historically slow progress for pedestrian infrastructure.

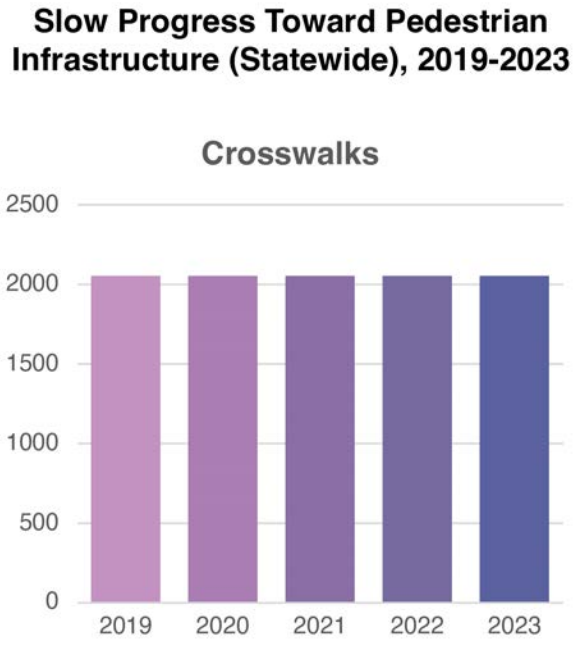


Figure 11. Number of crosswalks for years 2019-2022. Source Facility Chart)

Second, HDOT has demonstrated an inability to prioritize and invest in pedestrian safety, which imposes a barrier and hazard to increased pedestrian use. Although HDOT has recognized the safety benefits of raised crosswalks,[22] the share of raised crosswalks remains minimal, at only 3.9% of all crossings.

Third, HDOT’s funding of pedestrian infrastructure lags far behind its investments projects that exacerbate GHG emissions. Similarly, HDOT reported that its total capital budget for the Highways Division in 2023 was $218,014,000, of which it spent around $11 million—only about 5%—on pedestrian infrastructure (HDOT, 2023e).[23] For comparison, the City and County of Honolulu estimates that providing the missing walkways on O‘ahu alone will cost $2.6 billion. (City & County of Honolulu, 2022). This gap of orders of

[22] Raised crosswalks reduce pedestrian crashes by 45%. (U.S. DOT, Agencies Design Raised Crosswalks). There has been zero pedestrian fatalities at the locations where raised crosswalks were installed, and “[i]nitial speed analysis demonstrates a potential decrease in speeding by up to 50 percent.” (HDOT, 2023e).

[23] The multimodal section of HDOT’s 2023 Act 100 report cites a figure of $11,147,719 for pedestrian facilities, but the main section of the report, under “Expenditures Breakdown” (HDOT, 2023d), cites a smaller figure of $10,235,733 for **all** multimodal projects, not just pedestrian facilities. The reason for this discrepancy is unclear, but either way, HDOT is dedicating only a tiny percentage of its budget to multimodal projects.

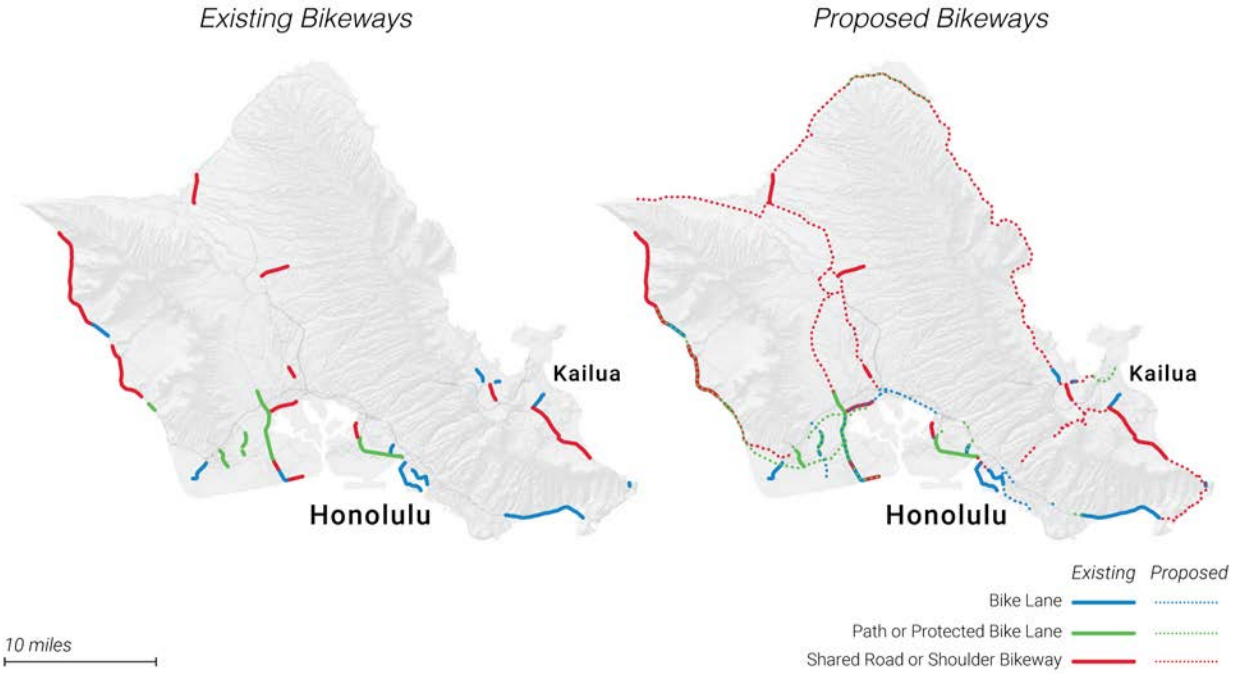
magnitude between HDOT's pedestrian infrastructure budget and overall statewide needs highlights the level of disconnect between HDOT's priorities and its mandate to establish a connected network of pedestrian pathways. (HRS § 264-142(a)(3)). Pedestrian infrastructure not only decreases GHG emissions and protects the children in this case from climate harms, but also provides safer and healthier pedestrian modes of transit with significant co-benefits for children, including these plaintiffs.

2. *HDOT Has Deprioritized the Statewide Bicycle Infrastructure for Decades and Will Leave the Network Vastly Incomplete.*

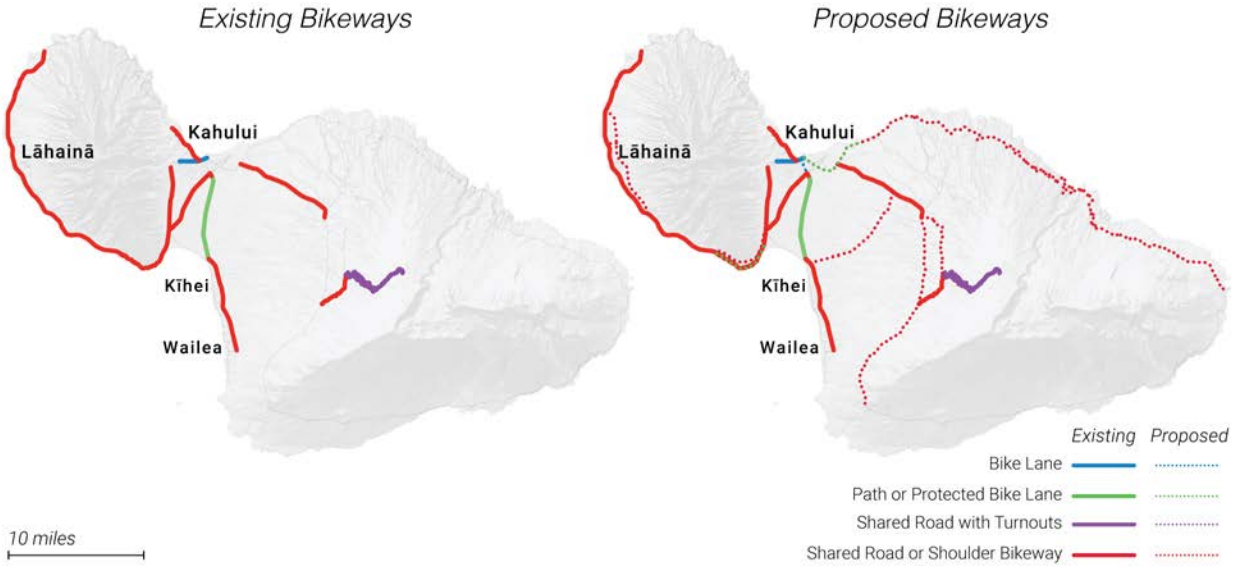
"Increasing a community's bicycle mode share reduces combustion engine vehicle miles traveled (VMT), which reduces greenhouse gas emissions that contribute to climate change." (City & County of Honolulu, 2019). HDOT's planning document for bicycle infrastructure is the *Bike Plan Hawai'i Refresh* (HDOT, 2022f), which updated the 2003 Bike Plan. HDOT's own data[24] show it is not planning or implementing a "contiguous network of bicycle and electric bicycle highways or pathways connecting communities throughout each island," but rather is perpetuating a highly fragmented and inaccessible system on every island. Further, HDOT's bicycle projects have heavily favored the addition of unsafe and unconducive "bike shoulders," which are basically bikeways painted onto existing road shoulders, instead of the mandated paths "separated and protected from vehicular traffic by physical or natural barriers or by meaningful distance or elevation." (HRS § 264-142(a)(2)).

[24] HDOT has not consistently tracked its bicycle facilities inventory and has data only for years 2003, 2013, and 2020-22. (Defs.' Resp. to Req. for Produc. No. 43).

Existing and Proposed Bikeways – O‘ahu



Existing and Proposed Bikeways – Maui



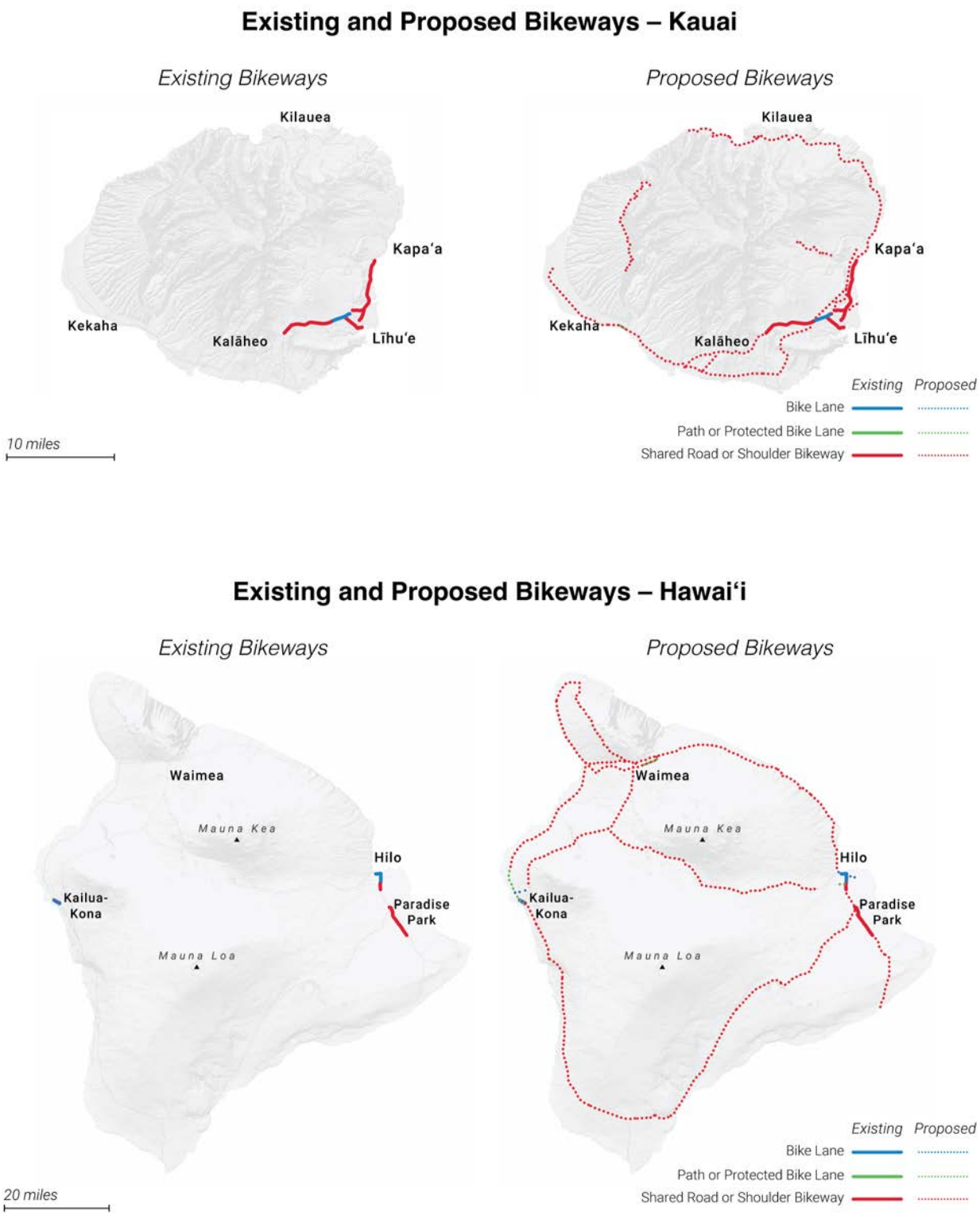


Figure 12. Existing and Proposed Bikeways. Source: (Bike Plan Hawaii Refresh: Bikeway Maps, 2022).

The State's Bike Plan, originally prepared in 1977 and updated in 1994 and 2003, "recommends the addition of approximately 1,722 miles of new bikeways to the statewide network (compared to 1,309 new miles in the 1994 plan)," which it states would improve "connectivity between existing and proposed facilities." But as of 2022, when the plan was "refreshed," there were only "174 miles of existing bikeways on the state highway system"—or only about 10% of the recommended bikeways. As shown in the following graph, in almost two decades, HDOT has added only 75 miles of bikeways. (HDOT, 2003; HDOT, 2022f).

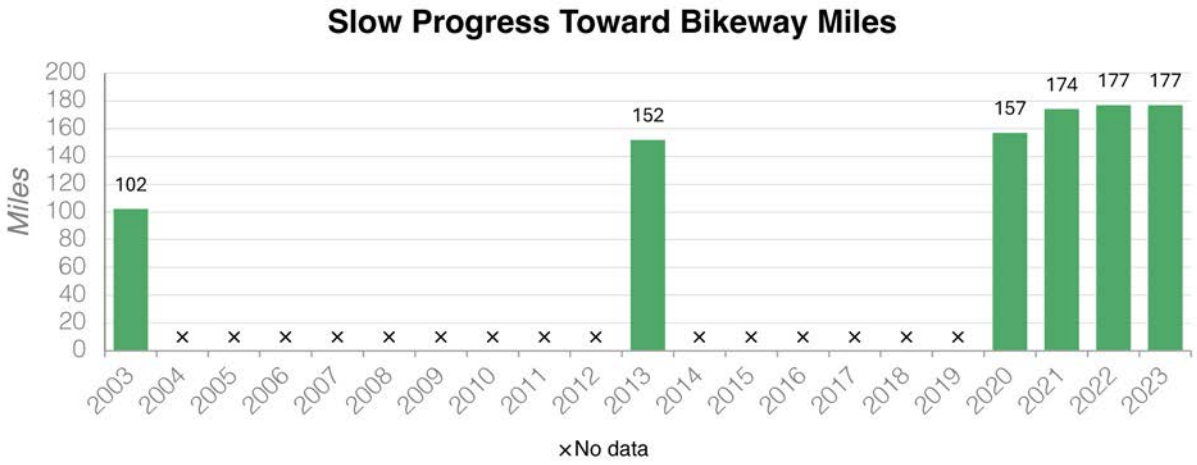


Figure 13. Number of bikeway miles on the State DOT system since 2003. Source: (HDOT, Bicycle Planning; HDOT 2022f).

In contrast to the 1,722 bikeway miles proposed in the 2003 Bike Plan, the Bike Plan Refresh provides a map with 792 proposed miles. Yet, the Bike Plan Refresh proposes an implementation plan that would end up with a total of only 121 miles of bike facilities in the next 5 to 10 years and 296 bikeway miles on the state highway system in the next 10 to 25 years, which would amount to only about 17% of what HDOT recommended in 2003.[25] (HDOT 2003; HDOT, 2022f; Defs' Response to Interrog. No. 26).

The planned long-term horizon of 10 to 25 years for implementation of 296 bikeway miles, which is only 37% of what HDOT stated is needed based on the 792 miles in the Bike Plan Refresh, extends to 2049. HDOT's implementation of this plan is not aligned with the mandates to complete the bikeway networks and decarbonize the transportation system.

[25] In the Bike Plan Refresh, projects listed in the "Estimated New Miles" column are intended to be implemented in the near-term of 5 to 10 years, and projects listed in the "Estimated Future Miles" column are intended to be implemented in the mid- to long-term of 10 to 25 years. (Roper-Noonan Tr. 123:11-124:2).

According to HDOT's Act 100 report, bicycle expenditures in 2023 amounted to about $18 million.[26] For comparison, the City & County of Honolulu's 2019 Bike Plan Update indicates that, to complete just the "Priority 1" bikeway projects for O'ahu, which amount to 103 miles, the State's projected share of the costs would be $56.9 million. (City & County of Honolulu's, 2019). This initial installment of bicycle infrastructure for O'ahu alone is three times the amount that HDOT spent across all the islands in 2023.

The Climate Commission emphasizes that "Prioritizing investments in projects that improve the safety of people walking and biking is needed to see a reduction in single occupancy vehicles and VMT." (Haw. Climate Comm'n, 2022a). However, in its funding of bike facilities, HDOT predominantly prioritizes "shoulder bikeways" painted onto existing road shoulders. Such pathways are the least safe and accessible option for bicycles and do not meet the requirement of pathways "separated and protected from vehicular traffic." (HRS § 264-142(b); HDOT, 2022c).

As part of the Bike Plan Refresh, HDOT collected data on the public's level of comfort with each of the bikeways shown in the chart below. Members of the public ranked shared-use paths as the most comfortable and shoulder bikeways as the least comfortable, which makes sense since shoulder bikeways leave users directly exposed to adjacent vehicular traffic.

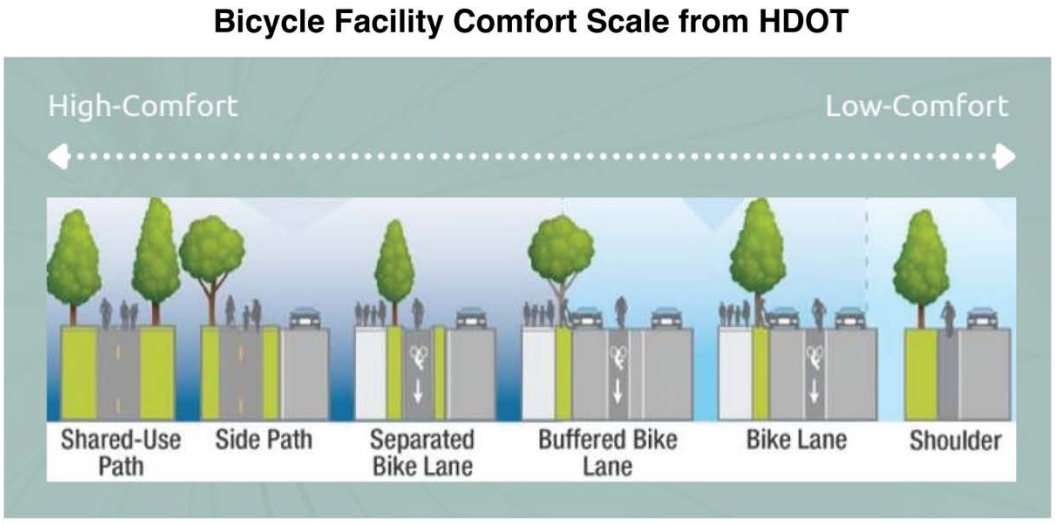


Figure 14. Source: (HDOT, 2022g).

[26] Again, HDOT's Act 100 report cites a figure of $18,399,725 figure for bike facilities, but also cites a significantly smaller number of $10,235,733 for all multimodal projects.

For the last two decades, however, HDOT has added very few protected bike paths and bike lanes, but instead has overwhelmingly prioritized road shoulders as a way to add bike routes. Of the 10 planned bike facilities, amounting to 41 miles of new bikeways, that HDOT budgeted for the next five years, HDOT continues to predominantly prioritize shoulder bikeways: six are shoulder bikeways, two are bike lanes, and two are described as either a path or a shared use path. (Defs.' Answer to Interrog. 26). Thus, even among the limited number of bikeways that HDOT is proposing, it is planning to build 37 out of the 41 miles as facilities in the form that is the least safe and accommodating for users, which will discourage usage and limit the VMT and GHG reduction benefits. HDOT's overreliance on shoulders does not fulfill the need and purpose to establish a bona fide, protected bicycle and electric bicycle network to support the State's decarbonization mandates.

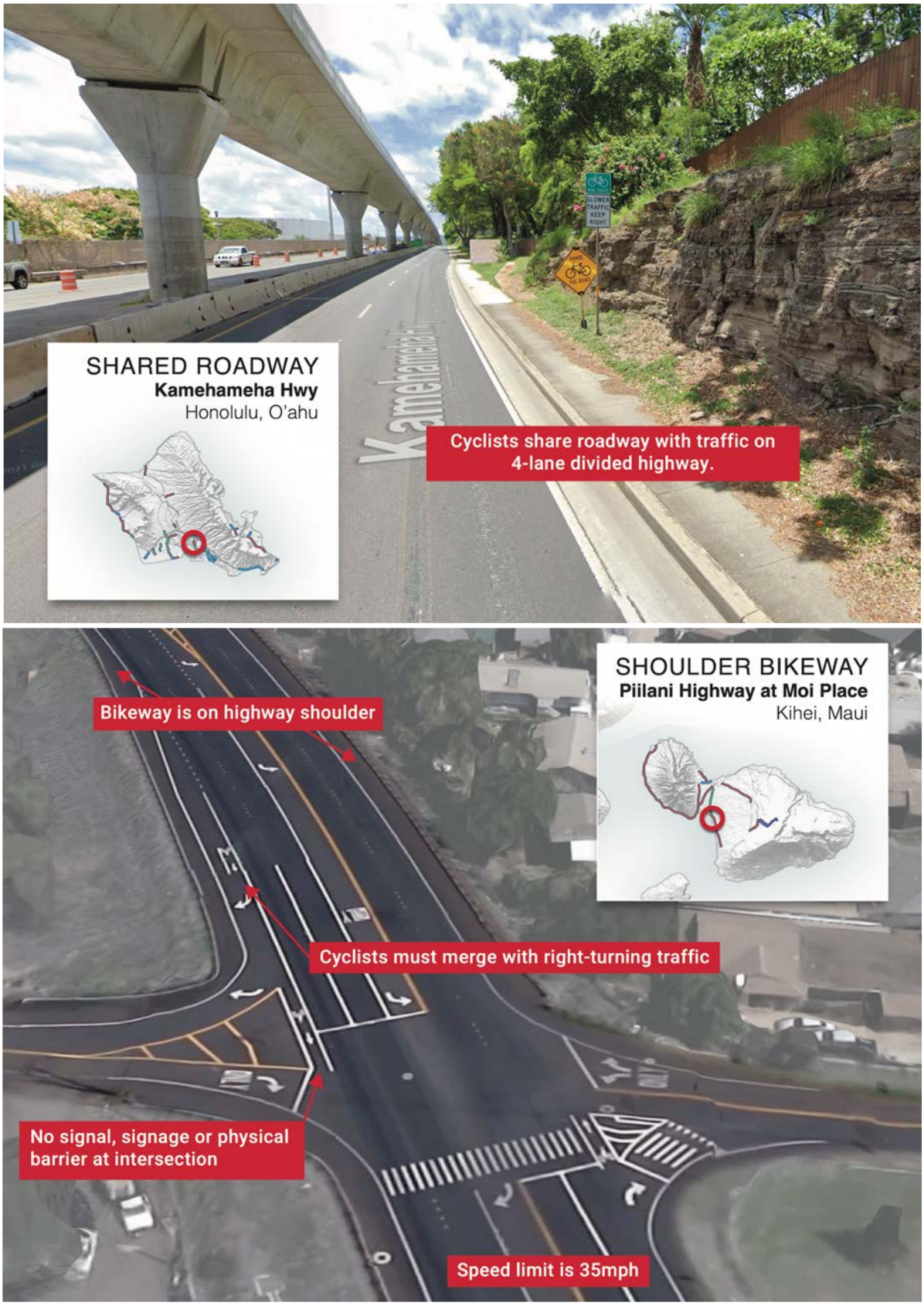

SHARED ROADWAY
Kamehameha Hwy
Honolulu, O'ahu
Cyclists share roadway with traffic on 4-lane divided highway.
SHOULDER BIKEWAY
Piilani Highway at Moi Place
Kihei, Maui
Bikeway is on highway shoulder
Cyclists must merge with right-turning traffic
No signal, signage or physical barrier at intersection
Speed limit is 35mph

Figure 15.

Based on my experience working in and observing other cities and states across the U.S. and the world, HDOT's current rate and form of investment in cycling infrastructure will not meaningfully increase the share of trips by bicycle by 2045, and therefore, will not meaningfully reduce GHG emissions. If HDOT, however, were to build and retrofit the 792 miles of bikeways in the Bike Plan Refresh as protected bike lanes, side paths, or shared use lanes with appropriate widths to accommodate potential demand, and stopped encouraging car dependence, it would begin to measurably boost the share of trips by bicycle in the span of a few years, as has happened in places like the Netherlands, Denmark, Germany, Japan, Bogota, and New York City.[27] New York City, for example, nearly doubled the number of daily cyclists between 2012 and 2022, as it grew its protected bike lane network to 644 lane-miles. If HDOT were to take such actions, it could dramatically improve cyclist safety, cut VMT, and reduce GHGs. With significantly improved investments in the quantity and type of infrastructure and the right incentives, in my opinion, bicycling trips (including electric bike, scooter, and other micromobility trips) could account for 10 or more percent of all trips in the state by 2045. As with sidewalks discussed above, bike lanes protect the children in this case by providing for safer modes of transit for people who cannot drive cars, in addition to reducing the GHG pollution that affects these children locally in causing climate change.

3. HDOT Has Ignored the Collapse in Public Transit Ridership.

Public transit also "offers a low emissions alternative to driving" that enables "significant [GHG] emissions savings." For example, U.S. bus transit, with about a quarter (28%) of its seats occupied on average, emits an estimated 33% lower GHG per mile than the average U.S. single-occupancy vehicle. (FTA, 2010). This GHG benefit, of course, increases with more ridership and as more buses convert to hybrid or full electric power. For almost a decade, however, the State of Hawai'i has been undergoing a critical collapse in public transit ridership that impairs its ability to achieve its transportation decarbonization goals, and HDOT has not meaningfully responded to the collapse.

While the counties operate public transit in Hawai'i, HDOT plays a key role in this area as the lead agency responsible for planning and funding the statewide transportation system. Since less public transit usage means increased reliance and pressure on the traditional default mode of single occupancy vehicles (and

[27] (Thomas, 2023; Fleming, 2018; Bike City, 2022; Marsal, 2021; NYC DOT, 2021b; NYC DOT, n.d.).

vice versa), HDOT has a direct interest in this transportation mode as much as any of the others. In its draft HSTP, HDOT claims that it "provides critical support and assistance to county transit systems, and transit systems in turn provide critical transportation services to Hawai'i's residents and visitors." (HDOT, 2022a). Yet, here as well, HDOT has not been taking the necessary active leadership to promote VMT and GHG reductions.

In the HSTP (2022a), HDOT reports drastic declines in bus ridership statewide over the past decade, by as much as 50 to 70 percent. For example:

- On O'ahu, TheBus and TheHandi-Van declined from almost 70 million annual passenger trips in 2015, to 65 million in 2019, to 50 million in 2020, and 28 million in 2021.
- The Maui Bus declined from 2.4 million passenger trips in 2015, to 2 million in 2019, 1.6 million in 2020, and 925,000 in 2021.
- Hawai'i Island's Hele-On ridership declined from 1.1 million passenger trips in 2015, to 665,000 in 2019, 560,000 in 2020, and 325,000 in 2021.
- Kaua'i Bus ridership declined from 875,000 in 2015, to 760,000 in 2019, 645,000 in 2020, and 408,000 in 2021.

Figure 17, below, shows the collapse in transit ridership in O'ahu over the decade between 2009 to 2022—before the pandemic occurred.

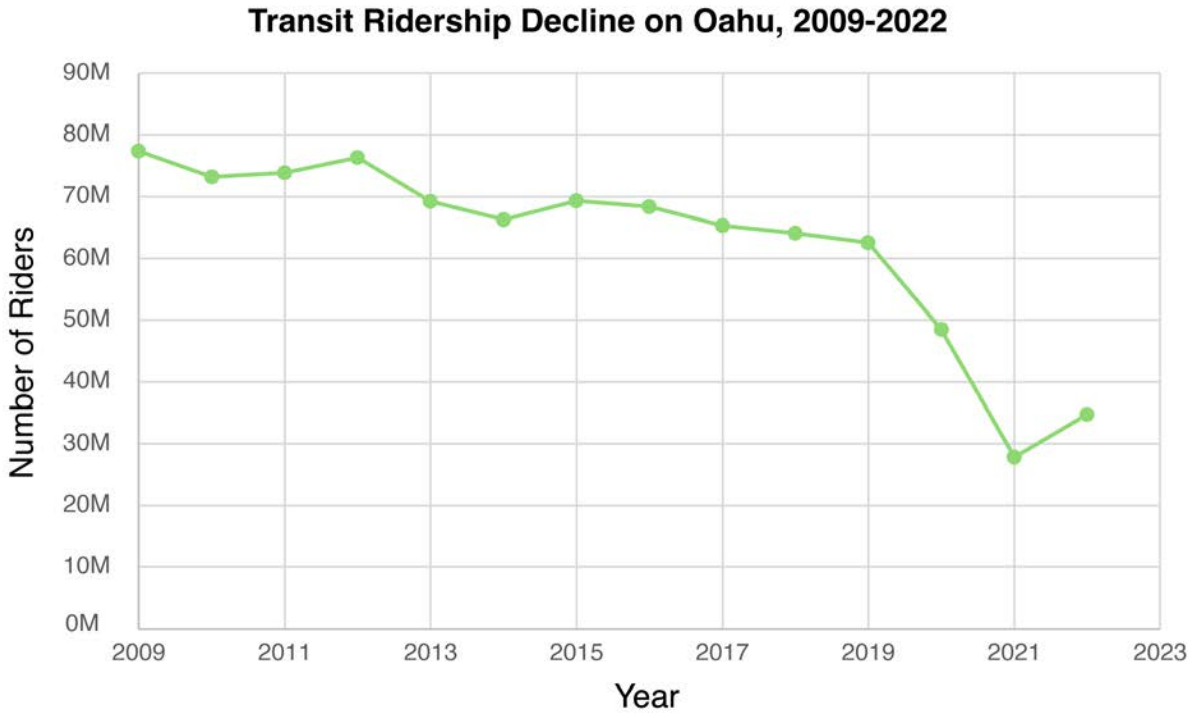


Figure 16. Source: (DBEDT, 2022).

While the COVID pandemic certainly contributed, these declines in public transit use also predated the pandemic by many years and have persisted long after the height of the pandemic. The declines in Hawai‘i extend back much longer and cut much deeper than the trends across the nation since the pandemic, where the national average now stands at 77% of pre-pandemic levels (a 23% deficit). (American Public Transportation Association, 2023).

In my experience working in a DOT, this level of collapse in statewide public transportation in Hawai‘i would qualify as a true crisis, demanding urgent attention and action by any and all responsible agencies. It should particularly concern HDOT since the decline is occurring across all the islands in the State and is headed in the opposite direction of what is needed to address the State's recognized climate emergency.

HDOT, however, has no plan or program to address this collapse in transit ridership and redirect it in line with the State's decarbonization mandates. Instead, in the limited mentions in HDOT's plans and reports that I have seen, HDOT has maintained a generally passive or cavalier mindset toward this crisis.

In its draft HSTP, for example, HDOT merely notes in passing the declines in transit ridership on each island, describing the over-50% drop in ridership on Kaua‘i since 2015 as "declined slightly." (HDOT, 2022a). It offers no concern about this crisis; no inquiry or analysis into its causes and impacts on the transportation system; and no vision and plan for not only arresting the decline, but rapidly reversing in the other direction to support Hawai‘i's VMT and GHG reduction mandates. While HDOT recently directed some unused leftover federal funds to the counties for transit at their request (HDOT Tr. 38:4-40:11), HDOT officials repeatedly maintained that the agency otherwise has no plans or programs to increase transit ridership and is not aware of any efforts; does not coordinate with the counties and is not aware of specific discussions; and is generally not involved. (Shishido Tr. 80:9-13; Dill Tr. 62:20-63:13, 109:5-7; Takiue Tr. 52:23-53:8).

To meet the decline in bus use across Hawai‘i, HDOT should be building its roadway network so that "priority and preference for access shall be given to public mass transportation." (HRS § 264-142(a)). Established best practices for providing such priority and preference include reserved bus lanes, queue jumper lanes, and signal preemption. Along these lines, the City and County of Honolulu recently installed a designated bus-only lane on King Street under an expedited pilot process, which was praised as a model for "climate-friendly transportation."

(Stampe, 2020). HDOT should be moving to plan and scale these and other improvements across the entire state.

Bus Rapid Transit is also an effective solution especially for high-volume corridors, where center-running bus lanes, limits on left turns, separate stations for buses, and off-board fare collection can transform buses into a high-speed and high-capacity transit option very cost-effectively. HDOT should also be leading the way to improve walk and bike access to transit stops; install secure bike parking at stops and connected protected bike lanes and sidewalks between stops and nearby activity centers; and expand options beyond massive park-and-ride lots at rail stations. In other words, needs and opportunities abound for HDOT, as the State's head transportation agency, to promote public transit and its VMT and GHG reduction benefits, should it meet this responsibility.

In sum, the crisis of public transit that has been unfolding in Hawai‘i for years should have raised alarms for the State as to its detrimental impacts on the need to reduce VMT and GHG. But HDOT has not recognized this urgency or fulfilled its leadership role for the State in addressing this key avenue for transportation decarbonization.

4. HDOT Fundamentally Undermines the Complete Streets Mandate.

HDOT's responsibility to enable all multimodal options is not a new requirement. Fifteen years ago, the Legislature enacted the Complete Streets mandate for Hawai‘i. Complete Streets is a widely established best practice, akin to a "Magna Carta" for the modern multimodal model of transportation. It mandates HDOT to "reasonably accommodate convenient access and mobility for all users of the public highways… including pedestrians, bicyclists, transit users, motorists, and persons of all ages and abilities." (HRS § 264-20.5(a)). Under best practices, Complete Streets should also emphasize the needs of people and communities who have been underserved and overburdened by the traditional vehicle-centric transportation model.

This era of climate emergency presents a heightened opportunity for the State and HDOT to realize the full promise of Complete Streets in giving the people of Hawai‘i a “robust, equitable and interconnected active transportation network,” which is “essential to achieving VMT reductions and making progress towards climate goals.” (Haw. Climate Comm’n, 2022a). Based on HDOT’s practices and its actual performance in prioritizing and promoting multimodal options, however, the Complete Streets mandate remains largely unfulfilled and insufficient to fulfill Hawai‘i’s climate mandates.



Figure 17. Source: (Replogle, 2023).

The Complete Streets requirement “shall apply to new construction, reconstruction, and maintenance of highways, roads, streets, ways, and lanes located within urban, suburban, and rural areas, if appropriate for the application of complete streets.” (HRS § 264-20.5(b)). As HDOT’s adopted Complete Streets procedures recognize, it applies to “[a]ll public highways, roadways, and streets statewide,” and in “[a]ll planning efforts and project alternatives, as well as development, capital improvement projects, operations, and maintenance.” (HDOT, 2022h). In other words, HDOT is “require[d] at any time we touch a system, we upgrade it for all modes of transportation relevant to its classification.” (HDOT Tr. 195:3-5).

In its ongoing practice, however, HDOT relegates Complete Streets to an afterthought to its traditional system focused on capacity expansion. As the Climate Commission found, “Current state and county transportation needs identification and project development processes tend to **prioritize and design for vehicle movements** while facility improvements for **non-motorized modes tend to be considered in later phases of project development**.” Instead, HDOT needs to “Consider **all user needs** on State and county facilities and prioritize people walking, biking, and taking transit **early in project development**.” (Haw. Climate Comm’n, 2022a) (emphases added).

HDOT confirms that, for its capacity program, "we don't look at complete streets for that program. We let them take care of it in the project level. So it's not a criteria that we use for capacity." (Tatsuguchi Tr. 149:9-12). Complete streets are considered when the capacity project "gets to the project delivery phase," but not when it "gets budgeted and programmed." Rather, "**it's assumed it will be taken care of when they go to the next step**." (Tatsuguchi Tr. 149:18-25) (emphasis added). This is exactly the problem that the Climate Commission highlighted. It shows how legacy practices prioritize projects that increase VMT and GHG; subordinate other transportation needs to secondary consideration for potential later add-ons; and ultimately circumvent the Complete Streets mandate.

Further, as discussed above, adding a multimodal component as an extra layer on top of a vehicle capacity expansion project does nothing to ameliorate the underlying VMT increases that the project causes. Rather, the science establishes that capacity expansions lead to VMT increases, and thus GHG emissions, which concurrent multimodal expansions do not counteract. Additional work and intervention then become necessary to undo the GHG impacts of the capacity expansion.

HDOT's *Practical Solutions Action Plan* reported in 2016 that "staff still generally struggles with how to implement [Complete Streets] at the project level" and maintained that a "Complete Streets approach is not reactive. In other words, a transportation agency would not wait for a separate planning effort to prioritize a corridor for bicycles and pedestrians." Yet, eight years later, HDOT still conveys the same struggles.

The Complete Streets mandate exempts certain situations where full accommodations are prohibited or unsafe, there is no future need, or "costs would be excessively disproportionate to the need or probable use." (HRS § 264-20.5(c)). Although HDOT's *Practical Solutions Action Plan* recommended that HDOT "[c]reate or adopt a Complete Streets guide" including design standards and performance measures, HDOT has no written guidance or transparent criteria for determining whether any of the exemptions apply to a project. (Roper-Noonan Tr. 155:3-10). HDOT also does not consider climate change and costs when determining whether the "excessively disproportionate cost" exception applies. (Shishido Tr. 160:4-14; Roper-Noonan Tr. 156:11-21).

HDOT's Complete Streets procedures require that HDOT "**will include** bicycle, pedestrian, and other multimodal improvements with projects ('plus up' the system) **unless there is a documented exception**" (emphasis added). "The evaluation process will be **transparent** and decisions **documented**," and HDOT

"**will maintain a list of projects to track exceptions** and project data" (emphasis added). HDOT, however, does not maintain such a list. (Defs' Resp. to Req. for Produc. No. 73).

HDOT's *Practical Solutions Action Plan* emphasizes: **"The bottom line is that HDOT should document reasons for failing to design all users into open access roadways, not require users to justify their safe accommodation"** (emphasis added). Yet, HDOT does not document and disclose to the public how often it invokes exceptions to the Complete Streets policy. (HDOT Tr. 197:19). Instead, HDOT claims that exceptions are sometimes, but not always, documented in individual project files. (Dill Tr. 81:1-18, 157:25-158:12). According to HDOT's reports, in 2023, only 35% of active projects have a bicycle and/or pedestrian improvement component, while 65% do not. (HDOT, 2023d). But what HDOT does not inform the public is why, and on what basis. This lack of transparency and accountability on Complete Streets fundamentally undermines this mandate.

HDOT's disregard of the Complete Streets mandate undermines not only the State's VMT and GHG reduction priorities, but also the closely interrelated priority at the heart of Complete Streets: **safety for all users, including those most vulnerable like pedestrians and cyclists**. The Legislature found in Act 131 that the legacy transportation system has produced "some of the highest transportation-related fatality rates in the nation," in which "drivers are more likely to strike and kill pedestrians in low-income neighborhoods than in high-income neighborhoods due to a lack of infrastructure." Act 131 thus sought to "modernize Hawai'i's ground transportation infrastructure" and "move Hawai'i forward into the twenty-first century" by fulfilling parallel purposes including: "Minimizing injuries and fatalities" and "Addressing greenhouse gas emissions."

Based on my experience, including my work with NYC DOT, it is clear that HDOT must establish a new, comprehensive systems approach that fully integrates both the safety of vulnerable users and VMT and GHG reduction as top priorities. In 2014, NYC DOT was the first in the nation to adopt "Vision Zero," a commitment to eliminate all traffic fatalities. And it has continued this commitment as a recognized key part of its plan to become carbon neutral. As an example of one of its most ambitious and successful projects, the DOT has worked to redesign Queens Boulevard—a major car-dominated roadway spanning up to 300-feet and 10 lanes and known as the "Boulevard of Death" for its notorious history of 186 people being killed on it between 1990 and 2017—to incorporate more crosswalks, widened medians with trees and benches, bike

lanes, walking paths, and speed protections (see, e.g., Figure 18 above). As a result, pedestrian and cyclist deaths on the road dropped to zero. (Hu, 2017).

In 2019, the Hawai‘i Legislature also adopted Vision Zero, finding that "[i]n 2018, a record number of forty-three pedestrian fatalities were documented in Hawai‘i, reflecting a dramatic increase from fifteen in 2017." The Legislature intended that "Vision Zero strategies can be easily integrated into existing Complete Streets programs." (HRS § 286-7.5; Act 134, 2019). Yet, as a direct consequence of HDOT not fulfilling the Complete Streets mandate, deaths of vulnerable users continue. Based on HDOT's reported statistics, pedestrian and cyclist fatalities continue to hover around historical levels (with scooter fatalities also now starting to show up in the statistics). (HDOT, 2023g) (HDOT, Improve Safety). And hand-in-hand with these deaths, VMT and GHG from the transportation system and current and future harms from climate change continue to rise.

In sum, HDOT's practice and performance show how its traditional transportation agency approach diminishes Complete Streets from a mandate to establish a new model into an opaque process that maintains and accommodates the status quo. HDOT's treatment of Complete Streets promotes projects and an overall program that increases VMT and GHG, contrary to Hawai‘i's decarbonization mandates.

E. HDOT's Current Activities to Address Climate Mitigation Are Piecemeal Rather than Transformative.

In response to questions in discovery that I have reviewed, HDOT has listed a handful of individual activities or "initiatives" it has taken to reduce GHG emissions.[28] (Defs.' Response to Interrog. Nos. 5, 6, 7). In my expert opinion, while these individual activities can be minimally beneficial within their own discrete and limited scope, they demonstrate the fundamental problem with HDOT's approach to transportation decarbonization—namely, that HDOT remains focused on ad hoc, piecemeal measures at the margins, rather than

[28] The activities HDOT listed as action it is taking to reduce GHG emissions include: an energy performance contract, electrification of HDOT's own fleet, use of a carbon injected concrete mix, funding toward construction of a plastic recycling facility, allowing EVs in the high occupancy vehicle lanes, an electric bus demonstration, hosting a Sustainable Transportation forum from 2016-2018, sponsorship of the Port Infrastructure Development Program application at Kapalama Container Terminal, the LRTP, Bike Plan, Pedestrian Master Plan and Toolbox, Act 100 Reports, and the Act 222 Annual Bicycle Expenditures Report.

systems-level transformation at the scale and pace necessary to meet the State's declared "climate emergency" and established decarbonization mandates.

Most of HDOT's listed accomplishments focus only on its own facilities (e.g., its energy performance contract with an outside vendor to increase energy efficiency) and its own fleet (e.g., its procurement of electric vehicles). HDOT does not appear to have any idea or aspiration for how any of these activities may be rapidly scalable to achieve rapid sector-wide progress on reducing GHG.

This patchwork of activities is not informed by any analysis or reporting on how much GHG reductions are actually achieved by each activity and as a whole. (HDOT Tr. 31:14-21, 32:19-23, 81:8-10, 82:14-25, 91:17-92:10, 95:6-11, 132:3-6, 233:23-234:2). It is not organized under any unified and holistic plan or program. (HDOT Tr. 64:21-23). And most fundamentally, it does not address reducing GHG at the **systems** level, where HDOT holds "the greatest opportunity to reduce transportation GHG emissions" and transition the legacy system to the transportation system of the 21st century that a climate-safe world for these children requires. In focusing on its own facilities and fleet, for example, HDOT fixes its sights on only the narrowest possible portion of transportation sector emissions, typically a mere fraction of a percent of total emissions. (NCHRP, 2022a).

In sum, the scattered nature of HDOT's activities to reduce GHG should raise grave alarms for the State's ability to meet its decarbonization mandates. Yet, this breakdown in government response is a function and consequence of HDOT lacking a comprehensive performance framework, plan, and program for reducing GHG emissions from the state transportation system, as detailed above. So long as HDOT treats GHG mitigation as an ancillary consideration and limits its scope to the agency's own internal activities—rather than establishing it as a core part of its governmental mission of planning, building, and administering the State's transportation system—HDOT and the State will remain off track from the direction needed to decarbonize the transportation sector.

4. Conclusion

It is now 2024—the halfway point between the enactment of the ZET in 2018 and the 50% emissions limit in 2030. Based on my review of all the information as discussed above and my professional experience and expertise, including an entire career of working with and within transportation agencies and

as a DOT administrator myself, I conclude that HDOT's planning, implementation, and management of the state transportation system is perpetuating the legacy of dependence on fossil fuels and escalating climate pollution and harms to the youth Plaintiffs. It is my professional opinion that HDOT remains fundamentally misaligned as an institution with fulfilling the State's comprehensive decarbonization vision and mandates; moreover, this condition shows no foreseeable prospect of changing any time soon without some form of intervention.

As a final note, I offer some insights based on my own experience as a former administrator of a DOT responding to a court action challenging systemic legal violations. When I was Deputy Commissioner for Policy at NYC DOT, the agency was sued for its slow progress in bringing the city's sidewalks and curb ramps into compliance with the Americans with Disabilities Act of 1990 (ADA). The litigation resulted in a $7.5 billion, 30-year court-approved settlement agreement establishing a comprehensive remedial plan and a fundamental shift in agency policy and funding priorities.

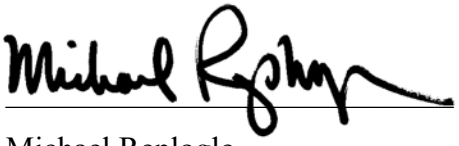
Among other commitments, NYC DOT agreed to conduct city-wide Light Detection and Ranging (LiDAR) surveys of every corner to inventory ADA-deficient locations, prioritize its workplan for installations and upgrades, and support ongoing performance monitoring. The DOT also provided public web access to the survey data and reported on its work progress. It agreed to address deficiencies as part of repaving and maintenance activities, while accelerating investment in curb remediation to meet ADA standards. It also agreed to be transparent about the specific reasoning and documentation for any project-level exceptions to meeting full ADA standards. The agency committed a total of $1.5 billion in its 10-year capital program and created a special 500-staff departmental unit dedicated to implementing the settlement. The court also appointed a monitor to review compliance.

I mention this experience as a concrete and practical example of how court action can be part of the process to achieve overdue reforms and protection of rights. The NYC DOT embraced the settlement as a way to institutionalize its governmental commitment to disability and access rights. The court's involvement was particularly instrumental in facilitating the support of the NYC Office of Management and Budget to approve the DOT funding commitments. Overall, the case helped to focus attention, marshal support and resources, and build public awareness to spur progress in an area in which the agency had previously struggled. Everyone involved appreciated the settlement as a positive step forward, and this appreciation will only grow as the necessary changes occur

such that, in the judge's words: "Years in the future, people will be used to nothing else but accessible curbs in New York City."

The State and HDOT have a similar opportunity in this case to embrace this legal process and their underlying governmental responsibilities so that, years from now, these youth Plaintiffs, all the parties involved, and future generations of the public can look back and see this as a historic moment that made a positive difference.

Signed this 23rd day of April, 2024 in Arnold, Maryland.



Michael Replogle

ATTACHMENT 1: CURRICULUM VITAE

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EXPERIENCE

Replogle Consulting
Principal | January 2022-present
Globally recognized catalytic leader and advisor on sustainable and equitable transportation policy and practices offering advisory services, expert testimony, and training to public, private, and non-profit organizations.

- Expert witness for plaintiffs in *Navahine F., et. al. v. Department of Transportation, State of Hawai'i, et. al.*, challenging the prolonged failure of state DOT to take steps to protect the environment for future generations by reducing traffic growth and greenhouse gas emissions. Prepared expert disclosure report in preparation for June 2024 trial in Hawaii State Court.

- Member, U.S. Environmental Protection Agency (EPA) Mobile Source Technical Review Subcommittee (MSTRS) of the Federal Clean Air Act Advisory Committee. 2019-present.

- As senior advisor to Institute for Transportation and Development Policy (ITDP), organized and coordinated TEAM for Climate Working Group uniting environmental, local government, and advocacy groups to promote more effective and equitable federal and state efforts for transportation decarbonization and environmental justice. Engaged National Association of City Transportation Officials (NACTO), Transportation for America, Georgetown Climate Center, Natural Resources Defense Council, Sierra Club, RMI, Southern Environmental Law Center, Equiticity, International Council for Clean Transportation, Smart State Transportation Initiative, Air Alliance of Houston, Equiticity, Coalition for Smarter Growth, and others. Submitted comments to and organized meetings with senior officials of US Department of Transportation (USDOT), Environmental Protection Agency (EPA), and White House advisors. 2022-2023.

- Strategic Advisor to *It's electric* as it develops on-street level-2 electric vehicle charging for dense urban and suburban neighborhoods, especially in under-resourced communities, with an innovative model for rapid scaling, active in New York City, Washington DC, Detroit, and elsewhere. 2022-present.

- Consultant to World Bank Asia Transport Division. Organized meetings for Dhaka, Bangladesh, Mayor and senior officials and with New York and Washington, DC officials. 2022.

New York City Department of Transportation
Deputy Commissioner for Policy | June 2015-June 2021
Managed Policy Unit, with a staff of 40 and 6 direct reports, including Safety Education. Guide agency's long-term strategy; advise DOT Commissioner and Mayor's Office on diverse issues. Initiate, coordinate, and evaluate new initiatives, including safety, bike and car sharing, electric vehicle

charging, freight, parking, mass transit, regional planning, economic appraisal, asset management, universal access, autonomous vehicles, and federal policy. Achievements include:

- Developed conceptual framework for NYC's "Open Restaurants" as a rights-based bottoms-up rapidly scalable program that within 3 weeks enabled 6,000 restaurants to make use of adjacent street parking for dining. Program grew to over 10,000 restaurants in 2 months, saving 100,000 jobs.
- Helped NYC win and accepted International Transport Forum 2018 Global Award for Vision Zero, recognizing City's success in cutting road deaths 28% in 4 years, while these rose 15% across the U.S.
- Guided policy to install 2,000+ speed enforcement cameras in school zones, yielding 73% drop in speeding and one-third reduction in pedestrian injuries at camera locations from 2019 to 2021.
- Worked with the New York State Department of Transportation to transform the I-895/Sheridan Expressway to a boulevard; supported Mayoral-appointed Blue Ribbon Panel on the Brooklyn Queens Expressway; helped manage NYC's Great Streets Program that transformed Queens Boulevard (which had been known as "The Boulevard of Death") and other high volume arterial roads into safe complete streets accommodating efficient motor vehicle traffic as well as pedestrians, cyclists, and public transportation.
- Managed transportation element of NYC's *Roadmap to 80x50* Climate Action Plan and development of *NYCDOT's Strategic Plan 2016: Safe, Green, Smart, Equitable*, and ongoing progress reporting.
- Managed development of *Electrifying New York: An Electric Vehicle Vision Plan for New York City*, and team that delivered NYC DOT pilot projects for 120 new On-Street level 2 Electric Vehicle Chargers and multiple DC Fast-Charging hubs, supported by ConEd and consultants.
- Advanced framework to modernize curb administration and enforcement in NYC, converting to digital "Pay-by-Plate" license-plate-based system to cut placard abuse and boost efficiency. Guided DOT Smart Truck Management Plan, Parking Blueprint, expansion of DOT's freight unit, and congestion pricing strategy. Led interagency working group with Department of Finance and NY Police Department to change commercial parking and double-parking rules to reduce congestion.
- Worked with Taxi and Limousine Commission (TLC) on studies and rulemakings to manage the impacts of for-hire vehicles on congestion, to raise driver income, and to use image analytics and connected vehicle technology to promote traffic safety.
- Helped negotiate $100 m agreement with Lyft to expand NYC's docked bikeshare system to 40,000 bikes and add pedal-assist e-bikes. Created vision for city-wide dockless bike share.
- Managed initial stages of NYC Congestion Pricing design, operational planning, and traffic impact analysis in collaboration with MTA.
- Worked with NACTO and city transportation officials across U.S. to develop data standards for taxis, for-hire vehicles, and new mobility and expand access to data needed for sound governance and planning.
- As member of NYC Automated Decision Systems Task Force, developed recommendations to City Council and Mayor for safeguards regarding use of artificial intelligence (AI) in governance.
- Represented NYC DOT in planning for Port Authority Bus Terminal replacement, Penn Station renewal, and Gateway corridor rail.

- Testified at March 2019 Senate Environment and Public Works Committee hearing on transportation and the economy; testified at October 2016 NYC Council hearing on autonomous vehicles; represented NYC at global climate summit in Paris in 2016 and in other key meetings.
- Deeply engaged as a founding member of the Open Mobility Foundation, supporting the development of open-source standards and tools that provide scalable mobility solutions for cities, enabling transfer of data between private and public stakeholders in the urban traffic environment.

New York University, Wagner Graduate School of Public Service

Adjunct Professor | January-April 2021

- Organized and taught class on topics in sustainable urban transportation policy and practice, with focus on innovations and challenges in New York City.

Institute for Transportation and Development Policy

Managing Director for Policy and Founder | 2009-2015

- Organized campaigns and developed strategic relationships with national governments, multilateral banks and institutions, and corporate leaders to scale-up sustainable transport financing, program appraisal, and project implementation initiatives to boost bus rapid transit, rail investment, traffic safety, bikesharing, and transit-oriented development. Strategic advisor to China, Brazil, Mexico, and U.S. national governments on transport policy.
- Cited in 2011 by *Bloomberg Business Week* as one of the world's leading global experts on transportation.
- As part of Senior Management Team for ITDP, co-managed 70+ staff, $7 million a year non-profit organization, with focus on organizational development, strategy, and policy, with direct responsibility for four direct reports, a roster of consultants, and budget of $2-3 million a year.
- Managed best practice guides, training, and capacity-building initiatives on bus rapid transit, travel demand management, parking, transport and carbon finance, and tear-down of urban motorways.
- Advised Jakarta and Yogyakarta governments on strategies to manage traffic on several major traffic corridors with street space reallocation, streetscape redesign, and road user and parking pricing.
- Consultant to Asian Development Bank, InterAmerican Development Bank, and Global Environmental Facility on methods to evaluate greenhouse gas impacts of transportation. Advisor to Climate Bonds Initiative on certification standards for transport sector.
- Advised Beijing Mayor on parking and road charging, with many parking recommendations implemented in 2013. Co-author of China Council for International Cooperation in Environment and Development report which was presented to the China State Council, *Promoting Urban Green Travel* (2013), shaping China Ministry of Transport's work. Visiting Professor at the China Academy of Transportation Sciences in Beijing (2013-15).
- Testified before U.S. Senate Banking Committee, Housing Transportation and Community Development Subcommittee, July 7, 2009, regarding the impact of transportation on climate change and the potential role of transit and livable communities in mitigating greenhouse gas emissions.

Partnership on Sustainable Low Carbon Transport

Chairman and Co-Founder | 2009-2016

- Developed and guided global partnership of 90 organizations -- Multilateral Development Banks (MDBs), UN agencies, NGOs, research institutes -- to mainstream sustainable transport in climate change policy and sustainable development goals and finance, and chaired SLoCaT Foundation.
- Mobilized successful $175 billion 10-year voluntary commitment for more sustainable transport from 8 MDBs at 2012 Rio+20 conference, with annual reporting. Worked with Asian Development Bank and MDBs to develop widely used Sustainable Transport Appraisal Rating (STAR) tool which is used to evaluate contributions to sustainability of thousands of transportation projects annually.

Environmental Defense Fund (EDF)

Transportation Director | 1992-2009

- Shaped development and implementation of U.S. transportation laws and advised governments on urban planning, transport management and finance, public-private partnerships, and environmental analysis for EDF, a million member, $100 million, non-profit advocacy group. Managed initiatives to curb growth in car use and sprawl by promoting best practices in US metropolitan areas and implementation of federal policies guiding transportation planning and project development. Deep engagements in Washington-Baltimore, New York, New Jersey, Portland, Atlanta, Denver, Austin, and San Joaquin Valley. Advisor and participant in technical missions related to bus rapid transit, air quality, and transportation planning in Jakarta, Bogota, Havana, Mexico City, many other cities. Managed 3-5 direct reports, extensive roster of consultants, and budget of $1-3 million a year.
- Leading environmental advocate for increased use of public-private partnerships to manage transport systems, supported by performance-contracting. Frequently invited to testify at US Congressional committees, White House meetings, state legislative bodies, and conferences about how transportation strategies and PPPs can achieve key public policy goals.
- Helped guide development of 5 successive U.S. federal transportation bills through Congress and related regulatory development, beginning with ISTEA in 1991 through SAFETEA-LU in 2006-09, focusing on clean air analysis, environmental review process, funding for clean air, transit, and enhancement programs, and federal transport planning requirements.
- Lead lobbyist for U.S. environmental movement on U.S. transportation law and policy in Congress and key federal agencies. Managed complex lobbying, litigation, and strategic communications efforts to bring about more effective regional transportation planning and use of market incentives to improve transport system performance. Advisor to federal and local officials regarding US DOT Urban Partnerships and Congestion Reduction Pilot Programs.
- Strategic advisor to New York City congestion pricing campaign (2006-08), supporting New York City Traffic Congestion Mitigation Commission, analysis of traffic, air quality, and equity impacts conducted by PB Consult and NY City Partnership, and technical studies and lobbying of state legislators about design and impacts of automated tolling of East River and Harlem River bridges.

- Member of NY Metropolitan Transportation Council (NYMTC) Travel Model Advisory Committee (2000-2005), advising on surveys, adoption of activity-based travel model, evaluation of Transportation Control Measures for air quality conformity, and conformity waiver following 9/11. Co-Chaired Mid-Hudson South Mobility Advisory Committee I-287 Task Force. Considered widening of I-287 in Westchester County (1995-2000) and secured time-of-day tolling on NY Throughway facilities. Strategic advisor to Tri-State Transportation Campaign board and staff on NY metropolitan region transportation issues (1992-2006). Expert witness in litigation Clean Air Act and NEPA litigation in New Jersey (1994). Advisor to New York City bike plan proposed by Transportation Alternatives (1993-95).
- Managed study for Mexico City government of plan for Mexico City Bus Rapid Transit network, including BRT line from airport to historic city center, to spur mobility and economic and social revitalization of decaying neighborhoods.
- Organized a coalition with environmental justice groups in Atlanta that shifted $300 million from sprawl inducing roads into public transport, walking, cycling, road safety, and maintenance, linking clean air, transport, and civil rights concerns in an effective legal-political strategy.
- Organized and guided pathbreaking *Moving Cooler* study that modeled alternative policy scenarios for U.S. transport sector VMT and CO2 emissions. Study was presented to US Congress and showed how sustainable transport strategies could not just cut CO2, but save consumers and taxpayers billions on transport costs while boosting public transport mobility for lower income people.
- Managed EDF initiative, *Reinventing Transit*, documenting how public transportation innovations serve mobility needs in diverse American communities, from rural and exurban areas to suburban and urban centers. Managed $2 million Commuter Choice media campaign for Maryland DOT as Treasurer and co-founder of Clean Air and Transportation, Inc. in partnership with US EPA.
- Managed Alternatives Analysis study of proposed outer beltway and BRT and light rail alternatives in Montgomery-northern Prince George's Counties, MD, considering air and water quality, traffic, CO_2, energy use, for coalition of civic groups. Managed study of express bus options on HOT lanes in northern Virginia. Founding member DOT/EPA Travel Model Improvement Program Advisory Panel (1993-1997).
- Guided regional Vision Plan initiatives that reshaped several major U.S. metro areas. As advisor to 1000 Friends of Oregon, 1989-94, designed and guided the study, *Making the Land Use-Transportation-Air Quality Connection (LUTRAQ),* which created template for the *Portland 2040 Plan* and numerous other U.S. vision planning initiatives. Designed and co-managed the Baltimore Regional Partnership visioning initiative with the Baltimore Metropolitan Council 1999-2003, linking the Baltimore Urban League, 1000 Friends of Maryland, Chesapeake Bay Foundation, and Environmental Defense Fund. Strategic advisor to long-range plan development in Denver, Atlanta, and New York.
- Worked in 1990s and early 2000s with industry and stakeholder groups as a member of the Intelligent Transportation Systems for America (ITSA) Environment and Energy Committee to consider how to strengthen integration of ITS with environmental and energy strategies and other modes, writing several papers on this subject.
- Member EPA Freight, Economy and Environment Working Group (1995-97). Member of U.S. EPA MOVES Emission Model Advisory Committee overseeing preparation of new federal emission factor

model (2007-2009). Wrote paper and conducted briefings on how an indirect source rule (ISR) could help cut pollution from new development, contributing to adoption of San Joaquin Valley Air Pollution Control District ISR (2005).

- Directed efforts to enforce and defend the Clean Air Act transportation conformity provision, winning 1999 US Court of Appeals ruling to close EPA regulatory loophole that exempted road projects from accountability for air quality. Directed litigation that diverted $300 million in funds from sprawl-inducing highway expansions around Atlanta into transit, safety, and pedestrian/bicycle improvements.
- Directed successful lawsuit resulting in EPA settlement agreement to enforce missed deadlines for issuance of federal or state implementation plans for attainment of ozone standards in the 10 largest U.S. metropolitan regions outside Los Angeles, including regional pollution caps that helped cut transportation plans motor vehicle emissions (1998-2001). Directed successful lawsuit settled in 2000 with EPA agreement to reinstate existing ozone non-attainment designations for over 1500 counties that had been exempted from transportation conformity accountability standards.
- Testified in legal cases on effects of added transportation capacity on traffic and pollution in Florida, Oregon, New Jersey, Connecticut, and District of Columbia. (1994-99).

Institute for Transportation and Development Policy

Founder and President | 1985-1992, 1998-2009

- Led organizational start-up and development as volunteer President of the Board. Responsible for conceiving and incorporating organization, forming board of directors, managing fundraising, strategic planning, organizational development, hiring of executive directors. Helped win $2 million US AID grant to promote livable cities transport initiatives in Africa, Asia, and Latin America (2002-04) and $6 million/year 5-year Climate Works grant in 2008, growing ITDP staff to 70+ in 8 offices worldwide.
- Organized and led 1984-88 Bikes Not Bombs campaign that recycled and sent 10,000 donated second-hand bicycles to Nicaragua to aid health and education programs. Project created and spun-off successful bicycle and wheelchair assembly and training workshops employing 40 local staff.

Opened new research areas with seminal research first defining sustainable transportation in 1987, published as "Sustainability: A Vital Concept for Transportation Planning and Development," *Journal of Advanced Transportation* (1990). Founded Transportation Research Board Committee on Transport Planning for Developing Countries (1985-92); elected *Emeritus* Member of Transportation Research Board Committee on Transportation in the Developing Countries in 2005.

Maryland-National Capital Parks and Planning Commission

Transportation Coordinator | 1983-1992

- Managed Transportation Modeling Group, M-NCPPC. Supervised work of 8 transportation engineers and planners who developed and used Montgomery County's computer transportation models and GIS for land use and transportation planning for jurisdiction of 800,000 people.

- Managed transport element on Montgomery County Vision Plan analysis. Lead transportation planner for long-range *Comprehensive Growth Policy Study* (1988-90), which evaluated transit/pedestrian-oriented development, demand management, and alternative infrastructure investments. This showed how county could double its population and employment over 30 years without excess congestion by focusing development around expanded transit, with improved walking and cycling, and traffic management.
- Managed *Montgomery County Annual Growth Policy*, which recommended development approval caps to County Council under the County's Adequate Public Facilities Ordinance, based on analysis of job and housing growth scenarios, policies, and investment options. Wrote *Alternative Transportation Scenarios and Staging Ceilings Staff Report,* and *Short-Term Traffic Alleviation Policy.*
- Managed development of innovative travel models, data collection, GIS, using EMME2 and TRANSCAD software. Initiated and managed household travel panel survey, and new approaches to measure pedestrian friendliness and its effects on travel behavior.
- Managed regional travel model and data systems development as founder and Chair of Travel Forecasting Committee of Washington Metropolitan Transportation Planning Board. Prepared workplans to support compliance by region to new federal requirements. Helped guide Long Range Plan and regional transportation improvement program, and air quality-transportation conformity analysis for Washington, DC region.
- Managed project planning studies, including *Corridor Cities Transit Easement Study* of potential light rail/busway from Shady Grove to Clarksburg and guided travel model analysis of master plans and Maryland State Highway Administration project planning studies.

Public Technology, Inc.

Research Associate | 1979-1983

- Documented and disseminated best practices in public transport and transport environmental mitigation, organizing conferences, training programs, and researching and writing articles and guidebooks.

SPEAKING

Speaker at hundreds of US and global transportation and environmental conferences. Lecturer at MIT, University of California/Davis, Cornell, George Mason, Catholic, George Washington, NYU, Harvard, University of Pennsylvania, American University, University of Vermont, Rutgers.

EDUCATION

- B.A. *cum laude* in Sociology, University of Pennsylvania, 1978.
- B.S.E. *cum laude* in Civil and Urban Engineering, University of Pennsylvania, 1978.
- M.S.E. in Civil and Urban Engineering, University of Pennsylvania, 1978.
- Week-long seminar in Negotiation, Harvard University, 1995.

CHRONOLOGICAL SAMPLE OF PUBLICATIONS

- M. Replogle, Comment on Docket No, DOT-OST-2023-0087: Regarding US DOT Equity Action Plan, on behalf of Institute for Transportation and Development Policy and 19 other organizations. June 2023.

- José Holguín-Veras, et.al. including M. Replogle, "The New York City Off-Hour Delivery Program: A Business and Community-Friendly Sustainability Program", *Interfaces,* Vol. 48 Issue 1, 2018 and NYUScholars.nyu.edu

- Michael Replogle, Carlos Felipe Pardo, Dario Hidalgo, Adriana Lobo, Salvador Herrera, David Uniman, Angelica Vesga, Stephanie Lotshaw, Dani Simons, Holly LaDue, Michael Kodransky, Aimee Gauthier, and Walter Hook (editors), *The Life and Death of Urban Highways*, Institute for Transportation and Development Policy, New York, 2012. https://www.itdp.org/2012/03/13/the-life-and-death-of-urban-highways/

- M. Replogle, "Congestion Charging Gains Ground in U.S.," *Sustainable Transport,* No. 19, Fall 2007.

- M. Replogle, "High Performance Corridors: Emerging Transportation Management Framework?," First International Conference on Funding Transportation Infrastructure, Baniff, Alberta, August 2006. University of Calgary.

- M. Replogle and Keri Funderburg, *No More Just Throwing Money Out the Window: Using Road Tolls to Cut Congestion, Protect the Environment, and Boost Access for All,* EDF, New York, NY, 2006.

- M. Replogle, Bob Yuhnke, and David Greenblatt, "Particulate Monitor Siting in Relation to Major Highways in Metro Washington, DC: Effects on Measured Pollution Concentrations and Implications for Policy," U.S. EPA 2006 National Air Monitoring Conference, Las Vegas, Nevada, November 2006.

- M. Replogle, "Putting a Price on Driving: Can Market Incentives Fix America's Transportation Woes?" *Next American City*, Issue 10, May 2006.

- M. Replogle, "New Law, New Questions, Missed Opportunities: What Does SAFETEA-LU Mean for Planning and the Environment," *Planning Magazine*, American Planning Association, May 2006.

- M. Replogle and John Balbus, M.D., M.P.H., "Considering Cancer Risk in Transportation Decision-Making," *Environmental Manager*, June 2005, page 14-17.

- M. Replogle, *New Toll Road vs. Toll Managed Lanes on Existing Motorways: Alternatives and Impacts In Metro Washington, DC*, PIARC/International Road Federation, *Proceedings of PIARC Seminar on Road Pricing with Emphasis on Financing, Regulation and Equity*, Cancun, Mexico, April 2005.

- Environmental Defense, Chesapeake Bay Foundation, Audubon Naturalist Society, Sierra Club, Coalition for Smarter Growth, *The Intercounty Connector: Impacts and Alternatives,* Washington, DC, January 2005.

- F. Kaid Benfield and M. Replogle, "The Roads More Traveled: Sustainable Transportation in America – Or Not", *Environmental Law Reporter*, Vol. 32, Number 6. 14 pages. June 2002 (also published in Dernbach, John C., *Stumbling Toward Sustainability,* Environmental Law Institute, Washington, DC, 2002, p. 647-665)

- Michael Oppenheimer and M. Replogle, *Sustainability and Renewal of Civil Infrastructure: An Environmental Perspective*, EDF, 1999. 20 pages.

- Replogle, Michael and David Reinke, “Estimating the Effects of Transportation Pricing Policies on Travel behavior: Current Techniques and Future Directions”, Presented to the Pricing Committee, Transportation Research Board 77th Annual Meeting, Washington D.C. 1998.

- M. Replogle, "Overcoming Barriers to Transportation Cost Internalization," *Social Costs and Sustainability: Valuation and Implementation in the Energy and Transport Sector,* (O.Hohmeyer, R.L.Ottinger, K.Rennings, eds.), Springer-Verag New York, 1997, 19 pg.

- Chesapeake Bay Foundation and Environmental Defense Fund, *A Network of Livable Communities: Evaluating Travel Behavior Effects of Alternative Transportation and Community Designs for the National Capital Region*, CBF, Annapolis, Md, May 1996.

- Edward Beimborn and Rob Kennedy, (M. Replogle, editor) *Inside the Black Box: Making Transportation Models a Tool for Livable Communities*, Citizens for a Better Environment/EDF, 1996, 52 pages.

- Walter Hook and M. Replogle, "Motorization and Non-Motorized Transport in Asia: Transport System Evolution in China, Japan, and Indonesia," *Land Use Journal*, Jan. 1996. 21 pages.

- M. Replogle, "Effects of Highway Capacity Changes on Energy Use and the Environment," a Minority Report to the Transportation Research Board study, *Expanding Metropolitan Highways: Implications for Air Quality and Energy Use*, July 1995. 15 pages.

- M. Replogle and Walter Hook, "Improving Access for the Poor in Urban Areas," *Appropriate Technology*, June 1995. 3 pages.

- M. Replogle, *Integrating Pedestrian and Bicycle Factors into Regional Transportation Planning Models: Summary of the State-of-the-Art and Suggested Steps Forward*, Urban Design, Telecommunication and Travel Forecasting Conference: Summary, Recommendations and Compendium of Papers, Travel Model Improvement Program, Arlington, TX, 1995. 21 pages.

- M. Replogle, "What's Sustainable," Suzan Zelinski and Gordon Laird (editors), *Beyond the Car: Essays on the Auto Culture*, Steel Rail Publishing, Toronto, 1995.

- M. Replogle and Hank Dittmar, *Integrating Transportation Management Strategies*, Presented at TRB conference on TDM, Arlington, VA, Nov. 1994. 24 pages.

- M. Replogle, *Intelligent Transportation Systems for Sustainable Communities*, EDF, June 1994. 22 pages.

- M. Replogle, *Transportation Conformity and Demand Management: Vital Strategies for Air Quality*, EDF, April 1993. 121 pages.

- M. Replogle, *IVHS at Risk: A Critique of the Draft National Program Plan for Intelligent Vehicle Highway Systems.* 1993. 20 pages.

- M. Replogle, *Bicycle and Pedestrian Programs in Asia, Australia, and New Zealand*, Federal Highway Administration, 1993. Free from National Bicycle & Pedestrian Clearinghouse: 800-760-6272. 84 pages.

- M. Replogle and H. Parcells, *Linking Bicycle/Pedestrian Facilities to Transit,* FHWA, 1993. National Bicycle & Pedestrian Clearinghouse.

- M. Replogle, *Non-Motorized Vehicles in Asian Cities,* World Bank Technical Paper No. 162, Asia Technical Department Series, 1992, 75 pp.

- M. Replogle, "Bicycle Access to Public Transportation: Learning from Abroad," *Institute of Transportation Engineers Journal,* Vol. 62, #12, Dec. 1992, 6 pages.

- M. Replogle, "Bicycle Access to Public Transportation: Learning from Abroad," *Transportation Research Record 1396*, 1991.

- M. Replogle, "Sustainability: A Vital Concept for Transportation Planning and Development," *Journal of Advanced Transportation*, Durham, NC, vol.25, no.1, Spring 1991, pp. 3-18 (Presented at Conference on Urban Transport in Developing Countries, Sao Paulo, Brazil, 1989). 8 pages.

- M. Replogle, "Sustainable Transportation Strategies for Third World Development," *Transportation Research Record No. 1294*, Transportation Research Board, Washington, DC, 1991, pp. 1-9 (paper presented at World Conference on Transport Research, Yokohama, Japan).

- *Montgomery County Comprehensive Growth Policy Study, Vol 2: Alternative Scenarios and Evaluation*, order from Montgomery County Planning Board, Maryland National Capital Park and Planning Commission, 8787 Georgia Ave., Silver Spring, Maryland, August 1989, 142 pp.

- M. Replogle, "Computer Transportation Models for Land Use Regulation and Master Planning in Montgomery County," *Transportation Research Record 1262*, Wash., DC, 1989. 18 pages.

- M. Replogle, "The Role of Bicycles in Public Transportation Access," *Transportation Research Record 959*, Transportation Research Board, 1989. Pg 55-62.

- M. Replogle, *Bicycles and Public Transportation: New Links to Suburban Transit Markets,* Bicycle Federation, 1983, Wash, DC. 180 pages.

ATTACHMENT 2: REFERENCES

AASHTO. “State DOTs Highlight Benefits of $1.2T Infrastructure Bill.” *American Association of State Highway and Transportation Officials*. (2021). https://aashtojournal.transportation.org/state-dots-highlight-benefits-of-1-2t-infrastructure-bill/

ADB. “Sustainable Transport Appraisal Rating, WEB-STAR.” (n.d.) Last accessed: Jan. 25, 2024. https://tpassess.adb.org/index.html

American Public Transportation Association. “Ridership Report.” (2023). https://www.apta.com/research-technical-resources/transit-statistics/ridership-report/

Bike City. “Is Germany becoming a cycling country?” (June 21, 2022). https://amplerbikes.com/nl-NL/blog/is-germany-becoming-a-cycling-country

Bradbury, J., Subin, Z., Holland, B. and Levandowski, R. “Issue Brief: States Are in the Driver’s Seat on Transportation Carbon Pollution.” *Georgetown Law, Georgetown Climate Center*. (Mar. 24, 2023). https://www.georgetownclimate.org/blog/states-in-the-driver-eys-seat.html

Burbank, C. “Strategies for Reducing the Impacts of Surface Transportation on Global Climate Change: A Synthesis of Policy Research and State and Local Mitigation Strategies.” Parsons Brinckerhoff, Inc. Prepared for American Association of State Highway and Transportation Officials. (2009). https://rosap.ntl.bts.gov/view/dot/18599

CA Office of Planning and Research. “Technical Advisory, On Evaluating Transportation Impacts in CEQA.” (2018). https://opr.ca.gov/docs/20190122-743_Technical_Advisory.pdf

Cambridge Systematics, Inc. “Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions.” Washington, D.C.: *Urban Land Institute*. (2009). https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/MovingCoolerExecSummaryULI.pdf

CARB. “2017 Scoping Plan-Identified VMT Reductions and Relationship to State Climate Goals.” California Air Resource Board. (2019).

CCICED. “Promoting Urban Green Travel, CCICED Special Policy Study Summary Report.” *China Council for International Cooperation on Environment and Development*. (2013). https://itdpdotorg.wpengine.com/wp-content/uploads/2014/07/Promoting-Urban-Green-Travel-CCICED1.pdf

Cervero, R. and Hansen, M. “Induced travel demand and induced road investment: A simultaneous equation analysis.” *Journal of Transport Economics and Policy*, 36(3), pp.469-490. (2002). https://www.jstor.org/stable/20053915

CH2M. “Hawaii Department of Transportation Mid-Range Transportation Plan: Proposed Plan and Next Steps.” Prepared for Hawaii Department of Transportation. (2020).

City and County of Honolulu. “O‘ahu Bike Plan.” (Dec. 2019). https://www.honolulu.gov/rep/site/dts/bike_docs/OBP_Final_2019_Oahu_Bike_Plan_Update.pdf

City and County of Honolulu. “O‘ahu Pedestrian Plan.” (July 2022). https://www.honolulu.gov/rep/site/dts/dts_docs/20230525_Ped%20Plan%20Final%20Report_noappendices_compressed.pdf

CO DOT. “Carbon Reduction Strategy.” (Nov. 2023). https://www.codot.gov/programs/environmental/greenhousegas/assets/colorado-carbon-reduction-strategy-repaired.pdf

Data USA. “Hawaii, Housing and Living, Transportation, Commuter Transportation.” (n.d.). https://datausa.io/profile/geo/hawaii#mode_transport

Data USA. “Hawaii.” (n.d.). Last accessed: Jan. 25, 2024. https://datausa.io/profile/geo/hawaii

DBEDT. “Hawaii Climate Change Action Plan.” (1998). https://planning.hawaii.gov/wp-content/uploads/2016/06/HawaiiActionPlan1998.pdf

DBEDT. “State of Hawaii Data Book Timeseries, Section 18: Transportation.” (n.d.). https://dbedt.hawaii.gov/economic/databook/data_book_time_series/

DBEDT. “Table 18.25-- Public Transit, for O‘ahu: 1993 to 2022.” *State of Hawaii Data Book 2022*. (2022). https://files.hawaii.gov/dbedt/economic/databook/2022-individual/18/182522.pdf

Duranton, G. and Turner, M.A., “The fundamental law of road congestion: Evidence from US cities.” *American Economic Review*, 101(6), pp.2616-2652. (2011). https://www.aeaweb.org/articles?id=10.1257/aer.101.6.2616

FHWA. “Docket No. FHWA-2021-0004.” (Oct. 13, 2022).

FHWA. “Highway Performance Monitoring System (HPMS).” Page last modified: Nov. 7, 2014. (n.d.). https://www.fhwa.dot.gov/policyinformation/hpms/epastat.cfm

Fleming, S. “What Makes Copenhagen the World’s Most Bike-Friendly City.” *World Economic Forum*. (Oct. 5, 2018). https://www.weforum.org/agenda/2018/10/what-makes-copenhagen-the-worlds-most-bike-friendly-city/

FTA. “Public Transportation’s Role in Responding to Climate Change.” (Jan. 2010). https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/PublicTransportationsRoleInRespondingToClimateChange2010.pdf

Georgetown Climate Center. “BLOG: A growing number of states are taking steps to align transportation planning decisions with climate targets.” (Jan. 10, 2024). https://www.georgetownclimate.org/blog/a-growing-number-of-states-are-taking-steps-to-align-transportation-planning-decisions-with-climate-targets-eo.html

Georgetown Climate Center. “Issue Brief: Estimating the Greenhouse Gas Impact of Federal Infrastructure Investments in the IIJA.” (2021). https://www.georgetownclimate.org/articles/federal-infrastructure-investment-analysis.html

Georgetown Climate Center. “Issue Brief: Flexible Federal Funding Opportunities for State and Local Clean Transportation Investments.” (2023). https://www.georgetownclimate.org/blog/federal-transportation-funding-flexibility.html

Grant, M., Hartley, S., Milam, R., Walters, J., O'Rourke, L., Brickett, J. and Suter, S. “Handbook for Estimating Transportation Greenhouse Gases for Integration into the Planning Process.” Report No. FHWA-HEP-13-026. U.S. Federal Highway Administration. (2013b). https://rosap.ntl.bts.gov/view/dot/50823

Grant, M., Siwek, S., O'Rourke, L., Rose, E. and O'Connell, J. “A Performance-Based Approach to Addressing Greenhouse Gas Emissions through Transportation Planning.” Report No. FHWA-HEP-14-020. U.S. Federal Highway Administration. (2013a). https://rosap.ntl.bts.gov/view/dot/50820

Handy, S. and Boarnet, M. G. “Impact of Highway Capacity and Induced Travel on Passenger Vehicle Use and Greenhouse Gas Emissions, Policy Brief.” California Environmental Protection Agency. (2014a).

Handy, S. and Boarnet, M. G. “Impact of Highway Capacity and Induced Travel on Passenger Vehicle Use and Greenhouse Gas Emissions, Technical Background Document.” California Environmental Protection Agency. (2014b).

Haw. Climate Comm’n. “Final Vehicle Miles Traveled Policy Brief.” (2022b).

Haw. Climate Comm'n. "Investing in Transportation Choices, Recommendations for Safe, Sustainable, Affordable, and Reliable Mobility." (2022a). https://climate.hawaii.gov/wp-content/uploads/2023/07/Investing-in-Transportation-Choices-V6.pdf

Haw. Climate Comm'n. "Roadway Expansion and Vehicle Miles Traveled." (n.d.). Last accessed: Jan. 25, 2024. https://climate.hawaii.gov/hi-mitigation/hi-clean-cars-faq/roadway-expansion-and-vehicles-miles-traveled/

HCEI. "HCEI Road Map, 2011 Edition." (2011). https://www.nrel.gov/docs/fy11osti/52611.pdf

HCEI. "Transportation Energy Analysis." *The International Council on Clean Transportation*. Prepared for: Hawaii Department of Business, Economic Development & Tourism and Hawaii State Energy Office. (2015). https://energy.hawaii.gov/wp-content/uploads/2011/09/Final_TransEnergyAnalysis_8.19.15.pdf

HDOH. "Hawai'i Greenhouse Gas Emissions Report for 2005, 2018, and 2019." (Apr. 2023). https://health.hawaii.gov/cab/files/2023/05/2005-2018-2019-Inventory_Final-Report_rev2.pdf

HDOT. "Act100 Report Portal." (n.d.). Last accessed: Jan. 23, 2024. https://highways.hidot.hawaii.gov/stories/s/cn5s-zh7q

HDOT. "Annual Raised Crosswalks." (n.d.). https://highways.hidot.hawaii.gov/Act100/Annual-Raised-Crosswalks/nxkd-jycz

HDOT. "Bicycle Planning." (n.d.) https://highways.hidot.hawaii.gov/stories/s/Bicycle-Planning/v4zn-nbn4#bikeway-map

HDOT. "Comment Letters." (n.d.).

HDOT. "Improve Safety." (n.d.). Last accessed: Jan. 25, 2024. https://highways.hidot.hawaii.gov/stories/s/Read-More-About-Safety-Goals-2023/eisc-ceus

HDOT. "Ped-PM-Facility_Chart." (n.d.). Last updated: Dec. 5, 2023. https://highways.hidot.hawaii.gov/Bike-Pedestrian-Data/PED-PM-FACILITY_CHART/if5u-d8yi

HDOT. "RFP 46(ii)." (n.d.).

HDOT. "SmartTRAC Project Proposals." (n.d.).

HDOT. "Statewide AVMT." (n.d.).

HDOT. “Bike Plan Hawaii.” (2003). https://hidot.hawaii.gov/highways/bike-plan-hawaii-master-plan/

HDOT. “Hawaii Statewide Transportation Plan, Hawaii’s Multi-Modal and Inter-Modal Network, Executive Summary.” (2011). https://hidot.hawaii.gov/administration/files/2013/02/hstp2011-executive-summary.pdf

HDOT. “Highways Division Project Prioritization Guideline.” Highways Division. (2013a). https://hidot.hawaii.gov/highways/files/2013/10/4-131014-STIP-HWY-DIV-Project-Selection-Guideline-10182013.pdf

HDOT. “Statewide Pedestrian Master Plan.” (2013b). https://hidot.hawaii.gov/highways/files/2013/07/Pedest-Plan-PedMP.pdf

HDOT. “Hawai‘i Pedestrian Toolbox.” (2013c). https://hidot.hawaii.gov/highways/files/2013/07/Pedest-Tbox-Hawaii-Pedestrian-Toolbox-Low-Res.pdf

HDOT. “Statewide Federal-Aid Highways 2035 Transportation Plan.” (2014). https://hidot.hawaii.gov/highways/files/2014/09/Statewide-Federal-Aid-Highways-2035-Transportation-Plan_Yong.pdf

HDOT. “Practical Solutions Action Plan.” (2016).

HDOT. “Report to the Thirtieth Legislature of The State of Hawaii, Regular Session of 2020, on Act 100 Section 7 Session Laws of Hawaii 1999.” (Dec. 18, 2019). https://hidot.hawaii.gov/wp-content/uploads/2019/12/ACT-100-09-Government-Operations-Report.pdf

HDOT. “Interim Planned Development-Transit (IPD-T) and Special District (SDD) Permit Application No. 2020/SDD-45.” (Sept. 8, 2020)

HDOT. “Statewide Transportation Improvement Program (STIP) Fiscal Years 2022, 2023, 2024 and 2025 (2026 and 2027 Illustrative Years).” (2021a). https://drive.google.com/file/d/1bH9Aqb65r1mM1cVVzhNVSXRTvRMuw3UP/view

HDOT. “2021 Act 100 Report.” (2021b). Last accessed Jan. 23, 2024. https://highways.hidot.hawaii.gov/stories/s/2021-Act-100-Report-Homepage/fujm-qxwq

HDOT. “Application to Amend the Master Plan Permit (PL MASP 13.2.8) for Kamehameha Schools’ Kaiaulu O Kakaako Master Plan (KKMP) Kakaako, Oahu, Hawaii.” (2021c).

HDOT. “Hawaii Statewide Transportation Plan, DRAFT – November 2022.” (2022a). https://hidot.hawaii.gov/administration/files/2022/12/HawaiiStatewideTransPlan_Draft_compressed.pdf

HDOT. “Hawaii Statewide Transportation Plan, Executive Summary.” (2022b). https://hidot.hawaii.gov/administration/files/2022/12/HSTP_Exec_Summ_2022_compressed.pdf

HDOT. “2022 Act 100 Report.” (2022c). Last accessed Jan. 23, 2024. https://highways.hidot.hawaii.gov/stories/s/2022-Act-100-Report-Homepage/n8yx-tyve

HDOT. “VMT Reduction Toolkit.” (2022d).

HDOT. “MRTP Project Programming Request (PPR).” (2022e).

HDOT. “Bike Plan Hawai‘i Refresh: Priorities & Implementation Plan 2022.” (2022f). https://drive.google.com/file/d/1BHmKGhH93bCC2dd3qUMC49H7mXTDfCCV/view

HDOT. “Bike Plan Hawai‘i Refresh: Public Survey Results – Statewide.” (2022g). https://drive.google.com/file/d/1YBaX-iG22aqv1hNCdeqlF0NlKsWU0RYd/view

HDOT. “Highways Division Procedures, Complete Streets.” (2022h).

HDOT. “National Electric Vehicle Infrastructure (NEVI) Hawai‘i State Plan (July 2022); Addendum (Sept. 2022). (2022i). https://hidot.hawaii.gov/highways/files/2022/08/National-Electric-Vehicle-Infrastructure-NEVI-Program-SUBJECT-TO-APPROVAL.pdf ; https://hidot.hawaii.gov/highways/files/2023/03/Hawaii-State-NEVI-Plan-Addendum-September-2022.pdf

HDOT. “Statewide Transportation Improvement Program (STIP) FFY 2022 thru FFY 2025 (FFY 2026-2027 Informative Only) Revision #15 Amendment Approved, Revision Effective Date: September 12, 2023.” (2023a). https://drive.google.com/file/d/1jVpvujl_yBGFEbc866LryxWTh89HDVu-/view

HDOT. “National Electric Vehicle Infrastructure (NEVI) Hawai‘i State Plan, Update | August 2023.” (2023b). https://hidot.hawaii.gov/highways/files/2023/11/HDOT-2023-NEVI-Plan-Update.pdf

HDOT. “Report to the Thirty-Second Legislature of The State of Hawaii, Regular Session of 2023, on Act 100 Section 7 Session Laws of Hawaii 1999.” (2023c). https://hidot.hawaii.gov/wp-content/uploads/2023/05/2022-Government-Operations-Report-ACT100.pdf

HDOT. “2023 Act 100 Report.” (2023d). Last accessed Jan. 23, 2024. https://highways.hidot.hawaii.gov/stories/s/2023-Act-100-Report-Homepage/8aqy-atx3

HDOT. “Multi-Modal Integration.” (2023e). Last accessed: Jan. 25, 2024. https://highways.hidot.hawaii.gov/stories/s/Read-More-About-Multi-Modal-Integration-Goals-2023/h23g-dzri

HDOT. “Draft Hawaii Statewide Transportation Plan.” (2023f).

HDOT. “Performance Measure: Pedestrian Fatalities.” (2023g).

HDOT. “State of Hawai‘i Transportation Carbon Reduction Strategy.” (2023h). https://hidot.hawaii.gov/wp-content/uploads/2024/03/nov-2023-carbon-reduction-strategy.pdf

HDOT. “Statewide Transportation Improvement Program (STIP) Fiscal Years 2022 thru FFY 2025 (FFY 2026-2027 Informative Only) Revision #17 Administrative Modification Processed, Revision Effective Date: January 12, 2024.” (2024). https://drive.google.com/file/d/1oUhOl-sia-_yCZXFd_kQIIxY5Ffy5kvc/view

Hook, W., Replogle, M. and Hughes, C. K., “Manual for Calculating Greenhouse Gas Benefits of Global Environment Facility Transportation Projects.” *Institute for Transportation & Development Policy*, prepared for the Scientific and Technical Advisory Panel of the Global Environment Facility. (2022). https://www.itdp.org/wp-content/uploads/2022/03/GEF_CalculatingGHGbenefits_webCD.pdf

Hu, W. “No Longer New York City’s ‘Boulevard of Death.’” (Dec. 3, 2017). New York Times, https://www.nytimes.com/2017/12/03/nyregion/queens-boulevard-of-death.html

ICF Consulting. “Assessment of Greenhouse Gas Analysis Techniques for Transportation Projects.” (2006). https://onlinepubs.trb.org/onlinepubs/archive/notesdocs/25-25(17)_fr.pdf

ITDP. “Compact Cities Electrified.” Institute for Transportation and Development Policy. (Aug. 18, 2023). https://www.itdp.org/publications/

ITDP. “Transport Emissions Evaluation Models for Projects.” (2015). https://www.itdp.org/what-we-do/climate-and-transport-policy/transport-emissions-evaluation-models-for-projects/

Marsal, A. “Germany Plans to Become a Cycling Superpower by 2030.” (Oct. 21, 2021). https://www.welovecycling.com/wide/2021/10/21/germany-plans-to-become-a-cycling-superpower-by-2030/

Miller, A. “Colorado Proposes Shift from Highway Expansion to Transit.” National Resources Defense Council. (2022). https://www.nrdc.org/bio/alana-miller/colorado-proposes-shift-highway-expansion-transit

MN DOT. “Carbon Reduction Strategy.” (Nov. 2023). https://www.dot.state.mn.us/carbon-reduction-program/

National Academies of Sciences, Engineering, and Medicine. “Incorporating Greenhouse Gas Emissions into the Collaborative Decision-Making Process.” SHRP 2 Report S2-C09-RR-1. Washington, DC: The National Academies Press. (2012). https://doi.org/10.17226/22805

NCHRP. “Methods for State DOTs to Reduce Greenhouse Gas Emissions from the Transportation Sector.” Washington, DC: The National Academies Press. (2022b). https://doi.org/10.17226/26523.

NCHRP. “Reducing Greenhouse Gas Emissions: A Guide for State DOTs.” (2022a). https://crp.trb.org/nchrpwebresource1/

NYC. “New York City’s Roadmap to 80x50.” (2016). https://www.nyc.gov/assets/sustainability/downloads/pdf/publications/New%20York%20City's%20Roadmap%20to%2080%20x%2050_Final.pdf

NYC DOT. “Bicyclists: Cycling in the City.” (n.d.). Last accessed: Jan. 25, 2024. https://www.nyc.gov/html/dot/html/bicyclists/cyclinginthecity.shtml

NYC DOT. “Electrifying New York: An Electric Vehicle Vision Plan for New York City.” (2021a). https://www.nyc.gov/html/dot/downloads/pdf/electrifying-new-york-report.pdf

NYC DOT. “Safe Streets for Cycling: How Street Design Affects Bicycle Safety and Ridership.” (2021b). https://www.nyc.gov/html/dot/downloads/pdf/safe-streets-for-cycling.pdf

NYC DOT. “Strategic Plan 2016.” (2016). https://www.nyc.gov/html/dot/downloads/pdf/Strategic-plan-2016.pdf

OTC. “State of Oregon, Carbon Reduction Strategy.” Oregon Department of Transportation. (2023). https://www.oregon.gov/odot/Get-Involved/OTCSupportMaterials/Agenda_F_Climate_Office_Update_PACKET.pdf

Replogle, M. “A Global High Shift to Public Transport, Walking, and Cycling: New Roadmap for Low Carbon Inclusive Urban Transportation.” *Institute for Transportation & Development Policy*. (2014a). https://www.itdp.org/2014/09/17/a-global-high-shift-to-

public-transport-walking-and-cycling-new-roadmap-for-low-carbon-inclusive-urban-transportation/

Replogle, M. "A Global High Shift to Public Transport, Walking, and Cycling: New Roadmap for Low Carbon Inclusive Urban Transportation." *Institute for Transportation & Development Policy.* (2014b). https://itdpdotorg.wpengine.com/wp-content/uploads/2014/09/A-Global-High-Shift-Scenario_WEB.pdf

Replogle, M. "New York City DOT's Sustainable Transportation Initiatives." Institute for Transportation and Development Policy. (Aug. 2023). [on file with author]

RMI. "Roadway Expansions and Vehicle Miles Traveled." Haw. Climate Comm'n. (2022). https://climate.hawaii.gov/hi-mitigation/hi-clean-cars-faq/roadway-expansion-and-vehicles-miles-traveled/

Rooney, K. "Item VI.A. New TIP FFYs." O'ahu Metropolitan Planning Organization. (2021).

Rubin, C., Abonour, R. and Gahbauer, J. "Closing the Climate Investment Gap: California Must Prioritize Climate-Smart Transportation Projects." NRDC. (2023). https://www.nrdc.org/sites/default/files/2023-09/ca-transportation-investment-report.pdf

Salerno, C. "The IIJA is a climate time bomb. Will states defuse it?" (Feb. 2024) https://t4america.org/2024/02/28/the-iija-is-a-climate-time-bomb-will-states-defuse-it/

SSTI. "Hawaii: Drivers of VMT and priority reduction strategies." Smart Growth America. (2021). https://climate.hawaii.gov/wp-content/uploads/2023/07/USCA_Hawaii_VMT_strategies_Feb22.pdf

Stampe, E. "Honolulu's New Bus-Only Lane Puts People and Climate First." (Dec. 14, 2020). https://www.nrdc.org/bio/elizabeth-stampe/honolulus-new-bus-only-lane-puts-people-and-climate-first

State of Hawai'i, Department of Budget and Finance. "Executive Biennium Budget, Fiscal Budget 2021-2023, The Operating and Capital Budget for the Department of Transportation." (2020). https://budget.hawaii.gov/wp-content/uploads/2020/12/26.-Department-of-Transportation-FB21-23-PFP.8ag.pdf

State of Hawai'i, Department of Budget and Finance. "Executive Biennium Budget, Fiscal Budget 2023-2025, The Operating Capital Budget for the Department of Transportation." (2022b). https://budget.hawaii.gov/wp-content/uploads/2022/12/27.-Department-of-Transportation-FB23-25-PFP.Lk0_.pdf

State of Hawai‘i, Department of Budget and Finance. “The FB 2023-25 Executive Biennium Budget, Budget in Brief.” (2022a). https://budget.hawaii.gov/wp-content/uploads/2022/12/FB-23-25-BIB-12-16-22.Lk0_.pdf

STPO. “2016 Traffic Assignments.” (2016).

Thomas, M. “How the Netherlands Built a Biking Utopia.” *Distilled*. (March 8, 2023). https://www.distilled.earth/p/how-the-netherlands-built-a-biking

U.S. DOT. “Agencies Design Raised Crosswalks for Snow, Rain, and Heavy Vehicles.” Safe Transportation for Every Pedestrian, Case Study. (n.d.). https://safety.fhwa.dot.gov/ped_bike/step/resources/docs/step_casestudies_Agencies_Raised%20Crosswalk073120.pdf

U.S. DOT. “Bipartisan Infrastructure Law (BIL).” (n.d.). Last accessed: Jan. 23, 2024. https://www.fhwa.dot.gov/bipartisan-infrastructure-law/

U.S. DOT. “Carbon Reduction Program.” Last updated: Apr. 23, 2024. https://www.transportation.gov/priorities/climate-and-sustainability/carbon-reduction-program

U.S. DOT. “Integrating GHG Assessment and Reduction Targets in Transportation Planning, By incorporating greenhouse gas (GHG) analysis into transportation planning, agencies can act now to help decrease future emissions.” Federal Highway Administration, Center for Accelerating Innovation. (n.d.). https://www.fhwa.dot.gov/innovation/everydaycounts/edc_7/docs/EDC-7FactsheetGHG.pdf

U.S. DOT. Legislative Mandate: “Bipartisan Infrastructure Law (BIL) / Infrastructure Investment and Jobs Act (IIJA).” (n.d.). Last updated: Feb. 16, 2023. https://www.phmsa.dot.gov/legislative-mandates/bipartisan-infrastructure-law-bil-infrastructure-investment-and-jobs-act-iija

U.S. GAO. “Climate Change, State and Local Efforts to Reduce Greenhouse Gas Emissions from Vehicles.” (Aug. 2023). https://www.gao.gov/assets/gao-23-106022.pdf

UCLA, Institute of Transportation Studies. “Evaluation of California State and Regional Transportation Plans and Their Prospects for Attaining State Goals.” (2021). https://escholarship.org/content/qt50j4b4r8/qt50j4b4r8_noSplash_d80dcb8bb17e845dfd48c1238daedbfb.pdf?t=r7iajg

Ulupono Initiative. “Draft Hawai‘i State Transportation Plan.” (Jan. 12, 2023).

Univ. of Hawai‘i at Manoa. “Hawaii Complete Streets Policy.” *Healthy Hawaii Initiative, Hawaii Department of Health*. (2011).

Volker, J. and Handy, S. “Increasing Highway Capacity Induces More Auto Travel.” *UC Davis: National Center for Sustainable Transportation*. (2023). https://escholarship.org/uc/item/3q21f88p

Volker, J. M, and Handy, S. L. “Updating the Induced Travel Calculator.” *UC Davis: National Center for Sustainable Transportation*. (2022). http://dx.doi.org/10.7922/G2P55KTX

Volker, J.M., Lee, A. and Handy, S. “Induced Vehicle Travel in the Environmental Review Process.” *Transportation Research Record*, *2674*(7), pp. 468-479. (2020). https://journals.sagepub.com/doi/abs/10.1177/0361198120923365

WS DOT. “Washington State Transportation Carbon Reduction Strategy.” (2023). https://wsdot.wa.gov/sites/default/files/2023-11/TCRS-Report.pdf

ATTACHMENT 3: BUDGET ANALYSIS METHODOLOGY

I am familiar with other research that has been conducted to analyze whether transportation budgeting decision aligns with climate change mitigation goals, which includes a recent report in California, as well as analysis produced in Hawai‘i by transportation experts at the Ulupono Initiative. (UCLA, 2021; Rubin et al., 2023; Rooney, 2021). I am also aware of others who are similarly doing these kinds of analyses, including Transportation for America. I used a similar approach to conduct such analysis in the Hawai‘i context, with adjustments based on the relevant and available documents in this state. Specifically, I reviewed the data from the State of Hawai‘i Fiscal Biennium Budgets ("Biennium Budgets") for the operations and capital improvements projects of executive branch agencies, which are publicly available on the capitol.hawaii.gov website.

I used data under the category "Transportation Facilities," under the specific subcategories for: TRN501 (Oahu Highways); TRN511 (Hawaii Highways); TRN531 (Maui Highways); TRN561 (Kauai Highways); and TRN595 (Highways Administration). As indicated in the Biennium Budgets, the projects listed under these five subcategories reflect the HDOT-Highways capital improvements projects that have been proposed and approved for funding. These transportation improvements budgets comprehensively include projects that receive federal funding, as well as projects that receive only state funding. Thus, they more broadly reflect HDOT's budgeting priorities, in comparison to other budget documents such as the STIP, which is a fiscally constrained document that focuses on the subset of projects that receive federal funding.

My review included the Biennium Budgets for the legislative years 2013 through 2023 to assess trends over the past eleven years.[29] This dataset totaled 1,872 projects totaling $8.61 billion in funding for the fiscal years 2013-14 to 2024-25.

Similar to an analysis that was conducted in California, I reviewed the data and organized the projects based on whether they would: (1) increase VMT, (2) decrease VMT, or (3) have no impact on VMT. The reason I looked at VMT is that it can serve as a proxy for transportation- related GHG emissions. (CARB, 2019). As a general proposition, projects that increase VMT increase GHG emissions and projects that decrease VMT decrease GHG emissions. In doing this work, I adapted the guidance issued by the State of California for assessing the VMT/GHG impact of projects (CA Office of Planning & Research, 2018;

[29] A list of source files for the Biennium Budgets from 2013-2023 is attached.

Rubin et al., 2023), which I generally agree with based on my own professional knowledge and experience. The projects are categorized as follows:

Projects that are likely to **increase VMT** include projects that add motor vehicle capacity, such as:

- The addition of through lanes on existing or new highways, including general-purpose lanes, high-occupancy vehicle (HOV) lanes, peak-period lanes, auxiliary lanes, or lanes through grade-separated interchanges.
- The installation or reconfiguration of traffic lanes and/or intersections designed to reduce the travel time for motor vehicles other than projects that are focused on giving priority to public transportation, walking, and cycling.

Projects that are likely to **decrease VMT** include projects that expand or enhance access for multimodal forms of transportation, such as:

- Improving or increasing access to transit;
- Orienting a project toward transit, bicycle, or pedestrian facilities;
- Improving pedestrian or bicycle networks, or transit service; and
- Implementing roadway pricing or substantive incentives for ridesharing.

Projects that are likely to have **no impact on VMT** include projects that neither add motor vehicle capacity or expand or enhance access to multimodal forms of transportation, such as:

- Rehabilitation, maintenance, replacement, safety, and repair projects that are designed to improve the condition of existing transportation assets (e.g., highways; roadways; bridges; culverts; Transportation Management System field elements such as cameras, message signs, detection, or signals; tunnels; transit systems; and assets that serve bicycle and pedestrian facilities) and that do not add additional motor vehicle capacity;
- Conversion of existing general-purpose lanes (including ramps) to managed lanes or transit lanes, or changing lane management in a manner that would not substantially increase or reduce vehicle travel;

- Grade separation to separate vehicles from rail, transit, pedestrians, or bicycles or to replace a lane in order to separate preferential vehicles (e.g., HOV, high-occupancy toll, or trucks lanes) from general vehicles; and
- Installation of roundabouts or traffic circles.

In several instances, the description of transportation projects in the Biennium Budgets include both the addition of new road capacity or reconstruction or replacement of existing bridges or highway segments, along with the addition of sidewalks or bicycle facilities. In the absence of a more detailed breakout of this information, I have generally assumed for this analysis that 80% of the cost of such projects are attributable to the added capacity (i.e., VMT increasing) or to the reconstruction or replacement (i.e., VMT neutral) and 20% of the cost of such projects are attributable to the pedestrian and/or bicycle improvement associated with the project (i.e., VMT decreasing). This is a conservative approach given the much higher costs of traditional roadway work, as well as the science that capacity expansions increase VMT and are not mitigated by concurrent multimodal accommodations. In other words, I took extra steps to give credit for multimodal investments, even when they were only add-ons to capacity expansion projects.

I also created a separate category for projects that have no impact on VMT but include GHG emission reductions, such as energy efficient highway lighting upgrades and electric vehicle charging stations. For highway lighting upgrade projects that did not specify whether the upgrades involved the conversion to more energy efficient lighting, I conservatively assumed these upgrades would reduce energy consumption and thus reduce GHG emissions.

I also categorized projects based on whether they involved expansions or enhancements for bicycles or pedestrians, or neither. This categorization allowed me to count the number of projects with and without these improvements, which sheds further light on the extent to which HDOT is investing in a fully connected multimodal network.

In instances where it was unclear from the available description of the project whether it would increase VMT or have no impact on VMT, I conducted further research on the nature and details of the project as could be gleaned from publicly available information. If I was ultimately unable to find supporting information, I conservatively assumed there was no VMT impact.

Some project descriptions were so generalized and vague that I was unable to discern the nature of the projects, including whether they involved bicycle or pedestrian improvements. These included broad categories such as "Construction for Highways Division Projects Receiving Federal Discretionary Grant Awards" or "Construction for Completion and Closeout of Outstanding Construction Projects," which would seem to encompass any number of discretionary projects of indeterminate nature and scope. In these instances, I categorized the items as "insufficient information provided."

I relied on the following list of Biennium Budgets to perform my analysis:

2013 Highways CIP projects appropriated under Act 134, 06/18/2013
(Gov. Msg. No. 1234)

Source 1:
https://www.capitol.hawaii.gov/sessions/session2013/bills/GM1234_.pdf
Source 1:
https://www.capitol.hawaii.gov/session/archives/measure_indiv_Archives.aspx?billtype=HB&billnumber=200&year=2013

2014 Highways CIP projects appropriated under Act 122, 06/24/2014
(Gov. Ms. No. 1225)

Source 2:
https://www.capitol.hawaii.gov/sessions/session2014/bills/GM1225_.pdf
Source 2:
https://www.capitol.hawaii.gov/session/archives/measure_indiv_Archives.aspx?billtype=HB&billnumber=1700&year=2014

2015 Highways CIP projects appropriated under Act 119, 06/12/2015
(Gov. Msg. No. 1219)

Source 3:
https://www.capitol.hawaii.gov/sessions/session2015/bills/GM1219_.pdf
Source 3:
https://www.capitol.hawaii.gov/session/archives/measure_indiv_archives.aspx?billtype=hb&billnumber=500&year=2015

2016 Highways CIP projects appropriated under Act 124, 06/23/2016
(Gov. Msg. No. 1225)

Source 4:

https://www.capitol.hawaii.gov/sessions/session2016/bills/GM1225_.PDF
Source 4:
https://www.capitol.hawaii.gov/session/archives/measure_indiv_archives.aspx?billtype=hb&billnumber=1700&year=2016

2017 Highways CIP projects appropriated under Act 49, 06/21/2017
(Gov. Msg. No. 1149)

Source 5:
https://www.capitol.hawaii.gov/sessions/session2017/bills/GM1149_.PDF
Source 5:
https://www.capitol.hawaii.gov/session/archives/measure_indiv_archives.aspx?billtype=hb&billnumber=100&year=2017

2018 Highways CIP projects appropriated under Act 053, 06/22/2018
(Gov. Msg. No. 1153).

Source 6:
https://www.capitol.hawaii.gov/session2018/bills/GM1153_.PDF
Source 6:
https://www.capitol.hawaii.gov/session/archives/measure_indiv_archives.aspx?billtype=hb&billnumber=1900&year=2018

2019 Highways CIP projects appropriated under Act 040, 06/07/2019
(Gov. Msg. No. 1141).

Source 7:
https://www.capitol.hawaii.gov/session2019/bills/GM1141_.PDF
Source 7:
https://www.capitol.hawaii.gov/session/archives/measure_indiv_archives.aspx?billtype=hb&billnumber=1259&year=2019

2020 Highways CIP projects appropriated under Act 006, 07/07/2020,
(Gov. Msg. No. 1107).

Source 8:
https://www.capitol.hawaii.gov/session2020/bills/GM1107_.PDF
Source 8:
https://www.capitol.hawaii.gov/session/archives/measure_indiv_archives.aspx?billtype=hb&billnumber=2725&year=2020

2021 Highways CIP projects appropriated under Act 088, on 06/24/2021 (Gov. Msg. No. 1190).

Source 9:
https://www.capitol.hawaii.gov/session2021/bills/GM1190_.PDF
Source 9:
https://www.capitol.hawaii.gov/session/archives/measure_indiv_archives.aspx?billtype=hb&billnumber=200&year=2021

2022 Highways CIP projects appropriated under Act 248 on 07/07/2022 (Gov. Ms. No. 1351).

Source 10:
https://www.capitol.hawaii.gov/sessions/session2022/bills/GM1351_.pdf
Source 10:
https://www.capitol.hawaii.gov/measure_indiv.aspx?billtype=HB&billnumber=1600&year=2022

2023 Highways CIP projects appropriated under Act 164 on 06/30/2023 (Gov. Msg. No. 1267).

Source 11:
https://www.capitol.hawaii.gov/sessions/session2023/bills/GM1267_.pdf
Source 11:
https://www.capitol.hawaii.gov/session/measure_indiv.aspx?billtype=HB&billnumber=300&year=2023

ATTACHMENT 4: LEGAL REFERENCES

23 U.S.C. § 175. Carbon reduction program.
https://www.govinfo.gov/content/pkg/USCODE-2022-title23/pdf/USCODE-2022-title23-chap1-sec175.pdf

49 U.S.C. § 5304. Statewide transportation planning.
https://www.govinfo.gov/content/pkg/USCODE-2011-title49/html/USCODE-2011-title49-subtitleIII-chap53-sec5304.htm

1999 Haw. Sess. Laws Act 100 (S.B. No. 1518).
https://www.capitol.hawaii.gov/slh/Years/SLH1999/SLH1999_Act100.pdf

2015 Haw. Sess. Laws Act 97 (H.B. 623).
https://www.capitol.hawaii.gov/slh/Years/SLH2015/SLH2015_Act97.pdf

2017 Haw. Sess. Laws Act 32 (S.B. No. 559).
https://www.capitol.hawaii.gov/slh/Years/SLH2017/SLH2017_Act32.pdf

2018 Haw. Sess. Laws Act 15 (H.B. 2182).
https://www.capitol.hawaii.gov/slh/Years/SLH2018/SLH2018_Act15.pdf

2019 Haw. Sess. Laws Act 134 (H.B. No. 757).
https://www.capitol.hawaii.gov/slh/Years/SLH2019/SLH2019_Act134.pdf

2021 Haw. Sess. Laws Act 74 (H.B. No. 552).
https://www.capitol.hawaii.gov/slh/Years/SLH2021/SLH2021_Act74.pdf

2021 Haw. Sess. Laws Act 131 (S.B. No. 1402).
https://www.capitol.hawaii.gov/slh/Years/SLH2021/SLH2021_Act131.pdf

88 FR 85364. "National Performance Management Measures; Assessing Performance of the National Highway System, Greenhouse Gas Emissions Measure." FHWA. (2023). https://www.govinfo.gov/content/pkg/FR-2023-12-07/pdf/2023-26019.pdf

HRS § 26-4. Structure of government.
https://www.capitol.hawaii.gov/hrscurrent/Vol01_Ch0001-0042F/HRS0026/HRS_0026-0004.htm

HRS § 26-19. Department of transportation
https://www.capitol.hawaii.gov/hrscurrent/Vol01_Ch0001-0042F/HRS0026/HRS_0026-0019.htm

HRS § 225P-3. Hawaii climate change mitigation and adaptation commission; general functions, duties, and powers.

https://www.capitol.hawaii.gov/hrscurrent/Vol04_Ch0201-0257/HRS0225P/HRS_0225P-0003.htm

HRS § 225P-5. Zero emissions clean economy target.
https://www.capitol.hawaii.gov/hrscurrent/Vol04_Ch0201-0257/HRS0225P/HRS_0225P-0005.htm

HRS § 225P-7. Climate change mitigation.
https://www.capitol.hawaii.gov/hrscurrent/Vol04_Ch0201-0257/HRS0225P/HRS_0225P-0007.htm

HRS § 264-20.5. Complete streets.
https://www.capitol.hawaii.gov/hrscurrent/Vol05_Ch0261-0319/HRS0264/HRS_0264-0020_0005.htm

HRS § 264-142. Ground transportation facilities.
https://www.capitol.hawaii.gov/hrscurrent/Vol05_Ch0261-0319/HRS0264/HRS_0264-0142.htm

HRS § 264-143. Ground transportation; project goals; reporting.
https://www.capitol.hawaii.gov/hrscurrent/Vol05_Ch0261-0319/HRS0264/HRS_0264-0143.htm

HRS § 269-92. Renewable portfolio standards.
https://www.capitol.hawaii.gov/hrscurrent/Vol05_Ch0261-0319/HRS0269/HRS_0269-0092.htm

HRS § 279A-1. Statement of purpose.
https://www.capitol.hawaii.gov/hrscurrent/Vol05_Ch0261-0319/HRS0279A/HRS_0279A-0001.htm

HRS § 279A-2. Statewide transportation plan.
https://www.capitol.hawaii.gov/hrscurrent/Vol05_Ch0261-0319/HRS0279A/HRS_0279A-0002.htm

HRS §§ 279D-1 to -11. Metropolitan Planning Organization.
https://www.capitol.hawaii.gov/hrscurrent/Vol05_Ch0261-0319/HRS0279D/HRS_0279D-.htm

HRS § 286-7.5. Vision Zero.
https://www.capitol.hawaii.gov/hrscurrent/Vol05_Ch0261-0319/HRS0286/HRS_0286-0007_0005.htm

Report to the Thirty-Second Legislature

2023 Regular Session

SEA LEVEL RISE VULNERABILITY AND ADAPTATION REPORT

Prepared by the

State of Hawaii Department of Land and Natural Resources,

Office of Conservation and Coastal Lands

In response to Act 32,

of the Regular Session of 2017;

December 2022

ATTACHMENT C

Hawai`i Sea Level Rise Vulnerability and Adaptation Report

2022 Update



Hawai`i State Climate Commission

Acknowledgements

The Hawai'i State Climate Commission gratefully acknowledges the hard work of the project team for compiling this report. The project team consists of Leah Laramee, Hawai'i Climate Change Mitigation & Adaptation Coordinator, Dr. Bradley Romine and Amy Wirts of the University of Hawai`i Sea Grant College Program, Dr. Charles Fletcher, Dr. Shellie Habel, Dr. Juliette Budge and Colin Lee, Esq of the University of Hawai'i School of Ocean and Earth Sciences Climate Resilience Collaborative, and Amanda Ho, Community Engagement and Climate VISTA.

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Appendix A - Responses to Learning Questions from 2017 Report

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Hawai`i Sea Level Rise Vulnerability and Adaptation Report 2022 Update Executive Summary

Introduction

The 2017 Hawai`i Sea Level Rise Vulnerability and Adaptation Report (2017 Report) was mandated by the Hawai`i Climate Change Adaptation Initiative (Act 83 (Session Laws of Hawaii (SLH) 2014)), and expanded by the Hawai`i Climate Change Mitigation and Adaptation Initiative (Act 32, SLH2017). Through this report the Legislature aimed to address the threat posed by climate change to the economic well-being, public health, natural resources, and environment of Hawai`i. The 2017 Report was prepared in recognition that sea level rise (SLR) is an inevitable outcome of global warming that will continue far into the future, even with an immediate and drastic reduction of greenhouse gas emissions.

In addition to the preparation of the 2017 Report, Act 32 charged the Hawai`i Climate Change Mitigation and Adaptation Commission to conduct a comprehensive review of implementation and submit a report to the governor, legislature, and the counties no later than twenty days prior to the convening of the regular session of the 2023 Legislature and every five years thereafter. This document serves as the five-year update to the 2017 Report and the Commission's report on recent sea level rise adaptation initiatives across State and County government, many of which are a direct result of the information and map data provided by the 2017 Report and companion State of Hawai`i Sea Level Rise Viewer (Viewer).

Scientific Observations and Predictions

In 2017, and again in 2020, the Honolulu Harbor Tide gauge recorded its highest daily mean water levels observed over its 112-year history. These record high water levels were produced by a combination of phenomena that included long-term global sea level rise, peak annual astronomical tides ("king tides"), wave setup, and migration of warm buoyant waters brought in by winds and currents. These events provide a glimpse of what will become a more regular occurrence as sea level continues to rise. Local impacts were observed throughout the State in the form of increased coastal erosion, minor wave over-wash flooding, backshore flooding from groundwater rise and storm drain backflow, and impeded and potentially hazardous beach access.

The United Nations Environment Program Emissions Gap Report, 2022 indicates that globally, nations have missed the emissions goals that may have constrained overall global warming to 1.5° C, and that given our current path and past actions, the world is likely to warm by 2.8°C by the end of the century. Sea level responds to greenhouse gas emissions more slowly than global surface temperature. This slow response leads to long-term committed SLR, associated with ongoing ocean heat uptake and the slow adjustment of the ice sheets. The Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report states with high confidence that "*Global mean sea level will continue to rise for thousands of years, even if future CO_2 emissions are reduced to net zero and global warming halted, as excess energy due to past emissions continues to propagate into the deep ocean and as glaciers and ice sheets continue to melt*." (Arias, et al. (2021)).

Sea level rise exposure mapping in the 2017 Hawai'i Sea Level Rise Report and Hawaii Sea Level Rise Viewer is based on an upper-end projection in the 2013 IPCC 5th Assessment Report of 3.2 feet of global mean sea level rise by 2100. Since completion of the 2017 Report, peer-reviewed scientific literature as

well as government and multinational reports increasingly point to 3 to 4 feet of sea level rise by 2100 as a mid-range, rather than high-end, scenario for Hawai'i. Long-term observational data from local tide gauge stations show that sea level is rising around Hawai'i. Models indicate that Hawai'i and other tropical Pacific sites will experience sea level rise that is 16% to 20% higher than the global average (Sweet. et al. 2022). As the science progresses towards increasingly concerning rates of sea level rise for Hawai`i, it remains imperative that the legislature and state and county agencies maintain a long-term focus on building resiliency to rising seas by reducing overall vulnerability of infrastructure and implementing adaptation measures to allow our state to continue to thrive with higher seas.

Accomplishments and Progress

The 2017 Report included nine recommendations with 49 recommended actions aimed at improving the state's capacity to address the social, economic, and environmental impacts of sea level rise.

Key Statewide Accomplishments:

Use of the Sea Level Rise Exposure Area Data and Sea Level Rise Viewer: Although the Sea Level Rise Exposure Area (SLR-XA) was not officially recognized as a state-wide vulnerability zone, the Viewer and SLR-XA are in widespread use by state and county agencies for adaptation planning purposes.

**Hawai`i Coastal Zone Management Act Updates**: Act 16, SLH2020 updated the Hawai`i Coastal Zone Management Act (HRS Chapter 205A) including strengthening protections for beach and other coastal environments by specifically prohibiting private shoreline hardening structures and minimizing public shoreline hardening structures, including seawalls and revetments, at sandy beaches where they would interfere with existing recreational and waterline activities.

Sea Level Rise Report Addendum: The *Guidance for Using the Sea Level Rise Exposure Area in Local Planning and Permitting Decisions* was published by the State as a supplement to the 2017 Report. The Addendum was prepared by the University of Hawai`i Sea Grant College Program (Hawai`i Sea Grant) with the Hawai`i Department of Land and Natural Resources - Office of Conservation and Coastal Lands (OCCL) for the Hawai`i Climate Change Mitigation and Adaptation Commission - Climate Ready Hawai`i Initiative. The Hawai`i Climate Change Mitigation and Adaptation Commission issued a statement of approval for the Addendum at its October 28, 2020 meeting.

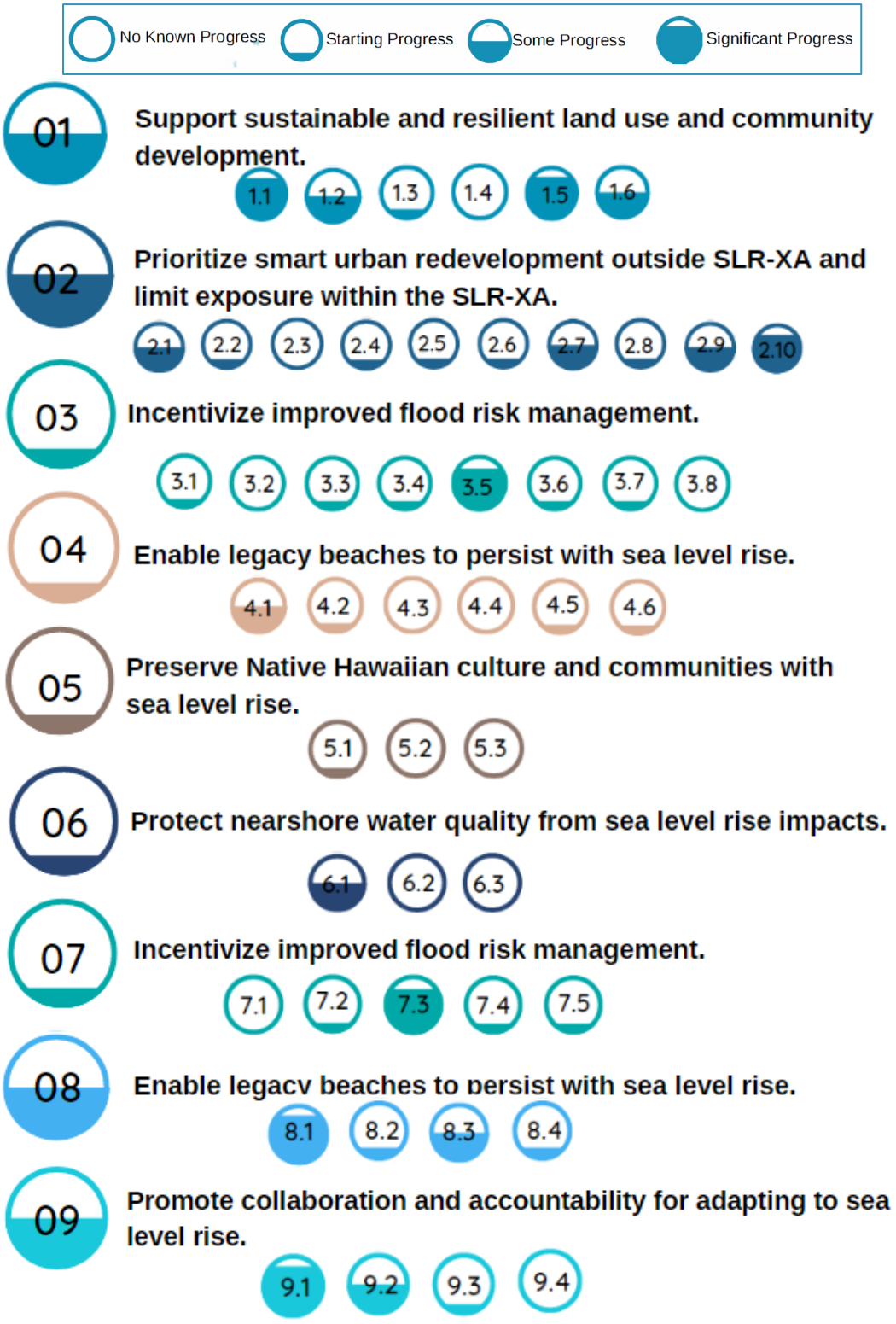
Hawai`i 2018 Hazard Mitigation Plan: The 2018 update of the State's Hazard Mitigation Plan includes expanded consideration of climate change and sea level rise hazards, including hazard assessment using the SLR-XA and a 1% Annual-Chance Coastal Flood Zone with 3.2 feet of sea level rise (1%CFZ-3.2) modeled for the Plan: https://dod.hawaii.gov/hiema/sert-resources/hazard-mitigation/

Planning for Managed Retreat: The Office of Planning and Sustainable Development Coastal Zone Management Program (OPSD-CZM) published a report titled *Assessing the Feasibility and Implications of Managed Retreat Strategies for Vulnerable Coastal Areas in Hawai`i* in 2019 and is embarking on a next-step study that will assess the options for and implications of implementing managed retreat from the perspectives of (1) policy and regulation, and (2) funding and financing mechanisms in 2023.

Statewide Inventory of Vulnerable Infrastructure: Act 178 Relating to Sea Level Rise Adaptation was passed to begin the long-term planning needed to effectively address climate impacts. OPSD-CZM submitted a report to the legislature in 2021 reporting on progress towards the phased approach required by Act 178.

Summary of Accomplishments

Progress towards meeting the nine recommendations (represented by large circles) and 49 associated recommended actions (represented by small circles underneath) is presented here as measured on a qualitative scale of "no known progress" to "significant progress" as depicted by the following key:



Next Steps

New and updated recommendations provide a roadmap for bridging from this interim report to a full, comprehensive Sea Level Rise Vulnerability and Adaptation Report in 2027. This Report Update recommends continuing work on the nine 2017 Recommendations and associated recommended actions, and adds two new 2022 Recommendations with supporting recommended actions.

2022 Recommendation 1 is to fund and conduct a comprehensive update of the Sea Level Rise Vulnerability and Adaptation Report in 2027, and **2022 Recommendation 2** is to continue to implement the 2017 Recommendations with minor edits as outlined in this 2022 Report Update. The recommended actions within these two new recommendations provide a framework for further identifying gaps in progress since 2017 and meeting the overall goals of this initiative. A key updated recommended action is for the state to set a revised planning and policy benchmark of 4 ft (up from the 2017 guidance of 3.2ft) as the minimum scenario for all planning and design based on the report's Intermediate (mid-range) scenario for Hawai`i of 3.9 feet of sea level rise by 2100, and apply a 6 ft benchmark for planning and design of public infrastructure projects and other projects with low tolerance for risk based on the report's Intermediate High scenario for Hawai`i of 5.9 feet of sea level rise by 2100.

In addition to the recommendations, this report has identified the following unmet needs and areas in need of focus in the next five years which should be set as priority action areas from 2023-2027.

- **Facilitate interagency coordination for holistic adaptation planning** (e.g., comprehensive consideration and planning for natural resources, roads, communities; and improved communications between government agencies) (2017 Recommendation 9, 2022 Recommendation 1)
- **Conserve and adapt Native Hawaiian cultural resources and sites** (2017 Recommendation 5)
- **Integrate equity and justice considerations to vulnerability assessments and adaptation planning and actions** (2017 Recommendation 2)
- **Address and stop the loss of shoreline access** (2017 Recommendation 4)
- **Integrate economic valuation and ecosystem co benefits of natural coastal resources into planning and actions** (2017 Recommendations 4, 5 and 8)
- **Make managed retreat a viable option and identify funding mechanisms for adaptation** (2017 Recommendations 2 and 7)
- **Implement phased adaptation to sea level rise** (2017 Recommendation 1, 2, 7)

Our understanding of the sea level rise outlook has improved since the 2017 Report and we now have a better understanding of the most probable impacts of sea level rise in Hawai`i. This Updated Report and the recommendations within should be used as a tool by the decision makers of the State, the Counties, and community leaders. Recommendations to increase our capacity to adapt to sea level rise should be implemented across the levels of government now to address the inevitable near and medium-term rise of sea level rise.

Hawai`i Sea Level Rise Vulnerability and Adaptation Report 2022 Update

Introduction

The 2017 Report provided the first detailed statewide assessment of Hawaii's exposure to sea level rise related hazards and proposed recommendations to reduce the state's vulnerability to sea level rise and increase our capacity to adapt. This report is intended as a five-year update to the 2017 Report and is not a full review or stand-alone document. Instead, it refers to the 2017 Report and provides an overview of updates to climate and sea level rise science, the accomplishments achieved relative to the 2017 Report recommendations, and provides updated recommendations for the next five years and beyond. "Learning Questions" posed by the 2017 Report are directly addressed in Appendix (A) of this Report.

Sea Level Rise Outlook: Updated Global and Local Projections

The 2017 Hawai`i Sea Level Rise Vulnerability and Adaptation Report provided a detailed overview of climate science and sea level rise observations and predictions based on the latest and best-available science at that time including the Intergovernmental Panel on Climate Change Fifth Assessment Report (IPCC AR5) and the U.S. Global Change Research Program (USGCRP) 4th National Climate Assessment. As expected, climate and sea level rise science has continued to advance since the 2017 Report, with landmark intergovernmental reports including the IPCC AR6 in August 2020 and NOAA-led Sea Level Rise Technical Reports in 2017 and 2022. An update on Sea Level Rise Science was provided as an appendix in an October 2020 Hawai`i Climate Change Commission document, Guidance for Using the Sea Level Rise Exposure Area in Local Planning and Permitting Decisions - A Supplement to the Hawai`i Sea Level Rise Vulnerability and Adaptation Report. In July 2022, the City and County of Honolulu Climate Change Commission provided an updated guidance document on the latest sea level rise science and projections with recommendations for adaptation planning. This section provides an overview of the latest climate science and sea level rise projections published in those documents with specific regional and local projections and likely impacts.

Global and Local Sea Level Rise Trends

Sea level rise exposure mapping in the 2017 Hawai`i Sea Level Rise Report and Hawai`i Sea Level Rise Viewer (Viewer) is based on an upper-end projection in the 2013 IPCC 5th Assessment Report of 3.2 feet of global mean sea level rise by 2100. As expected, the science on sea level rise observations and forecasts has continued to advance. Since completion of the 2017 Report, peer-reviewed scientific literature as well as government and multinational reports increasingly point to 3 to 4 feet of sea level rise by 2100 as a mid-range, rather than high-end, scenario for Hawai`i. These increasing projections of sea level rise are based on greenhouse gas emissions, which continue to increase, and observations of accelerating ice mass loss to the oceans, particularly from Greenland and West Antarctica. The projections are often provided to 2100, though sea level rise will likely continue for centuries.

Since 1993, 27 years of continuous satellite altimeter measurements tied to tide gauges and averaged across the planet (Figure 1) show that global mean sea level is not only rising at a rate of 3.4 mm/yr (1.3 inches per decade, sealevel.nasa.gov), it is accelerating at a rate that will lead to 23 cm (9 inches) of global mean sea level rise by 2050 (relative to the year 2000; Nerem et al., 2022). Continued global warming is expected to increase this rate of acceleration, and therefore 9 inches of sea level rise by 2050 is likely a conservative (low-end) sea level rise scenario for that timeframe.

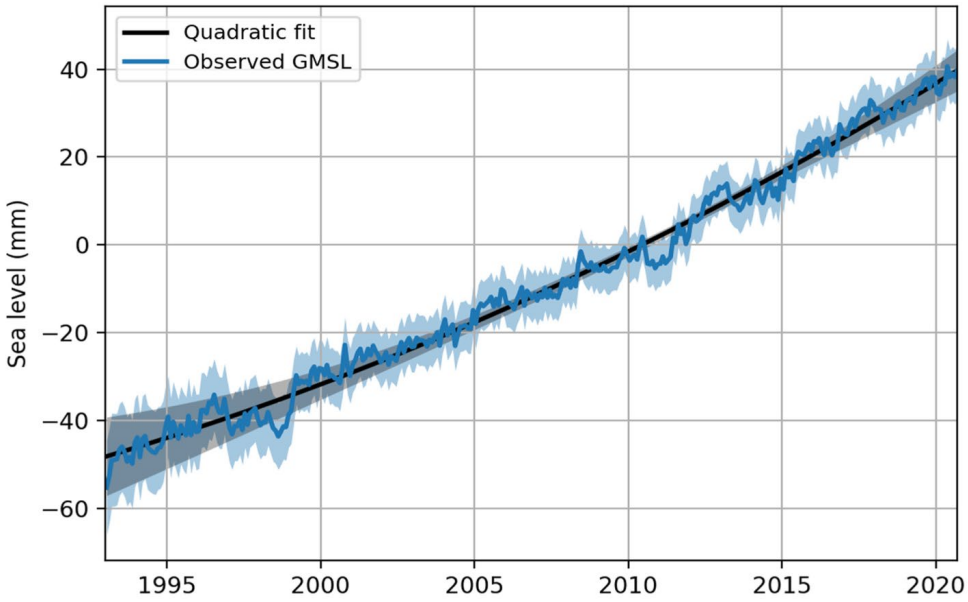


Figure 1. Global mean sea level is rising at a rate of 3.4 mm/yr (1.3 inches per decade, sealevel.nasa.gov) and this rate is accelerating (Figure: Nerem et al., 2022).

The most recent projections of global and regional sea level rise are published in a 2022 intergovernmental report led by NOAA (Sweet et al. 2022). The 2022 report builds on a 2017 NOAA report (Sweet et al., 2017) and global mean sea level rise scenarios from the United Nations Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6; IPCC 2021). Key findings of the NOAA 2022 report include:

- Increased confidence, regardless of Greenhouse Gas (GHG) emissions scenario, in sea level rise projections at 2050 with sea level expected to rise as much over the next 30 years as it has over the last 100 years.
- An increase in magnitude and frequency of coastal flooding by 2050 from high tide and storm surge flood events with significant consequences to coastal infrastructure, communities, and ecosystems.
- A 50% probability of exceeding 0.5 m (1.6 ft) of sea level rise globally by 2100 with an increase in average global temperature of 2°C above preindustrial levels (global temperature has already risen 1.01°C since 1880). The probability of exceeding 0.5 m (1.6 ft) of global sea level rise increases to 80% to 99% under higher GHG emissions scenarios with 3°-5°C of warming, respectively. These probabilities do not consider the potential for faster-than-projected ice

sheet losses in Antarctica and Greenland within this century, which is a focus of ongoing research.

- There is a 50% probability of exceeding 1.0 m (3.3 ft) and 10% probability of exceeding 2.0 m (6.6 ft) of global sea level rise by 2100 when considering a high GHG emissions scenario that leads to an average global temperature increase of 5°C plus the impact of earlier and faster ice sheet losses from Antarctica and Greenland. While physically plausible, the likelihood of widespread ice sheet collapse to that extent within this century is currently unknown and is an active area of ongoing observation and research.

Long-term observational data from local tide gauge stations show that sea level is rising around Hawai`i. Models indicate that Hawai`i and other tropical Pacific sites will experience sea level rise that is 16% to 20% higher than the global average (Sweet. et al. 2022). The NOAA 2022 report provides a range of regionalized sea level rise scenarios based on differing GHG emissions pathways and associated global warming and ice sheet melt (all projections relative to sea level in the year 2000):

- Sea level will rise around Hawai`i between 0.7 and 1.5 feet by 2050.
- The Intermediate (mid-range) estimate is for a rise of 1.0 feet by 2050.
- Sea level will rise between 1.3 and 8.0 feet by 2100.
- The Intermediate (mid-range) estimate is for a rise of 3.9 feet by 2100.

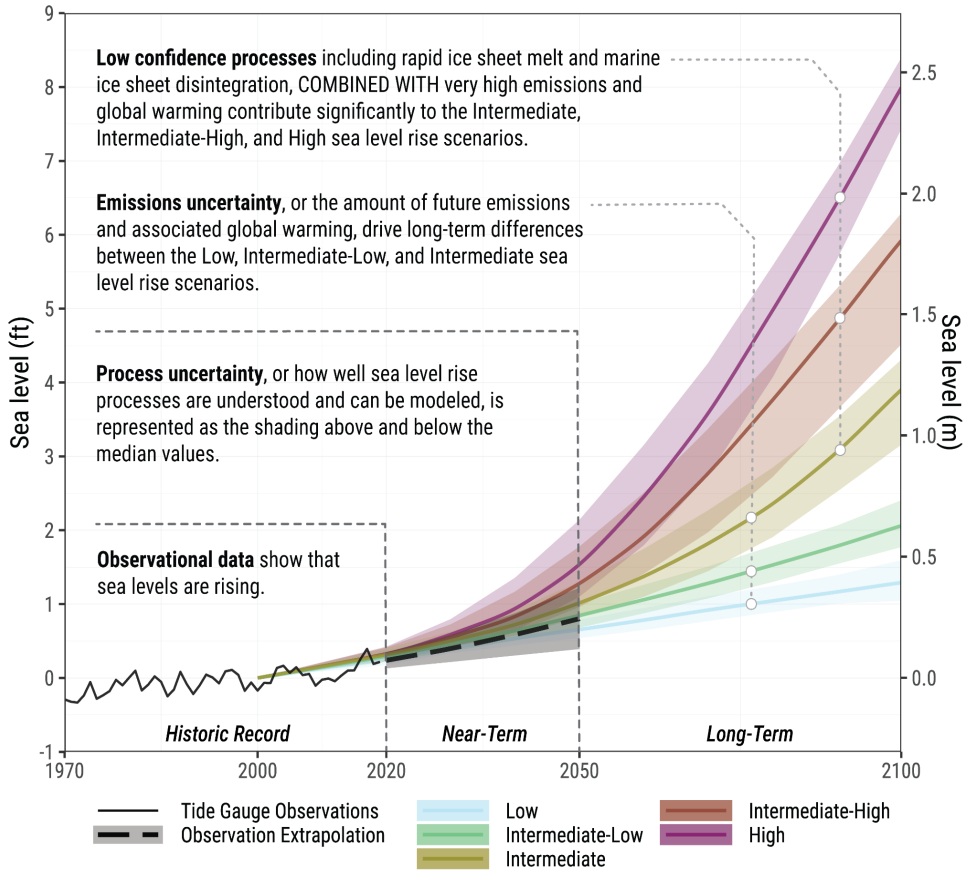


Figure 2. Sea level rise observations (solid black line), extrapolated observed trend (dashed black line), and sea level rise scenarios Hawai`i from NOAA interagency sea level rise report (Sweet, et al. 2022). The text in the figure

describes the various processes and uncertainties that contribute to the various sea level rise scenarios (Figure by Jamie Carter, NOAA).

	Year	
Scenario	**2050**	**2100**
Low	0.7	1.3
Intermediate-Low	0.9	2.0
Intermediate	1.0	3.9
Intermediate-High	1.3	5.9
High	1.5	8.0

Units in feet relative to year 2000

Table 1. Sea level rise scenarios for 2050 and 2100 for Hawai`i from interagency report (Sweet, et al. 2022).

In a study by researchers at the University of Hawai`i Sea Level Center and others, it was reported that rapid increases in tidal flooding are expected to begin locally by the mid-2030's (Thompson, et al. 2021). This increase will be the result of ongoing sea level rise in combination with natural cyclicity in tidal amplitudes, i.e., natural variations in the highest high tides. By the early 2040's Honolulu is projected to experience 2 to 3 high tide flood days per month considering NOAA's intermediate SLR scenario. However, such high tide events will be clustered over times of the year when tides are at their peak (i.e., during "king tides"), in which as many as 6-14 days per month can be expected. Thus, researchers recommend that compound flood impacts during these more extreme periods of tidal flooding be considered in flood management planning instead of annual averages (Thompson, et al. 2021).

Compound flooding describes flood sources that are additive to that generated by sea level rise alone. Compound flood sources can include the shallowing or emergence of coastal groundwater, rain events, and overwhelming of drainage systems that can ironically act as additional sources of floodwater. In a study that investigated proportions of flooding in Honolulu's Primary Urban Core caused by single, versus multiple components of sea level rise induced inundation, it was found that less than three percent was caused solely by direct overland connection to a rising ocean. Sources of compound flooding and exacerbation of such flooding by rising sea level should be a top consideration as part of ongoing research and flood management planning.

Local Observations of Coastal Impacts

The 2017 Report provided a detailed outline of the statewide results of the vulnerability assessment based on the outputs of the SLR-XA model and Viewer. Vulnerability was assessed in terms of potential impacts to land use, people, property, cultural and natural resources, and critical infrastructure. This section provides an overview of the observed local impacts since 2017 to inform the application of the SLR-XA to current and future planning efforts. This report does not include an updated assessment of the potential economic loss or impacts on people, roads, other infrastructure and ecological features within the SLR-XA. Such analyses will be included as part of planned updates to the Report and Viewer.

As was identified in the 2017 Report, chronic coastal flooding within the SLR-XA is an ongoing problem. The consequences of elevated sea level have already become apparent. In 2017, and again in 2020, the Honolulu Harbor Tide gauge recorded its highest daily mean water levels observed over its 112-year history. These record high water levels were produced by a combination of phenomena that included long-term global sea level rise, peak annual astronomical tides ("king tides"), wave setup, and migration of warm buoyant waters brought in by winds and currents. These events provide a glimpse of what will become a more regular occurrence as sea level continues to rise. Local impacts were observed throughout the State in the form of increased coastal erosion, minor wave over-wash flooding, backshore flooding from groundwater rise and storm drain backflow, and impeded and potentially hazardous beach access.

In addition to the observed coastal flooding, elevated water levels and recent extreme rainfall events have spurred concern regarding the functionality of municipal drainage systems, especially across heavily developed low-lying areas. Drainage systems in these areas were designed to convey stormwater from higher elevation to lower elevation waterways. As sea level rises, differences in these elevations have become reduced, and at times reversed, such that drainage systems are becoming increasingly inundated even in the absence of rainfall. Additionally, it is typical for these systems to feature cracks that can allow surrounding elevated groundwater to enter, further reducing drainage capacity. Reverse flow of stormwater is commonly observed in locations like Mapunapuna and Waikiki on O`ahu. Present drainage issues illustrate the fact that coastal flooding will increasingly be generated by a variety of flood sources including the contribution from stormwater conduits, particularly during heavy rainfall events.

The progressive impacts of sea level are likewise evident in the form of chronic coastal erosion. As expected, such erosion has continued along the majority of the State's coastlines, resulting in degradation of public access and nearshore infrastructure. Coastlines along West Maui and O`ahu's North Shore have become particularly stricken by the loss of coastal public trust lands and damage to backshore assets. An aggressive episode of coastal erosion in early 2022 critically undermined one single family home, leading to its collapse and deposition of dangerous debris along Pupukea Beach Park. The collapse followed four years of a progressively worsening combination of chronic and seasonal erosion between Rocky Point and Sunset Beach Park in Paumalu that has become a focal point, highlighting the need for improved management and retreat strategies. In West Maui, chronic erosion along stretches of Ka`anapali and Kahana have spurred the development of several beach and dune restoration projects with the goal of serving as natural buffers to ongoing erosion. Similarly, the degradation of coastal areas along West Maui has become a flashpoint for debate regarding public access rights to public trust

resources, private property rights, and environmentally appropriate coastal management strategies. Seasonal erosion along Ka`anapali in Summer 2022 exceeded recent historical records, revealing derelict erosion control efforts such as sandbags and highway barriers placed during the summer of 2007. The 2022 summer erosion resulted in the loss of trees and undermined the concrete beachwalk. Although the area is experiencing seasonal recovery, the shoreline has migrated mauka and similar erosion events can be expected in the future.

The impacts of coastal erosion on the state highway system are also significant. Hawai`i Department of Transportation (HDOT) Highways is proposing revetments in at least two locations along the Kamehameha Highway on O`ahu to protect the threatened roadway. On Maui, HDOT-Highways proposes to move portions of Honoapi`ilani Highway inland as a sea level rise adaptation. HDOT-Highways is also exploring the use of sand-savers and a revetment to protect against future erosion events in Wailua, Kaua`i and along the Windward O`ahu coastline.

Viewer Updates and Guidance Documents

The State of Hawai`i Sea Level Rise Viewer (Viewer) is the online atlas that supports the 2017 Report. The Viewer is designed to be useful for policy makers, government officials, and the public. There is an ongoing effort to refine the Viewer to continually provide the best available information to the users and stay in line with current science, observations, and projections. This section provides an overview of updates made to the Viewer to-date and modeling upgrades in progress to further refine the information provided by the Viewer.

In November 2018**,** the disclaimer text was updated in the Report and Viewer with the State Climate Commission's approval, stating that "having gone through peer review and publication in the Nature Journal Scientific Reports, the results of this study are sufficiently validated to be appropriately used in land management decisions as the best available information…"

In 2020, the State published the **Sea Level Rise Report Addendum: Guidance for Using the Sea Level Rise Exposure Area in Local Planning and Permitting Decisions as a** supplement to the 2017 Report. The Addendum was prepared by the University of Hawai`i Sea Grant College Program with the Hawai`i Department of Land and Natural Resources - Office of Conservation and Coastal Lands for the Hawai`i Climate Change Mitigation and Adaptation Commission - Climate Ready Hawai`i Initiative. The Hawai`i Climate Change Mitigation and Adaptation Commission issued a statement of approval for the Addendum at its October 28, 2020 meeting.

The primary purpose of the Addendum is to assist state and county planners, natural resource and infrastructure managers, and others with understanding and using the Sea Level Rise Exposure Area (SLR-XA) from the Report and Viewer in day-to-day planning and permitting decisions, particularly at the project or property-level scale. This guidance was developed in response to requests from county planning departments and other stakeholders to provide information on how to appropriately interpret and apply the SLR-XA map data in land use planning and permitting decisions while increasing understanding of the methods, assumptions, and limitations of the data.

Within the Viewer, several updates to the supporting text and available layers were completed since 2017 with the goal of making the tool more accessible and useful to users:

- An address and TMK search tool and a TMK Parcels boundary layer were added in response to the Disclosure Requirement for Residential Real Estate in the Sea Level Rise Exposure Area . These updates were made as a result of discussions with the Hawai`i Realtors Association to enable meaningful implementation of the requirement beginning in May 2022.
- A passive flooding exposure layer at 6 feet of sea level rise from NOAA was added in support of planning guidance to consider greater than 3.2 ft of sea level rise for critical infrastructure.
- Layers depicting moku and ahupua`a boundaries were added to support visualization and understanding of sea level rise hazards in a community and cultural context.
- A 1%-Annual-Chance Coastal Flood Hazard Zone with Sea Level Rise layer from the Hawai`i State Hazard Mitigation Plan was added to depict changing coastal flood hazard risks with less frequent but more severe storm and wave events
- A Land Use Districts layer was added in support of community planning for sea level rise.
- The text within the section titled "Sea Level Rise Projections for Modeling" was updated with the latest science.
- Text describing Assumptions and Limitations for the SLR-XA and three component models: Passive Flooding, Annual High Wave Flooding, and Coastal Erosion were added to improve understanding and transparency.

As sea level rise science and projections continue to evolve, the Viewer will be updated to incorporate new data and subsequent model outputs. The Coastal Erosion exposure map data in the Viewer was updated for Kaua`i, O`ahu, and Maui in 2020 by the University of Hawai`i Coastal Geology Group. However, the combined SLR-XA was not updated accordingly. A timeline and outline for implementation of a fully updated version of the Viewer is included in the Next Steps and Future Recommendations Section at the end of this report.

The Viewer was updated to provide specific local data for West Maui in the West Maui Wave Flooding Tool and Wave Runup Forecast Tool.

In addition to the Viewer, the State has published other related guidance and tools building on the 2017 Report. These efforts are listed below:

- **State of Hawai`i Climate Adaptation Portal - HI Adaptation site**: https://climate.hawaii.gov/hi-adaptation/
- **Sea Level Rise Guidance Tool**: interactive web-based guide to incorporate sea level rise considerations into planning and permitting: https://climate.hawaii.gov/hi-adaptation/sea-level-rise-viewer-flowchart/
- **Guidance for Addressing Sea Level Rise in Community Planning**: This project led by Hawai`i Sea Grant in partnership with Hawai`i Department of Land and Natural Resources (DLNR) and Office of Planning & Sustainable Development - Coastal Zone Management Program (OPSD-CZM) worked with state and county government to produce a guidance document and conduct outreach to address sea level rise and coastal hazards in the county general and community planning process: https://seagrant.soest.hawaii.edu/resources/program-publications
- **Guidance for Disaster Recovery Preparedness in Hawai`i**: This project led by Hawai`i Sea Grant in partnership with Hawai`i DLNR and OPSD-CZM worked with state and county government to

establish resilience-focused recovery practices before a disaster hits to enable communities to recover quickly while also adapting to sea level rise and protecting sensitive coastal environments through recommended preparedness activities and model planning and policy resources: https://seagrant.soest.hawaii.edu/resources/program-publications

- **Assessing the Feasibility and Implications of Managed Retreat Strategies for Vulnerable Coastal Areas in Hawai`i**: This report by OPSD-CZM examined managed retreat programs that have been successfully implemented in post-catastrophic events and in response to chronic coastal hazards and reviewed if and how the programs may be applied to Hawai'i. The assessment identified next steps and key questions to further understanding of how to implement retreat: https://planning.hawaii.gov/czm/ormp/ormp-action-team-project-on-the-feasibility-of-managed-retreat-for-hawaii/
- **Hawai`i 2018 Hazard Mitigation Plan**: The 2018 update of the State's Hazard Mitigation Plan includes expanded consideration of climate change and sea level rise hazards, including hazard assessment using the SLR-XA and a 1% Annual-Chance Coastal Flood Zone with 3.2 feet of sea level rise (1%CFZ-3.2) modeled for the Plan: https://dod.hawaii.gov/hiema/sert-resources/hazard-mitigation/

Review of 2017 Recommendations

The 2017 Report included nine recommendations with 49 recommended actions to achieve the desired outcomes. The recommendations were focused on improving our capacity to address the social, economic, and environmental impacts of sea level rise. Over the past 5 years, the legislature and various state and county agencies undertook several initiatives which align with the recommendations and goals set out in the 2017 Report. This section provides an overview of the status of those recommendations and associated recommended actions. Several of the initiatives are in progress or are ongoing efforts to continually adjust and address the threats of sea level rise and coastal erosion. In many cases, an initiative may address more than one recommendation or recommended actions. In those cases, the initiative is listed under each recommended action it addresses to give a complete picture of the state's progress towards meeting the goals of the 2017 Report.

Each recommendation and recommended action listed here will be noted with either a description of how it has been addressed, the ongoing efforts to address it, or flagged as unaddressed. All existing recommendations should be continued to the 2027 Report, with a few updates as detailed in the Further Recommendations Section towards the end of this report. The 2017 Report contains detailed descriptions and reasoning for each recommendation; readers can refer to that report for further information regarding the purpose and goal of the recommendations. This Report does not provide an assessment of the reduction in vulnerability as a factor of exposure, sensitivity, and adaptive capacity in response to the actions taken.

Progress Towards Meeting 2017 Recommendations:

A summary of the progress towards meeting the recommendations and recommended actions is presented here as measured on a qualitative scale of "no known progress" to "significant progress" as depicted by the following key:





1.1 Recognize the SLR-XA as a state-wide vulnerability zone: The State has not officially adopted SLR-XA as a statewide vulnerability zone but has made a number of important steps including the following:

- The Hawai`i Climate Change Mitigation and Adaptation Commission adopted the Hawai`i Sea Level Rise Vulnerability and Adaptation Report (and recommendations therein) and the Hawai`i Sea Level Rise Viewer following their completion in December 2017, recognizing the SLR-XA as a statewide vulnerability zone.
- The State Climate Commission adopted Recommendations for Countering Impacts of Sea Level Rise (September 2018) including the following recommended strategies:
  - Support legislation for disclosure for private property and public offerings located in areas with potential exposure to sea level rise.
  - Request all new development, redevelopment and modifications be directed away from beach areas.
  - Urge counties to incorporate the 3.2 ft. sea level rise exposure area (SLR-XA) into their general and development plans.
  - Encourage agencies and non-governmental utility providers to identify and prioritize assets within the 3.2 ft SLR-XA or more as described in the State's Sea Level Rise report, identify adaptation measures, and to provide a status update on this activity annually to the Climate Commission.
  - Support legislation that funds State programs to meet mitigation goals, and to bring resources to assist in planning and implementation for sea level rise and other climate related impacts.
- Honolulu Mayor Directive 18-02 (July 16, 2018) requires all City departments to use the most current versions of the City Climate Change Commission's Guidance and accompanying Brief, and the 2017 Report and associated Hawai`i Sea Level Rise Viewer as resources for managing assets, reviewing permitting requests, and assessing project proposals
  - City Climate Change Commission Sea Level Rise Guidance (2017, updated in 2022) builds on findings of the 2017 Hawai`i Sea Level Rise Report and recent scientific literature to provide specific policy and planning guidance on responding to sea level rise by the City.
- A Maui Mayoral Proclamation (February 22, 2018) directs County departments to use the 2017 State Sea Level Rise Report, Viewer, and SLR-XA in their plans, programs, and capital improvement decisions.

- County of Kaua`i incorporated SLR-XA into West Kaui`i Community Plan

1.2 Seek opportunities to plan new development outside of the SLR-XA under long-term, comprehensive managed retreat strategy

- OPSD-CZM published a report titled *Assessing the Feasibility and Implications of Managed Retreat Strategies for Vulnerable Coastal Areas in Hawai`i* in 2019 and is embarking on a next-step study that will assess the options for and implications of implementing managed retreat from the perspecives of (1) policy and regulation, and (2) funding and finacing mechanisms in 2023.
- Act 223, SLH2022 expands the authority of the counties to transfer development rights to address areas at risk of sea level rise, coastal erosion, storm surge, or flooding associated with climate change.
- The 2022 Draft update to the City and County of Honolulu Primary Urban Center Development Plan includes a Sea Level Rise and Coastal Hazards Planning Chapter and states Goal SLR-2: Conduct Long-Range Planning to Increase Area-Wide Adaptation and Resilience; Policy SLR 2.1: Plan for priority growth areas outside of the 3.2' SLR-XA and 6' SLR, and vent proposed solutions for highly impacted areas with the community.
- Bill 10 (2022) currently before the Honolulu City Council, Relating to Use Regulations would further expand the authority of Honolulu City and County to use transfer of development rights to support retreat from areas at risk of flooding and coastal erosion.
- Molokai Molokai Climate Change and Sea-Level Rise Adaptation and Resiliency (CCSLAR) Master Plan is a community-led climate change & sea-level rise plan for Molokai's future. Our overarching goal is to develop a Climate Change and Sea Level Adaptation and Resiliency (CCSLAR) Plan that best serves our Molokai community. It identifies areas at risk from sea level rise and areas for potential relocation.
- West Maui Community Plan (effective January 31, 2022) Section 2 Policies, Goal 2.1 Ready and Resilient Systems includes the following:
  - 2.1.1 | Proposed Community Plan Amendments for new development on existing golf course land in Kā'anapali makai of Honoapi'ilani Highway should be approved only for existing shoreline development that is retreating inland because of impacts from sea level rise or other coastal hazards.
  - 2.1.2 | To minimize impacts from future coastal erosion, new permanent structures must be located landward of the State-recognized SLR-XA for coastal erosion, except a minimum buildable area must be provided. This restriction does not apply to structures needed as part of an approved beach restoration project or cultural project, such as loko i'a, and which must be evaluated on a case-by-case basis.
  - 2.1.3 | For redevelopment and new developments within the SLR-XA, developers must proactively: a. Coordinate with the Maui County Department of Planning and adjacent or nearby property owners to understand possible collective relocation of at-risk structures; b. Incorporate results of coordination into development plans by siting any new planned structures out of harm's way; c. Make efforts to not hold the County of Maui and State of Hawai'i liable for any and all future costs associated with maintaining or protecting the property developed within the SLR-XA, including costs associated with retreat, hazard mitigation, and cleanup costs to maintain the health of the nearshore marine environment from material debris originating from the ocean or from the

structures' own erosion; and d. Make efforts to waive the ability to ever request shoreline hardening for their property or project from the County of Maui or the State of Hawai'i.

- The County of Maui adopted a Managed Retreat Revolving Fund in 2022 to take effect in July 2023. The fund is intended to help Maui homeowners manage coastal erosion and address climate change. The fund will specifically support shoreline improvements and the in-land relocation of infrastructure owned by the county and private entities. The money will come from 20% of the county's transient accommodations tax.
- West Kaua`i Community Plan (adopted 2020)
  - Includes Objectives (page 65) to provide a higher elevation area for property owners with vulnerable homes to retreat to in the future via transfer of development rights or land swap opportunities and that evacuated land serves as a buffer against future coastal hazards.
  - Encourages new development outside of the SLR-XA through zoning amendments. Several implementation zoning amendments were also approved with the plan document. This included ZA-2020-9, which established a new special treatment district called "ST-Coastal Edge" in the CZO. The new district was implemented in all residential neighborhoods vulnerable to sea level rise and located makai of a public road. Any use, structure, or development permitted with or without a Use Permit in the Special Treatment Coastal Edge District shall mitigate impacts from coastal hazards.
  - Identifies managed retreat as a priority as reflected in Resiliency Policy #1: Adapt West Kauai's low lying neighborhoods for climate change impacts and lay the groundwork for managed retreat

1.3 Conduct an inventory of existing lands designated for urban use that are located outside of the SLR-XA and prioritize these areas for new development

- The 2022 Draft of the revised Primary Urban Center Plan for the City and County of Honolulu includes the following Growth and Development Policy Goal: Invest in long-term growth in commercial corridors and mixed-density neighborhoods outside of the Sea Level Rise Exposure Area (SLR-XA). The goal contains an action to identify and create a geographic catalog of underutilized sites. Share these infill opportunities with non-profit developers.

1.4 Strive to balance managed retreat strategies from vulnerable urban areas with preservation of agriculture and conservation lands by relying on state planning act policies and tools and the State Land Use Commission boundary review process.

- No known action.

1.5 Integrate sea level rise adaptation plans and policies into state, county and community plans

- Hawai`i Sea Grant with State DLNR and OPSD-CZM developed Guidance for Addressing Sea Level Rise in Community Planning in 2020 in conjunction with county planning departments.
- In 2021, Hawai`i Department of Transportation (HDOT) Highways Division released its Climate Adaptation Action Plan, exposure assessments, and hazard viewer.
- Statewide Transportation Planning Office (STPO) is developing the 2045 Hawaii Statewide Transportation Plan (HSTP), an overarching policy document to guide system

level and master plans for the three primary modes of transportation in Hawaii. Currently, the HSTP draft plan is undergoing review and the STPO is seeking public comment via online public survey to help better determine feedback on the strategies that can help to implement the goals and objectives of the HSTP. You may find out more information regarding the HSTP at https://arcg.is/1KmHSP and participate in the public survey at https://www.surveymonkey.com/r/J8RHRTT.

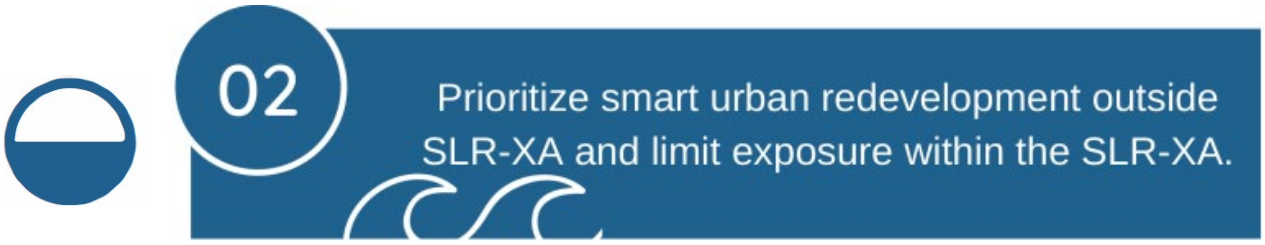
- The draft Department of Hawaiian Homelands (DHHL) General Plan, currently under final review, includes a Technical White Paper on Climate Change Impacts & Adaptation Planning with climate change adaptation strategies for sea level rise, erosion, and flooding. The draft General Plan incorporates climate change mitigation and adaptation concepts and measures into the agency's long-term vision, goals, objectives and policies, as well as DHHL's statewide land use designations, and proposes establishing overlays or other mechanisms that can be applied to areas subject to sea level rise and other climate-related hazards.
- The Hawai`i Department of Transportation (HDOT) published the Statewide Coastal Highway Program Report in 2019. The objective of the project was to develop a scientifically rigorous methodology to assess and rank the susceptibility of State of Hawaii coastal roads to erosion and structural degradation due to ocean hazards such as waves, currents, tides and sea level rise.
- HDOT's Act 100 Resiliency Report outlines the work HDOT is performing to incorporate resilience into its programs and projects.
- Draft Primary Urban Center Development Plan and North Shore Sustainable Communities Plan, currently in review from the Honolulu Planning Department include detailed consideration of sea level rise hazards with proposed actions informed by technical papers on climate change and sea level rise risks specific to the urban Honolulu and North Shore regions.
- East Honolulu Sustainable Community Plan, updated in 2022, addresses sea level rise and SLR-XA in hazard planning, zoning and permitting.
- Ko`olauloa Sustainable Community Plan, updated in 2020, sets a policy for open space to be used to provide adequate shoreline setbacks that consider shoreline changes resulting from erosion hazards and rising sea levels, based on adopted projections of shoreline erosion rates and sea level rise. The Plan also prioritizes using best-available sea-level rise science as a basis for planning.
- West Maui Community Plan adopted into Ordinance by the Maui County Council in December 2021 includes detailed sea level rise considerations and policy guidance informed by community input and a Climate Change and Sea Level Rise Technical Resource Paper.
- South Maui Community Plan currently in review includes detailed consideration of sea level rise informed by a Climate Change & Hazards Resource Paper
- The draft Hawai`i County General Plan, currently in review, includes a section on Mitigating & Adapting to Hazards and Climate Change including sea level rise informed by the SLR-XA.
- West Kaua`i Community Plan (adopted in December 2020) includes detailed sea level rise vulnerability and adaptation considerations and recommendations informed in-part by a West Kaua`i Community Vulnerability Assessment.
- Waimea 400 Conceptual Master Plan, which is a master plan for the 417-acre parcel between Kekaha and Waimea that was purchased by the County of Kaua'i in 2019, integrates the principles of Adaptation Planning in anticipation of sea level rise, flooding,

groundwater intrusion and climate change impacts within the vulnerable areas of the property. Preliminary zones were created based on existing information on potential inundation and future flooding. Appropriate uses for the conditions of each zone were identified.

1.6 Develop shoreline protection, conservation, and restoration priorities and guidelines

- Act 16, SLH2020 updated the Hawai`i Coastal Zone Management Act (HRS Chapter 205A) in many ways including strengthening protections for beach and other coastal environments by specifically prohibiting private shoreline hardening structures and minimizing public shoreline hardening structures, including seawalls and revetments, at sandy beaches where they would interfere with existing recreational and waterline activities. Further, the legislature amended HRS §205A-46 to change the standard for a variance for private facilities to clarify that "a variance to artificially fix the shoreline shall not be granted in areas with sand beaches or where artificially fixing the shoreline may interfere with existing recreational and waterline activities unless the granting of the variance is clearly demonstrated to be in the interest of the general public…".
- Act 16, SLH2020 also updated HRS Chapter 205A to increase protections of "valuable coastal ecosystems, including reefs, beaches, and coastal dunes, from disruption and minimize adverse impacts on all coastal ecosystems." Underline indicates addition from the former language. Further, it now refers specifically to protecting "beaches and coastal dunes for: (i) Public use and recreation; ii The benefit of coastal ecosystems; and (iii) Use as natural buffers against coastal hazards…".
- DLNR-OCCL completed a statewide programmatic environmental assessment and is in the process of updating its permitting program for Small Scale Beach Restoration.
- The Division of Aquatic Resources is developing the Coral Reef Restoration Action Plan. This plan will designate specific areas throughout Hawai`i to prioritize long-term coral reef restoration efforts to address specific goals. One of these goals is shoreline protection. The State will rely on community input, intersections between coral reef health and economic valuations of coastal flood risk/hazard mitigation potential, and analyses of vulnerable coastal infrastructure as likely factors in deciding specific sites for shoreline protection focused coral reef restoration.
- The Hawai`i Department of Transportation (HDOT) published the Statewide Coastal Highway Program Report in 2019. The objective of the project was to develop a scientifically rigorous methodology to assess and rank the susceptibility of State of Hawaii coastal roads to erosion and structural degradation due to ocean hazards such as waves, currents, tides and sea level rise.
- HDOT's Act 100 Resiliency Report outlines the work HDOT is performing to incorporate resilience into its programs and projects.
- Ko`olauloa Sustainable Community Plan includes the following: "To the extent possible, acquire shallow developed beach-front lots which would be impractical to redevelop given existing zoning standards or wave hazard considerations in order to improve public access and lateral shoreline views along Kamehameha Highway".
- DHHL's draft So. Molokai Shoreline Erosion Management Plan (SM_SEMP), currently under review, assesses causes, identifies effective and sustainable shoreline erosion management strategies, and educates homestead communities on best practices and nature-based solutions. The SM-SEMP will enable DHHL to develop shoreline protection, conservation and restoration priorities and guidelines and work with its lessees to proactively plan for and better manage and mitigate sea level rise-related impacts.

- County of Maui Department of Parks and Recreation published the Maui Beach Park Vulnerability and Adaptation Study with shoreline adaptation strategies for 65 beach parks.
- The West Maui Community Plan includes goal 2.1.5 | Protect the shoreline and beaches by preserving waterfront land within the SLR-XA as open space wherever possible.



2.1 Evaluate existing policies and institutional capacity of implementing smart redevelopment

- Act 208, SLH2022 expands the purpose and rationale for Special Improvement Districts to include financing of climate change and sea level rise adaptation.
- City & County of Honolulu Office of Climate Change and Resilience was established in the City Charter in 2017 increasing institutional capacity for coordinating actions and policies to improve community resilience to climate change and sea level rise impacts and integrating sustainable and environmental values into City plans, programs, and policies.
- County of Maui established an Office of Climate Change, Resiliency, and Sustainability in 2022 to increase capacity including through the ongoing development of a Climate Action and Resiliency Plan and Resilient Housing Guide.

2.2 Identify priority areas for smart redevelopment as part of a managed retreat strategy

- West Kaua`i Community Plan (adopted 2020) includes Objectives (page 65) to provide a higher elevation area for property owners with vulnerable homes to retreat to in the future via transfer of development rights or land swap opportunities and that evacuated land serves as a buffer against future coastal hazards.

2.3 Conduct a market study for priority redevelopment areas

- No known progress.

2.4 Develop detailed redevelopment strategies for priority areas and incentivize development

- West Kaua`i Community Plan (adopted 2020) includes an Objective (page 65) to Support a master-planned new community mauka within a Walkable Neighborhood designation to accommodate workforce housing, planned growth, and a potential sea level rise managed retreat area.
- The Waimea 400 Master Plan incorporates considerations of flooding and sea level rise in land use planning.

2.5 Update capital improvement planning to incorporate sea level rise and prioritize infrastructure improvements for priority redevelopment areas

- Act 178, SLH2021 requires OPSD, in cooperation with each state agency having operational responsibilities over state facilities, to identify existing and planned facilities that are vulnerable to sea level rise, flooding impacts, and natural hazards; assess a range of options to mitigate the impacts of sea level rise to those facilities. OPSD-CZM maintains a Story Map titled Sea Level Rise Adaptation in Hawai`i to track progress on meeting the Act 178 mandate.

2.6 Develop design standards for existing and proposed land uses that limits urban growth and increases flood resiliency within the SLR-XA

- Act 16, SLH2020 amended HRS § 205A-44 to ensure that permitted structures within the shoreline setback may not be rebuilt or replaced without a new variance. Specifically, it states that "permitted structures may be repaired, but shall not be enlarged, rebuilt, or replaced within the shoreline area without a variance."
- City and County of Honolulu released Climate Adaptation Design Principles identifying recommended tools and best practices to consider in designing building sites and structures to be resilient to sea level rise, flooding, extreme heat, and groundwater inundation.
- In October 2022, County of Kaua`i passed first of its kind Sea Level Rise Constraint District that uses passive flooding and wave runup models developed for Hawai`i Sea Level Rise Viewer. Using these modeled sea level rise hazards, the constraint district requires the elevation of at least two feet out of harm's way for residential structures and at least one foot out of harm's way for non-residential structures to limit the risk to public health and safety. The constraint district is a great example of resilient design standards for proposed uses within the SLR-XA.

2.7 Require the design and siting of planned new development and capital improvement projects to include an in-depth analysis of sea level rise impacts based on elevation, tolerance for risk, and lifetime of the structure

- The State Environmental Impact Statement Rules (HAR 11-200.1) were updated in 2018 to include consideration of location in the sea level rise exposure area in determining whether an action may have a significant effect on the environment. Environmental Impact Statements and Environmental Assessments must include SLR-XA maps as an indication of impact on the environment.
- The 2018 Kaua'i General Plan Policy 3.2C1 States: "In accordance with Hawai'i State Planning Act Priority Guidelines, consider multiple scenarios of SLR and associated flooding, wave inundation, and erosion impacts when developing and approving capital improvement projects."

2.8 Develop State and County guidance and a checklist for developers to assist with the integration of sea level rise in project design and encourage the use of best management practices for incorporating green and sustainable approaches in all stages of project development.

- City and County of Honolulu released Climate Adaptation Design Principles identifying recommended tools and best practices to consider in designing building sites and structures to be resilient to sea level rise, flooding, extreme heat, and groundwater inundation.

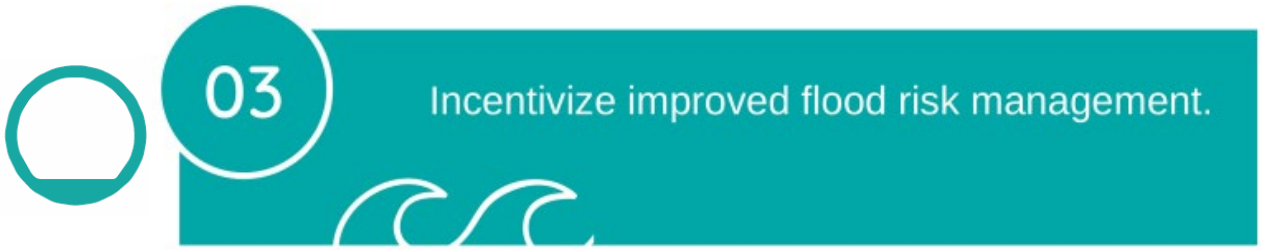
2.9 Develop guidance on integrating sea level rise and climate change in the environmental review process and incorporating environmental justice considerations

- Act 17,SLH2018 directed the environmental council to adopt and maintain rules pursuant to chapter 91, Hawai`i Revised Statutes, requiring all environmental assessments and environmental impact statements prepared pursuant to chapter 343, Hawai`i Revised Statutes, whether in draft or final form, to include consideration of sea level rise based upon the best available scientific data regarding sea level rise. Subsequent rules amendments incorporated the requirement.
- In November, 2019 the State Climate Commission released a Statement on Climate Equity which urges government entities in Hawai`i to Use a vulnerability framework that is appropriate for Hawai`i, and incorporate cultural responsiveness, reflect indigenous voices and customary law practices to identify any inequitable distribution of benefits, burdens and processes caused by climate change impacts and policy; and - Recognize and address the inequitable distribution of benefits, burdens and processes, by incorporating equity considerations into their planning, policy development and implementation for climate change mitigation, adaptation and resilience. For adaptation policies relating to sea level rise, such a framework should address equity issues surrounding access to information in the identification and prioritization of addressing the impacts of sea level rise on critical public infrastructure—such as roads, bridges, schools, hospitals, shelters and other structures. It poses the question: How will Hawaii's vulnerable communities provide input into policymaking that addresses the impacts of sea level rise?
- The State Environmental Impact Statement Rules (HAR 11-200.1) were updated in 2018 to include consideration of location in the sea level rise exposure area in determining whether an action may have a significant effect on the environment. Environmental Impact Statements and Environmental Assessments must include SLR-XA maps as an indication of impact on the environment.
- CZM's NOAA Coastal Fellow began her 2-year fellowship on August 1, 2022. The Fellow's project focuses on the nexus of coastal hazards and social vulnerability in Hawai`i and aims to better understand and identify communities with higher risk to coastal hazards due to socio-economic and demographic factors.

2.10 Integrate sea level rise vulnerability considerations into the Hawai'i Coastal Zone Management (CZM) Act

- Act 16, SLH2020 amended the Hawai`i Coastal Zone Management Act (HRS Chapter 205A) to further protect against impacts of sea level rise including adding sea level rise in the definition of "coastal hazards."
- Act 16, SLH2020 amended the Hawai`i Coastal Zone Management Act (HRS Chapter 205A) to further protect beaches by increasing the minimum shoreline setback in each county from 20 to 40 feet. Specifically, the legislature amended HRS § 205A-43 to mandate that shoreline setbacks throughout the state be "not less than forty feet inland from the shoreline."
- County of Maui and County of Kaua`i amended their shoreline setback ordinances to include a historical erosion rate-based setback. Updates are pending with the City and County of Honolulu, would update Revised Ordinances of Honolulu Chapter 23, relating to Shoreline Setbacks, to incorporate the 2020 CZMA amendments and implement a historical erosion-based shoreline setback formula on O'ahu (Bill 41, 2022).

Amendments to the Maui County ordinance to utilize a model-based erosion hazard line as the baseline for setbacks are pending.



3.1 Adopt higher flood standards to account for sea level rise

- The State of Hawai`i 2018 Hazard Mitigation Plan incorporated the results of modeling and an assessment of vulnerability to coastal flooding from storm-induced wave events with sea level rise. A 1%-annual-chance coastal flood zone with 3.2 feet of sea level rise was modeled to estimate coastal flood extents for wave-generating events including tropical storms, hurricanes, tsunamis, and other severe wave events with sea level rise and was added to the Hawai`i Sea Level Rise Viewer.
- County of Kaua`i adopted Bill 2879 to update the zoning ordinance to require the lowest floor of any new dwellings in the Sea Level Rise Constraint District be raised 2 feet above the highest sea level rise flood elevation as projected by the SLR-XA Viewer and associated Kaua`i SLR Constraint District Viewer. New, non-livable buildings need to be raised 1 foot above the flood elevation projection.

3.2 Consider adopting V zone construction standards in the Coastal A Zone

- No known action.

3.3 Provide technical and financial support to a state-wide Community Rating System program

- No known state-wide action
- County of Maui and County of Hawai`i are active Community Rating System (CRS) communities. Currently, flood insurance policy holders in the County of Maui benefit from a 15 percent reduction in their NFIP premiums due to Maui's proactive flood risk reduction measures. Residents of the County of Hawai`i already receive 10 percent reductions.
- County of Kauaii's status as an active CRS community is pending, an official announcement is expected in 2023

3.4 Encourage property owners at risk to coastal flooding to purchase flood insurance

- DLNR, FEMA and Hawai`i Independent Insurance Agents hosted a continuing education seminar on the National Flood Insurance Program (NFIP) for licensed insurance agents in August 2019.
- The City and County of Honolulu Office of Climate Change, Sustainability and Resiliency provides information flood risk and flood insurance on their Get Flood Ready website.

3.5 Incorporate sea level rise into state and county hazard mitigation plans

- The State of Hawai`i 2018 Hazard Mitigation Plan included expanded risk and vulnerability assessment for Climate Change and Sea Level Rise utilizing the SLR-XA data from the 2017 Report and Viewer.
- The 2020 Multi-Hazard Pre-Disaster Mitigation Plan for the City and County of Honolulu incorporates Climate Change, Sea Level Rise and coastal erosion into the vulnerability and mitigation planning.
- The 2020 County of Maui Hazard Mitigation Plan Update incorporates Climate Change, Sea Level Rise and coastal erosion into vulnerability and mitigation planning.
- The 2020 County of Hawai`i Multi-Hazard Mitigation Plan recognizes Climate Change, Sea Level Rise and coastal erosion into vulnerability and mitigation planning.
- The 2020 County of Kaua`i County Multi-Hazard Mitigation and Resilience Plan incorporates Climate Change, Sea Level Rise and coastal erosion into vulnerability and mitigation planning.

3.6 Adopt a state-wide program that supports the Building Code Effectiveness Grading Schedule(BCEGS) program for insurance rating

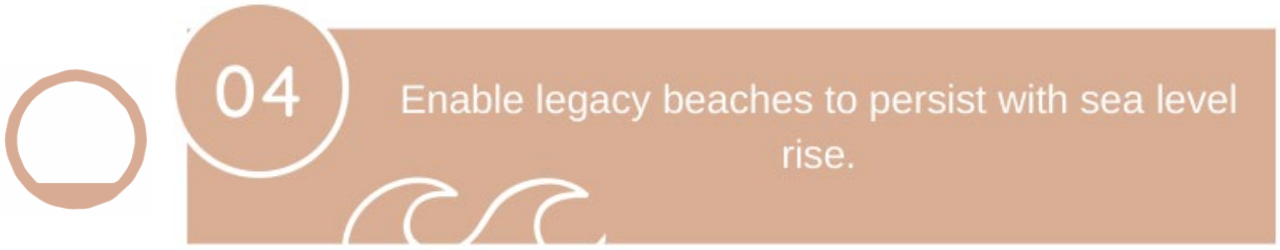
- HI-EMA conducting surveys of BCEGS eligibility ratings for each county - recently assessed Kaua`i County with a rating of 9, and currently assessing Big Island.

3.7 Develop pre-disaster recovery frameworks at state and county levels that incorporate opportunities to adapt to sea level rise through disaster recovery

- HI-EMA's 2020-2025 Five Year Strategic Plan recognizes development of disaster recovery frameworks as a key element in meeting preparedness goals.
- Honolulu Office of Climate Change, Sustainability, and Resilience has a current grant-funded project to develop a Long-Term Disaster Recovery plan and tools to help O`ahu organize and recover more quickly from a disaster.
- Hawai`i Sea Grant is in receipt of grant funding to assist County of Kaua`i develop a pre-disaster recovery plan beginning in 2023.

3.8 Perform a study to identify what other incentives could be utilized to promote improved flood risk management.

- No known action.



4.1 Conduct a state-wide assessment to identify legacy beach conservation priorities

- Act 16, SLH 2020 updated the Hawai`i Coastal Zone Management Act (HRS Chapter 205A), including strengthening protections for beach and other coastal environments and prohibitions against seawalls and other coastal armoring.
- OPSD-CZM is conducting a Regional Shoreline Management Scoping Study (ongoing) to develop and outline a recommended approach that can help define regions and subregions for the purpose of improving shoreline management. The Scoping Study will explore strategies for utilizing environmental characteristics and conditions to define "regions" for the purposes of rethinking shoreline management across the state, with the intention of facilitating larger-scale, nature-based, comprehensive management strategies.
- DLNR-OCCL completed an statewide programmatic environmental assessment and is in the process of updating its permitting program for Small Scale Beach Restoration.
- The City and County of Honolulu adopted Ordinance 22-22 Relating to Indigenous Plants in Public Beach Parks prioritizing the use of appropriate indigenous plantings to enhance the health of beaches and dunes and enhance resilience.

4.2 Establish a "willing seller" program to move development away from legacy beaches

- OPSD-CZM published a report titled *Assessing the Feasibility and Implications of Managed Retreat Strategies for Vulnerable Coastal Areas in Hawai`i* in 2019 and is embarking on a next-step study that will assess the options for and implications of implementing managed retreat from the perspectives of (1) policy and regulation and (2) funding and financing mechanisms.in 2023.

4.3 Amend the State Legacy Lands Act to set aside funding for priority coastal lands and enable the use of a variety of practices and tools

- Legislation to amend the State Legacy Lands Act was considered but determined not to be the best mechanism for designating funds for coastal land acquisition. An update to this Recommended Action is detailed later in this report.

4.4 Expand the area of national, state, and county parks and wildlife refuges to preserve critical coastal wildlife habitats

- No known action.

4.5 Prioritize coral reef preservation to buffer the impacts of coastal hazards with sea level rise

- In 2021 SCR159, SD1 directed the following: "Department of Land and Natural Resources is urged to examine and consider purchasing reef insurance to support nature-based solutions to protect Hawaii's coastline and coastal infrastructure from natural disasters.". The Division of Aquatic Resources found reef insurance to be a

valuable financial tool because of its accessibility to both public and private sector funds and its ability to rapidly deploy money for reef resilience maintenance via emergency restoration. They also encouraged continued investigations into additional funding sources, as this is not the only financial tool for hazard mitigation utilizing nature-based solutions. Additional findings related to coral reef's role in coastal protection and sea level rise mitigation can be found in the Division of Aquatic Resource's Reef Insurance Feasibility Report.

4.6 Develop public-private partnerships for coastal land acquisition, beach management, and reef protection

- Act 208, SLH2022 expanded the purpose and rationale for Special Improvement Districts to include financing of climate change and sea level rise adaptation.
- Hawai`i Sea Grant published the Hawai`i Dune Restoration Manual in 2022. The manual is a resource for community groups, nonprofits, county and state agencies and departments, coastal resorts and condominiums, coastal landowners and managers, and anyone interested in conducting proactive dune restoration projects in partnership with Hawai'i Sea Grant community extension agents.



5.1 Develop an archipelagic-wide inventory of Native Hawaiian cultural resources and practices impacted by sea level rise

- OHA's Kipuka Database is a geographical information system (GIS) that utilizes the latest mapping technologies to provide a window into native Hawaiian land, culture and history. Kipuka links historic data sets to geographic locations reinforcing the concept of information embedded in the 'aina (land), encoded in the wahi inoa (place name). The foundation of Kipuka is the traditional land system, mokupuni divided into moku, ahupua'a, ili and kuleana. The mission of Kipuka is to create a repository of knowledge where information about Hawai'i's land, culture and history can be easily accessed, to develop a virtual mo'oku'auhau of land tenure in Hawai'i, and to provide an opportunity for individuals to forge new relationships between themselves and the 'aina (land) that is most important to them.

5.2 Work with Native Hawaiian Communities to develop a culturally-based adaptation process and protocols to preserve iwi kūpuna and Native Hawaiian cultural resources and practices with sea level rise

- The County of Kauai`i is engaged in developing an island-wide Climate Adaptation Plan.

5.3 Develop adaptation plans to preserve access to coastal lands and water within Native Hawaiian communities with sea level rise.

- No known action.



6.1 Identify hazard mitigation measures to address coastal flooding of hazardous material/waste storage facilities, underground storage tanks, and on site sewage disposal systems vulnerable to sea level rise

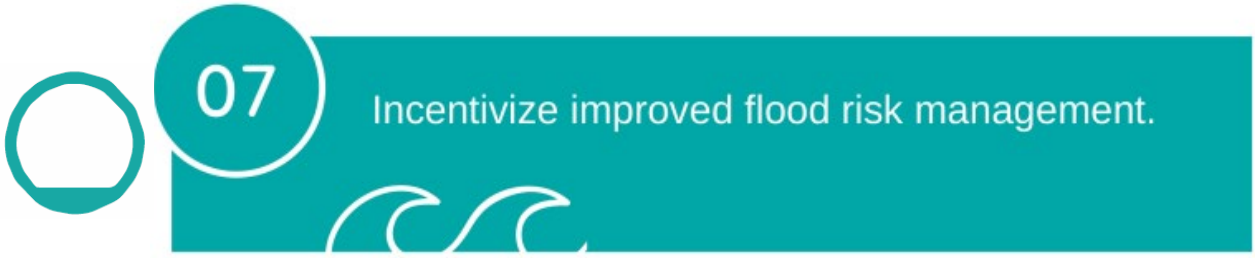
- Hawai`i Department of Health, Hazard Evaluation & Emergency Response Office released a memorandum in June 2021 describing how increased flooding, groundwater inundation and sea level rise resulting from climate change will increase risks to human health and the environment from chemical contamination.
- There are currently over 88,000 cesspools in Hawai`i and many of them are in the Special Management Area and located on beachfront properties. State has banned the construction of new cesspools and has required that all current cesspools be converted by 2050. Act 125, SLH2017 requires conversion of cesspools by 2050. Act 153, SLH2022 authorized development of a pilot program to assist low- and middle-income residents to complete the conversion.
- A state income tax credit is available for upgrading a cesspool to a septic or aerobic system or connecting to the sewer for cesspools located within 500 ft of the shoreline, a perennial stream or wetland, or within a source water assessment program area.
- The Department of Health (DOH) has been authorized by Act 132, SLH2018 to establish a cesspool conversion working group. The purpose of this working group is to develop a long-range, comprehensive plan for cesspool conversion statewide for all cesspools by 2050. The final report of the working group is due to the legislature prior to the 2023 session.
- During FFY 2022 approximately $12.3 million under the Base Clean Water State Revolving Fund (CWSRF) appropriation and $14.5 million under the Bipartisan Infrastructure Law (BIL) CWSRF appropriation will be allocated to the State of Hawai`i. The DOH Wastewater Branch is now prioritizing funding of wastewater projects that will support sustainable infrastructure to withstand the effects of rising Sea level due to climate change and provide adaptation for coastline innovation.

6.2 Review existing environmental regulations, guidance documents, and best management practices

- No known action.

6.3 Update guidance and propose legislative amendments to existing environmental regulations.

- No known action.



7.1 Conduct more detailed financial and economic analysis of sea level rise impacts in the SLR-XA

- No known action.

7.2 Develop a multi-pronged financing strategy at federal, state, county, private sector, and philanthropic levels to address costs of adaptation to sea level rise

- Act 208, SLH2022 expands the purpose and rationale for Special Improvement Districts to include financing of climate change and sea level rise adaptation.

7.3 Require mandatory disclosure for private properties and public offerings located in areas with potential exposure to sea level rise

- In 2021, the State of Hawai`i enacted an update to the Mandatory Seller Disclosures in Real Estate Transactions Law, codified within Hawai`i Revised Statutes §508D-15, requiring that real estate transactions within the State must disclose any risk of sea level rise (up to and including the 3.2-feel sea level rise scenario) to the property. The Commission released a flyer regarding the Disclosure Requirement for Residential Real Estate in the Sea Level Rise Exposure Area in 2022 to assist real estate agents and homeowners effectively navigate the new law. The promotional materials include information on how to identify whether a property is at risk, what the potential risks are, and how to use the Hawai`i Sea Level Rise Viewer.

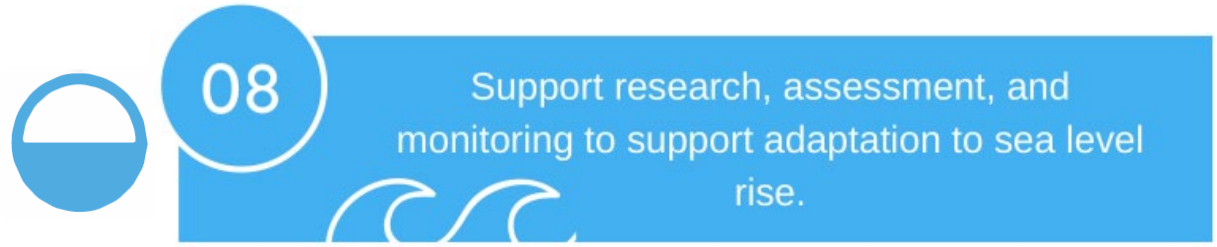
7.4 Explore the use of transfer of development rights and purchase of development rights programs that facilitate managed retreat and legacy beach preservation

- Act 223, SLH2022 expands the authority of the counties to transfer development rights to address areas at risk of sea level rise, coastal erosion, storm surge, or flooding associated with climate change.
- Honolulu City Council is considering a bill (Bill 10, 2022) with proposed updates to the Land Use Ordinance relating to transfer of development rights from properties within the special management area (SMA) to a location outside the SMA is in discussion in the City Council.

7.5 Consider the feasibility of a buy-out program for residential property owners vulnerable to sea level rise

- In February 2019 OPSD-CZM released a report titled *Assessing the Feasibility and Implications of Managed Retreat Strategies for Vulnerable Coastal Areas in Hawai`i*. The report determined that at time of writing, it was unrealistic to develop a step-by-step plan to implement managed retreat areas in Hawai`i threatened by sea level rise, given

a variety of unknowns and competing priorities. Instead, the assessment reports findings regarding retreat programs and their relative significance to Hawai`i and a specific multi-prong recommendation regarding the feasibility of retreat in Hawai`i.



8.1 Update coastal hazards modeling and vulnerability assessment as needed based on new climate science, sea level rise projections, and methods

- Ongoing updates to the modeling for the SLR-XA Viewer are outlined in the Updates to the 2017 Report and Viewer above and in the Next Steps section at the end of this Report.
- In 2022 HDOT Highway's released an Asset and Hazard Map that lets users explore the intersection of transportation infrastructures and climate hazards across Hawaii.
- In 2021 Pac IOOS released a Wave Runup Tool for West Maui and theWest Maui Wave Flooding Tool to provide specific information for the region.
- County of Maui developed the Maui County Beach Park Vulnerability Tool.

8.2 Engage communities in monitoring the impacts of sea level rise

- Hawai`i Sea Grant sponsors the Hawai`i and Pacific Islands King Tides citizen science program to enable individuals to contribute to the documentation of the impacts of King Tides to better understand tomorrow's impacts from sea-level rise and other coastal hazards.

8.3 Conduct in-depth assessment of vulnerability and evaluation of adaptation strategies for critical infrastructure throughout the State

- In 2021, the State's Thirty-First Legislature recognized that climate change and sea level rise "pose significant, dangerous and imminent threats to the State's social and economic well-being, public safety, nature and environment, cultural resources, property, infrastructure, and government functions and will likely have a disproportionate impact on low-income and otherwise vulnerable communities." Act 178, SLH2021 Relating to Sea Level Rise Adaptation was passed to begin the long-term planning needed to effectively address climate impacts. The purpose of this Act is to: (1) Require the OPSD, in coordination with state agencies with operational responsibilities over state facilities, to: a. Identify existing and planned facilities that are vulnerable to sea level rise, flooding impacts, and natural hazards; b. Assess options to mitigate the impacts of sea level rise to those facilities; and c. Submit annual reports to the Governor, Legislature, and the Hawai`i Climate Change Mitigation and Adaptation Commission regarding vulnerability and mitigation assessments for state facilities and progress toward implementing sea level rise adaptation in future plans, programs, and

capital improvement needs and decisions. (2) Update and reaffirm the role of the OPSD to coordinate climate change adaptation and sea level rise adaptation among all state agencies to improve the interagency coordination of these activities; and (3) Amend the Hawai`i State Planning Act to include sustainable development, climate change adaptation, and sea level rise adaptation as objectives for facility systems.

- OPSD-CZM released a 2021 Annual Report for Act 178, SLH2021. The report describes OPSD's activities and progress related to the implementation of Act 178, Relating to Sea Level Rise Adaptation, including a discussion on the findings of an initial state facility inventory and exposure assessment, considerations for future assessments, and recommendations for next steps. The report identifies a three phased approach: 1) conduct a high-level inventory of state facilities vulnerable to sea level rise; 2) conduct a vulnerability assessment of facilities in order to prioritize needs; and 3) identify a suite of mitigation and adaptation strategies for vulnerable facilities.
- OPSD-CZM is developing a Menu of Coastal Hazard Adaptation Strategies Suitable for Hawai`i Coastlines. The project deliverable is a comprehensive, informational resource that outlines potential coastal adaptation strategies. Each strategy will have its own "Strategy Info Card" which highlights the strategy's pros and cons, appropriate site conditions, potential permits, etc. The project is scheduled to be completed by November 2022.
- OPSD-CZM is developing a Regional Shoreline Management Scoping Study. This scoping study is an exploratory step towards a regional shoreline management strategy for the State of Hawai`i. Current shoreline management is done at the parcel level which often leads to "harder" adaptation solutions. This study will result in a proposed methodology for defining "coastal regions and subregions" that considers environmental and land use factors. The project is scheduled to be completed by December 2022.
- Hawai`i Sea Grant, University of Hawai`i Department of Urban and Regional Planning, and County of Kaua'i conducted a 2-year community-based vulnerability assessment for climate change and sea level rise on West Kaua`i using the decision support tool: Vulnerability, Consequences, Adaptation, Planning Scenarios or VCAPs. The assessment covered 6 management concerns and profiled 5 towns. This involved mapping of exposed community assets, and 7 four-hour workshops with the community. All the community participants combined resulted in over 100 hours sharing important information on how West Kaua`i is vulnerable to sea level rise, and options for adaptation. The final report was produced in June 2020. The County of Kaua`i incorporated the results of the WKCVA into the West Kaua`i Community Plan, a land use and policy document for the west side, which was adopted in 2020.

8.4 Develop a sea level rise research, assessment, and monitoring agenda to support the 5-year update process

- The Climate Resilience Collaborative (CRC) is a research program at the University of Hawai`i at Mānoa, School of Ocean and Earth Science and Technology, that is funded through the Office of Naval Research and led by Dr. Chip Fletcher. CRC is an affiliation of researchers, technicians, modelers, architects, attorneys, economists, planners, and undergraduate and graduate students spread across the Mānoa campus working on challenges related to climate change. CRC personnel conduct investigations of sea level rise and community design, increasing resilience to extreme weather events, projecting future climate stresses and shocks, marine and reef impacts, and better understanding

community exposure to rising heat, storms, and drought. This requires cross-disciplinary and integrated research investigation on a range of spatial and temporal scales.



9.1 Develop sea level rise adaptation priorities for the Hawai`i Climate Commission

- The Hawai`i Climate Commission adopted Recommendations for Countering the Impacts of Sea Level Rise in September, 2018.

9.2 Continue to support the Office of Planning and DLNR-OCCL to provide leadership, technical support, education and outreach, and interagency coordination to the Hawai`i Climate Commission and other stakeholders for sea level rise

- Working closely with the OCCL Administrator, Hawai`i Climate Mitigation and Adaptation Commission Coordinator, and planning staff at the DLNR-OCCL through cooperative funding agreements, University of Hawai`i Sea Grant extension specialists aid the DLNR-OCCL and partner State and county government agencies in making sound, science-based decisions promoting responsible and proactive coastal land use planning and coastal zone management and assist the DLNR with its climate change and sea level rise adaptation efforts.
- The 2020 Ocean Resources Management Plan: Coastal Zone Management Mauka to Makai provides guidance for a focused effort to improve State policies for ocean resources by addressing management gaps in the State. Within the focus area of Development and Coastal Hazards, the Plan identifies community action opportunities, main entities in the action team, and recommendations for stakeholders to consult. The Plan also lists out proposed projects and initiatives addressing this focus area, based on closing identified management or knowledge gaps. The ORMP's Coordinated Working Group, program managers representing a variety of agencies at the state, county and federal levels, meet quarterly to exchange information and build collective knowledge.
- OPSD-CZM worked with the USACE to officially establish the Hawai`i Silver Jackets Team in 2021. The Team's first initiative, approved in 2022, is to develop a framework for decision-making along Hawaii's shorelines. Actions planned through this proposal include identification of specific decision-making roadblocks and possible resolutions through 1) review of state and county regulations & 2) proposed revisions to facilitate consistent land use decisions that ensure the inclusion of current and projected environmental conditions, coastal hazard risks, and types of development. CZM will collaborate with county planning departments, OCCL, HI-EMA, NOAA OCM and USACE. The proposal is designed to obtain alignment of agency responses to chronic coastal hazards and provide homeowners/developers/planners with predictability on what mitigation strategies are acceptable. The Silver Jackets team acknowledges that this proposal may not allow for resolved decision-making for all of Hawaii's diverse coastal

geologies, hydrodynamics, and development patterns and will work collectively towards identifying highest priority typologies.

- 9.3 Develop a multi-agency, multi-media, and multi-stakeholder education and outreach program as part of a long-term commitment to building an informed and active constituency on climate change mitigation and adaptation
    - The Hawai`i Climate Change Portal hosted by the Climate Commission hosts a consolidated inventory of climate adaptation and mitigation documents and tools.

- 9.4 Develop a monitoring and evaluation plan with benchmarks and indicators to support the 5-year update process
    - No known action.

Further Recommendations and Next Steps

As we continue to make progress towards achieving the recommendations set forth in the 2017 Report, we must also focus on realigning our path and goals to continue to progress over the next five years. This includes proposing updated recommendations to guide State and County Agencies in continued planning and implementation of sea level rise related adaptation and mitigation efforts, as well as identification of new and unmet needs. Together, the updated recommendations and identification of unmet needs present a roadmap for bridging to a next-generation State of Hawai`i Sea Level Rise Viewer and a comprehensive update to the Hawai`i Sea Level Rise Vulnerability and Adaptation Report in five years.

Recommendations

The accomplishments achieved since 2017 provide a solid foundation for continued action for the state to meet the challenges and impacts of sea level rise. All 2017 recommendations and recommended actions should be continued over the next five years, with some minor edits and additions as outlined below. This report includes new recommended actions that align with existing recommendations from the 2017 Report and updates to some 2017 recommended actions.

This section presents the following:

- Two new recommendations, labeled as **2022 Recommendations,** with associated Recommended Actions, labeled as **2022 Recommended Actions**,
- One updated 2017 Recommendation, labeled as **Updated 2017 Recommendation** with three associated updated 2017 Recommended Actions, labeled as **Updated 2017 Recommended Actions,** and
- Thirteen new Recommended Actions aligned with 2017 Recommendations, labeled as **2022 Recommended Actions**.

2022 Recommendation 1: Conduct a full update of the Sea Level Rise Vulnerability and Adaptation Report in 2027.

- 2022 Recommended Action 1.1: Develop a next-generation State of Hawai`i Sea Level Rise Viewer and complete a more extensive update of the Hawai`i Sea Level Rise Vulnerability and Adaptation Report in 2027 utilizing the latest and best-available climate change and sea level rise

scientific information and sea level rise exposure map data (e.g., Climate Resilience Collaborative at the University of Hawai`i). The state should allocate funding to complete a comprehensive report in 2027 with a focus on community-level impacts and actions and implementation of identified adaptation recommendations from 2017. This recommendation builds on the existing mandate for a review and update every five years by proposing that the 2027 Report include a full vulnerability assessment and documentation of ongoing initiatives to reduce vulnerability and increase resiliency and adaptation. Contracting and drafting for the 2027 Report should begin at least two years in advance of the reporting deadline mandated by Act 32, SLH2017. Current progress towards developing the next-generation Sea Level Rise Viewer is detailed in the Next Steps Section, below.

- 2022 Recommended Action 1.2: Develop a centralized tracking system to coordinate all efforts that are responsive to the 2017 and 2022 Report Recommendations. Establish a position within DLNR, in coordination with the Climate Commission, to improve cooperation and coordination between State and county agencies for all issues relating to sea level rise mitigation and adaptation, and to raise the visibility and understanding of these efforts to the public and across the state and county government agencies. The state should create a reporting tool potentially housed by the State Climate Commission, to consolidate reporting of progress towards meeting the objectives and recommendations of the 2017 Report and this Update. Ongoing accounting for the initiatives and progress from state and county agencies will enable greater visibility between agencies and will support the completion of the 2027 Report. This Recommended Action also aligns with 2017 Recommended Action 9.4 Develop a monitoring and evaluation plan with benchmarks and indicators to support the 5-year update process.
- 2022 Recommended Action 1.3: Identify emerging issues and unmet needs for sea level rise adaptation and mitigation not addressed by the 2017 Report. State and county agencies, in coordination through the State Climate Change Commission, should review current and ongoing initiatives to determine unaddressed issues for consideration in the 2027 Report.
- 2022 Recommended Action 1.4: Conduct an updated and more detailed vulnerability assessment within the SLR-XA: As part of the 10-Year Update the state should conduct a full review of all actions taken in response to these recommendations and the 2017 recommendations to determine the changes in vulnerability within the SLR-XA as a factor of exposure, sensitivity, and adaptive capacity. The vulnerability assessment should include a detailed analysis of socio-economic factors including community sensitivity and adaptive capacity**.**

2022 Recommendation 2: Continue to implement the 2017 Recommendations with minor edits as outlined in the 2022 Report Update.

- 2022 Recommended Action 2.1: Identify gaps in progress since 2017. State agencies should work towards completing and where necessary, revising the recommendations from the 2017 Report with a particular focus on areas where significant progress is lacking in the past five years. The state should ensure that agencies are adequately resourced to implement programs and policies to address the increased risk of sea level rise.

2017 Recommendation 1: Support sustainable and resilient land use and community development

- Updated 2017 Recommended Action 1.1: Recognize the SLR-XA as a statewide exposure zone: The phrase “vulnerability zone” should be replaced with “exposure zone” to more accurately

reflect what the SLR-XA depicts. Vulnerability within the exposure area can be reduced through adaptation measures for infrastructure that cannot be moved. Although all infrastructure within the SLR-XA is vulnerable to sea level rise, several factors can impact the extent of vulnerability or resiliency.

- 2022 Recommended Action 1.7: Update planning guidance to reflect most recent sea level rise projections:
  Following the latest Sweet, et al., 2022 NOAA-interagency sea level rise report, the state should set a revised planning and policy benchmark of 4 ft as the minimum scenario for all planning and design based on the report's Intermediate (mid-range) scenario for Hawai`i of 3.9 feet of sea level rise by 2100, and apply a 6 ft benchmark for planning and design of public infrastructure projects and other projects with low tolerance for risk based on the report's Intermediate High scenario for Hawai`i of 5.9 feet of sea level rise by 2100. The latest science suggests that the SLR-XA for 3.2ft of sea level remains valid as a planning overlay for the mid century at this time. The State should continue to use the 3.2 foot Sea Level Rise Exposure (SLR-XA) and NOAA 6 foot passive flooding map data available in the Viewer until updated SLR-XA data is available. Agencies should incorporate the revised planning benchmarks into adaptation planning to account for the more accurate regional projections prior to the availability of revised SLR-XA data as possible. This recommendation is consistent with recent recommendations from the City and County of Honolulu Climate Change Commission which recommends an increase from 3.2 feet of sea level rise by 2100.
- 2022 Recommended Action 1.8: Implement the recommendations of the February 2019 Office of Planning and Sustainable Development - Coastal Zone Management Program report titled "Assessing the Feasibility and Implications of Managed Retreat Strategies for Vulnerable Coastal Areas in Hawai`i": The state should establish and fund programs at the state and county level to incentivize relocation (e.g., willing-seller managed retreat) to benefit community resilience and protect public trust resources. Such programs include the ongoing work to:
  - Expand the State's and counties' ability to implement voluntary managed retreat "tools" including but not limited to transfer of development rights (TDRs), rolling easements, and land transfers;
  - Review state and county land use to determine where it may be possible to retreat to, i.e, "receiving areas";
  - Engage communities to obtain their input and priorities for retreat location strategies;
  - Identify and establish federal, state, and county funding for retreat and restoration of coastal lands to natural conditions or lightly developed parklands for public benefit of conserving shoreline access and improving community resilience;
  - Review state and county plans to determine where they may be amended and updated to support retreat;
  - Review laws and regulations that may have to be amended and adopted to facilitate retreat;
  - Prioritize support for voluntary relocation of multi-generational shorefront landowners; and
  - Establish managed retreat pilot implementation areas.

- 2022 Recommended Action 1.9: Conduct long-term strategic planning for maintenance, repair and replacement of critical infrastructure within the SLR-XA in advance of emergent need: State

agencies should undertake long-term strategic planning initiatives to reduce the use of emergency measures for maintenance and repair of facilities and infrastructure within the SLR-XA. Emergency authorizations and implementation of adaptation measures reduce public input to the planning and permitting process. While immediate emergency action is sometimes necessary for public health and safety, it should not be used to circumvent public involvement. Proactive and comprehensive long-term planning for sea level rise impacts prior to emergency situations is necessary to safeguard natural resources while ensuring ongoing maintenance and potentially relocation of critical infrastructure. Accurate SLR-XA data available via the Viewer provides an advanced look at future sea level conditions and is a key planning tool for applying planning benchmarks outlined in this report.

2017 Recommendation 2: Prioritize smart urban redevelopment outside the SLR-XA and limit exposure within the SLR-XA

- 2022 Recommended Action 2.10.1 Incorporate existing and emerging scientific data in updates to shoreline setback ordinances: The state should support the counties in updating shoreline setback and zoning ordinances to reflect the increasing threat of coastal erosion and sea level rise.

2017 Recommendation 3: Incentivize improved flood risk management; Recommended Action 3.1 Adopt higher flood standards to account for sea level rise

- 2022 Recommended Action 3.1.1: Improve guidelines and regulations for planning and design in the SLR-XA and FEMA Special Flood Hazard Zones: Establish a position within DLNR, in coordination with the Climate Commission, to improve cooperation and coordination between State and county floodplain management and planning departments to integrate sea level rise considerations into floodplain management and hazard mitigation.
- 2022 Recommended Action 3.1.2 Utilize passive flooding and wave runup model projections in building and zoning ordinances (e.g., "Constraint District"): The state should support counties in updating zoning ordinances and building codes to incorporate model projections of passive flooding and wave runup.

Updated 2017 Recommendation 4: Enable ~~legacy~~ beaches to persist with sea level rise;

- Updated 2017 Recommended Action 4.1: Conduct a state-wide assessment of beaches applying the objectives of the Hawai`i Coastal Zone Management Act (HRS §205A-2). The DLNR, Office of Conservation and Coastal Lands (OCCL), together with federal, state, and county governments, nongovernmental organizations, and local stakeholders, should undertake a state-wide assessment to identify beaches and dune systems that are important for recreational uses, cultural practices, wildlife habitat, and coastal resilience. The state should further coordinate with county agencies to prohibit development in such areas, and even consider removing development from areas with upland sand deposits if we hope to retain this vital natural and cultural resource for future generations.
- Updated 2017 Recommended Action 4.2: Establish a "willing seller" program to move development away from beaches: The State should establish a "willing seller" program that pre-identifies property owners that would be willing to sell or relocate their property outside of the

state-wide vulnerability zone. There are many successful examples of "willing seller" programs, the most notable of which is the City of Portland, Oregon's "Johnson Creek Willing Seller Program" which helps move people and property out of areas that frequently flood. Restoration projects on land acquired through the program increase flood storage, improve fish and wildlife habitat, restore wetlands, and create passive recreational activities for city residents. For more information regarding this program, please visit https://www.portlandoregon.gov/bes/article/106234.

- Updated 2017 Recommended Action 4.3: Explore legislative and policy mechanisms to designate funding for priority coastal lands and enable the use of a variety of practices and tools and utilize existing programs to acquire beaches and other coastal lands for recreational, cultural, ecosystem and resilience objectives: The state and counties should consider additional legislative actions to identify a dedicated sources of funding for coastal land acquisition. The state should further pursue opportunities to leverage programs such as the Federal Coastal and Estuarine Land Conservation Program, as detailed in the Hawai`i Coastal and Estuarine Land Conservation Plan, and other federal or state land acquisition grant programs as they become available to acquire coastal property for conservation purposes. In addition to land acquisition for beaches, a variety of tools, including buffer zones and conservation easements, are needed to support conservation of coastal lands through incremental changes in the shoreline. Buffer zones could be used to restrict development within specified distances of natural and cultural resources. Expanding buffer zones around beaches, sand dunes, and coastal wetlands would provide space for these environments to migrate landward with rising sea levels. State law authorizes public bodies and nonprofit organizations to hold conservation easements for the purposes of preserving and protecting open space, natural landscapes, cultural and historical sites and resources, and agricultural lands.
- 2022 Recommended Action 4.4: Support County Parks Departments in the management of county beach parks. The State should coordinate closely with the County Parks Departments to ensure that beach parks are managed holistically and with natural resource protection as a key priority. Beach Parks present the best opportunity for the preservation of public access and conservation of natural shorelines and beach habitat.

2017 Recommendation 6: Protect nearshore water quality from sea level rise impacts

- 2022 Recommended Action 6.1.1: Support research and development efforts to identify and implement affordable alternatives to cesspools in shoreline areas: Following on the outcomes of the cesspool conversion working group, the state should sponsor research and development efforts to expand affordable and actionable conversion options for shoreline property owners. Such options should account for SLR-XA projections of coastal erosion and associated land loss, and potential failure of onsite sewage treatment systems resulting from SLR-induced groundwater inundation. Removal of cesspools is imperative to the health of nearshore waters for all properties within the SLR-XA and for members of the public accessing coastal resources. Removal may not be achievable by 2050 as directed by state law without viable alternatives for replacement.

- 2022 Recommended Action 6.4: Develop clear policy and guidance for onsite sewage disposal systems in the sea level rise exposure area to protect public health: The state should expand policy directives beyond the existing income tax credits and requirement for removal by 2050. Specifically, policy must address existing cesspools in the coastal zone in relation to

enforcement of existing laws and regulations and removal of unpermitted shoreline hardening. Cesspools on the shoreline and in the coastal zone will be an increasing source of nonpoint-source pollution as groundwater rises and coastal erosion accelerates. Applicable to Recommendation 6.1.

Recommendation 7: Develop innovative and sustainable financing and incentives to support adaptation to sea level rise

- 2022 Recommended Action 7.6: Explore the use of the FEMA funding for use in Hawai`i**:** The state should explore FEMA funding options to support moving homeowners away from flood zones in support of a comprehensive managed retreat plan. Specifically work with FEMA for Building Resilient Infrastructure and Communities (BRIC) grants, hazard mitigation programs and other funding opportunities to identify options for federal support to Hawaii's adaptation priorities. Additionally, the state should work with federal representatives to explore exemptions from prohibitive FEMA policies, particularly on DHHL Land where the lessee model may prohibit individuals from participating in the National Flood Insurance Program (NFIP).

2017 Recommendation 9: Promote collaboration and accountability for adapting to sea level rise

- 2022 Recommended Action 9.5: Incorporate community-scale vulnerability assessments and adaptation planning into the 2027 Sea Level Rise Vulnerability and Adaptation Report. The state should develop detailed and comprehensive community-based climate change and sea level rise vulnerability assessments and adaptation strategies that prioritize areas experiencing the most immediate and severe impacts with early and continuous community engagement and input.
- 2022 Recommended Action 9.6: Improve cooperation between state and county government agencies to strengthen enforcement and compliance with existing coastal laws The state should encourage and support its agencies to cooperate across jurisdictional frameworks and with the counties' various agencies to manage coastal resources. The state should encourage progessive action by its agencies to enforce coastal conservation laws and public and private compliance with coastal conservation laws. For county agencies that have conducted vulnerability assessments for their sectors, the state should review the assessments for consistency and consolidate them to comprehensively visualize and track vulnerabilities across the state.
- 2022 Recommended Action 9.7: Increase state agency capacity to enforce existing laws and regulations. The state should prioritize enforcement and compliance for natural resource protection by increasing staffing in regulatory, legal and enforcement agencies.

Next Steps

As an immediate next step, the State Climate Commission should adopt this report and forward it to the Legislature.

In addition to the recommendations listed above, the process of preparing this report has identified the following unmet needs and areas in need of focus in the next five years.

- **Facilitate interagency coordination for holistic adaptation planning** (e.g., comprehensive consideration and planning for natural resources, roads, communities; and improved communications between government agencies) (2017 Recommendation 9, 2022 Recommendation 1)
- **Conserve and adapt Native Hawaiian cultural resources and sites** (2017 Recommendation 5)
- **Integrate equity and justice considerations to vulnerability assessments and adaptation planning and actions** (2017 Recommendation 2)
- **Address and stop the loss of shoreline access** (2017 Recommendation 4)
- **Integrate economic valuation and ecosystem co benefits of natural coastal resources into planning and actions** (2017 Recommendations 4, 5 and 8)
- **Make managed retreat a viable option and identify funding mechanisms for adaptation** (2017 Recommendations 2 and 7)
- **Implement phased adaptation to sea level rise** (2017 Recommendation 1, 2, 7)

The Climate Commission should set these unmet needs as priority action areas from 2023-2027. To facilitate coordination among state agencies, the Commission should host a staff-level workshop or series of workshops for discussion of this report and the actions for each agency going forward. Such a workshop will set the agenda for the next five years, create a mechanism to ensure ongoing interagency collaboration, and provide a baseline for action.

Next Steps for the SLR Viewer

To increase our ability to plan for sea level rise The Climate Resilience Collaborative at the University of Hawai`i is working to update and expand the State of Hawai`i Sea Level Rise Viewer. Utilizing federal funding, researchers are developing the next generation of passive flooding, high wave flooding, coastal erosion, compound events and other relevant sea level rise exposure map data that will be available in three to five years. Specific elements of the work towards as Sea Level Rise Viewer 2.0 are as follow:

- Augment existing imagery database and increase spatial and temporal resolution of coastline observations by incorporating imagery from satellites and small unmanned aerial systems (sUAS or drones). This will allow for enhanced detail in analyses and modeling. Calculating historical rates of shoreline change with increased precision will improve future predictions of shoreline locations.
- The USGS-developed Coastal Storm Modeling System - Coastal On-line Assimilated Simulation Tool (CoSMos-COASTS) is being adapted to Hawai`i-specific wave conditions, and future sea level rise projections to emulate how the ocean behaves in the near shore environment in two directions – along-shore and cross-shore to expand on the existing SLR-XA modeling.
    - Development of a full transect grid along the islands' coastlines, including digitizing the shoreline and identifying non-erodible areas, as well as correctly classifying beach types and littoral cell boundaries for the CoSMos-COASTS model. This team is also working to set up the framework for collecting LandSat, Sentinel, and Planet Labs satellite imagery through the CoastSat package, written by Kilian Vos (UNSW).
    - Collecting aerial imagery and modeling the Island of O'ahu in phases. Orthomosaics have been generated for some areas in the islands, the shoreline positions have been

digitized and beach width determined, and historical and future shoreline change rates and hazard zones have been produced. Finally, aerial surveys are being conducted of all the shorelines.

The current SLR viewer has given the state of Hawai`i an opportunity to look ahead and understand the risks of sea level rise well into the future. In a collaborative effort, this new research will help to provide improved estimates of future shoreline positions for all beaches in Hawai`i with increased spatial and temporal accuracy. Ultimately, these predicted shoreline positions will continue to inform policy decisions for shoreline management, and community resilience for the State. With this knowledge, as the state adapts to higher sea levels, priority should be given to adaptation tools that protect, and enhance the public coastal resources and access. It is critical that developments, and redevelopments be sited and designed to not require future protection that may alter a natural shoreline.

Conclusion

As sea level rise continues to accelerate, the State of Hawai`i must maintain a constant and ongoing effort to adopt policies and programs to support adaptation to a changing world. Although there has been progress made towards reducing vulnerability and enhancing adaptability, we must maintain a diligent focus on continual and ongoing improvement of community engagement, laws, regulations, and policies to meet the challenge ahead and safeguarding our cultural and natural resources while also providing adaptation tools to the people of Hawai`i in an equitable manner. The recommendations contained in the 2017 Report and this update provide key steps towards increasing the islands' resiliency to sea level rise and many of the recommended actions provide co-benefits such as mitigating impacts from storms and tsunami and improving overall community vitality. In the next five years, the state must continue to work towards identifying and implementing programs which sustain vibrant communities while improving resilience to sea level rise and mitigating other natural hazards.

Works Cited

Arias, P.A., et al. (2021) Technical Summary. In Climate Change 2021: The Physical Science Basis. Contribution of WGI to the AR6 of the IPCC [Masson-Delmotte, V., et al. (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, pp. 33−144. doi:10.1017/9781009157896.002.

Long, X., Widlansky, M. J., Schloesser, F., Thompson, P. R., Annamalai, H., Merrifield, M. A., & Yoon, H. (2020). Higher sea levels at Hawaii caused by strong El Niño and weak trade winds. Journal of Climate, 33(8), 3037-3059.

Nerem, R.S., Frederikse, T. and Hamlington, B.D., 2022. Extrapolating Empirical Models of Satellite-Observed Global Mean Sea Level to Estimate Future Sea Level Change. Earth's Future, 10(4), p.e2021EF002290.

Sweet, W.V., B.D. Hamlington, R.E. Kopp, C.P. Weaver, P.L. Barnard, D. Bekaert, W. Brooks, M. Craghan, G. Dusek, T. Frederikse, G. Garner, A.S. Genz, J.P. Krasting, E. Larour, D. Marcy, J.J. Marra, J. Obeysekera, M. Osler, M. Pendleton, D. Roman, L. Schmied, W. Veatch, K.D. White, and C. Zuzak, 2022: Global and Regional Sea Level Rise Scenarios for the United States: Updated Mean Projections and Extreme Water Level Probabilities Along U.S. Coastlines. NOAA Technical Report NOS 01. National Oceanic and Atmospheric Administration, National Ocean Service, Silver Spring, MD, 111 pp. https://oceanservice.noaa.gov/hazards/sealevelrise/noaa-nostechrpt01-global-regional-SLR-scenarios-US.pdf

Thompson, P.R., Widlansky, M.J., Hamlington, B.D., Merrifield, M.A., Marra, J.J., Mitchum, G.T. and Sweet, W., 2021. Rapid increases and extreme months in projections of United States high-tide flooding. Nature Climate Change, 11(7), pp.584-590.

Widlansky, M. J., Annamalai, H., Gingerich, S. B., Storlazzi, C. D., Marra, J. J., Hodges, K. I., ... & Kitoh, A. (2019). Tropical cyclone projections: Changing climate threats for Pacific Island defense installations. Weather, climate, and society, 11(1), 3-15.

IPCC (2021) Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson- Delmotte, V., et al. (eds.)]. Cambridge Univ. Press. In Press.

Appendix A

Responses to Learning Questions from the 2017 Hawai`i Sea Level Rise Vulnerability and Adaptation Report

Sea Level Rise Outlook: Global and Local Observations and Projections

1. What are the observations of change in sea level in the vicinity of the Hawaiian Islands, and how do they correspond with the recent global acceleration in mean sea level rise?

Long-term observational data from local tide gauge stations show that sea level is rising around Hawai'i. Models indicate that Hawai'i and other tropical Pacific sites will experience sea level rise that is 16% to 20% higher than the global average (Sweet. et al. 2022). The NOAA 2022 report provides a range of regionalized sea level rise scenarios based on differing GHG emissions pathways and associated global warming and ice sheet melt. The report finds that sea level will rise around Hawaii between 0.7 and 1.5 feet by 2050. The Intermediate (mid-range) estimate is for a rise of 1.0 feet (relative to sea level in the year 2000). The observed rate of sea level rise measured from tide gauges in Hawaii lead to a median estimate of 0.8 feet by 2050, though this rate is expected to accelerate in coming decades similar to global trends. Sea level will rise between 1.3 and 8.0 feet by 2100 (relative to the year 2000) with an Intermediate estimate of 3.9 feet (Sweet, et al. 2022).

2. To what extent has the magnitude and timing of the sea level rise projections from IPCC AR5 changed with new projections from the IPCC AR6?

Sea level rise exposure mapping in the 2017 Hawai'i Sea Level Rise Report and Hawaii Sea Level Rise Viewer is based on an upper-end projection in the 2013 IPCC 5th Assessment Report of 3.2 feet of global mean sea level rise by 2100. As expected, the science on sea level rise observations and forecasts has continued to advance. Since completion of the 2017 Report, peer-reviewed scientific literature as well as government and multinational reports increasingly point to 3 to 4 feet of sea level rise by 2100 as a mid-range, rather than high-end, scenario for Hawai'i.

3. What are the observations and projections of the frequency and intensity of tropical cyclones and El Niño events and their effects on coastal water levels and tidal flooding?

Major tropical cyclones (hurricanes) in Hawaii's region of the Central North Pacific are much less common than in the Eastern and Western tropical Pacific. From 1991-2020, an average of 3.6 tropical storms, 1.7 hurricanes (Category 1 or above), and 0.9 major hurricanes (Category 3 or above) occurred per year in the Central Pacific (J. Marra and H. Diamond, NOAA, personal communication, November 21-22, 2022). Of particular note in the past five years, Hurricane Walaka reached Category 5 status on October 1, 2018 passing south and west of the main Hawaiian Islands but traveled directly over Kānemiloha'i (French Frigate Shoals) in Papahānaumokuākea Marine National Monument as a Category 3 hurricane (https://www.nhc.noaa.gov/data/tcr/CP012018_Walaka.pdf). East Island, a low-lying sand and gravel atoll island in French Frigate Shoals and an important green sea turtle nesting site, was almost completely washed away by Walaka's waves and storm surge. Elevated sea surface temperatures in the Central North Pacific (1.0º to 1.5º Celsius above average) and low wind shear contributed to Walaka's unusual strength (H. Diamond, NOAA, personal communication, November 21, 2022). While it

is difficult to blame climate change on a single storm event, Walaka may serve as an example of increasing tropical cyclone activity and impacts for Hawaii likely to occur in coming decades.

Advancing research since the 2017 SLR Report using climate models points to similar frequency but increasing intensity of tropical cyclones around Hawaii, linked primarily to increased warming of ocean surface waters (Widlansky, et al. 2019). El Nino conditions generally mean increased occurrence of tropical storms around Hawaii. The "triple dip" La Nina conditions over the past three years has likely suppressed tropical cyclone activity around Hawaii over that time period due to cooler waters and increased windshear (changes in wind speed and direction with altitude). Record high sea levels in 2017 have been linked to delayed effects from a strong El Nino in 2015 and climate model projections point to increased periods of weak trade winds following El Nino events that have been linked to the occurrence of high sea levels around Hawaii (Long, et al. 2020).

Methodology

1. **To what extent do new global sea level rise projections differ from those used in this hazard modeling?**

Sea level rise exposure mapping in the 2017 Hawai'i Sea Level Rise Report and Hawaii Sea Level Rise Viewer is based on an upper-end projection in the 2013 IPCC 5th Assessment Report of 3.2 feet of global mean sea level rise by 2100. As expected, the science on sea level rise observations and forecasts has continued to advance. Since completion of the 2017 Report, peer-reviewed scientific literature as well as government and multinational reports increasingly point to 3 to 4 feet of sea level rise by 2100 as a mid-range, rather than high-end, scenario for Hawai'i.

2. To what extent have data and coastal hazard modeling improved to warrant updating this hazard modeling?

As current science, observations and projections evolve, the University of Hawai`i Climate Resilience Collaborative is working to update and expand the State of Hawaii Sea Level Rise Viewer. Utilizing federal funding, researchers are developing the next generation of passive flooding, high wave flooding, coastal erosion, compound events and other relevant sea level rise exposure map data that will be available in three to five years.

3. To what extent have property values, population, and other development trajectories changed from the baseline data used in this report?

<u>Property Values</u>
The 2017 Report estimated that the value of private lands and structures within the SLR-XA on O'ahu was roughly $12.9 billion. A precise answer to this question was not attainable for the purposes of this report. Calculations of the change in property value are in progress by the University of Hawai'i Institute for Sustainability and Resilience (ISR), led by Dr. Makena Coffman (personal communications, 2022).

<u>Population</u>
The 2017 Report states that "[o]ver the next 30 to 70 years, chronic flooding with sea level rise will increase, impacting homes and businesses located near the shoreline. Approximately…19,800 people statewide would be exposed to chronic flooding in the SLR-XA with 3.2 feet of sea level rise." A precise answer to this question was not attainable for the purposes of this report. Updated population calculations are in progress by the ISR.

Development

The 2017 Report states that "[o]ver the next 30 to 70 years, chronic flooding with sea level rise will increase, impacting homes and businesses located near the shoreline. Approximately 6,500 structures…statewide would be exposed to chronic flooding in the SLR-XA with 3.2 feet of sea level rise."

Development trends throughout the state have not significantly changed since 2017, however the recent and pending updates to county SMA and shoreline setback ordinances may affect coastal development patterns moving forward.

4. Is the SLR-XA for 3.2 feet of sea level rise modeled in the Report still valid as the exposure overlay for the mid to latter half of this century?

The latest science suggests that the SLR-XA for 3.2ft of sea level remains valid as a planning overlay for the mid century at this time. Following the latest Sweet, et al., 2022 NOAA-interagency sea level rise report, the State should update the guidance to set a planning and policy benchmark of 4 ft for all planning and design for actions and infrastructure planned to 2100, and apply a 6 ft benchmark for planning and design of public infrastructure projects and other projects with low tolerance for risk.

Results

1. To what extent is potential chronic flooding in the SLR-XA with 1.1 foot of sea level rise aligned with areas currently exposed to chronic flooding?

In 2017, and again in 2020, the Honolulu Harbor Tide gauge recorded the highest daily mean water levels observed over its 112-year history. These record high water levels were produced by a combination of phenomena that included long-term global sea level rise, peak annual astronomical tides ("king tides"), wave setup, and migration of warm buoyant waters brought in by winds and currents. During both events, observed sea levels tracked between 0.5 and 1 ft higher than predicted, providing a glimpse of what will become a more common occurrence in the near future as sea level continues to rise. Flooding observed during these events was widely documented as part of the Hawai`i and Pacific Islands King Tides citizen science program. Local impacts were observed throughout the State in the form of increased coastal erosion, minor wave over-wash flooding, backshore flooding from groundwater rise and storm drain backflow, and impeded and potentially hazardous beach access. Observations in low-lying areas like Mapunapua on Oahu confirmed flooding characterized by SLR-XA passive flood layers representing the 1.1 ft scenario.

2. Are there any new developments or critical infrastructure in the SLR-XA with 3.2 feet of sea level rise not accounted for in the vulnerability assessment?

State and County updated policies are designed to reduce the building of new homes and infrastructure within the SLR-XA. In preparing this report, a full assessment of new development or critical infrastructure within the 3.2ft SLR-XA was not conducted. This report recommends a full vulnerability assessment for the 2027 Report.

3. To what extent have land and structure values for parcels in areas potentially impacted by sea level rise changed as a basis for estimating potential economic loss?

It is not clear that there has been any trend in shoreline development or retreat that would meaningfully change the basis for estimating economic loss in the SLR-XA since the 2017 Report.

4. To what extent has human migration from other Pacific Islands and wildlife migration from the NWHI to the main Hawaiian Islands changed?

It is unknown at this time whether there has been a change in human and wildlife migration patterns since the 2017 report.

5. What adaptation measures have been taken to reduce vulnerability to sea level rise?

Several adaptation measures have been taken throughout the state which reduce vulnerability to sea level rise. Most of these are detailed in the Recommendations section of the report, and are highlighted here briefly as specific measures which may reduce individual vulnerability to sea level rise.

The following is a general listing of actions which are further detailed in the Recommendations section in the body of this report:

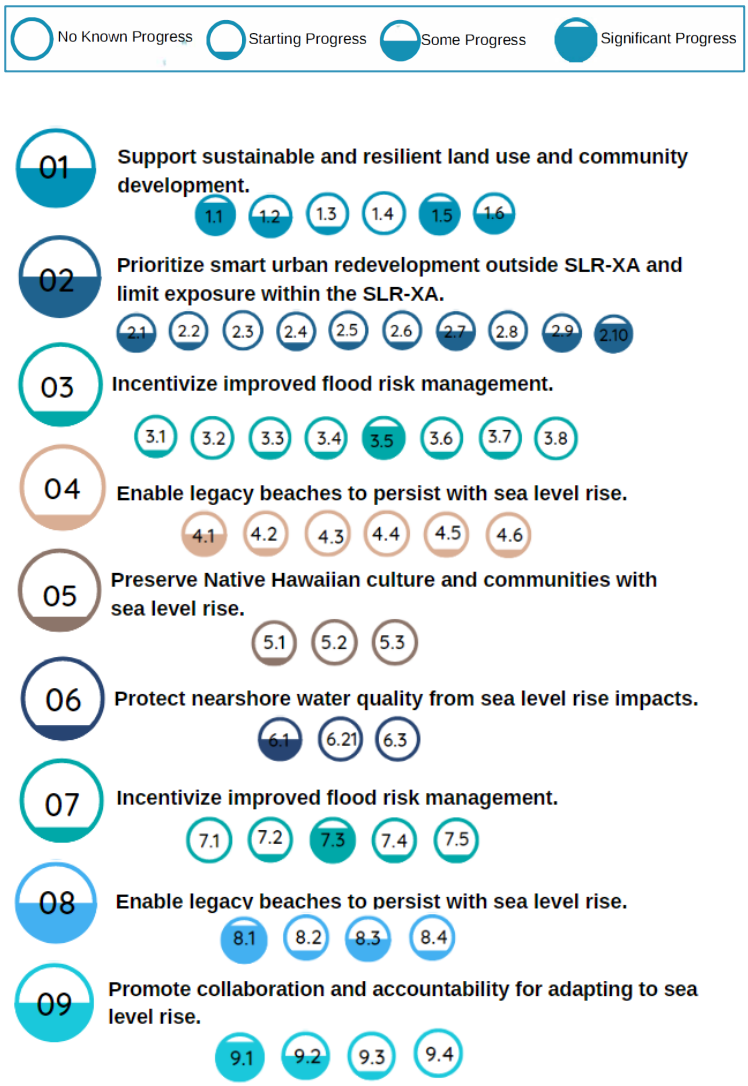
- County of Kaua'i passed first of its kind Sea Level Rise Constraint District that uses passive flooding and wave runup models developed for Hawai'i Sea Level Rise Viewer. The constraint district is a great example of resilient design standards for proposed uses within the SLR-XA.
- The state implemented a disclosure requirement for real estate transactions for all properties located within the sea level rise exposure area.
- The state has sponsored or permitted beach nourishment activities in Waikiki and elsewhere which improve resiliency by augmenting the beach profile and replacing eroded sand onto the beach. Coupled with sand nourishment, some projects have also included groin construction in an effort to keep nourished sand on the beach.
- In 2020, County of Kaua`i established a Special Treatment Coastal Edge District (ST-CE) as areas that are highly vulnerable to coastal hazards including but not limited to sea level rise, coastal erosion, high wave run-up, passive flooding, and an increased frequency and intensity of storms. Within the ST-CE any use, structure, or development permitted with or without a Use Permit in the Special Treatment Coastal Edge District shall mitigate impacts from coastal hazards, including but not limited to sea level rise, coastal erosion, high wave run-up, passive flooding, and an increased frequency and intensity of storms.
- Along the elevated portions of the Honolulu Rail Transit Project between Chinatown and Ala Moana Center the stations were redesigned so no electronics below 6ft and elevated portions meet federal requirements even if roads are raised by 6ft. Additionally, all hanging elements were removed to allow for 6ft of adaptation.
- Sidewalks and entryways in Kaka`ako are elevated above street level to account for flooding.
- The City and County of Honolulu and the Maui County both issued Mayoral Declarations requiring executive departments to consider and incorporate SLR-XA data for capital planning.
- City and County of Honolulu Department of Planning and Permitting instituted a requirement for consideration of sea level rise for all building permits and for all properties conducting renovations within the SLR-XA.

Recommendations

1. What recommendations have been implemented and why?

The status of the recommendations and recommended actions contained in the 2017 Report is covered in detail in the body of this report. Progress towards meeting the nine recommendations (represented

by large circles) and 49 associated recommended actions (represented by small circles) is presented here as measured on a qualitative scale of “no known progress” to “significant progress”.



Some key statewide accomplishments that address the recommendations are noted as follows:

Use of the Sea Level Rise Exposure Area Data and Sea Level Rise Viewer: Although the Sea Level Rise Exposure Area (SLR-XA) was not officially recognized as a state-wide vulnerability zone, the Viewer and SLR-XA are in widespread use by state and county agencies for adaptation planning purposes. The use of the SLR-XA data as identified by the Viewer for policy decisions was enabled by the peer reviewed publication of the methods, which allowed for the removal of the original disclaimer language cautioning against such use. Easy availability and the establishment of guidance for SLR-XA data interpretation via the viewer made it critically important to the success of planning efforts and new policies. We recommend a continual peer review of ongoing research to strengthen the research products used in policy decision making.

**Hawai`i Coastal Zone Management Act Updates**: Act 16, SLH2020 updated the Hawai`i Coastal Zone Management Act (HRS Chapter 205A) in many ways including strengthening protections for beach and

other coastal environments by specifically prohibiting private shoreline hardening structures and minimizing public shoreline hardening structures, including seawalls and revetments, at sandy beaches where they would interfere with existing recreational and waterline activities.

Sea Level Rise Report Addendum: Guidance for Using the Sea Level Rise Exposure Area in Local Planning and Permitting Decisions was published by the State as a supplement to the 2017 Report. The Addendum was prepared by the University of Hawai`i Sea Grant College Program with the Hawai`i Department of Land and Natural Resources - Office of Conservation and Coastal Lands for the Hawai`i Climate Change Mitigation and Adaptation Commission - Climate Ready Hawai`i Initiative. The Hawai`i Climate Change Mitigation and Adaptation Commission issued a statement of approval for the Addendum at its October 28 2020 meeting.

Hawai`i 2018 Hazard Mitigation Plan: The 2018 update of the State's Hazard Mitigation Plan includes expanded consideration of climate change and sea level rise hazards, including hazard assessment using the SLR-XA and a 1% Annual-Chance Coastal Flood Zone with 3.2 feet of sea level rise (1%CFZ-3.2) modeled for the Plan: https://dod.hawaii.gov/hiema/sert-resources/hazard-mitigation/

Planning for Managed Retreat: OPSD-CZM published a report titled *Assessing the Feasibility and Implications of Managed Retreat Strategies for Vulnerable Coastal Areas in Hawai`i* in 2019 and is embarking on a next-step study that will assess the options for and implications of implementing managed retreat from the perspectives of (1) policy and regulation, and (2) funding and financing mechanisms in 2023.

Statewide Inventory of Vulnerable Infrastructure: Act 178 Relating to Sea Level Rise Adaptation was passed to begin the long-term planning needed to effectively address climate impacts. OPSD-CZM submitted a report to the legislature in 2021 reporting on progress towards the phased approach required by Act 178.

In addition to the above listed state-wide highlights, the ongoing support from University of Hawai`i entities such as the Sea Grant College Program, the Climate Resilience Collaborative, and others) to state and county agencies provided expertise for interpretation of the report and practical implementation of recommendations and use of data. The capacity to address the impacts of sea-level rise grew at county and state levels of government. For example, the City and County of Honolulu established the City and County of Honolulu established the Climate Change Commission. The City and County of Honolulu and the County of Maui established an Office of Climate Change, Sustainability and Resiliency; the County of Hawaii maintains a Climate Change Action program within its Office of Research and Development and the County of Kauai maintains a Sustainability Program Area within its Office of Economic Development.

2. What recommendations have not been implemented and why?

Although the state made progress towards implementing the recommendation of the 2017 Report, there are areas of unmet need that require a renewed focus over the next five years.

- **Facilitate interagency coordination for holistic adaptation planning** (e.g., comprehensive consideration and planning for natural resources, roads, communities; and improved communications between government agencies) (2017 Recommendation 9, 2022 Recommendation 1)
- **Conserve and adapt Native Hawaiian cultural resources and sites** (2017 Recommendation 5)

- **Integrate equity and justice considerations to vulnerability assessments and adaptation planning and actions** (2017 Recommendation 2)
- **Address and stop the loss of shoreline access** (2017 Recommendation 4)
- **Integrate economic valuation and ecosystem co benefits of natural coastal resources into planning and actions** (2017 Recommendations 4, 5 and 8)
- **Make managed retreat a viable option and identify funding mechanisms for adaptation** (2017 Recommendations 2 and 7)
- **Implement phased adaptation to sea level rise** (2017 Recommendation 1, 2, 7)

The status of the recommendations and recommended actions contained in the 2017 Report is covered in detail in the body of this report.

The summary graphic in the answer to question 2 in this section captures recommendations and recommended actions for which no action and/or little progress was reported.

The 2017 Recommendations were adopted by the State Climate Commission but were not specifically assigned to individual agencies for action. As a result, individual agencies prioritize and implement new programs or policies aligned with their strategic goals, and not in response to all recommendations from the 2017 Report. Overall funding and personnel capacity also hinder progress towards implementing the recommendations and recommended actions.

3. What have been barriers to implementation and measures taken to overcome these barriers?

The COVID pandemic caused delays to action across the federal, state and county government agencies. Although capacity to address climate change and sea level rise increased at the state and county levels, there is a need for additional personnel and funding as outlined in the updated recommendations in this report. Additionally, specific to the implementation of progressive shoreline setback ordinances, there is a need for public engagement and education regarding the need and benefit for increased setback distances. Opposition from property rights advocates will continue to be an issue when attempting to implement stricter setback rules.

There is also a lack of funding mechanisms to enable managed retreat. The ongoing work of OPSD-CZM to study the various possibilities should be supported and the findings of the initial study should be implemented.

4. To what extent has Hawaii's capacity to adapt to sea level rise increased based on benchmarks and measurable indicators?

Among the updated recommendations presented in this interim report is a focus on the facilitation of interagency coordination for holistic adaptation planning and greater resources dedicated to tracking and integrating agency initiatives and efforts towards adaptation. There are currently no benchmarks or measurable indicators to measure the State's progress towards sea level rise adaptation. In order to objectively assess Hawaii's capacity to adapt to sea level rise, we must set benchmarks for measurement and all state and county agencies must adopt and utilize those benchmarks.

This Report did not undertake an effort to assess reductions in vulnerability or increased capacity to adapt to sea level rise based on the implementation of the recommended actions. We recommend that the state should conduct a full review of all actions taken in response to the 2017 and 2022 recommendations to determine the reduction in vulnerability for areas within the exposure area. as part of the 10-Year Update.

Global and Regional Sea Level Rise Scenarios for the United States



Credit ©Gary L Kohn

US Army Corps of Engineers

USGS science for a changing world

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ATTACHMENT D



Cover Image: Flooding from 15-knot northerly winds on Smith Island, Maryland, on November 23, 2015. Credit ©Gary J. Kohn

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Global and Regional Sea Level Rise Scenarios for the United States: Updated Mean Projections and Extreme Water Level Probabilities Along U.S. Coastlines

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Projections methods employed.

Table A1.2: 76

Offsets, in meters, for different time periods and for each region considered in Section 2. These offsets are assessed using the trajectory determined from the available tide-gauge data in each region.

Table A1.3: 77

Regional designation, tide gauge information, extreme water level metadata, and high tide flood heights.

Executive Summary

This report and accompanying datasets from the U.S. Sea Level Rise and Coastal Flood Hazard Scenarios and Tools Interagency Task Force provide 1) sea level rise scenarios to 2150 by decade that include estimates of vertical land motion and 2) a set of extreme water level probabilities for various heights along the U.S. coastline. These data are available at 1-degree grids along the U.S. coastline and downscaled specifically at NOAA tide-gauge locations. Estimates of flood exposure are assessed using contemporary U.S. coastal flood-severity thresholds for current conditions (e.g., sea levels and infrastructure footprint) and for the next 30 years (out to year 2050), assuming no additional risk reduction measures are enacted.

This effort builds upon the 2017 Task Force report (Sweet et al., 2017). In particular, the set of global mean sea level rise scenarios from that report are updated and downscaled with output directly from the United Nations Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6; IPCC, 2021a), through the efforts of the NASA Sea Level Change Team; updates include adjustments to the temporal trajectories and exceedance probabilities of these scenarios based upon end-of-century global temperatures. As with the 2017 report, these global mean sea level rise scenarios are regionalized for the U.S. coastline. In addition, methodology supporting the U.S. Department of Defense Regional Sea Level (DRSL) database[1] (Hall et al., 2016) is adapted for the extreme water level dataset newly developed for this report.

This report will be a key technical input for the Fifth National Climate Assessment (NCA5). These data and information are being incorporated into current and planned agency tools and services, such as NOAA's Sea Level Rise Viewer and Inundation Dashboard,[2] NASA's Sea Level Change Portal,[3] and others. Although the intent of this report is not to provide authoritative guidance or design specifications for a specific project, it is intended to help inform Federal agencies, state and local governments, and stakeholders in coastal communities about current and future sea level rise to help contextualize its effects for decision-making purposes.

Key Message #1:
Multiple lines of evidence provide increased confidence, regardless of the emissions pathway, in a narrower range of projected global, national, and regional sea level rise at 2050 than previously reported (Sweet et al., 2017).

- Both trajectories assessed by extrapolating rates and accelerations estimated from historical tide gauge observations, and model projections, fall within the same range in all cases, giving higher confidence in these relative sea level (RSL; land and ocean height changes) rise amounts by 2050.
- Relative sea level along the contiguous U.S. (CONUS) coastline is expected to rise on average as much over the next 30 years (0.25–0.30 m over 2020–2050) as it has over the last 100 years (1920–2020).
- Due to processes driving regional changes in sea level, there are similar regional differences in both the modeled scenarios and observation-based extrapolations, with higher RSL rise along the East (0–5 cm higher on average than CONUS) and Gulf Coasts (10–15 cm higher) as compared to the West (10–15 cm lower) and Hawaiian/Caribbean (5–10 cm lower) Coasts.
- The projections do not include natural year-to-year sea level variability that occurs along U.S. coastlines in response to climatic modes such as the El Niño–Southern Oscillation.

[1] https://drsl.serdp-estcp.org/
[2] https://coast.noaa.gov/digitalcoast/tools/slr.html
[3] https://sealevel.nasa.gov/

Key Message #2

By 2050, the expected relative sea level (RSL) will cause tide and storm surge heights to increase and will lead to a shift in U.S. coastal flood regimes, with major and moderate high tide flood events occurring as frequently as moderate and minor high tide flood events occur today. Without additional risk-reduction measures, U.S. coastal infrastructure, communities, and ecosystems will face significant consequences.

- Minor/disruptive high tide flooding (HTF; about 0.55 m above mean higher high water [MHHW][4]) is projected to increase from a U.S average frequency of about 3 events/year in 2020 to >10 events/year[5] by 2050.
- Moderate/typically damaging HTF (about 0.85 m above MHHW) is projected to increase from a U.S. average frequency of 0.3 events/year in 2020 to about 4 events/year in 2050.
- Major/often destructive HTF (about 1.20 m above MHHW) is projected to increase from a U.S. average frequency of 0.04 events/year in 2020 to 0.2 events/year by 2050.
- Across all severities (minor, moderate, major), HTF along the U.S. East and Gulf Coasts will largely continue to occur at or above the national average frequency.

Key Message #3:

Higher global temperatures increase the chances of higher sea level by the end of the century and beyond. The scenario projections of relative sea level along the contiguous U.S. (CONUS) coastline are about 0.6–2.2 m in 2100 and 0.8–3.9 m in 2150 (relative to sea level in 2000); these ranges are driven by uncertainty in future emissions pathways and the response of the underlying physical processes.

- With an increase in average global temperature of 2°C above preindustrial levels, and not considering the potential contributions from ice-sheet processes with limited agreement (low confidence) among modeling approaches, the probability of exceeding 0.5 m rise globally (0.7 m along the CONUS coastline) by 2100 is about 50%. With 3°–5°C of warming under high emissions pathways, this probability rises to >80% to >99%. The probability of exceeding 1 m globally (1.2 m CONUS) by 2100 rises from <5% with 3°C warming to almost 25% with 5°C warming.
- Considering low-confidence ice-sheet processes and high emissions pathways with warming approaching 5°C, probabilities rise to about 50%, 20%, and 10% of exceeding 1.0 m, 1.5 m, or 2.0 m of global rise by 2100, respectively. These processes are unlikely to make significant contributions with 2°C of warming, but how much warming might be required to trigger them is currently unknown.
- As a result of improved understanding of the timing of possible large future contributions from ice-sheet loss, the "Extreme" scenario from the 2017 report (2.5 m global mean sea level rise by 2100) is now viewed as less plausible and has been removed. Nevertheless, the potential for increased acceleration in the late 21st century and beyond means that the other high-end scenarios provide pathways that could reach this threshold in the decades immediately following 2100 (and continue rising).
- Regionally, the projections are near or higher than the global average in 2100 and 2150 for almost all U.S. coastlines due to the effects from vertical land motion (VLM); gravitational, rotational, and deformational effects due to land ice loss; and ocean circulation changes. Largely due to VLM, RSL projections are lower than the global amounts along the southern Alaska coast and are higher along the Eastern and Western Gulf coastlines.

[4] Mean higher high water (MHHW) level is estimated over the 1983–2001 tidal epoch period and, in this case, is considered a fixed elevation that does not change with sea level rise.

[5] The extreme value statistical methods in this report do not directly resolve frequencies >10 events/year.

Key Message #4

Monitoring the sources of ongoing sea level rise and the processes driving changes in sea level is critical for assessing scenario divergence and tracking the trajectory of observed sea level rise, particularly during the time period when future emissions pathways lead to increased ranges in projected sea level rise.

- Efforts are under way to narrow the uncertainties in ice-sheet dynamics and future sea level rise amounts in response to increasing greenhouse gas forcing and associated global warming.
- Early indicators of changes in sea level rise trajectories can serve to trigger adaptive management plans and are identified through continuous monitoring and assessment of changes in sea level (on global and local scales) and of the key drivers of sea level change that most affect U.S. coastlines, such as ocean heat content, ice-mass loss from Greenland and Antarctica, vertical land motion, and Gulf Stream system changes.

Section 1: Introduction

Sea level rise driven by global climate change is a clear and present risk to the United States today and for the coming decades and centuries (USGCRP, 2018; Hall, Weaver et al., 2019). Sea levels will continue to rise due to the ocean's sustained response to the warming that has already occurred—even if climate change mitigation succeeds in limiting surface air temperatures in the coming decades (Fox-Kemper et al., 2021). Tens of millions of people in the United States already live in areas at risk of coastal flooding, with more moving to the coasts every year (NOAA NOS and U.S. Census Bureau, 2013). Rising sea levels and land subsidence are combining, and will continue to combine, with other coastal flood factors, such as storm surge, wave effects, rising coastal water tables, river flows, and rainfall (Figure 1.1), some of whose characteristics are also undergoing climate-related changes (USGCRP, 2017). The net result will be a dramatic increase in the exposure and vulnerability of this growing population, as well as the critical infrastructure related to transportation, water, energy, trade, military readiness, and coastal ecosystems and the supporting services they provide.

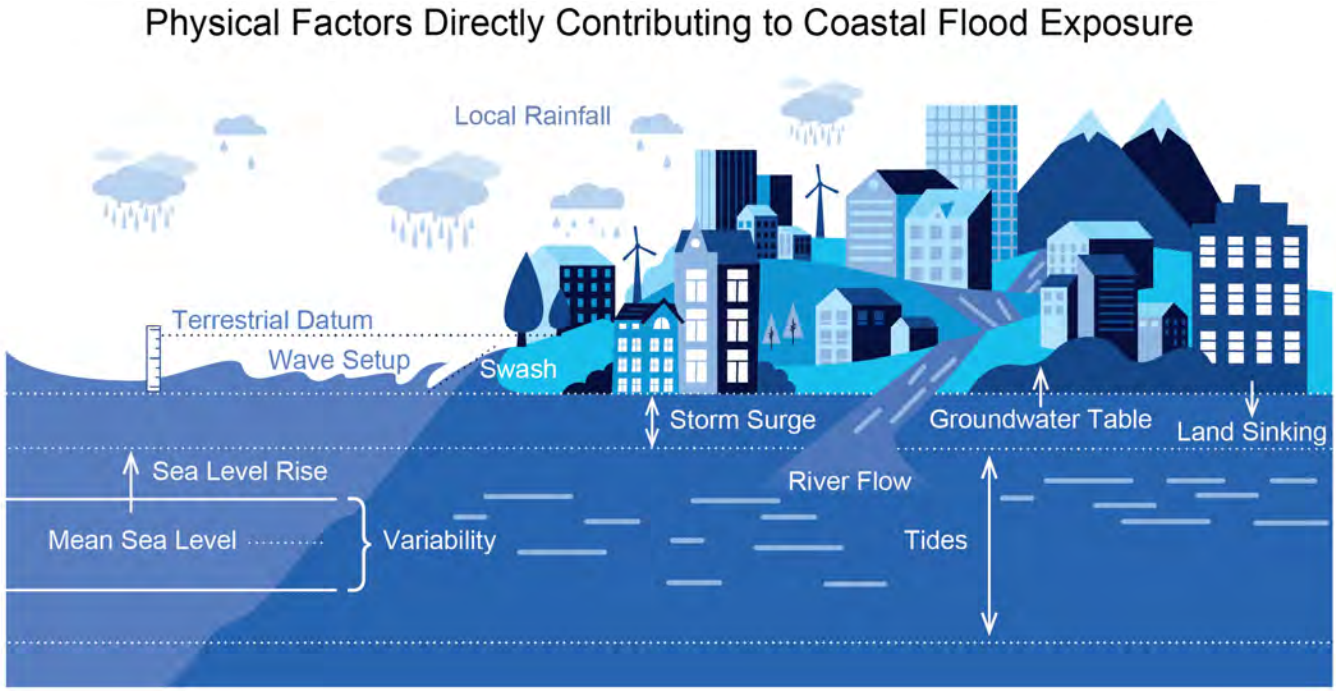


Figure 1.1: Schematic (not to scale) showing physical factors affecting coastal flood exposure. Due to the clear and strong relative sea level rise signal (i.e., combination of sea level rise and sinking lands), the probability of flooding and impacts are increasing along most U.S. coastlines.

Global mean sea level (GMSL) rise is a direct effect of climate change, resulting from a combination of thermal expansion of warming ocean waters and the addition of water mass into the ocean, largely associated with the loss of ice from glaciers and ice sheets. These processes are well understood for the recent past, and their contributions have been estimated for the 20th century (Figure 1.2a). With regard to increasing sea levels associated with climate change, the questions are when and how much, rather than if (USGCRP, 2017; Hall, Weaver et al., 2019). Increases in GMSL provide an important indicator of the changing climate, but it is the sea level rise on local and regional scales—measured by the global network of tide gauges and satellites—that is most relevant for coastal communities around the world. Regional and local sea level rise has not been and will not be uniform in time or space. Rather, sea levels change locally for a variety of reasons, such as vertical land motion (VLM), which can exacerbate the effects of the rising ocean. For context, whereas GMSL has risen by about 17 cm over the last 100 years (1920–2020), with noted acceleration since about 1970, relative sea level (RSL) averaged along the contiguous United States (CONUS) has risen about 28 cm over the same period with similar onset of acceleration (Figure 1.2b).

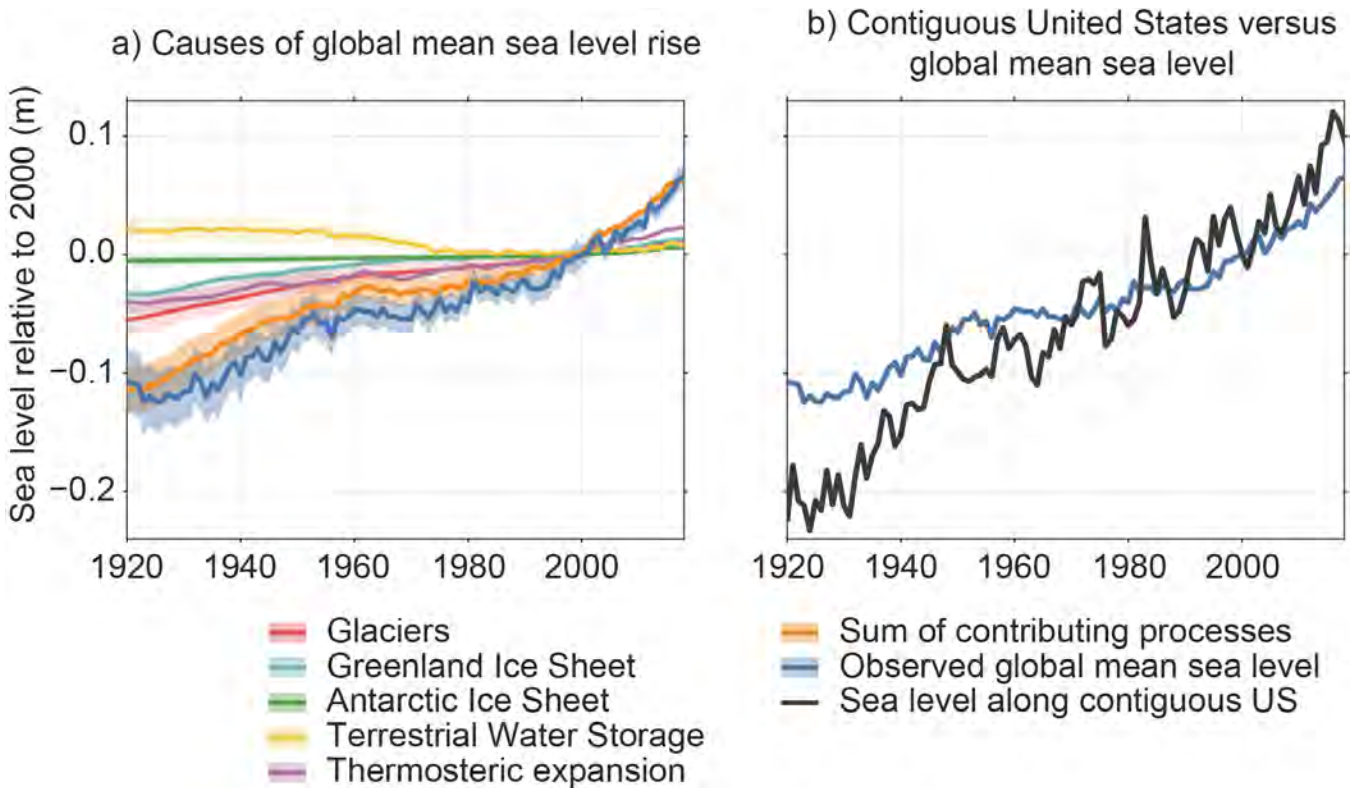


Figure 1.2: a) Observed annual global mean sea level (GMSL) change from global tide gauges (blue line), along with the sum (orange line) of contributions from thermal expansion (thermosteric) and four distinct water-mass-driven increases in GMSL. b) GMSL change (blue line) as shown in a) with the annual average relative sea level change measured by tide gauges around the contiguous United States (black line; with a linear regression estimate of 28 cm of sea level rise from 1920 to 2020). (Adaptation of Frederikse et al., 2020).

While this long-term and upward shift in mean RSL is the underlying driver of changes to the Nation's coasts, extreme water levels (EWLs) occurring against the background of this shifting sea level baseline are responsible for many of the recurring and event-based impacts. In this report, EWLs are explicitly assumed to be ocean-related changes measured by tide gauges (e.g., high tides and storm surges), which typically do not measure other contributors such as direct rainfall or river flow unless they are positioned upstream of major river systems (Moftakhari et al., 2016). Specifically, EWLs are considered as those occurring with an average event frequency between 0.01 events/year (often referred to as the 1% annual chance event) and 10 events/year. This range mostly spans the flood frequency of NOAA high tide flood (HTF) severity levels (minor, moderate, and major). HTF levels are nationally calibrated against NOAA's National Weather Service and local emergency managers' depth-severity thresholds used in weather forecasting and impact communications (NOAA, 2020) to provide a consistent coastal-climate resilience standard (Sweet et al., 2018).

Higher sea levels amplify the impacts of storm surge, high tides, coastal erosion, and wetland loss, even absent any changes in storm frequency and intensity. Because of threshold effects related to changes measured relative to a fixed elevation (Figure 1.3a), even the relatively small increases in sea level over the last several decades have led to greatly increased frequency of flooding[6] at many places along the U.S. coast (Figure 1.3b). Much of the coastline is already close to a flood regime shift, with respect to flood frequency (and presumably damages). That is, only about a 0.3–0.7 m height difference currently separates infrequent, moderate/typically-damaging and major/often-destructive HTF from minor/disruptive "nuisance" HTF (Sweet et al., 2018), whose impacts are already remarkable throughout dozens of densely populated coastal cities (Moore and Obradovich, 2020). Decades ago, powerful storms were what typically caused coastal flooding,

[6] The definition of a "flood" in this report is typically meant to refer to a water level associated with impacts rather than the occurrence of natural phenomena.

but today, due to RSL rise, even common wind events and seasonal high tides regularly cause HTF within coastal communities, affecting homes and businesses, overloading stormwater and wastewater systems, infiltrating coastal groundwater aquifers with saltwater, and stressing coastal wetlands and estuarine ecosystems.

At multiple locations along the U.S. coastline, the annual frequency of minor HTF is accelerating and has more than doubled over the past couple of decades, turning it from a rare event into a recurrent and disruptive problem (Sweet and Park, 2014; Sweet et al., 2018; USGCRP, 2018). For example, the trends in minor/disruptive HTF have grown from about 5 days in 2000 to 10–15 days in New York City and Norfolk, Virginia, in 2020; in Miami, Florida, and Charleston, South Carolina, annual frequencies have grown from 0–2 days to about 5–10 days over the same period. These increases will continue, further accelerate, and spread to more locations over the next couple of decades (Sweet et al., 2021; Thompson et al., 2021). Thus, accurate projections of ongoing and future sea level rise and assessments that integrate across processes and temporal and spatial scales are key inputs to planning efforts and a key goal of this report.

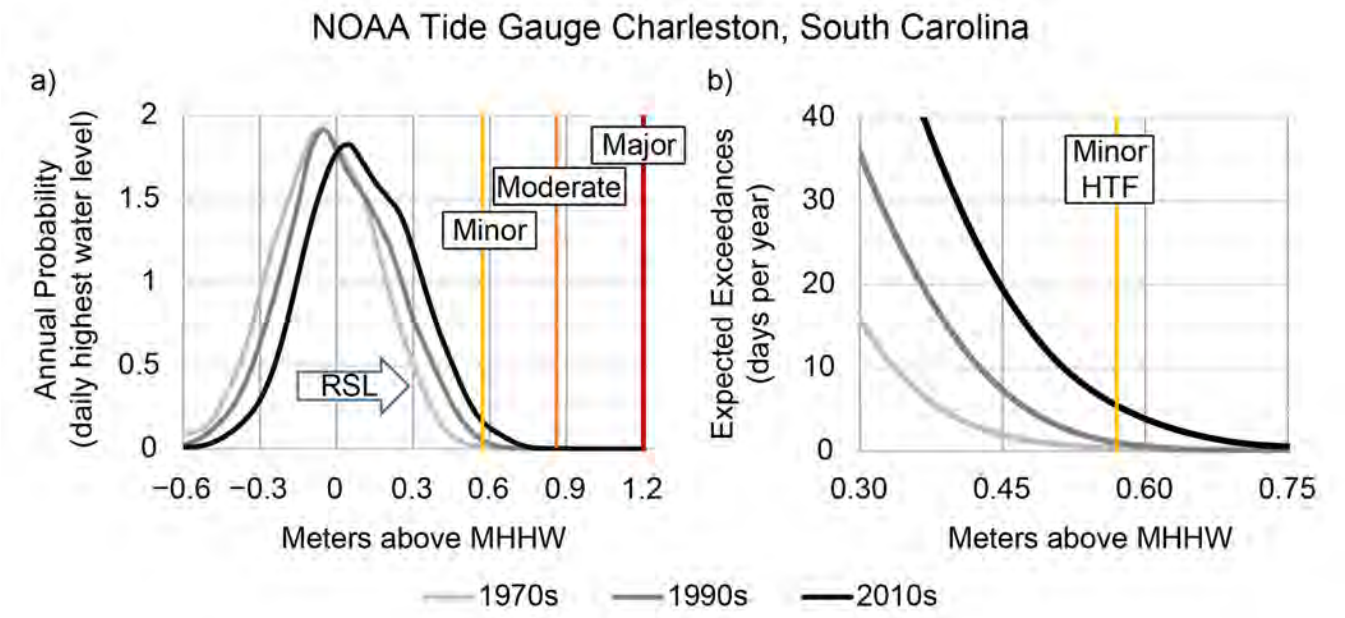


Figure 1.3: a) Annual probability density and b) annual expected exceedances for daily highest water levels relative to the 1983–2001 mean higher high water (MHHW) tidal datum showing increases in NOAA minor, moderate, and major high tide flooding (HTF) probabilities/frequencies due to relative sea level (RSL) rise at the NOAA tide gauge in Charleston, South Carolina.

The Sea Level Rise and Coastal Flood Hazard Scenarios and Tools Interagency Task Force (hereafter "Task Force") was jointly convened at the direction of the White House Resilience Council in 2015 under the U.S. Global Change Research Program (USGCRP), the Subcommittee on Ocean Sciences and Technology (SOST), and the National Ocean Council (NOC). This was in recognition of the strong need and demand for authoritative, consistent, and accessible sea level rise and associated coastal hazard information for the entire U.S. coastline, coordinated across the relevant Federal agencies, to serve as a starting point for on-the-ground coastal preparedness planning and risk management activities. The goal of the Task Force, since its inception, has been to develop the necessary products through sustained and coordinated participation of key agencies, based on the best available science, including regional science and expertise when possible and appropriate. The goal has also been to incorporate those products into user-friendly mapping, visualization, and analysis tools made easily accessible through existing agency portals serving specific partners and stakeholders, as well as interagency venues such as the National Climate Assessment (NCA), the U.S. Climate Resilience Toolkit, and others.

The Task Force focused its initial efforts on the development of an interagency report (Sweet et al., 2017), providing updated GMSL rise scenarios focused primarily on 2100 and integrating these GMSL rise scenarios with regional factors contributing to sea level change to produce, for the first time, a set of RSL scenarios for the entire U.S. coastline. These scenarios were also a major technical input to Volumes I and II of the Fourth NCA (NCA4; USGCRP 2017, 2018) and have been widely used in the development of state (e.g., Florida[7] and Virginia [CCRM, 2019]) and local agency adaptation plans (e.g., Pensacola, Florida,[8] and Portland, Maine [One Climate Future, 2019]), and processes for anticipating and managing future coastal risks.

The Task Force's first report (Sweet et al., 2017) built upon the most current scenarios at that time (e.g., Parris et al., 2012; Kopp et al., 2014; Hall et al., 2016) and estimated the full possible range for GMSL rise by 2100 as being bounded by 0.3 m on the low end, representing a simple linear extrapolation of the GMSL rate since the early 1990s, and by 2.5 m on the high end, representing an extreme ice-sheet melt/discharge scenario. This 0.3–2.5 m range was discretized and aligned with emissions-based, conditional probabilistic storylines and global model projections into six GMSL rise scenarios: Low, Intermediate-Low, Intermediate, Intermediate-High, High, and Extreme, corresponding to GMSL rise by 2100 of 0.3 m, 0.5 m, 1.0 m, 1.5 m, 2.0 m, and 2.5 m, respectively. These GMSL rise scenarios were then used to derive regional RSL responses on a 1-degree grid covering the coastlines of the U.S. mainland, Alaska, Hawai'i, the Caribbean, and the Pacific Island territories, as well as at the precise locations of tide gauges along these coastlines.

This current report takes the Sweet et al. (2017) report as its starting point, updating the GMSL scenarios and the associated local and regional RSL projections to reflect recent advances in sea level science, as well as expanding the types of scenario information provided to better serve stakeholder needs for coastal risk management and adaptation planning. As with the 2017 report, this iteration will also serve as a key technical input to the NCA, in this case NCA5. Specific updates in this report include the following:

- While this report still uses the same nomenclature as the NOAA 2017 GMSL scenarios, it draws upon new science of the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6; Fox-Kemper et al., 2021; Garner et al., 2021) to provide updated temporal trajectories and exceedance probabilities based on different levels of global warming. One effect is that the associated RSL projections for the U.S. coastline (gridded and at individual tide-gauge locations) differ in timing and magnitude as compared to the NOAA 2017 projections.
- In addition, in leveraging this updated science, including a longer observational record, improved understanding of ice-sheet dynamical processes, and better-constrained models, this report provides a more comprehensive and detailed assessment of the distinct types and range of uncertainties associated with the GMSL rise scenarios, particularly at the high end.
- By utilizing 50-year regional sets of tide-gauge data, observation-based rates and accelerations are extrapolated to the year 2050 to identify the scenario projections aligning with current RSL trajectories.
- Lastly, gridded EWL probabilities are provided, along with methods to localize them along most U.S. coastlines, to contextualize each of the regionalized sea level scenarios across a range of flood frequencies under current standards, from recurrent tidal flooding to major storm-surge flooding, out to 2050.

To frame the remainder of this report, it is important to emphasize the distinction between describing scientific progress, in terms of current understanding and key uncertainties, and translating such advances in the scientific knowledge base into actionable science. The latter requires sustained engagement by groups such as NOAA's Office of Coast Management and the Sea Grant program with users, stakeholder groups, and associated boundary organizations regarding their specific planning and decision contexts. Our development

[7] https://floridadep.gov/rcp/florida-resilient-coastlines-program/documents/proposed-rule-development-draft-62s-7-sea-level

[8] https://storymaps.arcgis.com/stories/e812723f69ad4a618c8f5f8b08cb208e

of scenarios in this report is grounded in the principles of risk-based framing for climate assessment (King et al., 2015; Weaver et al., 2017; Sutton, 2019; Kopp et al., 2019) and is consistent with adaptation pathways approaches for long-term planning. What we thus aim to provide are screening-level (suitable for first-order assessment) products appropriate for framing and bounding important problems in coastal risk assessment and management, along with contextualization of the underlying science and illustrative case studies. For example, consistent with this purpose, this report aims to provide the underlying scientific information to develop both planning- and bounding-type scenarios across the full spectrum of coastal risk; that is, 1) planning scenarios intended to frame near- to mid-term decision contexts and/or longer-term decisions with high-risk tolerance or ability to adjust plans, which address the question, What is most likely to happen? and 2) bounding scenarios designed to set the envelope of possible future outcomes, which can be used to stress-test long-term objectives, gauge the "when, not if" a given level of sea level rise might be reached, and address the question How bad could things get? *What this report does NOT provide is official guidance nor design specifications for a specific project.*

Section 2 describes advances in the understanding of the drivers of mean sea level since the 2017 report, discusses the use of observations for a near-term trajectory assessment, and provides the updated GMSL rise scenarios and their associated regional RSL projections. Section 3 focuses on high-frequency EWLs, including a regional frequency analysis of historical NOAA tide-gauge data to develop a set of EWL probabilities for assessing and projecting (to 2050) across a range of flood levels. Section 4 applies these scenarios and projections in illustrative use-case examples. Section 5 provides a summary of the report findings, as well as conclusions and next steps.

Section 2: Future Mean Sea Level: Scenarios and Observation-Based Assessments

Since Sweet et al. (2017), the observations and available data records of both sea level change and the associated processes have increased in number and length. In part due to these observations, our understanding of the drivers of sea level change has improved. There have also been significant advances in modeling how these processes will cause sea level to change in the future. This has led to an improved understanding of the possible trajectory of future sea level rise. In this report, these advances are reflected both in an update to the GMSL scenarios and a change in approach from Sweet et al. (2017). The primary change in approach is in separating this section into two different time periods: 1) near term (2020–2050) and 2) long term (2050–2150). There is also a section discussing divergence of the GMSL scenarios and tracking that is particularly relevant during the transition between the near- and long-term time periods. In the remainder of this section, a brief overview of the drivers of global and regional sea level rise is provided. Next, updates to Sweet et al. (2017) are discussed, and the motivation and scientific justification for these changes are given. Finally, the updated information for the two time periods, along with the transition between these periods, is provided.

2.1. Overview of Regional and Global Sea Level Rise

Over long, multidecadal to centennial timescales, the primary drivers of changes in GMSL are thermal expansion due to the heating of the ocean and the addition of water mass associated with ice-mass loss from the ice sheets and glaciers. Other changes in the movement of water between ocean and land, including from groundwater depletion and water impoundment, have a secondary impact on GMSL, although they can increase in importance for certain time periods (see Frederikse et al., 2020). During the 20th century, GMSL estimated from tide-gauge records has been explained by the individual processes contributing to it (see Figure 1.2a; Frederikse et al., 2020). More recently, observed GMSL from satellite altimetry over the past 15 years has been explained using the in situ measurements of the Argo profiling floats and the observations of water-mass change from the GRACE and GRACE-FO satellites (WCRP, 2018). On shorter timescales, considerable interannual and decadal variability in GMSL is linked primarily to variations in terrestrial water storage and driven heavily by the El Niño–Southern Oscillation (ENSO; Boening et al. 2012; Fasullo et al., 2013; Piecuch and Quinn, 2016; Hamlington et al., 2020a, 2020b].

At the regional level, rates of sea level rise can deviate significantly from the globally averaged rate. Sea level rise is not uniform across the globe; rather, it manifests as relative sea level (RSL) rise that also responds to several key factors important at regional and local scales (Kopp et al., 2014; Sweet et al., 2017; Hamlington et al., 2020a; Fox-Kemper et al., 2021). On short timescales and in short records, natural variations on interannual to decadal timescales can impact estimates of rates and accelerations. On long timescales, however, there are three primary causes of regional variations in estimated rates and accelerations: 1) sterodynamic sea level change; 2) gravitational, rotational, and deformational (GRD) changes due to contemporary ice-mass loss and the movement of water between land and ocean; and 3) vertical land movement (VLM; subsidence or uplift) due to glacial isostatic adjustment (GIA), tectonics, sediment compaction, groundwater and fossil fuel withdrawals, and other non-climatic factors. These three causes are discussed briefly below.

Sterodynamic sea level changes are those that arise from changes in the ocean's circulation (currents) and its density (temperature and salinity). Sea level rise associated with sterodynamic sea level change is the combination of global mean thermosteric rise associated with global ocean warming and local deviations from the global mean due to ocean dynamic processes. It is these changes in ocean dynamics that lead to regional differences. Focusing on possible causes of long-term sterodynamic sea level changes for the U.S. coastlines, future changes in the Atlantic meridional overturning circulation (AMOC) are particularly relevant. The IPCC AR6 (IPCC, 2021a) determined that it is *very likely* that the AMOC will decline in the future, although there is still disagreement as to the extent of this decline. A weakening AMOC will lead to an increase in sea level along the coastal Northeast and Southeast regions (Yin et al., 2009; Krasting et al.,

2016; see Figure A1.1 for region definitions). For the Northwest and Southwest coastal regions, ENSO plays a substantial role in interannual sea level change, although there is no clear evidence for a sustained shift in ENSO that will result in a long-term increase or decrease in sea level. Some models project future sea level changes associated with ocean dynamics to be large in magnitude in some locations, but these projections remain uncertain (Fox-Kemper et al., 2021).

The ice-mass loss from ice sheets and glaciers to the ocean has a strong influence on regional sea level. Changes in Earth's GRD responses dictate the spatial distribution of water across the global ocean (Farrell and Clark, 1976; Milne and Mitrovica, 1998; Mitrovica et al., 2001). These so-called sea level fingerprints are important to determining regional sea level rise. Mass loss causes a sea level fall in the near-field, a reduced sea level rise at intermediate distances, and a greater-than-global-average sea level rise at larger distances. For U.S. coastlines, particularly in the Northeast, this means that a similar amount of ice-mass loss in Antarctica will have a larger impact than ice-mass loss in Greenland. Similarly, ice-mass loss in Greenland leads to bigger increases in sea level along the Northwest and Southwest coastal regions than along the Northeast coastal region. At any time horizon, the regional sea level rise associated with GRD will be driven both by the amount of ice that is being lost and the source of that ice. These regional fingerprints are tied to projected trajectories of mass loss from the associated source. Changes in terrestrial water storage (groundwater withdrawal and dam building) also have an associated fingerprint, but the regional contribution is generally smaller than that from the ice sheets and glaciers.

Lastly, the VLM considered in this report refers to either subsidence or uplift that occurs in coastal regions and can lead to the change in the height of sea level relative to land. VLM is not a singular phenomenon but instead results from various processes that display different patterns in space and time. These patterns have different impacts from place to place, especially in coastal settings where many of them operate at the same time. For much of the coastal United States, subsidence is driven on local scales by groundwater and fossil fuel withdrawal and on larger scales by GIA. However, in some regions such as southern Alaska, GIA leads to high rates of uplift in coastal regions. GIA is the ongoing response of the solid earth due to ice-mass changes in the past, particularly the deglaciation after the last glacial maximum. GIA induces VLM, in particular subsidence along the U.S. East Coast, as well as changes in the gravity field, which cause local sea level changes. Accurate future projections of VLM require an understanding of the underlying processes and the time and space scales on which they vary. Currently, and in this report, VLM projections are based in part on analysis of past observations. If activities change in a particular location (e.g., reduction in groundwater pumping), an associated change in the rate of VLM will not necessarily be captured. Modeling of future VLM under a range of possible scenarios is not currently available over large scales. (See the vertical land motion use case in Section 4.4 for more information.)

Beyond these processes that impact long-term changes in sea level, there is also considerable natural (or "unforced") climate variability that can lead to significant, albeit temporary, changes to sea level on the order of years or even decades. In many of the available observational records, it can be a challenge to distinguish between these natural signals and those processes discussed above. As an example, in Figure 2.1, the regional rates of sea level rise along U.S. coastlines are shown for the first half (a, 1993–2006), second half (b, 2007–2020), and full (c, 1993–2020) satellite altimeter record (which do not measure VLM effects), along with overlaid tide-gauge rates (which measure VLM effects) measured over the same time period. A significant shift occurs from the first half of the record to the second half, with high sea level rise rates found along all coastlines of CONUS from 2007 to 2020. For the Northwest and Southwest coastal regions, in particular, the rate was near 0 for the first half of the record before shifting to almost 10 mm/year over the second half, driven by decadal variability linked to the Pacific Decadal Oscillation (PDO; e.g., Bromirski et al., 2011; Hamlington et al., 2021). For the full record, there is considerably less spatial variability, with most regions approaching the globally averaged rate of 3.1 mm/year.

In this section of the report, the contribution of natural variability is not assessed directly, but its importance and contribution should be considered when looking at observed rates and assessing possible sea level at a specific time in the future. In other words, there is an "envelope" of naturally occurring sea level variability on top of the sea level rise discussed here that needs to be included to estimate sea level at a particular location at a specific time in the future. A depiction of the relationship between sea level rise and this envelope is provided in Figure 1.3. The median of the distribution increases over time as a result of the rising sea levels, while other sea level variability on a range of timescales contributes to the spread around this central value.

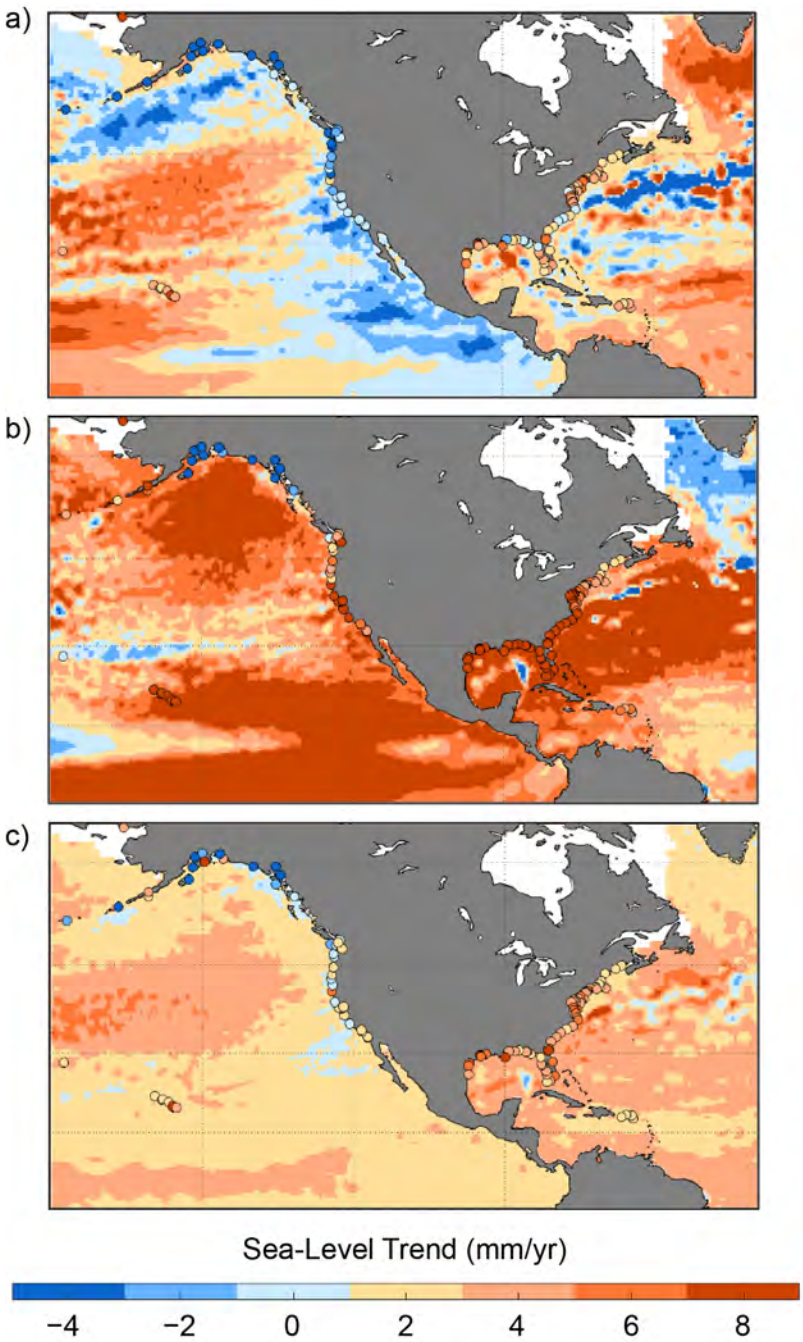


Figure 2.1: Regional sea level linear rates of rise (mm/year) from satellite altimetry over three different time periods: (a) 1993–2006, (b) 2007–2020, and (c) 1993–2020. Linear rates of change of relative sea level (ocean and land height changes) from tide gauges over the same time period are also shown (circles).

2.2. Updates from Sweet et al. (2017)

One of the main structural changes from the Sweet et al. (2017) report to this one is a specific emphasis on the near-term time period, 2020–2050. There is also a detailed discussion of GMSL scenario divergence and tracking that becomes particularly important in the transition from the near term to the long term. The motivation for the focus on these two topics is given below. Following this explanation, the primary advances in the sea level scenarios and assessments of future sea level are discussed in two subsections. The first provides an overview of the science and framework advancements that have led to an update of the scenarios first presented in Sweet et al. (2017). The second covers the inclusion of observation-based assessments of near-term sea level change for the first time.

2.2.1. Inclusion of Near-Term Time Period (2020–2050)

The dedicated focus on the near-term time period represents a new element in this report. Motivation for this change is provided briefly here. With increasing record lengths, the impact of natural sea level variability on estimated rates and accelerations diminishes, revealing more of the underlying climate change signal (see Figure 2.1c, for example). Tide gauges surrounding the U.S. coastlines provide records exceeding 100 years in some locations, and the satellite altimeter record is nearing three decades in length. Recent studies have assessed the degree to which rates and accelerations estimated from these records are reflective of the long-term increase in sea level (via satellite altimetry; e.g., Fasullo and Nerem, 2018; Richter et al., 2020) and RSL (via tide gauges; e.g., Wang et al., 2021). These studies suggest that with appropriate consideration of uncertainty, observation-based extrapolations can be informative in the near term. In this report, an assessment based solely on extrapolation of the observed rates and acceleration out to 2050 is used for trajectory tracking and a comparison to the GMSL and regional scenarios. These trajectories serve as an additional line of evidence for near-term sea level rise and provide a mostly independent (observational VLM information is shared in both) comparison to the model-based scenario. To maintain a distinction between estimates arising from observations and those coming from model-derived GMSL scenarios, the observation-based assessments are referred to in this report as “extrapolations” or “trajectories” and not as “projections.” These terms are also preceded by “observation-based” whenever used.

Beyond this renewed observational focus, the inclusion of this near-term time period is motivated by the fact that for certain decision types, short time horizons and nearer-term assessments are most relevant. For the typical lifetime of buildings and infrastructure in coastal areas, for example, a 30-year planning horizon has particular relevance (e.g., Fu, 2020; Hinkel et al., 2018). Additionally, flexible adaptation pathways and solutions typically require significant lead times on upgrades or replacements of coastal structures that necessitate assessments across a range of timescales. (Haasnoot et al., 2013, 2019; Bloeman et al., 2018; Werners et al., 2021; Hall, Harvey, and Manning, 2019). Knowing whether adaptation actions are required within the next 30 years or afterwards informs decisions about initial designs, the adaptations required, and the metrics that would trigger adaptation.

2.2.2. GMSL Scenario Divergence and Tracking

After 2050, the assessments and comparisons made using the observation-based extrapolations of future sea level rise become less informative and should be made with caution. This is because uncertainty in the current estimates of rates and accelerations leads to large projected ranges and because current estimates may not be reflective of shifts or process changes that may occur in the future with additional emissions and global warming, resulting in increasing divergence between the future GMSL scenarios after 2050. During the transition from near- to long-term assessments, an understanding of when the GMSL scenarios will diverge and what drives this divergence becomes increasingly important. Two types of uncertainty are important to consider in this context: uncertainty in physical processes and uncertainty in future emissions and ensuing warming. Although there are possible alternative definitions and framings, as used in this report, *process uncertainty* (Box 2.1) is associated with how well we currently understand why sea level has changed in the past and how it will change in the future. Stated another way, how well do we understand and model

the processes that will combine to impact sea level at a specific time and location in the future? This uncertainty is also reflected in the likely range of future sea level rise for a given GMSL scenario. The spread between the five GMSL rise scenarios is intended to reflect the range of potential future emissions pathways and associated warming levels that depends highly on global socioeconomic factors that have yet to unfold. This unknown future pathway leads to what is referred to here as *emissions uncertainty* (Box 2.1).

At some point in the future, the separation between GMSL rise scenarios will overtake the process uncertainty associated with individual GMSL rise scenarios. In other words, scenario dependence will emerge, and it will be possible to distinguish between the observation-based trajectories associated with two neighboring GMSL rise scenarios. In general, these time periods are important for connecting the near-term similarities between scenarios to the time period where scenarios diverge rapidly. An effort is made here to understand when divergence of the GMSL rise scenarios might occur and to link them to possible future warming and emissions pathways. This analysis then serves as the foundation for process-based monitoring that could be useful in determining the trajectory of ongoing sea level rise and, by extension, the possible future sea level rise out to 2150.

Box 2.1: Uncertainties

When assessing future changes in sea level, this report considers two main sources of uncertainty.

Process Uncertainty

An increase in emissions will cause ice-mass loss, ocean thermal expansion, and local ocean dynamic changes, but the sensitivity of these processes to these forcing changes comes with uncertainty. For example, the sensitivity of the Antarctic ice sheet is not yet fully understood, leading to a substantial uncertainty in how sea level reacts to forcing changes. Additionally, the future contributions from processes, such as changes in ocean circulation and VLM, that impact RSL change more locally have an associated uncertainty. This uncertainty in the contribution of these various processes to future RSL change is referred to in this report as *process uncertainty*.

Emissions Uncertainty

Increasing the amount of greenhouse gases (GHGs) in the atmosphere will trap more heat in the earth system. The amount of GHGs in the atmosphere determines the "forcing" of climate change and its effects, such as changes in temperature and sea level rise. Various forcing scenarios describe possible GHG emissions pathways, which range from quick emissions reduction to unmitigated future emissions. In the IPCC AR6 (IPCC, 2021a), these possible future pathways are referred to as Shared Socioeconomic Pathways (SSPs). The uncertainty in the future pathway is referred to as *emissions uncertainty*.

Uncertainties in this Report

In this report, emissions uncertainty and process uncertainty are combined to generate five sea level scenarios with GMSL target values in 2100: Low (0.3 m), Intermediate-Low (0.5 m), Intermediate (1 m), Intermediate-High (1.5 m), and High (2 m). These sea level scenarios are related to but distinct from the emissions pathway scenarios in the IPCC AR6.

Natural Variability

Next to sea level changes caused by changes in GHG forcing, many physical processes cause natural variations (e.g., ENSO). The scenarios and uncertainty ranges for each scenario and for the observation-based trajectories in this report do *not* include variations due to natural variability (the decadal scenario values are 19-year averages that remove most variability effects). Natural variability is not directly considered a source of uncertainty in the context of this report but does contribute to the uncertainty range in the observation-based extrapolations, as it can influence the estimated rates and accelerations in observational records. Natural, or non-forced, variations can also make significant contributions to sea level on a wide range of timescales. For example, along the U.S. West coast, sea levels are higher during El Niño years. When assessing sea level at a specific location and time in the future, the sea level contribution from natural variability must be combined with the scenarios and trajectories provided here.

2.2.3 Updates to the 2017 Sea Level Scenarios

In order to support decision-making efforts related to future sea level risks, past interagency efforts (Parris et al., 2012; Hall et al., 2016; Sweet et al., 2017) have defined a set of GMSL rise scenarios spanning a range from a Low scenario, consistent with no additional GMSL acceleration, to a worst-case, or high-end, Extreme scenario, judged to be at the physically plausible limits based on the scientific literature. In Sweet et al. (2017), these scenarios were developed to span a range of 21st-century GMSL rise from 0.3 m to 2.5 m. Sweet et al. (2017) built these scenarios upon the probabilistic emissions scenario–driven projections of Kopp et al. (2014). Kopp et al. (2014) combined a variety of different lines of evidence—global climate model (GCM) projections, the IPCC AR5 assessment of ice-sheet changes, and structured expert-judgment ice-sheet projections, among other sources of information—to generate distributions of future global and associated regional sea level changes consistent with low, medium, and high emissions scenarios. Sweet et al. (2017) filtered the ensemble of different future projections generated by Kopp et al. (2014) to identify those subsets consistent with 0.3 m, 0.5 m, 1.0 m, 1.5 m, 2.0 m, and 2.5 m of 21st-century GMSL rise. These subsets constituted the six Sweet et al. (2017) GMSL scenarios. For most purposes, Sweet et al. (2017) focused on the median of each subset, although 17th and 83rd percentile levels were also reported.

This report retains the Sweet et al. (2017) scenarios (except the Extreme 2.5 m scenario, discussed below), with the principal difference being updated temporal trajectories and exceedance probabilities now based on global warming levels rather than emissions scenarios. Linking to global warming levels provides a straightforward physical link for the GMSL scenarios and establishes a connection to global temperature monitoring efforts. The updates made in this report reflect the underlying ensemble of future projections based on methods used in the IPCC AR6 (Fox-Kemper et al., 2021; Garner et al., 2021) and listed in Table A1.1. As in Sweet et al. (2017), these projections are filtered based on 21st-century GMSL rise. In other words, projected pathways that intersect the GMSL scenario target values in 2100 are retained and then used to generate the GMSL scenarios from Low to High described here.

In addition to being updated based on the latest generation of GCMs and the IPCC AR6, this set of projections incorporates multiple methods of projecting future ice-sheet changes, which are the major sources of future sea level rise and pose the biggest source of uncertainty in projecting the timing and magnitude of future possible rise amounts. For Antarctica, this includes emulators derived from two different ice-sheet model intercomparison exercises (Edwards et al., 2021; Levermann et al., 2020), as well as from a single-model study focused on the potentially high-impact but uncertain-likelihood marine ice cliff instability (MICI) mechanism (DeConto et al. 2021) and a structured expert-judgment study (Bamber et al, 2019). For Greenland, this includes a single intercomparison-derived emulator (Edwards et al., 2021) and a structured expert-judgment study (Bamber et al., 2019). There is now a broader range of both Antarctic and Greenland potential contributions, compared to Sweet et al. (2017). Whereas the high-end scenarios of Sweet et al. (2017) were all dominated by Antarctic contributions, the potential for high Greenland contributions now also adds to these high-end scenarios, and due to its proximity, also drives larger differences along U.S. coastlines.

The use of multiple methods, including methods that consider mechanisms that could substantially increase ice-sheet sensitivity under high emissions scenarios, means that the time path of the higher GMSL scenarios is more realistic than in Sweet et al. (2017), which assumed (based on the underlying Kopp et al. [2014] projections) that ice-sheet loss would accelerate at a constant rate over the remainder of the century. A result is that there is less acceleration in the higher scenarios until about 2050 and greater acceleration toward the end of this century. This has two primary implications. First, despite maintaining the same target values and having the same range between scenarios in 2100, the range covered by the scenarios is smaller in the near term than in Sweet et al. (2017). Second, the likely (17th–83rd percentile) ranges of projections consistent with each scenario before and after the 2100 time point used to define the scenarios tend to be broader than in Sweet et al. (2017).

An important change from the Sweet et al. (2017) report is the exclusion of the Extreme (2.5 m) scenario in this report. Based on the most recent scientific understanding and as discussed in the IPCC AR6, the uncertain physical processes such as ice-sheet loss that could lead to much higher increases in sea level are now viewed as less plausible in the coming decades before potentially becoming a factor toward the end of the 21st century and beyond. A GMSL increase of 2.5 m by 2100 is thus viewed as less plausible, and the associated scenario has been removed from this report. Nevertheless, the increased acceleration in the late 21st century and beyond means that the other high-end scenarios provide pathways that potentially reach this threshold in the decades immediately following 2100 (and continue rising).

2.2.4. Observation-Based Extrapolations

As discussed above, the pathways of the updated GMSL scenarios differ from those presented in Sweet et al. (2017), and the range between the scenarios in the near term is now reduced. This report, for the first time, includes observation-based extrapolations to serve as a near-term (2020–2050) comparison for the scenarios. They can also be viewed as "trajectories" of current sea level rise. When interpreting these extrapolations, they should be considered as an additional line of evidence for near-term sea level rise alongside the model-based GMSL scenarios. They are not intended to replace the GMSL scenarios. Additionally, such observation-based extrapolations, or trajectories, can be potentially misleading if not appropriately constrained. This report makes no detailed assessment of whether the long-term rate and acceleration have emerged from the influence of natural variability in the observational record, although recent studies suggest this could be the case in some regions (Lyu et al., 2014; Richter et al., 2020; Fasullo and Nerem, 2018; Wang et al., 2021). Instead, the observation-based extrapolations are presented as computed and without interpretation after several methodological choices were made to generate extrapolations that can be compared to the scenarios and identify those scenarios that "bound" the 2050 extrapolations. These methodological choices are described briefly below.

First, the rates and accelerations are estimated from the tide-gauge records starting in 1970. Recent studies have shown a consistent acceleration in GMSL since 1970 (Dangendorf et al., 2019; Frederikse et al., 2020), and this is a primary motivator for the time period chosen. The impact of varying this start date on the regional scales relied on here was assessed and found to be negligible within a few years of 1970 (more below). This is not true, as a general statement, when using individual tide-gauge records. Second, the observation-based extrapolations are made only to 2050. Beyond that date, it is assumed that processes not fully represented in the observations could become dominant. Third, the uncertainty in the rate and acceleration associated with the influence of natural variability is accounted for as fully as possible and included in the extrapolation. Finally, the extrapolations are made for GMSL, the coastlines of CONUS, and 10 separate coastal regions around the United States and outlying islands (see Figure A1.1 for region definitions). By grouping tide gauges regionally, the influence of localized variability is reduced, and challenges associated with individual tide gauges with incomplete or short records are overcome, thus yielding more useful and narrower extrapolated ranges. These regional comparisons also fulfill the intent of providing an additional line of evidence and comparison point to the GMSL scenarios.

For each individual region, the observation-based extrapolation is performed as follows:

1. The tide gauges in the region are grouped and combined following the virtual station method (see Frederikse et al., 2020) to generate a monthly time series of RSL from 1920 to present.
2. Natural variability is partially removed through regression analysis using climate indices representing the El Niño–Southern Oscillation, Pacific Decadal Oscillation, and North Atlantic Oscillation (see Calafat et al., 2012; Hamlington et al., 2021).
3. The rate and acceleration from 1970 to present is computed, and the uncertainty on each term is assessed, accounting for the influence of remaining natural variability (see Hamlington et al., 2021) and serially correlated variability in the tide-gauge record (Bos et al., 2013, 2014).

4. The rates, accelerations, and uncertainties are used to generate an ensemble of 5,000 extrapolations with a baseline year of 2000 and extending to 2050. Median projections and a likely (17th–83rd) range are computed from this ensemble.

Following this procedure, observation-based extrapolations are obtained for GMSL, CONUS, and 8 coastal regions (Figure A1.1)—the Northeast (Maine to Virginia), the Southeast (North Carolina to the east coast of Florida), the Eastern Gulf (west coast of Florida to Mississippi), the Western Gulf (Louisiana to Texas), the Southwest (California), the Northwest (Oregon to Washington), the Hawaiian Islands, and the Caribbean. Elsewhere in the report, projections are discussed for the Pacific Islands, but due to the availability of tide-gauge data and the geographic range covered by the region, the extrapolations are conducted using only those gauges on the Hawaiian Islands. Observation-based extrapolations are also made for the southern and northern coasts of Alaska and mentioned in the text but not included in the tables below. Differential VLM heavily impacts the tide-gauge records along the southern coastline of Alaska and makes the creation of a regionally representative time series challenging. The observation-based extrapolations for Alaska are thus caveated with increased uncertainty in the underlying regional processes that heavily limit their utility as a comparison to the GMSL scenarios.

2.3. Near-Term Sea Level Change (2020–2050)

In Sweet et al. (2017), the range between the median values of the Low and High GMSL scenarios in 2020, 2030, 2040, and 2050 was 0.05 m, 0.12 m, 0.23 m, and 0.38 m, respectively. As a result of improved science and the updated framework and procedure for generating the GMSL scenarios, the time path of the scenarios—particularly the higher scenarios—is now more realistic and consistent with current process-based understanding. In this report, the range between the Low and High scenarios in 2020, 2030, 2040, and 2050 is now 0.02 m, 0.06 m, 0.15 m, and 0.28 m, respectively (Table 2.1). In other words, there is less divergence between the GMSL scenarios in this near-term time period, which reduces uncertainty in the projected amount of GMSL rise up to the year 2050. The Low scenario remains largely the same between this report and Sweet et al. (2017); this range reduction reflects a downward shift in the higher scenarios in 2050 and times prior, as discussed above. As an example, the projected value in 2050 for the High scenario in this report (~0.4 m) is the same as that for the Intermediate-High projected value in 2050 in Sweet et al. (2017). In short, while the scenarios continue to be defined by projected values of GMSL increase in 2100, it is important to note that the paths to get to these target values have changed in this report compared to the previous one.

Following the procedure outlined in Section 2.2.4, an observation-based extrapolation of GMSL is computed using the global tide-gauge reconstruction from Frederikse et al. (2020; Figure 2.2a; also see top row of Table 2.1). The extrapolated value of GMSL increase in 2050 relative to a baseline of 2000 is 0.24 m, with a likely (17th–83rd percentile) range between 0.19 m and 0.29 m. A similar extrapolation was made using GMSL data measured by satellite altimeters over 1993–2021, resulting in an estimate of 0.23 m of rise from 2000 to 2050 and in agreement with the results of the tide-gauge extrapolation. Based on the updated GMSL scenarios, the median of the 2050 observation-based extrapolation is bounded by (i.e., it falls between) the Intermediate-Low and Intermediate scenarios. The likely ranges for the Low and High scenarios do not overlap with the likely range of observation-based extrapolation in 2050, although the very likely ranges (5th–95th percentiles) do overlap. The likely range of the Intermediate-High scenario does overlap with the likely range of the observation-based extrapolation. A similar observation-based extrapolation is completed using only the tide gauges located around CONUS (Figure 2.2b), resulting in a projected increase of 0.38 m in 2050, with a likely range of 0.32 m to 0.45 m. This range for CONUS is again narrower than in Sweet et al. (2017). Similar to GMSL, this observation-based assessment is bounded by the Intermediate-Low and Intermediate scenarios in 2050.

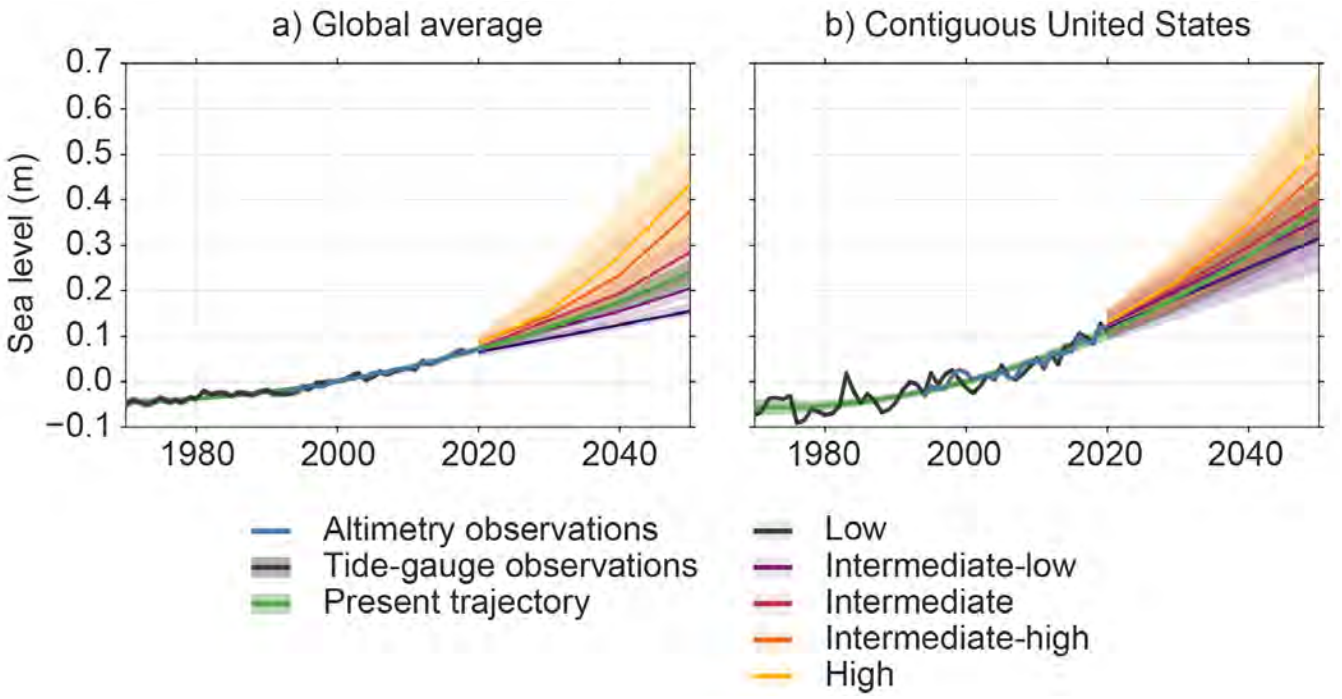


Figure 2.2: Observation-based extrapolations using tide-gauge data and five Scenarios, in meters, for a) global mean sea level and b) relative sea levels for the contiguous United States from 2020 to 2050 relative to a baseline of 2000. Median values are shown by the solid lines, while the shaded regions represent the likely ranges for the observation-based extrapolations and each scenario. Altimetry data (1993–2020) and tide-gauge data (1970–2020) are overlaid for reference.

As a result of the smaller region used and the increased influence of natural variability and VLM, the likely ranges in 2050 for CONUS in both the scenario projections and observation-based extrapolations are larger than those associated with the GMSL scenarios themselves. The likely range from the observation-based extrapolation does overlap with the likely ranges from both the Low and High scenarios. This is both a reflection of the larger range in the extrapolation for CONUS and the narrower range between the High and Low scenarios in this report. A key takeaway from this assessment is that on global and national scales, two lines of evidence (observations and GMSL scenarios) are consistent out to 2050 and support a narrower range in possible near-term sea level change than provided in Sweet et al. (2017). As discussed previously, this is consistent with and a result of the improved process-based understanding and projection approach that has been incorporated in this report.

The observation-based extrapolations are also computed for 10 coastal regions of the United States. Only 8 of these regions are shown in the tables and figures below, with the coastlines of Alaska covered separately in the text. As in the global and national cases, the observation-based extrapolations are extended out to 2050. Following the procedure outlined in section 2.2.4, tide gauges within each of these regions are combined into a single time series prior to extrapolating estimated rates and accelerations. Building on the discussion in section 2.2.4, the motivation for doing these assessments regionally as opposed to at each individual tide gauge location is two-fold. First, the observation-based extrapolations are intended to serve as a comparison to the model-based GMSL scenarios. Outside the possibility of very localized VLM, the processes included in the regionalized GMSL scenarios are generally spatially coherent over the regions considered. Indeed, the selection of specific regions is driven by process-based similarities mostly associated with ocean dynamics and large-scale VLM. Grouping the tide gauges and generating regional comparisons yields a closer analog to the information contained in the scenarios. The regional averages also reduce the influence of local signals—including VLM and other natural ocean variability—that can influence extrapolations and associated ranges. Second, some of the individual tide gauges around the U.S. coastlines have records that either do not span the full time period from 1970 to 2020 or contain data gaps. Generating

Table 2.1: Observation-based extrapolations and five scenarios, in meters, for global mean sea level and relative sea level for the contiguous United States from 2020 to 2050 relative to a baseline of 2000. Median [likely ranges] are shown.

Global Mean Sea Level				
	2020	2030	2040	2050
Obs. Extrapolation	0.07 [0.06, 0.08]	0.12 [0.11, 0.13]	0.18 [0.16, 0.19]	0.24 [0.19, 0.29]
Low	0.06 [0.05, 0.07]	0.09 [0.08, 0.10]	0.12 [0.11, 0.13]	0.15 [0.14, 0.17]
Intermediate-Low	0.07 [0.06, 0.07]	0.11 [0.09, 0.12]	0.15 [0.13, 0.17]	0.20 [0.18, 0.23]
Intermediate	0.07 [0.07, 0.09]	0.13 [0.11, 0.15]	0.19 [0.16, 0.23]	0.28 [0.22, 0.32]
Intermediate-High	0.08 [0.07, 0.10]	0.14 [0.11, 0.20]	0.23 [0.18, 0.32]	0.37 [0.27, 0.46]
High	0.08 [0.07, 0.10]	0.15 [0.11, 0.22]	0.27 [0.18, 0.39]	0.43 [0.31, 0.57]
Contiguous United States				
	2020	2030	2040	2050
Obs. Extrapolation	0.11 [0.09, 0.13]	0.19 [0.16, 0.21]	0.28 [0.23, 0.32]	0.38 [0.32, 0.45]
Low	0.12 [0.09, 0.15]	0.18 [0.14, 0.23]	0.25 [0.19, 0.31]	0.31 [0.24, 0.39]
Intermediate-Low	0.13 [0.10, 0.16]	0.20 [0.15, 0.25]	0.28 [0.22, 0.34]	0.36 [0.28, 0.44]
Intermediate	0.13 [0.10, 0.16]	0.21 [0.16, 0.26]	0.30 [0.23, 0.37]	0.40 [0.31, 0.49]
Intermediate-High	0.13 [0.10, 0.16]	0.22 [0.16, 0.28]	0.33 [0.24, 0.43]	0.46 [0.35, 0.61]
High	0.13 [0.10, 0.16]	0.22 [0.17, 0.29]	0.35 [0.26, 0.47]	0.52 [0.39, 0.68]

regional time series alleviates these challenges and allows us to provide generalized comparisons and assessments about the match between observations and model-based scenarios along the U.S. coastlines. These regional comparisons then provide an additional line of evidence for the possible overall trajectory of sea level in the near term. The result is shown in Figure 2.3, with corresponding values in Table 2.2 for each of the eight regions and compared to the scenarios in each region.

The regional differences in the observation-based extrapolations and scenarios in Figure 2.3 are consistent with the current process-based understanding of sea level rise. Processes such as ocean dynamics, the GRD response to contemporary ice-mass loss (i.e., fingerprints), and coastal VLM lead to differences between the eight regions. Additionally, uncertainty ranges on the extrapolations can be bigger or smaller depending on the number of tide gauges in a particular region and the influence of natural variability on the rate and acceleration estimates. To demonstrate this regionalization, Figure 2.4 shows these regional variations of sea level in 2050 for the Intermediate-Low and Intermediate-High scenarios. In 2050, the regional variation in future sea levels does not change significantly between scenarios. Although the values increase from the Intermediate-Low scenario to the Intermediate-High scenario, the east–west difference in sea level rise is similar. Higher values for both scenarios are found along the entire East and Gulf Coasts. Subsidence leads to the highest rates along the Gulf Coast, driven by regional and local factors, such as river sediment compaction and withdrawal of subsurface fluids (Dokka, 2011; NGS, 2001; Rydlund and Densmore, 2012). Along the East Coast, subsidence is generally associated with the large-scale process of GIA, with fluid extraction being an issue in some areas (Frederikse et al., 2017; Karegar et al., 2016). Beyond VLM, many of the regional differences are driven by differences in the ocean dynamic variability. For example, the sterodynamic contribution from 2000 to 2050 in the Northeast is more than double the sterodynamic contribution in the Southwest. This regional difference is similarly reflected in the observation-based extrapolations in 2050. It should be noted that this difference arises from higher-than-global-average projections for the Northeast as opposed to lower-than-global-average projections for the Southwest, which tracks very closely to the GMSL values shown in Table 2.1.

For the observation-based extrapolations, the largest estimates of sea level rise in 2050 are found along the entire Gulf Coast (Table 2.2). The Western Gulf has the highest extrapolated values in 2050, driven by high rates of coastal subsidence in the region and consistent with the scenarios discussed above. The Northwest and Southwest coastal regions have the lowest observation-based extrapolations to 2050. For the purposes of offering a comparison to the scenarios, the scenarios that either bound or track the median of the observation-based extrapolations are provided (denoted by red text or markers in Table 2.2). Two regions track the Intermediate-Low scenario (Northeast and Hawaiian Islands), and two regions track the Intermediate scenario (Southwest and Caribbean). The Intermediate-Low to Intermediate scenarios bound the Northwest, and the Intermediate to Intermediate-High scenarios bound the Southeast and Western Gulf regions. Finally, the Intermediate-High to High scenarios bound the Eastern Gulf region. With only the exceptions of the low-end scenarios in the Southwest and Eastern Gulf, the likely ranges from the observation-based extrapolations have at least some overlap with the likely ranges of all the scenarios within a given region. This is due to a combination of the larger uncertainty on the observation-based assessments at these regional levels for an individual scenario and the narrower ranges between the median values of each GMSL scenario found in this report compared to Sweet et al. (2017). While not shown in Table 2.2, the observation-based extrapolation for the northern coast of Alaska in 2050 (median value of 0.27 cm) is bracketed by the Intermediate and Intermediate-High scenarios. The extrapolation of the southern coast of Alaska leads to a large RSL decrease in 2050 and is inconsistent with the scenario median values. As mentioned above, this is a result of challenges in generating a representative tide-gauge time series to use in the extrapolation.

As a note on the interpretation of the results provided in this near-term section, the regional comparisons between the observation-based extrapolations and scenarios need to be considered in the context of the global comparison in Figure 2.2. The regional scenarios are intrinsically linked to their associated GMSL target values in 2100. In an ideal framework that perfectly represented the regionalization of these GMSL scenarios and the relevant regional processes, separate comparisons on a regional level would be unnecessary. In other words, all regions and locations would track the same GMSL scenario. Since this is not the case, if a particular region deviates from the others, it would be an indication that either the observation-based extrapolation for that region is biased high or low or that the framework used to generate the regionalization of the GMSL scenarios is not adequately representing the contribution of a regional process. Since the observed GMSL trajectory is near the Intermediate-Low scenario, as shown here, based on the current understanding of the processes driving regional RSL, it is not expected that a particular region would track a much higher scenario. These regional comparisons during the near-term time period then serve two potential purposes: 1) they provide an additional line of evidence along with the GMSL and CONUS comparisons for the near-term trajectory of sea level rise, and 2) they can serve to identify cases when the contributions of regional processes may be tracking differently than represented by the regionalization of the GMSL scenarios.

As a general assessment of these two purposes, the likely ranges of all but one of the regions are either bounded on one side by the Intermediate scenario or tracks a scenario neighboring the Intermediate scenario, showing some level of consistency with the GMSL and CONUS comparisons. This provides additional confidence in the narrower range (when compared to Sweet et al., 2017) of sea level rise at the regional level out to 2050 presented in this report. The Eastern Gulf is the only region bounded by the High scenario. The high observation-based extrapolation for the Eastern Gulf should be interpreted with caution, as it does not necessarily mean a higher scenario is applicable compared to other regions. As a possible explanation, unresolved natural ocean variability in the observational record could lead to an observation-based extrapolation that is biased high. Such variability would need to be low-frequency—or long period—to significantly impact a rate and acceleration estimated in a 50-year record. For all regions considered here, it is likely that natural variability still contributes to the median observation-based extrapolation, and as seen in Figure 2.1, this variability has a substantial impact on the coastlines of the United States. This influence of natural variability on rates and accelerations is captured to the extent possible in the likely ranges of the observation-based extrapolations, and these likely ranges should be considered in tandem with the median values

when assessing near-term trajectories. Beyond the possible influence of natural variability, there may also be a mismatch in the process representation between the observations and regionalized, model-based GMSL scenarios that leads to a projection that is too low in the latter. One possibility is non-linear or unresolved VLM in the region. The regionalized GMSL scenarios consider only long-term linear rates of VLM, while the observation-based extrapolations could represent a shift in the rate of VLM in the estimated acceleration.

An explanation of regional differences between observation-based extrapolations and model-based scenarios requires additional investigation, likely on a tide gauge-by-tide gauge basis. As a first step in this direction, the range between Low and High scenarios at each individual tide gauge (considering only the tide gauges with at least 30 years of data—102 of the full set of 121) is provided in Figure A1.2a, and the departure between the observation-based extrapolation and Intermediate scenario at each individual tide gauge is shown in Figure A1.2b. These figures show that the range between Low and High scenarios is generally lower than 20 cm in 2050 at the local level and that most observation-based extrapolations are within 15 cm of the Intermediate scenario in 2050. Of the 102 tide gauges used in this report, 65 have observation-based extrapolations that fall within the narrower Low to High ranges in 2050, and 80 of these 102 are within 15 cm of the Intermediate scenario. The majority of those falling below the Low scenario are found in the Northwest and southern Alaska regions, and the majority of those exceeding the High scenario are found in the two Gulf regions. This supports the regional comparisons shown in Figure 2.3 and Table 2.2 while also conveying that there is general agreement and consistency between the ranges of the observation-based extrapolations and regionalized GMSL scenarios even on a local, tide gauge-by-tide gauge level. A more definitive assessment of why some regions track higher (e.g., Eastern Gulf) or lower relative to others requires further analysis that should be done with consideration of the associated uncertainty and ranges.

As a general concluding statement on this near-term section, the link between the regional and global scenarios needs to be considered when drawing conclusions at the regional level based on the observation-based extrapolations. In practice, regionally identifying the scenario that upper-bounds the observation-based extrapolation at year 2050 (Table 2.2) may help compensate for potential interannual variability when projecting sea level for a particular location. The associated uncertainties in the approaches adopted here do emphasize the importance of ongoing monitoring using the observations and the need to update trajectories. As records continue to lengthen, likely ranges on near-term assessments will narrow. Additionally, satellite altimeter records are reaching sufficient length to be important in such monitoring. As a final note, the same framework used for extrapolating the observations forward can also be used to assess the increases—or offsets—observed over different recent time periods. These offsets are useful for adjusting baselines of the scenarios and are provided for each region in Table A1.2.

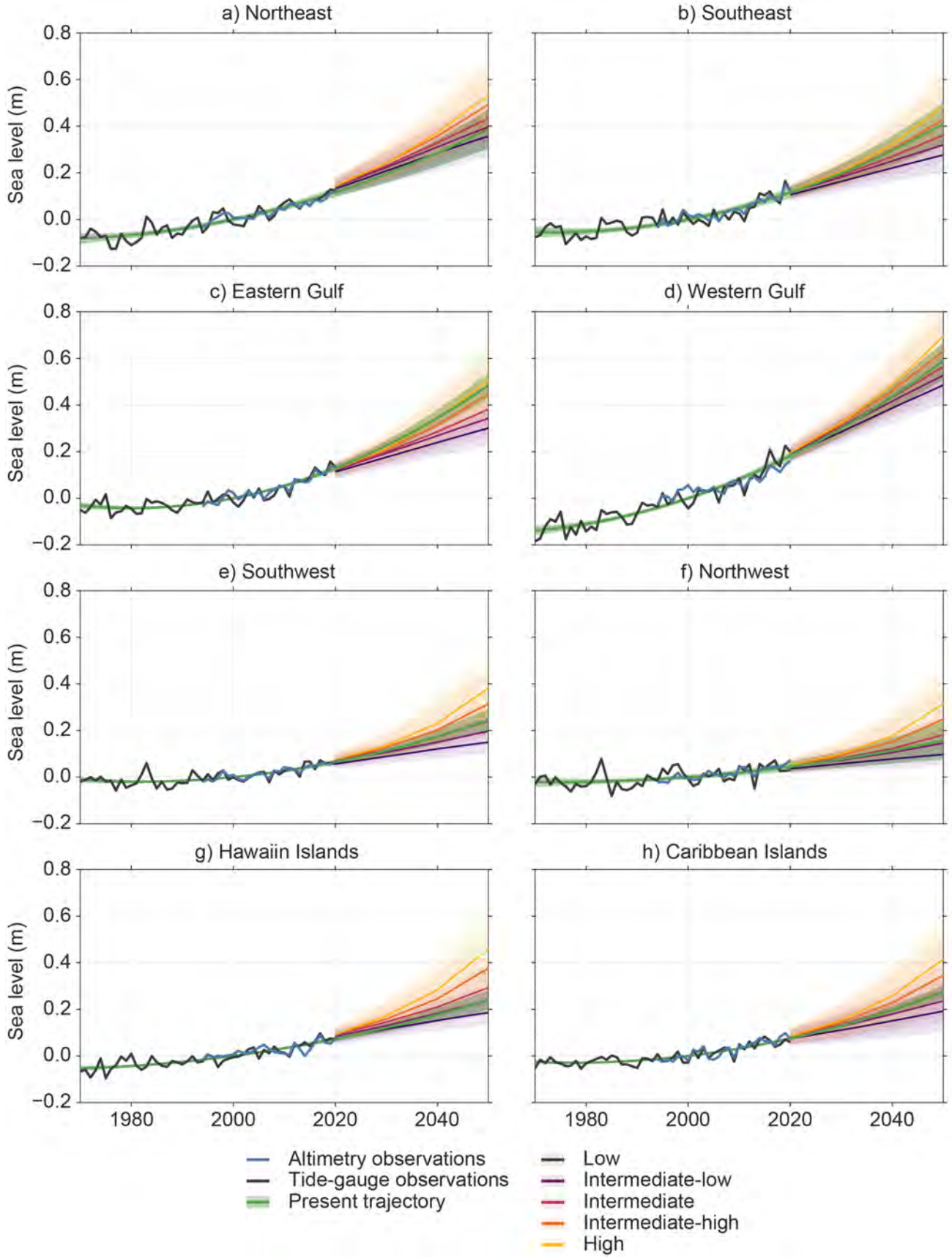


Figure 2.3: Observation-based extrapolations and five regionalized global mean sea level scenario projections, in meters, of relative sea levels for eight coastal regions around the United States from 2020 to 2050 relative to a baseline of 2000. Median values are shown by the solid lines, while the shaded regions represent the likely ranges for the observation-based extrapolations and each scenario. Tide-gauge data (1970 to 2020) are overlaid for reference, along with satellite altimetry observations, which do not include contributions from vertical land motion.

Table 2.2: Observation-based extrapolation and regionalized global mean sea level scenario–based estimates, in meters, of relative sea level in 2050 relative to a baseline of 2000 for eight coastal regions of the United States. Median [likely ranges] are shown. The two scenarios that bound the median observation-based extrapolation are also provided for each region and indicated by red dividing lines. In regions where the observation-based extrapolation is the same as a particular scenario, the scenario is indicated in red text and the bounding scenarios can be assumed to be the next higher or lower scenario (e.g., the Intermediate bounds the Northeast's observation-based extrapolation).

Observation Extrapolations	Low	Intermediate-Low	Intermediate	Intermediate-High	High	Median Bounding Scenarios
Northeast						
0.40 [0.30, 0.47]	0.36 [0.27, 0.45]	0.40 [0.31, 0.49]	0.43 [0.34, 0.54]	0.49 [0.38, 0.64]	0.54 [0.40, 0.69]	Int-Low
Southeast						
0.41 [0.32, 0.50]	0.28 [0.20, 0.35]	0.32 [0.25, 0.40]	0.36 [0.28, 0.46]	0.43 [0.32, 0.58]	0.49 [0.35, 0.64]	Int–Int-High
Eastern Gulf						
0.48 [0.43, 0.54]	0.30 [0.22, 0.38]	0.34 [0.26, 0.42]	0.38 [0.30, 0.48]	0.45 [0.34, 0.60]	0.51 [0.38, 0.68]	Int-High–High
Western Gulf						
0.59 [0.51,0.67]	0.49 [0.41, 0.57]	0.53 [0.44, 0.62]	0.57 [0.47, 0.67]	0.63 [0.51, 0.79]	0.69 [0.56, 0.87]	Int–Int-High
Southwest						
0.24 [0.20,0.29]	0.15 [0.10, 0.20]	0.20 [0.14, 0.26]	0.24 [0.18, 0.32]	0.31 [0.22, 0.45]	0.38 [0.26, 0.54]	Intermediate
Northwest						
0.16 [0.08, 0.24]	0.10 [0.05, 0.15]	0.15 [0.09, 0.20]	0.18 [0.12, 0.26]	0.25 [0.15, 0.39]	0.31 [0.19, 0.47]	Int-Low–Int
Hawaiian Islands						
0.24 [0.20, 0.28]	0.19 [0.13, 0.24]	0.24 [0.18, 0.31]	0.29 [0.22, 0.39]	0.38 [0.27, 0.53]	0.46 [0.31, 0.64]	Int-Low
Caribbean						
0.28 [0.24, 0.31]	0.19 [0.10, 0.29]	0.24 [0.14, 0.33]	0.28 [0.18, 0.39]	0.35 [0.22, 0.51]	0.42 [0.27, 0.59]	Intermediate

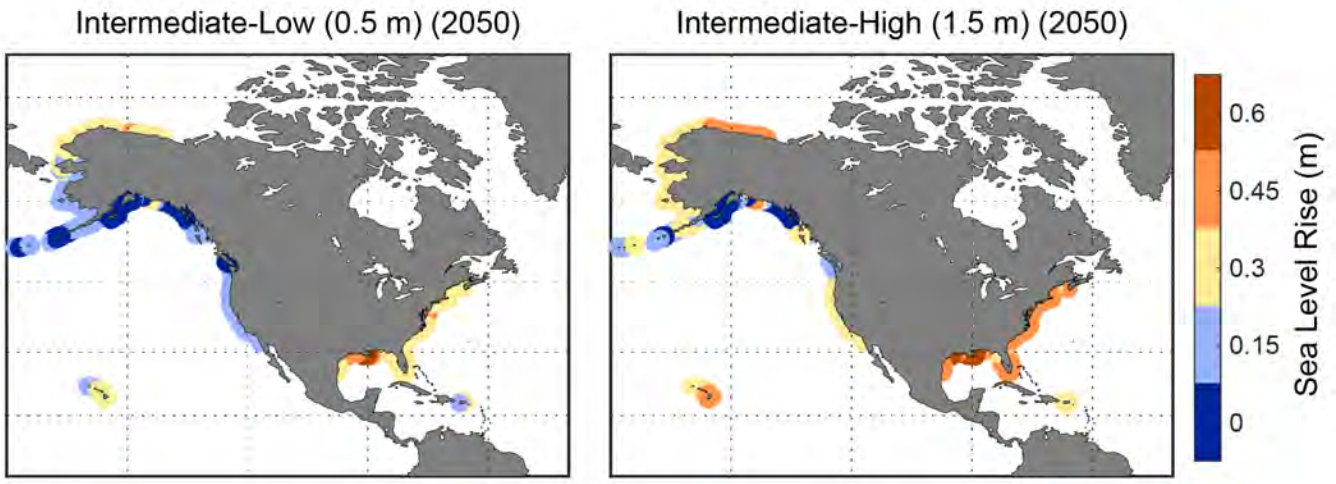


Figure 2.4: Relative sea level rise, in meters, in 2050 for the a) Intermediate-Low and b) Intermediate-High scenarios relative to the year 2000.

2.4. Long-Term Sea Level Change (2050–2150)

The updated GMSL values in 2050, 2100, and 2150 relative to a 2000 baseline are shown for each of the five scenarios in Table 2.3. Note that the current National Tidal Datum Epoch (NTDE) has a baseline of 1992 (midpoint of the 1983–2001 epoch). Comparisons between the projections here and calculations tied to the NTDE will require an adjustment between 1992 and 2000 (see Table A1.2 for offsets). Beyond the middle of this century, the differences between sea level scenarios become increasingly large, and the differences between sea level scenarios become more closely associated with differences in potential future GHG emissions pathways and associated global warming. Although the GMSL scenarios (names and their values) are the same at 2100 for this report and for Sweet et al. (2017), there is a narrowing in the range covered by the scenarios in both 2050 and 2150, driven primarily by a reduction in the values at those two target dates associated with the Intermediate-High and High scenarios in this report. As previously discussed, in 2050, the updated median value for the High scenario is similar to the median value for the Intermediate-High scenario from Sweet et al. (2017). This is not the case in 2150, however, where the separation between the scenarios remains similar to Sweet et al. (2017). Because of this, and because the scenarios are defined by the 2100 values, the same scenario naming is used in this report as in Sweet et al. (2017), with the notable exception of the omission of the Extreme (2.5 m) scenario.

In the very long term (over millennia), the magnitude of global mean sea level rise closely relates to the magnitude of global warming; however, over the timescales of decades and centuries, the magnitude of global warming more closely relates to the *rate* of GMSL rise. It is thus not possible to tie specific levels of warming in general to amounts of sea level rise, but it is possible to relate specific levels of warming *at specific points in time* (e.g., at the end of the century) to different levels of sea level rise. Thus, based on the IPCC AR6 (§9.6.3.4 in Fox-Kemper et al., 2021), it is possible to connect the GMSL rise scenarios to different levels

Table 2.3: Global mean sea level and contiguous United States scenarios, in meters, relative to a 2000 baseline.

Global Mean Sea Level				Contiguous United States			
	2050	2100	2150		2050	2100	2150
Low	0.15	0.3	0.4	Low	0.31	0.6	0.8
Intermediate-Low	0.20	0.5	0.8	Intermediate-Low	0.36	0.7	1.2
Intermediate	0.28	1.0	1.9	Intermediate	0.40	1.2	2.2
Intermediate-High	0.37	1.5	2.7	Intermediate-High	0.46	1.7	2.8
High	0.43	2.0	3.7	High	0.52	2.2	3.9

of future global mean surface air temperature occurring at the end of the century. The median GMSL projection for 2100 for a world with global mean surface air temperature in 2081–2100 averaging 2.0°C above 1850–1900 levels is about 0.5 m (*likely* range of 0.4–0.7 m; Table 2.4), consistent with the Intermediate-Low scenario. The median GMSL projection for a world with global mean surface air temperature in 2081–2100 averaging 4.0°C higher is about 0.7 m (*likely* range of 0.6–0.9 m), between the Intermediate-Low and Intermediate scenarios, with the upper end of the *likely* range approaching the Intermediate scenario. These two scenarios are also consistent with the current observed acceleration, which, if extrapolated, would yield about 0.24 m of GMSL rise by 2050 and 0.69 m by 2100.

However, these projections include only physical processes in which there is at least *medium confidence* in the current scientific understanding. As described in the IPCC AR6 (Box 9.4 in Fox-Kemper et al., 2021), the largest potential contributions to long-term GMSL rise come from ice-sheet processes in which there is currently *low confidence*. Projections that include the magnitudes, rates, and thresholds associated with these ice-sheet processes, particularly under higher emissions futures, could give rise to GMSL rise values well above the *likely* range. Pathways to such unknown-likelihood, high-impact outcomes—"potential surprises" in the words of NCA4 (Kopp et al., 2017)—include

- earlier-than-projected ice-shelf disintegration in Antarctica,
- abrupt, widespread onset of marine ice-sheet instability and/or marine ice-cliff instability in Antarctica, and
- faster-than-projected changes in surface-mass balance on Greenland, potentially associated with changes in atmospheric circulation, cloud processes, or albedo changes.

These outcomes are represented in the IPCC projections (§9.6.3 in Fox-Kemper et al., 2021) through the inclusion of an illustrative very high emissions (SSP5-8.5), *low-confidence* projection range, the 83rd percentile of which for 2100 extends to 1.6 m (modestly above the Intermediate-High scenario) and the 95th percentile of which extends to 2.3 m (above the High scenario). In 2150, the 83rd and 95th percentiles of this *low-confidence* scenario are 4.8 and 5.4 m, respectively. Because these outcomes are based on processes poorly represented in climate and ice-sheet models, the IPCC assessment of these processes incorporates information from a structured expert-judgement study (Bamber et al., 2019) and a single Antarctic ice-sheet modeling study that explicitly incorporates ice-shelf hydrofracturing and ice-cliff collapse mechanisms (DeConto et al., 2021). (See §9.6.3.2, §9.6.3.3, and Box 9.4 of Fox-Kemper et al., 2021, for further discussion.)

To connect this to the scenarios provided here, the Intermediate-High and High scenarios represent potential futures in which these deeply uncertain ice-sheet processes play important roles in the late 21st century and beyond. After 2100, these processes may also play important roles in the Intermediate scenario. These trajectories are highly emissions-dependent. For example, in an illustrative low emissions (SSP1-2.6) future, in which the world achieves net-zero carbon dioxide emissions by the 2070s and net-negative emissions thereafter, the corresponding AR6 l*ow-confidence* ranges in 2100 extend to 0.8 m at the 83rd percentile (between the Intermediate-Low and Intermediate scenarios) and 1.1 m at the 95th percentile (modestly above the Intermediate scenario), reaching 1.3 m (between the Intermediate-Low and Intermediate scenarios) and 1.9 m (consistent with the Intermediate scenario), respectively, in 2150. Thus, in a low emissions future, there is little evidence to support the plausibility of GMSL projections substantially higher than the median Intermediate scenario.

These warming levels are further compared to the five scenarios in this report by assessing the probability that the given GMSL value in 2100 will be exceeded for a particular warming level (Table 2.4). At all warming levels, there is at least a 92% chance of *exceeding* the Low scenario in 2100. The probability for exceeding the Intermediate-Low (0.5 m) scenario drops for all warming levels when compared to the probability for exceeding the Low scenario. For the Intermediate, Intermediate-High, and High scenarios, the probability drops

off at each warming level. Consistent with the framing of the five scenarios in this report, greater warming and higher emissions are generally needed to arrive at the Intermediate through High scenarios in 2100.

Table 2.4: IPCC warming level–based global mean sea level projections. Global mean surface air temperature anomalies are projected for years 2081–2100 relative to the 1850–1900 climatology. Sea level anomalies are relative to a 2005 baseline (adapted from Fox-Kemper et al., 2021). The probabilities are *imprecise probabilities*, representing a consensus among all projection methods applied. For imprecise probabilities >50%, all methods agree that the probability of the outcome stated is at least that value; for imprecise probabilities <50%, all methods agree that the probability of the outcome stated is *less than or equal to* the value stated.

Global Mean Surface Air Temperature 2081–2100	1.5°C	2.0°C	3.0°C	4.0°C	5.0°C	Unknown Likelihood, High Impact – Low Emissions	Unknown Likelihood, High Impact – Very High Emissions
Closest Emissions Scenario–Based GMSL Projection	Low (SSP1-2.6)	Low (SSP1-2.6) to Intermediate (SSP2-4.5)	Intermediate (SSP2-4.5) to High (SSP3-7.0)	High (SSP3-7.0)	Very High (SSP5-8.5)	Low (SSP1-2.6), *Low Confidence* processes	Very High (SSP5-8.5), *Low Confidence* processes
Total (2050)	0.18 (0.16–0.24)	0.20 (0.17–0.26)	0.21 (0.18–0.27)	0.22 (0.19–0.28)	0.25 (0.22–0.31)	0.20 (0.16–0.31)	0.24 (0.20–0.40)
Total (2100)	0.44 (0.34–0.59)	0.51 (0.40–0.69)	0.61 (0.50–0.81)	0.70 (0.58–0.92)	0.81 (0.69–1.05)	0.45 (0.32–0.79)	0.88 (0.63–1.60)
Bounding Median Scenarios in 2100	Low to Intermediate-Low	Intermediate-Low to Intermediate	Intermediate-Low to Intermediate	Intermediate-Low to Intermediate	Intermediate-Low to Intermediate	Low to Intermediate-Low	Intermediate-Low to Intermediate
Probability > Low (0.3 m) in 2100	92%	98%	>99%	>99%	>99%	89%	>99%
Probability > Int.-Low (0.5 m) in 2100	37%	50%	82%	97%	>99%	49%	96%
Probability > Int. (1.0 m) in 2100	<1%	2%	5%	10%	23%	7%	49%
Probability > Int.-High (1.5 m) in 2100	<1%	<1%	<1%	1%	2%	1%	20%
Probability > High (2.0 m) in 2100	<1%	<1%	<1%	<1%	< %	<1%	8%

The median regional scenario values in 2100 and 2150 for the eight coastal regions discussed in Section 2.3 are provided in Table 2.5. The values in 2100 for each region differ from the GMSL value used to define a given scenario due to the combination of regionally relevant factors that are discussed in Section 2.1. Similar to the near term, the highest values across all scenarios are found in the Western Gulf region, followed by the Eastern Gulf. These high values are heavily driven by the high rates of subsidence in the region. For all but two regions (Southwest and Northwest), the projected values exceed the GMSL values associated with a particular scenario. The values for each scenario in the Southwest region correspond closely to the GMSL values, which is consistent with the agreement seen between the observation-based extrapolations in 2050 for the global and regional case discussed in Section 2.3. To further understand the regional variability for a given scenario, Figure 2.5 shows the regional departure from the GMSL value for each scenario in 2100. In other words, the provided maps display the amount that needs to be added to the global value to get the associated regional value for a given scenario. The regional pattern is similar in each case. The Eastern Gulf and Western Gulf regions are consistently much higher than the global value, and the southern coast of Alaska is much lower across all scenarios. In the highest scenarios, the Northeast, Southeast, Northwest, and Southwest regions are near the global values, although there is a larger east–west separation in the lower scenarios. In these lower scenarios, the higher projections for the Northeast, when compared to the Southwest, are a result of both VLM and ocean circulation changes along the U.S. East Coast. In the higher

scenarios, the contributions from the ice sheets dominate and lead to less separation between the U.S. East and West Coasts.

Table 2.5: Scenarios of relative sea level, in meters, for eight coastal regions of the United States in 2100 and 2150 relative to a baseline of 2000. Median values are shown.

Region	Low	Intermediate-Low	Intermediate	Intermediate-High	High
Northeast					
2100	0.6	0.8	1.3	1.6	2.1
2150	0.9	1.3	2.3	2.7	3.7
Southeast					
2100	0.5	0.7	1.1	1.6	2.1
2150	0.7	1.1	2.1	2.7	3.7
Eastern Gulf					
2100	0.6	0.8	1.2	1.7	2.2
2150	0.8	1.2	2.2	2.8	3.9
Western Gulf					
2100	0.9	1.1	1.6	2.1	2.6
2150	1.3	1.7	2.8	3.4	4.5
Southwest					
2100	0.3	0.5	1.0	1.5	2.0
2150	0.4	0.8	1.9	2.6	3.7
Northwest					
2100	0.2	0.4	0.8	1.3	1.8
2150	0.3	0.7	1.6	2.3	3.3
Pacific Islands					
2100	0.4	0.6	1.1	1.7	2.3
2150	0.6	1.0	2.2	2.9	4.2
Caribbean					
2100	0.4	0.6	1.0	1.5	2.1
2150	0.5	0.9	2.0	2.6	3.7

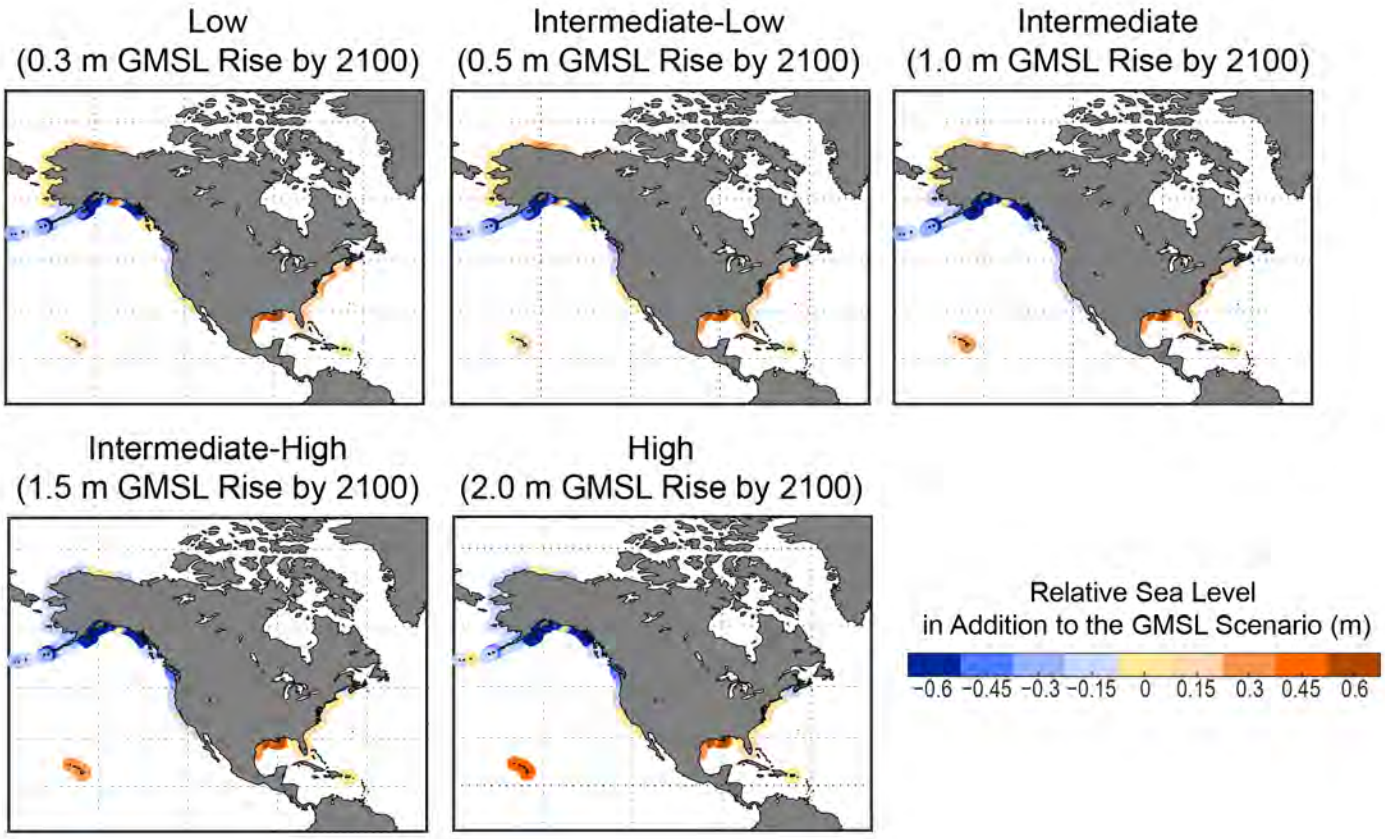


Figure 2.5: Regional deviations of relative sea level from the global mean sea level (GMSL; in meters) value for each scenario in 2100. To obtain the regional projection in 2100 for each scenario, the mapped values must be added to the GMSL value for the associated scenario.

2.5. Scenario Divergence and Tracking

In this report, for the first time, a specific focus is given to the near-term time period (2020–2050). During this window, observations can provide useful information on the trajectory of sea level rise on global and regional scales and serve as a comparison to the model-based GMSL scenarios. Prior to 2050, there is relatively small process uncertainty and little sensitivity to different emissions trajectories, and there is reduced spread between the scenarios in this report compared to Sweet et al. (2017). Connected to this reduced spread, the likely ranges of the revised GMSL scenarios presented here remain overlapping after 2050, whereas the Sweet et al. (2017) scenarios do not overlap after about 2040. In other words, in this report, the process uncertainty continues to exceed the GMSL scenario divergence past the near-term time period. Until the divergence exceeds the range for a given scenario, it will not be possible to determine when higher-end GMSL scenarios will unambiguously emerge from the potential range of the lower-end GMSL scenarios for decades to come. In this report, the time periods (or "gates") when the scenarios become separable are estimated. Different considerations for determining these gates must be made before and after the near-term time period, when the observations are most useful. It should be noted that the gates presented here are based solely on the GMSL differences between scenarios. Regionally, the timing of these gates may be different due to uncertainty in the contributing regional processes. Additionally, other lines of evidence including monitoring of individual processes or emissions trajectories could allow for distinguishing between the scenarios earlier than the gates provided here.

In Figure 2.6, the time pathways of the five GMSL scenarios from 2020 to 2100 are shown, and the gates at which the likely ranges diverge from a particular trajectory or scenario are determined. In Figure 2.6a, the divergence relative to the observation-based GMSL extrapolation is assessed. Note: the GMSL observation-based extrapolation is extended only to 2100 here for the purposes of this divergence assessment. For

the Low and High scenarios, the likely ranges separate prior to 2060, with the Intermediate-High scenario separating after 2060. On the other hand, the Intermediate-Low and Intermediate scenarios do not diverge from the extrapolated observation-based trajectory until after 2080. Consistent with the discussion in Section 2.3, if the processes driving sea level rise are assumed to remain similar for the next three decades, the Intermediate-Low and Intermediate scenarios provide useful bounds on GMSL rise for the near-term time period.

In the decades beyond 2050, however, the more uncertain processes described in Section 2.4 could become a factor and the observation-based trajectory becomes less informative. Instead of assessing the divergence relative to this trajectory, the separation gates relative to the Intermediate scenario are shown in Figure 2.6b. In this case, the Intermediate-High and High scenarios will not diverge from the Intermediate scenario until after 2070 and 2060, respectively. Only the Low scenario diverges from the Intermediate scenario prior to 2050. Although not depicted in Figure 2.6, the higher scenarios also start to overlap again after 2100; for example, GMSL rise consistent with the Intermediate scenario in 2100 (1.0 m) does not rule out GMSL rise consistent with the Intermediate-High scenario by 2150. In tying the two different gate assessments together, even though the Intermediate scenario tracks near the current observation-based trajectory, it will not be possible to statistically distinguish between the Intermediate scenario and the two higher scenarios for decades to come. This also provides important context and caution if attempting to use the observations directly to infer future sea level rise beyond the near-term time period.

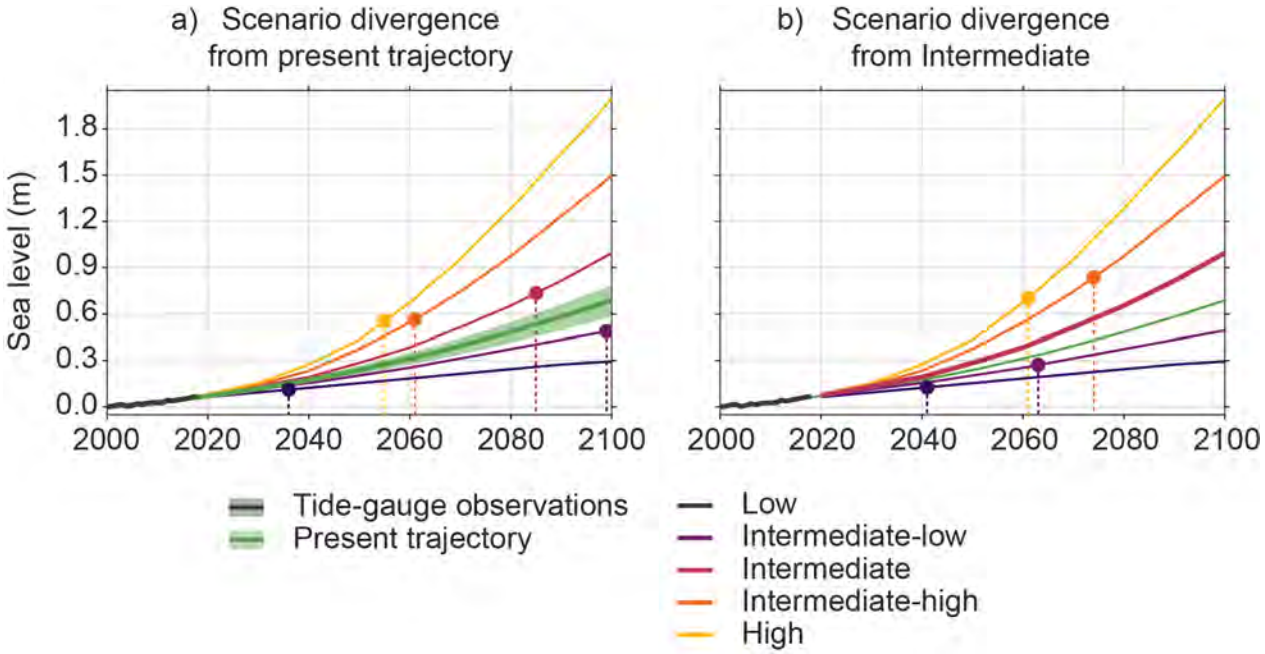


Figure 2.6: Divergence of global mean sea level (GMSL) trajectory and scenarios. The time series shows the observation-based GMSL trajectory and the five GMSL scenarios from 2000 to 2100. The dots denote where each scenario significantly (2 sigma) deviates from the a) observation-based trajectory and from the b) Intermediate scenario.

To explore this further, the proportions of the IPCC AR6 sea level projections contributing to each GMSL rise scenario are shown in Figure 2.7, with contributing emissions pathways specified. As an example interpretation of this figure, the Low scenario generally requires a low emissions pathway, while the Intermediate-Low scenario arises from low, intermediate, and high emissions pathways. Pathways consistent with the Intermediate scenario include low emissions trajectories but are mostly related to high emissions scenarios. In fact, the Intermediate, Intermediate-High, and High scenarios are all heavily driven by high emissions scenarios, and differences between these scenarios are associated predominantly with the possible role and contributions of the low-confidence ice-sheet processes described in section 2.4. The other processes that cause

future sea level change have similar contributions across these scenarios. In other words, sterodynamic sea level change is similar for the Intermediate, Intermediate-High, and High scenarios.

These estimates provide a link between the emissions trajectories in the near term and the possible scenario for GMSL rise in the long term. When coupled with the gating assessment in Figure 2.6, these estimates hold particular relevance for assessing the pathway of sea level rise and determining which long-term scenarios are then possible or even likely. As a way of connecting the elements of the report, the time period where the GMSL scenarios begin to diverge can be put in the context of the analysis done in both the near-term and long-term sections. The likely ranges of the Low and Intermediate-Low versus Intermediate scenarios separate at about 2040 and 2065, respectively. The observation-based extrapolations of global GMSL rise have a relatively narrow range out to this time horizon and can therefore play a role in determining whether a particular low-end trajectory or scenario is more or less likely to be exceeded in the coming decades. As shown in Figure 2.7, the Low scenario depends very heavily on a low emissions pathway on any time horizon. Monitoring using observations of both sea level and emissions can be useful for evaluating the likelihood of the Low scenario, both in the near term and long term.

On the other hand, the separations of the likely ranges for the Intermediate to Intermediate-High and Intermediate to High scenarios do not occur until after 2060 and 2070, respectively. The values at the end of the 21st century and beyond for these scenarios can arise under a variety of different emissions pathways, although higher scenarios are predominantly linked to higher emissions, as expected. To state it another way, the near-term trajectories discussed in Section 2.3 do not currently inform the likelihood of a given scenario occurring in 2100 or 2150. However, the observations can provide useful monitoring as the windows of separation (gates) for a different scenario approach in the future. On these global scales, process-based monitoring of the ice sheets, for example, can play an important role, as the higher scenarios (Intermediate to High) are closely linked to the potential for ice-sheet changes. Additionally, a link between the scenarios in 2100–2150, emissions pathways, and warming levels has been established here. Ongoing and continuous monitoring of both global temperatures[9] and emissions[10] will aid in determining the possible trajectory of future GMSL rise. It should be noted that while the windows provided in Figure 2.6 would be different on the national or regional level, the scenarios for a given location are still closely linked to emissions and warming, and the monitoring discussion above is still relevant.

Finally, regardless of future emissions pathways, GMSL rise will continue past 2150. The amount of "committed" rise can be assessed based on historical comparisons, modeling, and the current process-based understanding of GMSL rise. This committed rise is the amount of total sea level rise that will likely occur for a given warming level. For higher warming levels, the ranges of committed sea level are wide, but the possible values are large in magnitude. Even for a relatively low warming level of 1.5°C, the committed sea level over the next 2000 years still ranges between about 2 m and 3 m. For 2°C, the upper range increases to 6 m (IPCC, 2021a). Although the focus of this report is on the time period between 2020 and 2150, it does reinforce the "when, not if" framing provided in Section 1.

[9] https://climate.nasa.gov/vital-signs/global-temperature/

[10] https://gml.noaa.gov/ccgg/trends/

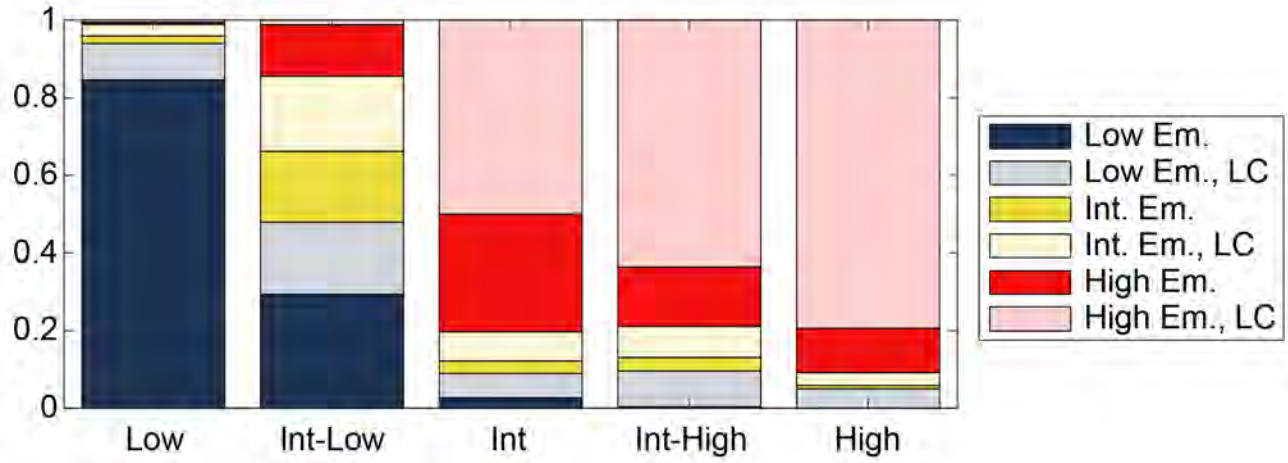


Figure 2.7: Proportions of the contributions from different IPCC AR6 sea level trajectories to each of the five global mean sea level (GMSL) rise scenarios used in this report: Low, Intermediate-Low, Intermediate, Intermediate-High, and High. The IPCC AR6 trajectories are Low Emissions; Low Emissions, LC (where LC indicates inclusion of low-confidence ice-sheet processes); Intermediate Emissions; Intermediate Emissions, LC; High Emissions; and High Emissions LC. The emissions pathways associated with the IPCC AR6 trajectories are as follows: Low Emissions = Shared Socioeconomic Pathway (SSP) 1-1.9 or SSP1-2.6; Intermediate Emissions = SSP 2-4.5; High Emissions = SSP3-7.0 or SSP5-8.5. Shifts between different GMSL rise scenarios approximately reflect the relative odds of being close to a given scenario under different emissions pathways; e.g., the Low scenario is much more plausible under a low emissions pathway, while Intermediate and higher scenarios are much more likely to be associated with high emissions pathways, as well as with low-confidence ice-sheet processes.

Section 3: Extreme Water Levels and Changing Coastal Flood Exposure

Since Sweet et al. (2017), some objectives of the Task Force have been to define and develop for the U.S. coastline 1) a set of coastal-climate flood-resilience standards and 2) a gridded set of extreme water level (EWL) probabilities that span flood frequencies with associated impacts to assess these standards. Together, these sets of information are used to describe how flood exposure within coastal floodplains are slated to change from rising sea levels (i.e., without mitigative action). Specifically for 1), we use a nationally calibrated set of the coastal water-level-impact-severity thresholds from the NOAA National Weather Service (Sweet et al., 2018), which are used in public communications. For 2), a regional frequency analysis (RFA) of tide-gauge observations is developed by adapting methods for exposure assessments within the Pacific Basin (Sweet et al., 2020b) and for the U.S. Department of Defense coastal installations worldwide[11] (Hall et al., 2016). Regional frequency analysis can provide many types of geospatial information based on limited sets of local observations, such as rainfall characteristics published by NOAA[12] (Perica et al., 2018), which are widely used in stormwater design and management within the United States. Both the RFA-based extremes and NOAA flood-threshold information are discussed below.

There are a few important notes about terminology for this section (and the report as a whole). First, "average event frequency" terminology is used throughout (except in Section 4.2 to build off of relevant papers/concepts) to describe extreme water level probabilities instead of the more traditional "return period" terminology. This is done primarily to address best practices (or avoid bad practices), which have been reviewed by the United States Corps of Engineers (USACE; USACE, 1994). Although "frequency" and "period" are related (they are reciprocals), the use of "periods" can be misconstrued; e.g., the so-called 100-year event can be easily confused or communicated (e.g., IPCC, 2021b) as an event that "occurs once per century." Such an interpretation could be assumed to imply a static and permanent water level that happens, on average, 100 years from the last event. In reality, such coastal water levels have and will continue to change with sea level rise, among other potential factors, and can occur (albeit with low probability) several times over the span of a few years. Second, although annual exceedance probability terminology is often used to describe average event frequencies (e.g., 0.1 events/year frequency expressed as the 10% annual chance event), we again stick to events/year frequency terminology, partly due to underlying method but also because events occurring more often than once a year are also being quantified and communicated (a 5 events/year frequency is poorly conveyed as a 500% annual chance event). Finally, the use of the word "occurrence" in this section means "has the probability of equaling or exceeding," as it applies to a particular water level or flood height.

3.1. Overview of Extreme Water Levels and Coastal Flooding

As sea levels continue to rise, coastal water levels—from the mean to the extreme—are growing deeper and reaching farther inland along most U.S. coastlines. Where local relative sea level (RSL) is rising, the wet–dry land delineation (i.e., mean higher high water [MHHW] tidal datum; NOAA, 2003) is encroaching landward, causing more permanent inundation and land loss (e.g., in Louisiana); affecting groundwater levels (Befus et al., 2020), stormwater systems' effectiveness (Habel et al., 2020), and water quality (McKenzie et al., 2021); and altering the intertidal zone and its ecosystems (Kirwan and Gedan, 2019). Where local RSL is falling relative to the land surface, other problems can occur, such as changes in coastal erosion processes, incision of tributaries, decreased draft for waterborne transport, decreased sedimentation in saltwater marshes, and alterations in intertidal zones and estuaries (Larsen et al., 2004; Sweeny and Becker, 2020). Especially problematic for society's coastal footprint is that the entire spectrum of flood exposure is also growing where RSL is rising, from minor high tide flooding (HTF) to more severe major flooding during storms (Sweet and Park, 2014; Fox-Kemper et al., 2021). For example, the national rate of minor HTF is accelerating and is now (circa 2020) more than double what it was in 2000 due to RSL rise (Figure 3.1), with projections suggesting

[11] https://drsl.serdp-estcp.org/

[12] https://www.weather.gov/owp/hdsc

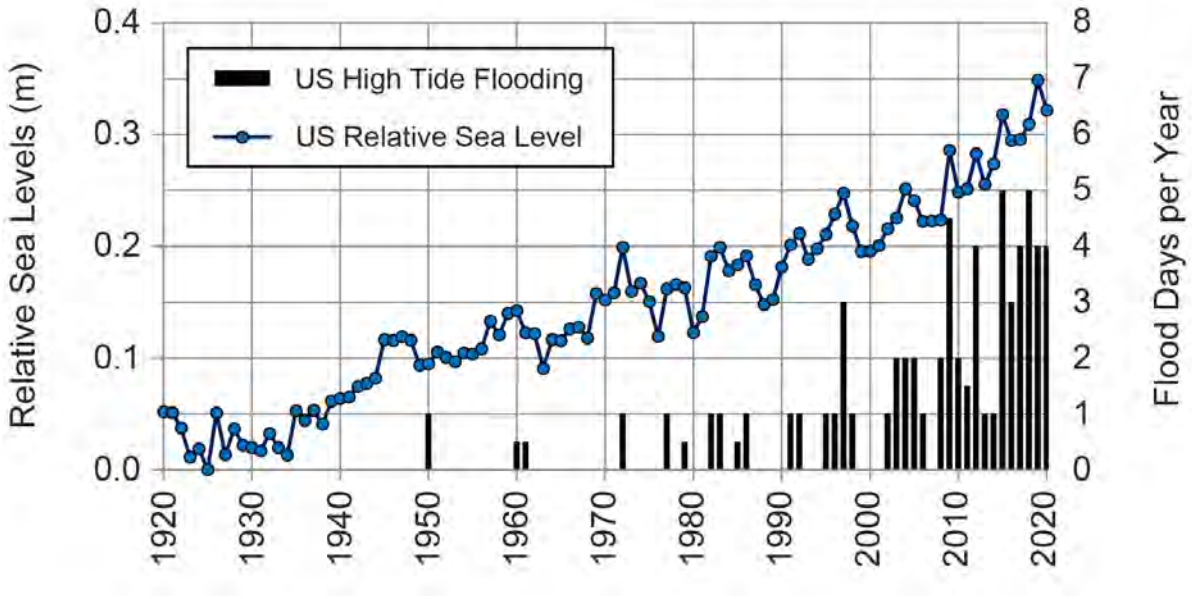


Figure 3.1: National median rate of minor high tide flooding and relative sea level, in meters, from 98 NOAA tide gauges along U.S. coastlines outside of Alaska used to monitor and track flood-frequency changes (from Sweet et al., 2021). Relative sea levels reference the lowest annual (1925) level.

a doubling of its current rate by 2030 (Sweet et al., 2018, 2021; The State of High Tide Flooding and Annual Outlook[13]; Thompson et al., 2021; Flooding Days Projection Tool[14]).

Assessments of current and future changes in minor to major HTF using RSL projections require probabilistic information about local water level variability. Specifically, they require the envelope of variability encapsulating EWLs that define the magnitude and frequency of events capable of causing a range of known or assumed impacts (Tebaldi et al., 2012; Church et al., 2013; Hall et al., 2016; USGCRP, 2017; Oppenheimer et al., 2019; Fox-Kemper et al., 2021). The basis for quantifying EWLs along U.S. coastlines originates with NOAA's tide-gauge network, which measures water level responses from multiple processes operating over a range of frequencies (Table 3.1). However, due to their general placement (e.g., in harbors), protective housings that dampen wave effects, and their multi-minute sampling rates, tide gauges typically do not measure or report values that include higher-frequency wave effects (Sweet et al., 2015; see Box 3.1). Other sources of useful tide level information for the U.S. and globally include USACE inventories (e.g., USACE MRG&P, 2017), the University of Hawaii Sea Level Center,[15] and the Global Extreme Sea Level Analysis database.[16]

Extreme water levels are often used as a proxy for impacts, such as the 0.01 events/year frequency level, better known as the "once per century" event (Oppenheimer et al., 2019), with connotations of the "flood of the century." However, such a probabilistically defined event can be both misleading about its true frequency (USACE, 1994) or might go mostly unnoticed in some locations (Sweet et al., 2020b). High tide flood heights, on the other hand, are absolute heights that are calibrated to the depth-severity impact thresholds of the NOAA National Weather Service and local emergency managers to trigger public notification of impending flood risks (NOAA, 2020). NOAA minor, moderate, and major HTF is defined as a water level reaching or exceeding about (national median values) 0.55 m, 0.85 m, and 1.20 m above current MHHW, respectively (Sweet et al., 2018). Put another way, an EWL is only a "flood" if it actually impacts the public in some manner and is not necessarily a description of a meteorological event.

[13] https://tidesandcurrents.noaa.gov/HighTideFlooding_AnnualOutlook.html

[14] https://sealevel.nasa.gov/data_tools/15

[15] https://uhslc.soest.hawaii.edu/

[16] https://www.gesla.org/

But the NOAA tide-gauge network is relatively sparse compared to the density of coastal communities, and the tide gauges have varying record lengths. From the perspective of a particular coastal community, this may result in either 1) a lack of local data (often data that are simply extrapolated from the closest NOAA tide gauge) or 2) a data record that is biased by lack of or overexposure to regionally significant rare events such as storm surges from landfalling tropical cyclones. Probabilistic assessments using atmospheric/ocean circulation models can increase spatial coverage (Vousdoukas et al., 2018), but they often perform poorly in areas with high tropical storm activity or with complex bathymetries (Muis et al., 2016). Targeted deployments of in situ sensors by communities to monitor changes in sea level, tide heights, and flood exposure (McCallum et al., 2013) can be informative but still lack the necessary longer-term regional perspective.

Table 3.1: Physical processes affecting U.S. coastal water levels and their temporal and spatial scale properties (modification of Sweet et al., 2017). Extreme water levels, which, as measured by tide gauges, generally exclude high-frequency wave effects, include processes between tsunami and ocean-basin variability and, to a lesser extent, low-frequency changes or trends associated with land ice melt/discharge, thermal expansion, and vertical land motion.

Physical Process	Spatial Scale			Temporal Scale	Potential Magnitude (yearly)
	Global	Regional	Local		
Wind Waves Effects	—	—	X	seconds to minutes	<10 m
Tsunami	—	X	X	minutes to hours	<10's of m's
Storm Surge (e.g., tropical and extra-tropical storms)	—	X	X	minutes to days	<10 m
Tides	—	X	X	hours to years	<15 m
Ocean/Atmospheric Variability (e.g., ENSO response)	—	X	X	days to years	<0.5 m
Ocean Gyre and Over-turning Variability	—	X	X	years to decades	<0.5 m
Land Ice Melt/Discharge	X	X	X	years to centuries	mm's to cm's
Thermal Expansion	X	X	X	years to centuries	mm's to cm's
Vertical Land Motion	—	X	X	minutes to centuries	mm's to m's

For the U.S., there are two primary sources of federally provided EWL probabilities. The first comes from the Federal Emergency Management Agency (FEMA, 2016b), which provides sets of regional solutions using a combination of NOAA storm-tide observations, historical high-water marks,[17] synthetic storm simulations (e.g., Nadal-Caraballo et al., 2020; ERDC Coastal Hazards System[18]), and wave effects to estimate the regulatory floodplain and its exposure to the rarest of events (e.g., 1% and 0.2% annual chance events). FEMA provides this information for national flood insurance purposes[19] but does not consider future sea levels. Another set of EWL probabilities is from NOAA's Center for Operational Oceanographic Products and Services (Zervas, 2013), which currently uses a generalized extreme value (GEV) distribution fit to annual highest water levels for tide-gauge records of >30 years).[20] The U.S. Army Corps of Engineers and their Sea Level Change Calculator[21] provide the NOAA EWL probabilities (Zervas, 2013) with several projections of future RSL to help in project planning but only for specific long-term tide-gauge locations.

A primary goal of the following subsections is to introduce a new set of EWL probabilities to support sea level rise and flood-exposure assessments and planning. The EWL set is applicable for most of the U.S. coastline and further resolves (both in physical and probability space) the EWL information currently available from

[17] https://stn.wim.usgs.gov/FEV/

[18] https://chs.erdc.dren.mil/

[19] https://www.fema.gov/flood-maps/national-flood-hazard-layer

[20] https://tidesandcurrents.noaa.gov/est/

[21] https://cwbi-app.sec.usace.army.mil/rccslc/slcc_calc.html

FEMA and NOAA; although again, the EWL data here, which are derived from tide-gauge data, generally do not include wave effects (see Table 3.1 and Figure 1.1). Section 3.2 briefly describes the RFA of NOAA tide-gauge data with pointers to the Appendix for a fuller description. In Section 3.3, data for all NOAA tide gauges with >10 years of record are used to compute EWL probabilities, and these results are compared to NOAA and FEMA datasets. Section 3.4 discusses methods on how local EWL probabilities can be 1) computed using other records, such as those of shorter duration (<10 years) from NOAA or other (user supplied) sources, and 2) estimated approximately every 500 m along the U.S. coastline based on local tide range information from NOAA models (e.g., VDatum[22]). Lastly, Section 3.5 assesses current and future flood exposure within the coastal floodplain using NOAA's height-severity categories of minor, moderate, and major HTF (Sweet et al., 2018), which broadly define water levels where U.S. infrastructure becomes impacted and are used in weather forecasting to trigger emergency responses (NOAA, 2020). Estimates of how flood exposure is projected to change by 2050 (assuming no additional adaptation or risk-deduction measures) are provided using the upper-bounding scenarios of the regional observation-based extrapolations along U.S. coastlines (see Table 2.2).

3.2. Regional Frequency Analysis of Tide-Gauge Data

Extreme water level probabilities and their 95% confidence intervals are provided at a 1-degree spacing along nearly the entire U.S. coastline (Figure 3.2). The EWL information is based on an RFA (Hosking and Wallis, 1997) of NOAA tide gauges within a 400-km radius of the center of each individual 1-degree grid and fit with a Generalized Pareto Distribution (GPD) of threshold exceedances (Coles, 2001). The RFA process not only better assesses EWL exceedance probabilities from a regional perspective as compared to a single-gauge assessment but also can supply information where no tide gauges exist. Furthermore, a GPD fit to exceedances above a high threshold as compared to a GEV fit to annual maxima uses more of the data record (e.g., two or more significant events within a particular year), not just those maxima within a certain (e.g., annual) time block. This approach, using RFA-based GPD fits, better resolves both the low- and high-frequency spectrum with output in this report ranging from 0.01 events/year to 10 events/year frequencies. Combining an RFA with GPD fits to obtain EWL probabilities is unique for U.S. coastlines, although there are other statistical methods such as the joint probability method (Baranes et al., 2020) and Bayesian hierarchical modeling (Calafat and Marcos, 2020), which may also prove useful in assessing rare event probabilities or providing information where no tide gauges exist.

[22] https://vdatum.noaa.gov/

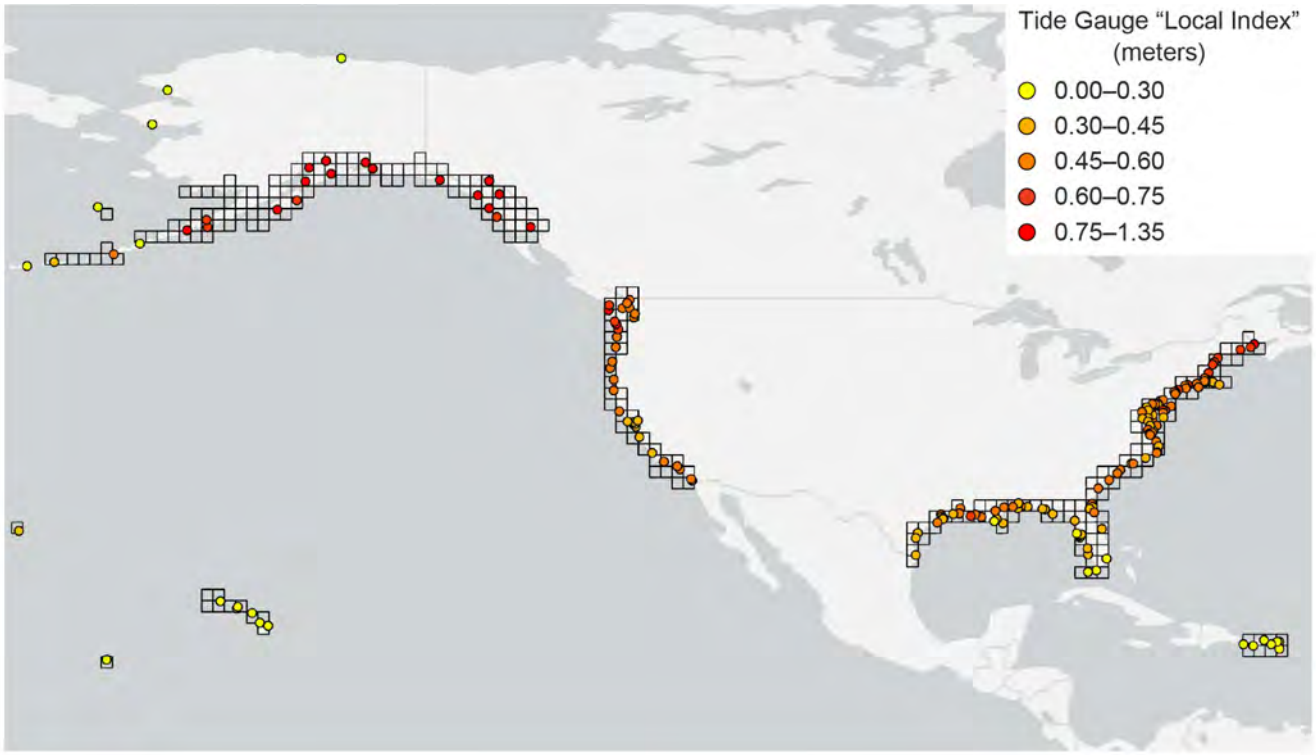


Figure 3.2: Regional Frequency Analysis 1-degree grids and local index values (u) relative to local mean higher high water tidal datum at the NOAA tide gauges used in this study.

To be useful for local decision-making, the gridded EWLs ($EWL_{gridded}$) derived by RFA need to be further localized (EWL_{local}), which is achieved via a "local index" (u) estimated at a particular tide gauge (u values are shown in Figure 3.2) or for a particular location and converted to the vertical control datum on the land surface, normally the North American Vertical Datum of 1988 (NAVD88). The following equation is used to estimate EWL_{local} probabilities (median and 95% confidence intervals):

1)
$$EWL_{local} = EWL_{gridded} * u_{local} + u_{local}$$

where $EWL_{gridded}$ is the gridded EWL composed on normalized (unitless) sets of tide-gauge data, and u_{local}, referred to simply as "u," are the same value and represent the height of the 98th percentile of daily highest water levels with a 4-day filter applied and are relative to the 1983–2001 (or 5-year modified epoch; Gill et al., 2014) MHHW tidal datum. For statistical independence when quantifying the EWL probabilities, the filtering process is needed to isolate and only include the peak water level value from a particular storm or "event," rather than including multiple consecutive daily peak levels resulting from the same event (e.g., a multiday storm surge). See Section A2 for more details.

3.3. Average Event Frequencies of Extreme Water Levels

The focus of this analysis is on EWL events and their probabilities that span the frequency space associated with coastal flooding under current sea levels (Sweet et al., 2018). An example for the NOAA tide gauge at The Battery in New York City (NYC) in Figure 3.3a shows the NOAA HTF heights and probability distributions for hourly water levels and also for their daily maxima.[23] Also shown is the local index (u = 0.55 m above MHHW) computed for this tide gauge, which is used to estimate EWL_{local} from the $EWL_{gridded}$ probabilities for this location (Figure 3.3b). See Figure A2.2f for the gridded probabilities applicable for NYC. At higher frequencies, such as those associated with the height of the minor HTF level (0.56 m above MHHW), the EWL_{local} probabilities for "events" (about 4–5 events/year) are close but slightly underestimate flood frequency estimates for "days" (about 11 days/year; not shown), which are based on a multidecadal distribution

[23] https://tidesandcurrents.noaa.gov/stationhome.html?id=8518750

of daily highest water levels (shown in Figure 3.3a) used by NOAA when making projections of minor HTF (Sweet et al., 2018). This difference reflects the 4-day event filter in estimates of the EWL_{local} probabilities discussed above. A similar ratio (about 2 days per event) exists in NOAA's HTF Outlook (about 11 days/year for 2020 at NYC, which is based on an extrapolation of quadratic or linear fits to annual counts of minor HTF days (Sweet et al., 2020a). The ratio of minor HTF "events" to "days" estimated at NOAA tide gauges as a whole is further discussed later in this section. The main point is that, typically, the duration of a minor HTF "event," as in NYC and along U.S. coastlines, spans about 2 days and multiple tide cycles on average.

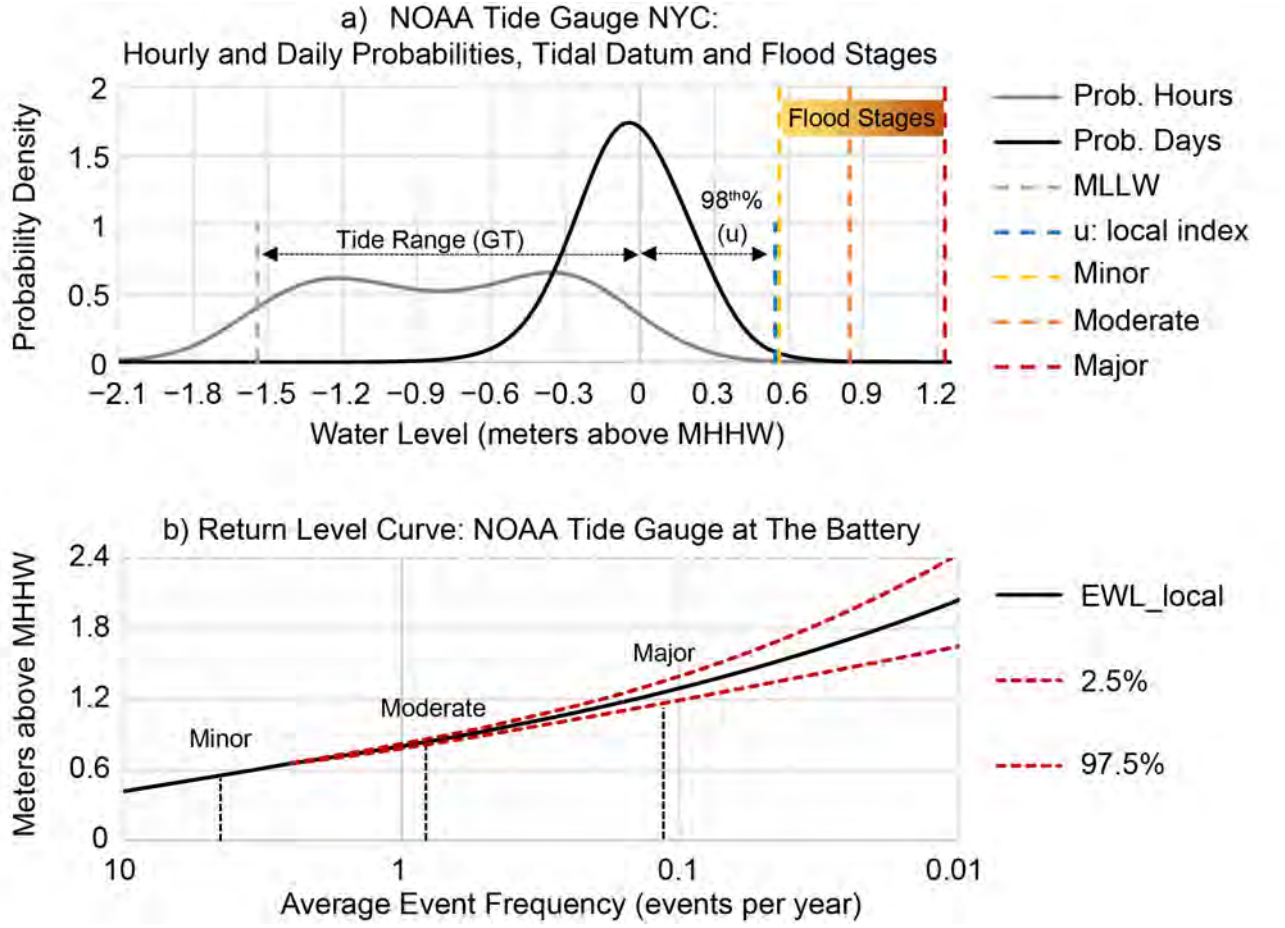


Figure 3.3: a) Empirical probability densities of hourly water levels and their daily maxima measured by the NOAA tide gauge at The Battery (New York City), as well as the tidal datums of mean lower low water (MLLW), great diurnal tide range (GT), local high tide flood (HTF) heights, and the local index (u) used to localize the RFA-gridded EWL for this location (see Figure A2.2f). All values are referenced to the mean higher high water (MHHW) tidal datum and shown in b) as a return interval curve with the 95% confidence interval (2.5% and 97.5% levels) normalized to year 2020 RSLs.

Some general patterns emerge in regional $EWLs_{local}$ with 1 event/year (Figure 3.4a) and 0.01 events/year frequencies (Figure 3.4b). Locations with higher 0.01 events/year EWL_{local} are found adjacent to wide, shallow continental coasts that are exposed to frequent tropical or extratropical storm surges, such as occur along the Eastern and Western Gulf coastal regions at 2.5 ± 1.1 m and 2.8 ± 0.8 m (median ± 1 standard deviation), respectively. In contrast, the U.S. Pacific/Hawaiian Islands and Southwest Pacific coastal regions have lower 0.01 events/year $EWLs_{local}$ due to deep, narrow continental shelves and generally calmer conditions (0.8 ± 0.1 m and 1.0 ± 0.1 m, respectively), although wave effects not inherent to the EWL probabilities are often the primary factor causing flooding, overwash, and erosion along natural landscapes in these locations (Barnard et al., 2019; see Box 3.1). In terms of the 1 event/year heights, tide ranges become influential (correlation of ~0.7 between great diurnal tide range [GT] and u across all locations), as is the case in the Northwest Pacific coastal region and the southern Alaska coasts, where the highest 1-year EWLs occur (0.8 ± 0.1 m and 1.0 ± 0.3 m, respectively) and larger tide ranges are found.

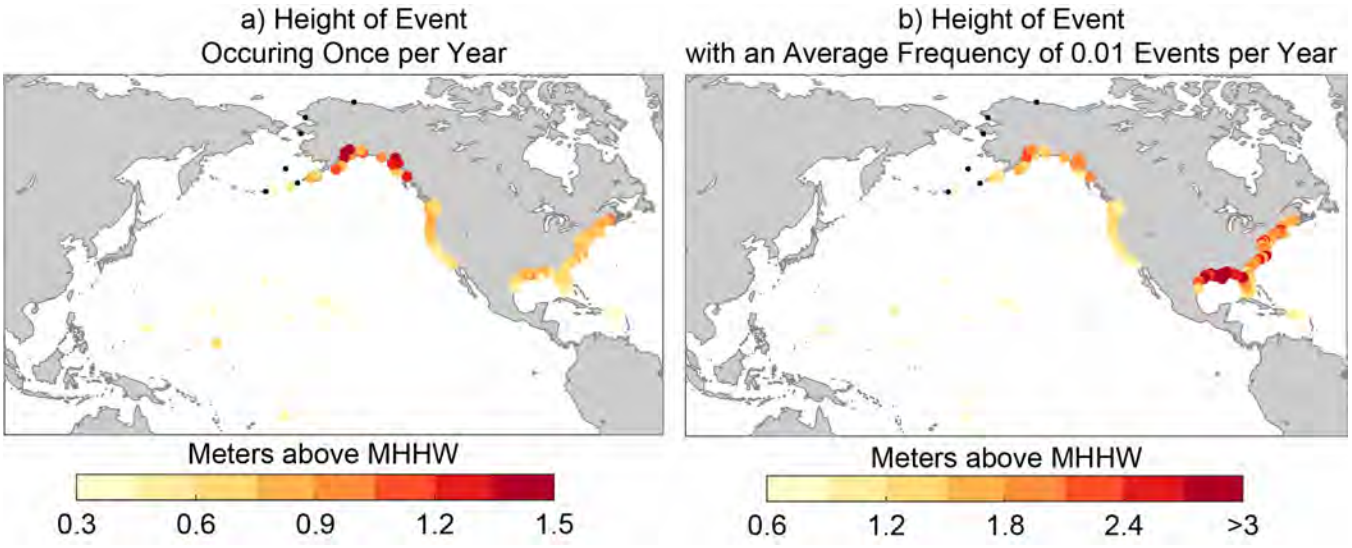


Figure 3.4: Current (circa 2020 relative sea levels) EWL_{local} that a) occur annually on average and b) have a 0.01-year average event frequency. Note: the scales in the two figures are not the same, and to be useful for decision-making, a conversion to land-based heights (e.g., NAVD88) should be made.

There are differences when comparing the RFA-based $EWLs_{local}$ from this study to current FEMA and NOAA governmental datasets. Comparisons to NOAA EWLs (Zervas, 2013) in Figure 3.5a–c show that the RFA-based 0.01, 0.1, and 0.5 events/year levels are about 6%, 9%, and 13% higher across the board based on linear regression, respectively. The bias between datasets is not unexpected, as an RFA typically results in higher EWL probabilities with narrowed confidence intervals due to the regionalization process as compared to a single-gauge analysis (Sweet et al., 2020b). Overall, there is strong correlation between datasets, although less so at the 0.01 events/year EWL_{local} (R^2 = 0.49) due in part to the large differences occurring along the Gulf coastlines of Alabama, Mississippi, and Louisiana, where the RFA-based 0.01 events/year EWL_{local} (~4 m above MHHW) values are substantially higher (>1 m) than the NOAA GEV estimates in a few locations.

The RFA-based EWL_{local} probabilities are also compared to the tide-gauge-equivalent "stillwater" component (tides, storm surge, and limited wave set-up, but not wave swash; see Figure 1.1) generated by FEMA and used within their regional Flood Insurance Studies[24] (Figure 3.5d–f). The FEMA EWLs vary in their construction by region, using a combination of singular and RFA tide-gauge analyses, storm-surge modeling, and synthetic tropical storm modeling (for the Northeast, Southeast, and Eastern and Western Gulf coastal regions) via a joint probability method–optimal sampling (JPM–OS) procedure (FEMA, 2016a, 2016b). The 0.01 and 0.1 events/year EWL_{local} are slightly lower (7% and 4%, respectively), with differences again noted along the Eastern and Western Gulf and Caribbean coastal regions. At the 0.5 events/year levels, both sets of EWLs are nearly the same based on linear regression. The goodness-of-fit (R^2) values are about the same as with the NOAA (2013) GEV results, although a little less at the 0.01 events/year levels—likely due to the inclusion of synthetic storm-surge modeling in the FEMA estimates, compared to the NOAA (2013) values, which are based on tide-gauge observations. Thus, it is concluded that the RFA-based EWL provides higher estimates than a single-gauge analysis (Zervas, 2013) but less than those of FEMA stillwater values at lower probabilities, since FEMA's data also include storm-surge modeling, synthetic storms, and high-water marks in addition to tide-gauge data.

[24] https://www.fema.gov/glossary/flood-insurance-study-fis

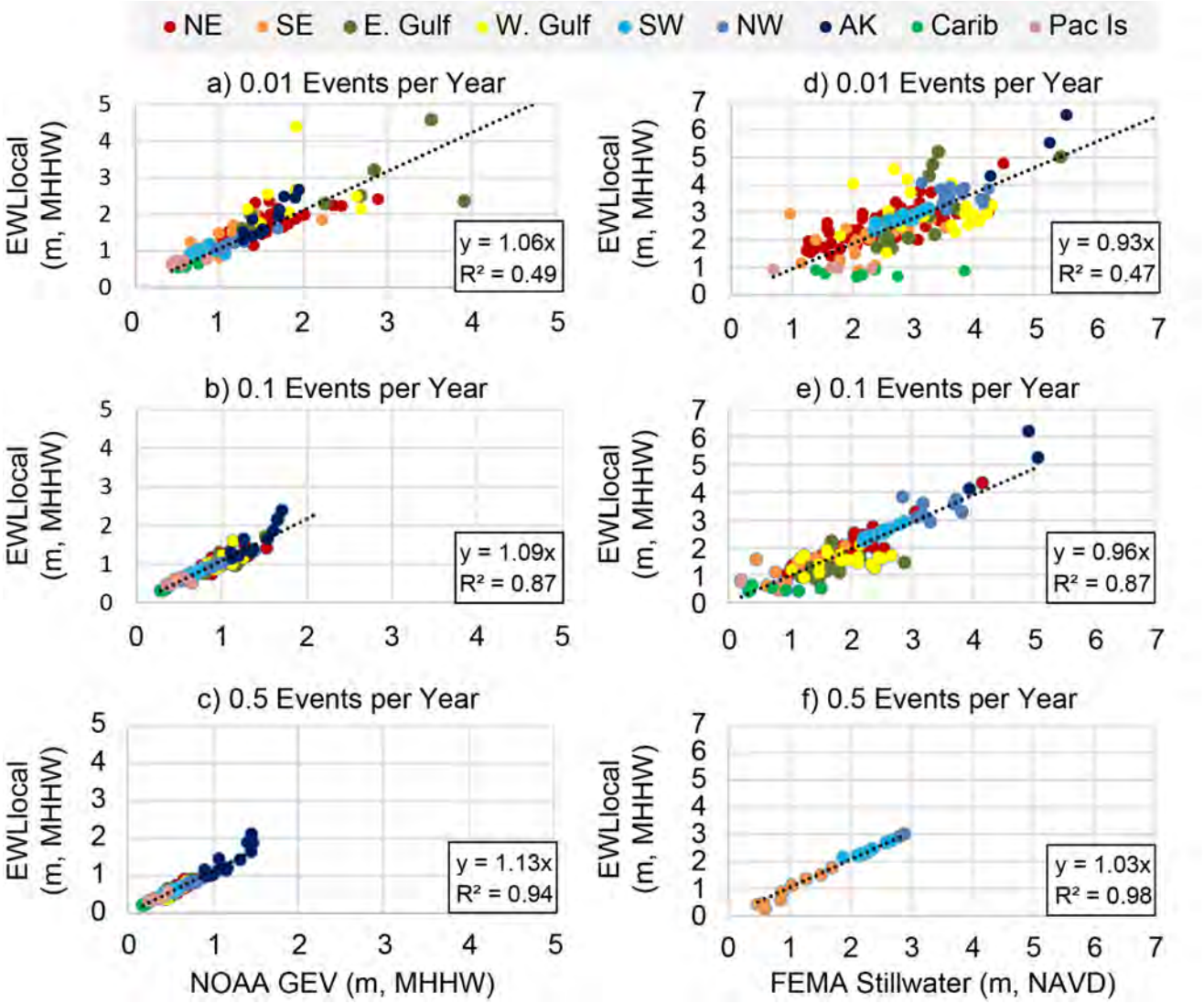


Figure 3.5: Comparison between (a–c) this study's EWL_{local} to those of NOAA (Zervas, 2013) based on a GEV fit of annual highest water levels and to (d–f) the stillwater (storm surge, tides, and wave set-up) components of FEMA used in their Flood Insurance Study at the 0.01-year, 0.1-year, and 0.5-year average event frequency levels.

3.4. Methods to Localize the Gridded Extreme Water Level Event Probabilities

There are several ways to obtain EWL_{local} from the $EWL_{gridded}$. All require a local index (u), which can be obtained from 1) a NOAA tide gauge used in this study (Figure 3.2; Table A1.3); 2) alternative sources of water level/tide-gauge data not used in this study (e.g., see Figure A2.3); or 3) tide range knowledge from measurements or models. When using short-term water level measurements (Figure A2.4), additional uncertainty, dependent on record length, is factored into the 95% confidence interval of the EWL_{local} estimate (see Equation 4 in the Appendix). This additional uncertainty relates to the fact that the local index (u) will vary from year to year akin to how RSL varies through time.[25] On a national scale (and for most regions as well; see Figure A2.4), the root mean square error (RMSE) in local index estimates is about 6–7 cm after 5 years and falls to less than 3 cm at 10 years, which is close to the standard error in tidal datum calculations themselves (see datum errors in Bodnar, 1981).

Where local water level measurements are not available, another option is to estimate a local index (u) and EWL_{local} probabilities based on an underlying relationship between local index values and tide range along U.S. coastlines. Additional uncertainty using this method will need to be factored into the results as well.

[25] https://tidesandcurrents.noaa.gov/sltrends/sltrends.html

This relationship (Figure A2.5) builds off of the findings of Sweet et al. (2020b) within the Pacific Ocean and of Merrifield et al. (2013) globally, who found a strong global correlation between the range of water level variability and average annual highest water level across the globe. Nationally, there exists a strong positive relationship (R^2 = 0.72 in Figure A2.5), although with fairly large uncertainty (RMSE of 0.11 m). But when tide range and local index values are regressed regionally, all the fits' RMSEs are less (see Figure A2.5). Across all U.S. regions, it takes about 6 years of data for the RMSE (see Figure A2.4) in local index (u) estimates to match the RMSE values based on measured tide range (see Figure A2.5). Tide range information can be obtained from NOAA Vertical Datum Transformation (VDatum).[26] Comparison of RMSEs based on multiple years of record versus tide range estimates of a local index (u) will vary by region (see Figures A2.4 and A2.5), and the lesser of the two is considered the better option in estimating an EWL_{local} for any specific location not associated with a tide-gauge location used in the study.

Here we provide an example of how to obtain EWL_{local} probabilities for a location not used in this study. The location for this example is the NOAA National Estuarine Research Reserve in Grand Bay, Mississippi (Figure 3.6a), which has a NOAA tide gauge, but the hourly record is only about 4 years long.[27]

1. The first step is to identify the specific EWL grid where the location resides, which in this case is grid number 42811 (Figure 3.6a), and obtain the $EWL_{gridded}$ probabilities.
2. Next, a local index needs to be estimated for an EWL_{local} to be computed, either by the tide-range-based method (Figure 3.6b) or using the existing short data record (Figure 3.6c) for the specific region, depending on the smaller RMSE of the two methods. The RMSE based on the tide range regression is 0.078 m (Figure 3.6b) and is less than the 0.099 m RMSE based on a 4-year water level record for this region (solving the equation shown in Figure 3.6c).
3. Using the published NOAA tide range value at this location (0.49 m) leads to an estimated local index value of 0.47 m through the regional regression (solving the equation shown in Figure 3.6b).
4. An EWL_{local} return level curve (Figure 3.6d) relative to the 1983–2001 tidal epoch is generated by substituting a local index value of 0.47 m and an RMSE of 0.078 m (with a variance of 0.078^2) into Appendix Equations 1 and 4 (see Section A2), respectively.
5. Finally, to update the curve to current conditions (circa 2020) from the midpoint of the 1983–2001 epoch (1992), 0.12 m is added to the return level curve values. The 0.12 m value represents the regional-median trend in u of 4.3 mm/year multiplied by 28 years (see Table A1.3 and Section A2.3.4 for more information). Alternatively, 0.15 m could be added instead by applying the RSL offsets from the regional observation-based extrapolations for this region (Table A1.2).

The resultant EWL_{local} probabilities estimated for Grand Bay are similar to others at nearby tide gauges that share the same 1-degree $EWL_{gridded}$ (see Figure 3.4). Less noticeable is that the 95th confidence intervals are more inflated (i.e., 0.5 m vs. 0.1 m at the 1 event/year EWL) because of the additional uncertainty from using the tide-range-based method to obtain a local index. Nationally, the spread of the 95% confidence interval at the 1 event/year EWL_{local} using a local index (u) estimated by tide range (Figure 3.6b and Figure A2.5) is 0.32 m as compared to 0.03 m when assessed across all NOAA tide gauges.

[26] https://vdatum.noaa.gov/

[27] https://tidesandcurrents.noaa.gov/stationhome.html?id=8740166

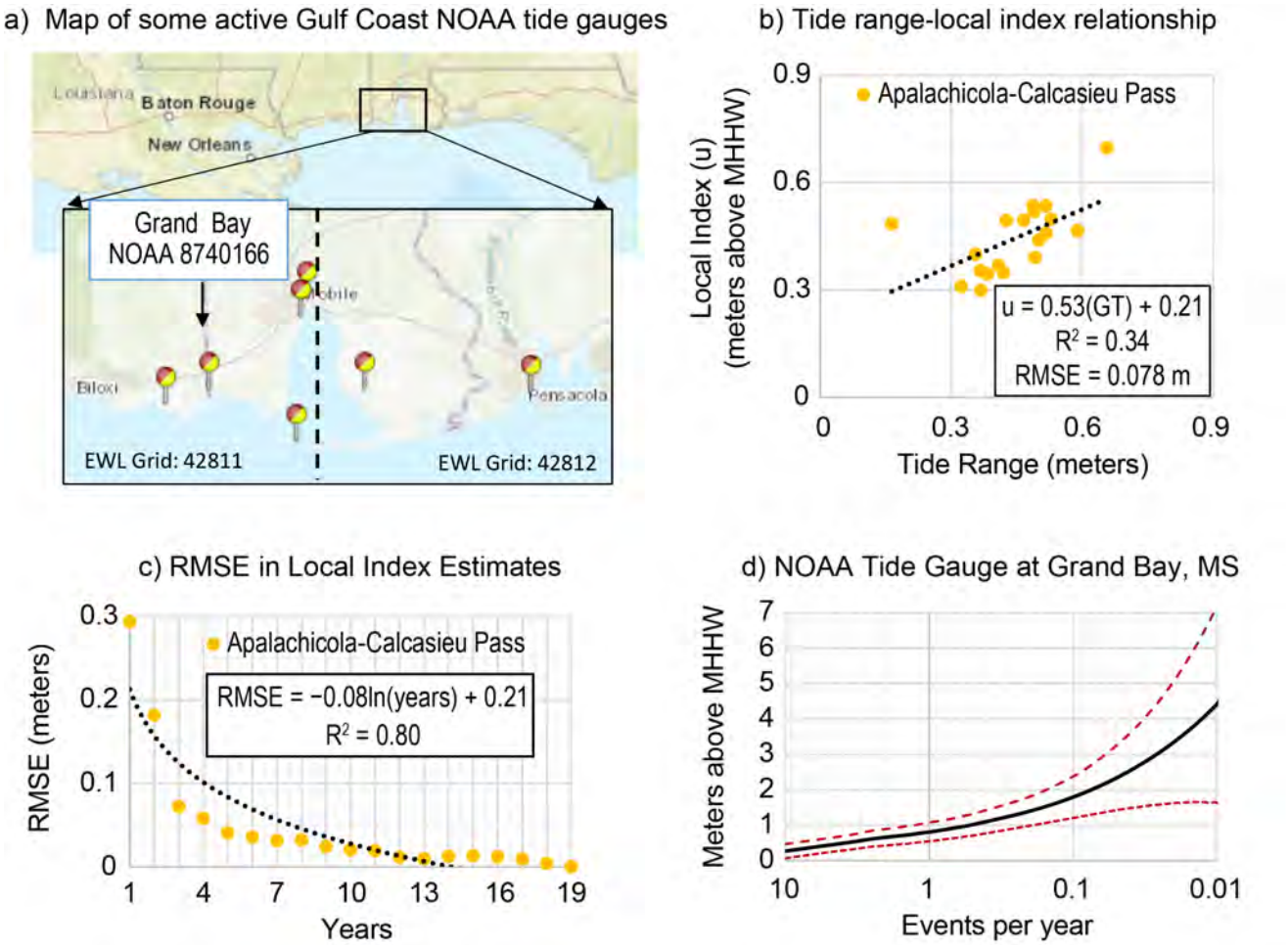


Figure 3.6: a) Map showing active NOAA tide gauges indicating Grand Bay, Mississippi, which has about 4–5 years of hourly data, b) tide range to local index (u) regression relative to the 1983–2001 tidal datum epoch with fit equation, goodness of fit (R^2), and associated root mean square error (RMSE) for the surrounding region, c) RMSE for estimates of u based on 1–19 years of consecutive data over the 2001–2019 period based on the regional tide gauges for the surrounding region; and d) a 2020 EWL_{local} return level curve for Grand Bay using a local index (u) from tide range regression. Note: to be useful for decision-making, a conversion to land-based heights (e.g., NAVD88) should be made.

3.5. The Changing Nature of Coastal Flood Exposure

To assess U.S. coastal flood exposure using the EWL_{local} probabilities, we use the nationally calibrated coastal HTF heights of NOAA (Sweet et al., 2018) and a modification of Sweet et al. (2020b) for Alaska coastlines (see Section A2.4). The NOAA HTF heights include three categories: minor, moderate, and major (national median) starting at about 0.55 m, 0.85 m, and 1.20 m, respectively (Figure A2.6), whose impacts are disruptive, typically damaging, and often destructive, respectively, under current flood defenses. NOAA provides data (e.g., Flood Frequency [MapServer][28]) and maps (Figure 3.7) in its SLR Viewer of exposure to HTF to help communities recognize potential flood exposure associated with weather–water level forecasts and for vulnerability assessments associated with sea level rise.

Currently (with EWL_{local} relative to year 2020 trend levels), minor HTF events occur (median value) about 3 times per year along U.S. coastlines and are most frequent along the Northeast, Western Gulf, and Northwest coastlines (about 4 events/year) and along the Southeast and Eastern Gulf coastlines (about 2 events/year; Figure 3.8a). A similar pattern emerges when comparing the 2020 NOAA minor HTF outlook (Sweet et al., 2020a) for the number of flood "days" at about 100 of the tide gauges (Figure 3.8b). The NOAA outlook for

[28] https://coast.noaa.gov/arcgis/rest/services/dc_slr/Flood_Frequency/MapServer

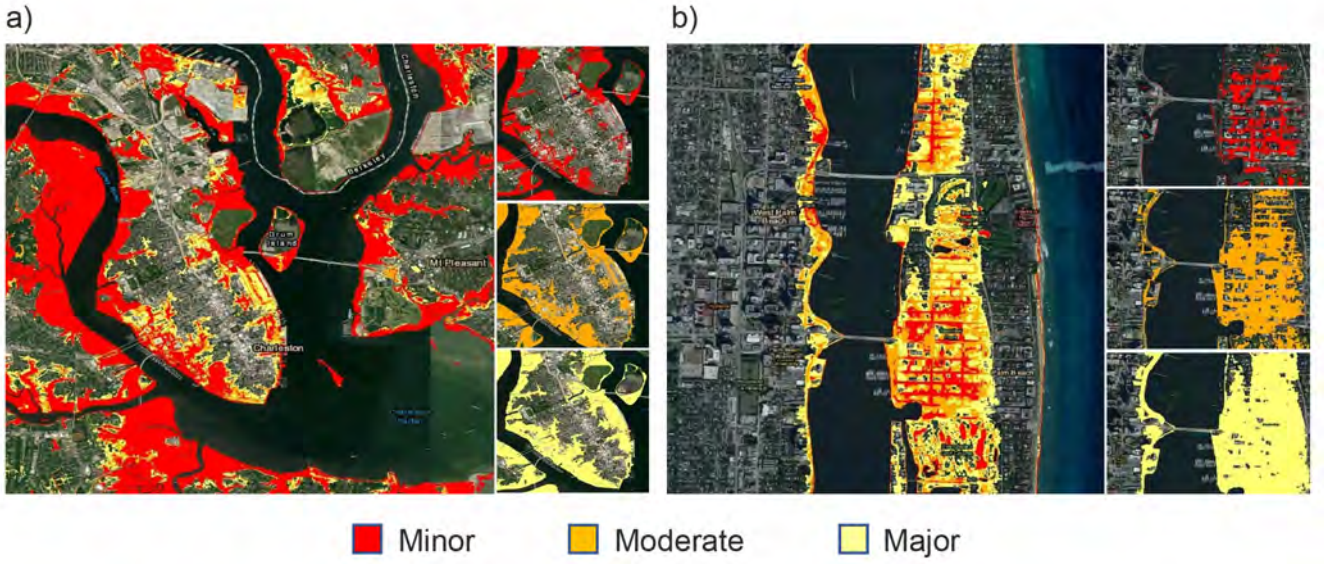


Figure 3.7: NOAA minor (red layer: land between mean higher high water [MHHW] and minor high tide flood [HTF] height above MHHW), moderate (orange layer), and major (yellow layer) HTF maps showing a regional layered map with individual layer panes to the right for a) Charleston, South Carolina, and b) West Palm Beach, Florida. MHHW for 1983–2001 is the shoreline edge. Note: to be useful for decision-making, a conversion to land-based heights (e.g., NAVD88) should be made.

minor HTF days uses extrapolations of linear and/or quadratic fits to days per year with a water level at or above the flood height. As a whole, there are about twice the number of days of minor HTF than the number of discrete events (Figure 3.8b inset), which is largely reflective of typical synoptic-scale (temporal) variability and the 4-day event filtering used in the RFA process and GPD fitting. The national (median) outlook for minor HTF in 2020 was 4–5 days, with about 8–9 days each along the Northeast and Western Gulf coastlines and 3–5 days each along the Southeast and Eastern Gulf coastlines (Sweet et al., 2020a).

Currently, moderate HTF in 2020 (Figure 3.8c) has about a 0.3 events/year frequency (median value) nationally and a similar 0.2–0.4 events/year frequency along the Southeast, Eastern Gulf, and Northwest coastlines. Moderate HTF is most likely along the Western Gulf coastlines (0.6–0.7 events/year). Major HTF (Figure 3.8d) nationally and along the Southeast coastline has about a 0.04 events/year frequency. Major HTF is most likely along the Western Gulf coastline (0.15 events/year) and along the Northeast and Eastern Gulf coastlines (0.08–0.09 events/year). For a more local perspective (see Figure 3.7), 2020 annual frequencies of minor, moderate, and major HTF in Charleston, South Carolina, and West Palm Beach, Florida, were about 2–3 events/year, 0.15–0.25 events/year, and about 0.02–0.04 events/year, respectively, based on the nearest tide gauge (see Table A1.2).

Changes in flood exposure are projected to 2050 considering no additional flood risk reduction or adaptation (e.g., via improved stormwater system functionalities) at NOAA tide gauges (Figure 3.9). The EWL_{local} probabilities are brought to 2050 levels by adding the local RSL projections initiating in year 2005 associated with the upper-bounding sea level scenario identified by the regional observation-based extrapolations (Table 2.2). Other scenarios could be used, but we opted for this particular set because it uses observational evidence—extrapolation of fits over the last 50-years (i.e., 1970–2020) to provide some level of prediction for the next 30 years. For instances where the extrapolations are the same as a particular scenario (e.g., Northeast), the adjacent (higher) scenario is used (e.g., the Intermediate is considered the upper-bounding scenario for the Northeast), which also serves to partially compensate for natural variability that is not reflected in the extrapolations.

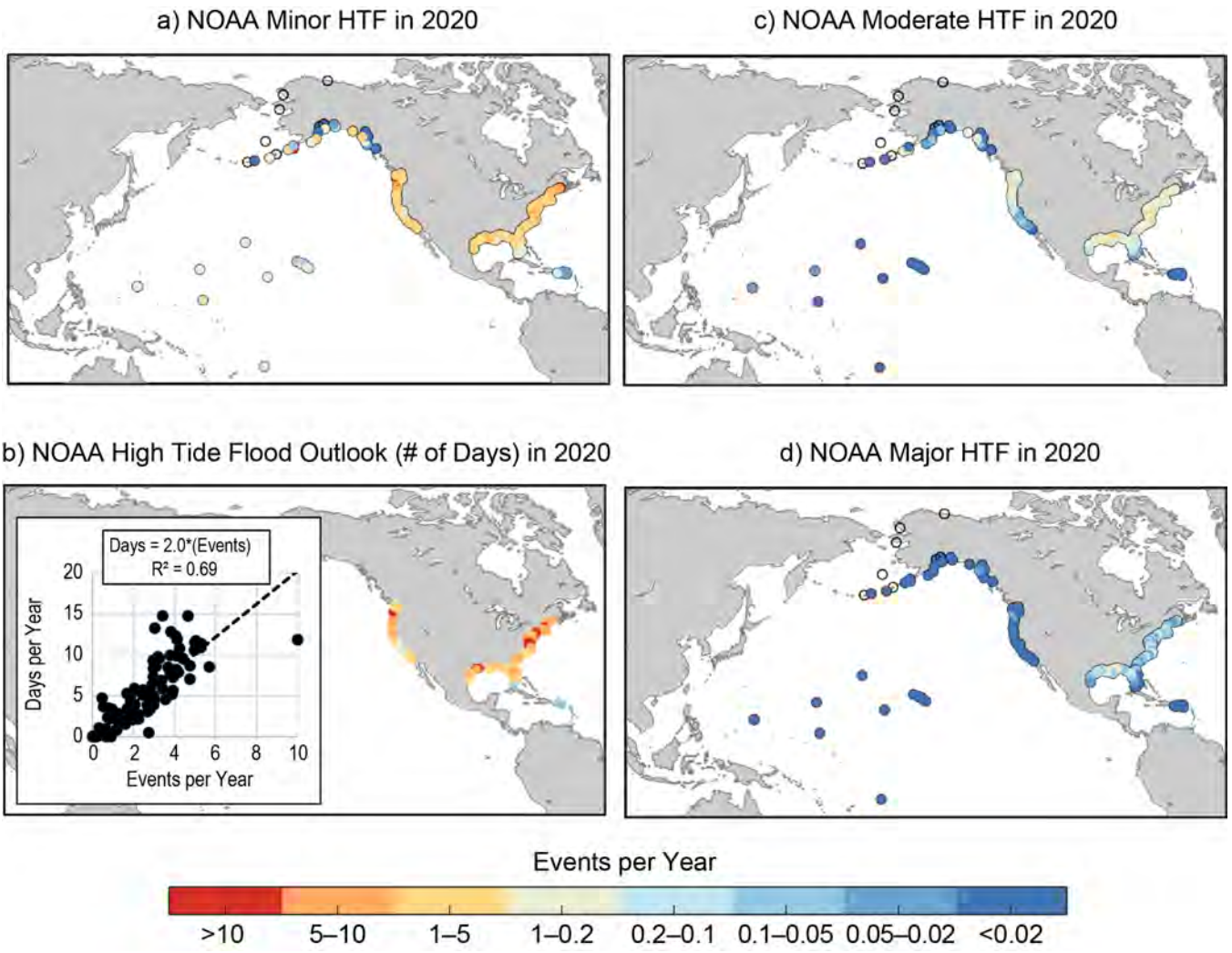


Figure 3.8: Average event frequencies in 2020 of a) minor high tide flooding (HTF); b) number of "days" (as compared to "events") of HTF estimated in NOAA's annual outlook (Sweet et al., 2021) and regression between events and days; c) average event frequencies in 2020 of moderate HTF; and d) average event frequencies in 2020 of major HTF. Flood height-severity definitions are from NOAA (Sweet et al., 2018) and, specifically for Alaska locations, from Sweet et al. (2020b).

Nationally and along all regions except the Hawaiian/Pacific Islands (about 9 events/year), the Caribbean (about 6 events/year), and Alaska (0.7 events/year) coastlines, the median event frequency in minor HTF is projected to increase to >10 events/year (Figure 3.9a). Moderate HTF (median) frequencies (Figure 3.9b) are projected by 2050 to increase nationally to about 4 events/year; >10 events/year along the Western Gulf coastline; 3–6 events/year along the Northeast, Southeast, and Eastern Gulf coastlines; about 1 event/year along the Northwest coastline; and 0.7 events/year along the Southwest coastline. Major HTF frequencies (Figure 3.9c) are projected to increase to about 0.2 events/year nationwide (median), with 1 event/year along the Western Gulf coastline, 0.5 events/year along the Northeast coastline, and 0.2–0.3 events/year along the Southeast Atlantic and Eastern Gulf coastlines. For a local perspective, the 2050 projections of annual frequencies of minor HTF in Charleston and West Palm Beach are >10 events/year, with 4–5 of those events reaching or exceeding moderate HTF and the possibility (0.1–0.2 events/year) of major HTF.

For perspective and a summary assessment by region, Table 3.2 quantifies how minor, moderate, and major HTF frequencies have changed and are projected to change considering the local RSL scenarios associated with the upper-bounding scenario of the regional observation-based extrapolations (Table 2.2) using 1990, 2020, and 2050 time slices. Nationally, minor HTF frequencies nearly tripled between 1990 and 2020, growing from about 1 to 3 events/year. They are projected to more than triple by 2050 to

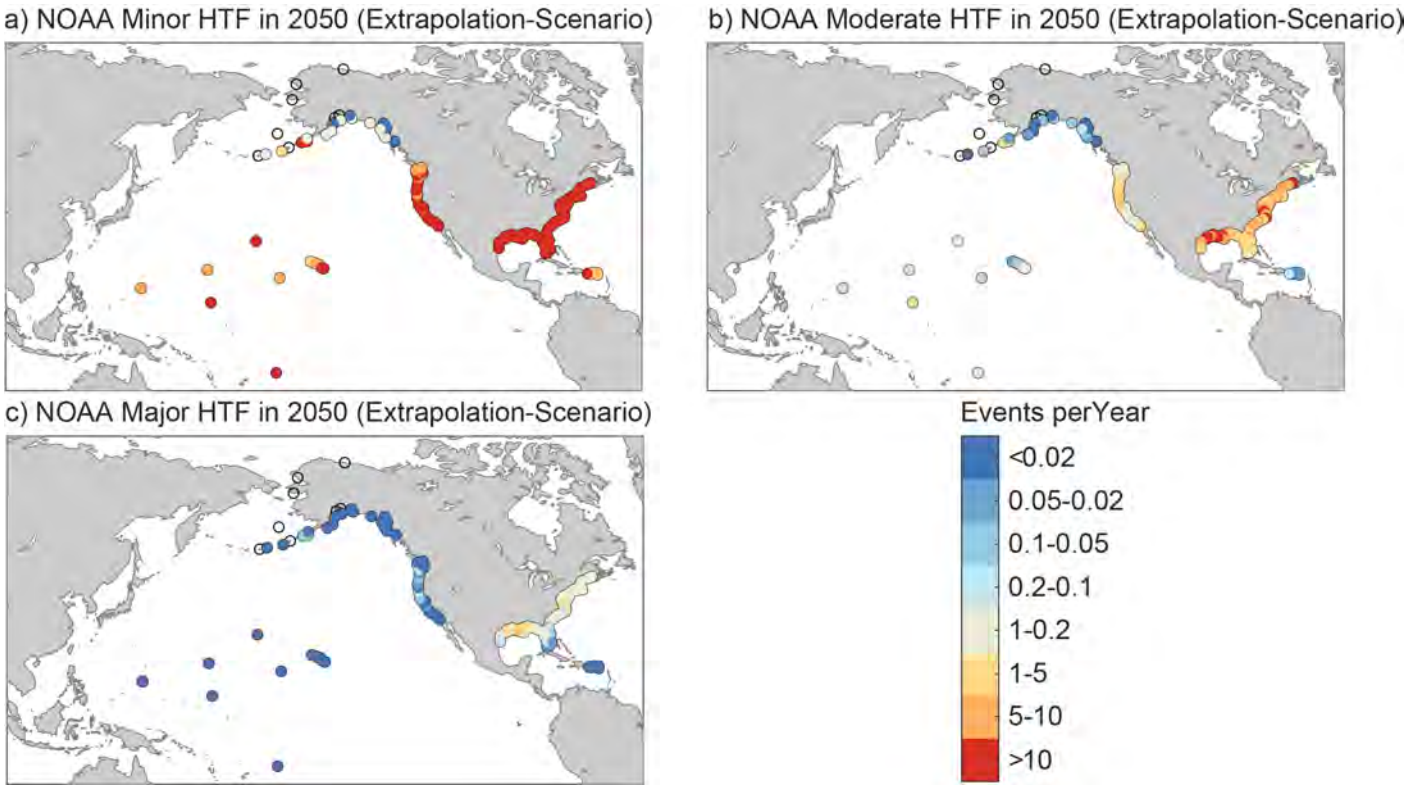


Figure 3.9: Coastal high tide flooding (HTF) frequencies projected at 2050 applying the sea level scenario that upper-bounds the regional observation-based extrapolations for NOAA a) minor, b) moderate, and c) major HTFs.

>10 events/year. Moderate HTF frequencies nationally experienced about a 50% increase (0.2 events/year growing to 0.3 events/year) from 1990 to 2020, which is slightly higher than the frequency increase in major HTF frequencies. By 2050, moderate HTF frequencies nationally are projected to increase by more than a factor of 10, with about a factor of 5 increase in major HTF frequencies. In short, assuming continuation of current trends and summarized at the national level, a flood regime shift is projected by 2050, with moderate HTF occurring a bit more frequently than minor HTF events occur today and major HTF events occurring about as frequently as moderate HTF frequencies occur today.

Table 3.2: Annual average event frequencies for NOAA-defined minor, moderate, and major HTF heights by region that were typical (median values) in 1990, under current (circa 2020) sea levels and projected to occur considering the upper-bounding scenario of the observations-based extrapolations in 2050 (see Table 2.2).

U.S. Region	1990			2020			2050		
	Minor Flood	Moderate Flood	Major Flood	Minor Flood	Moderate Flood	Major Flood	Minor Flood	Moderate Flood	Major Flood
National	1	0.2	0.03	3	0.3	0.04	>10	4	0.2
*Hawaii/Pac Is	0.06	<0.02	<0.02	0.2	<0.02	<0.02	9	0.1	<0.02
NE Atlantic	2	0.3	0.06	4	0.6	0.09	>10	6	0.4
SE Atlantic	0.9	0.1	0.03	2	0.2	0.04	>10	4	0.2
E Gulf	0.7	0.2	0.06	2	0.3	0.08	>10	3	0.3
W Gulf	1	0.3	0.1	4	0.7	0.2	>10	>10	1
SW Pacific	0.8	0.02	<0.02	1	0.04	<0.02	>10	0.7	<0.02
NW Pacific	3	0.3	<0.02	4	0.4	<0.02	>10	1	0.03
**Alaska	0.7	<0.02	<0.02	0.2	<0.02	<0.02	0.7	0.03	<0.02
US Carib	0.02	<0.02	<0.02	0.04	<0.02	<0.02	6	0.04	<0.02

*The Pacific Island locations use the same scenario assigned to the Hawaiian Islands (see Table 2.2); **Alaska locations, which as a whole could not be regionalized due to large differences in VLM, use the lower-bounding scenario per CONUS, which is the Intermediate-Low scenario (see Table 2.1). The lower-bounding scenario for Alaska is used to reflect the significant deviations below the Intermediate scenario (Figure A1.2b).

Box 3.1: Wave Contributions to Extreme Water Levels

Water level heights are a common proxy for coastal flooding (e.g., Sweet et al., 2018) and consist of a variety of components (see Figure 1.1). This report focuses primarily on projections of relative sea level (RSL) rise together with tides and storm surge contributions to extreme water levels (EWLs). However, along exposed coasts, wave-driven water levels can play a significant role in EWLs during storm events and during lesser storm conditions as exacerbated by sea level rise. Here we illustrate the relative influence of wave-driven water levels, broken down into the components of set-up and swash during extreme events across the United States, compared to tide and surge contributions.

Wave set-up is the quasi-static rise in water level at the shoreline due to breaking waves (Longuet-Higgins and Stewart, 1963). Swash is the time-varying elevation of the leading edge of wave uprush, which varies in frequency from seconds (due to incident waves) to minutes (e.g., surf beat; Guza and Thornton, 1982). Wave set-up and swash components, collectively known as wave run-up, are dependent on wave height, period, and beach slope (Stockdon et al., 2006) and are therefore controlled by local beach morphology and transient ocean conditions. To perform regional assessments of present-day or future wave-driven water level contributions, wave conditions are typically determined via global wave models forced by wind-reanalysis studies (e.g., Reguero et al., 2012) or historical/future wind fields produced by global climate models (e.g., Hemer et al., 2013).

Leveraging the global total water level assessment of Vitousek et al. (2017), which combines reanalysis models for waves, surge, and tides ("total water level" implying that all relevant components in Table 3.1 are included), we demonstrate the relative influence of waves on coastal water levels during extreme events (Figure Box 3.1). Even though the coarse resolution of this study (1° x 1° grid cells) cannot fully resolve tropical cyclones, which play a significant role in EWL events for the Southeast, Eastern and Western Gulf, Caribbean, and Hawaiian/Pacific Islands regions, this analysis demonstrates the relevance of waves in contributing to EWLs. Across the United States and its territories, using the 0.1 events/year EWL event as an example, this study estimates that wave set-up ranges from about 20–75 cm (Figure Box 3.1a) and swash from 35–125 cm (Figure Box 3.1b), together accounting for 25%–90% of EWLs (Figure Box 3.1c and based on Vistousek et al., 2017—not this study's RFA-based EWLs) for open-coast beaches (i.e., not for embayments protected from ocean waves). Wave-driven water levels (i.e., wave run-up) represent ~50% or more of the EWL contributions (again, not from this study) in areas with narrow continental shelves (reduces surge potential) and/or small tidal ranges, in particular the Hawaiian and Pacific Islands, the Caribbean, the Outer Banks (North Carolina), most of Florida, the entire U.S. West Coast, and portions of Louisiana, Texas, and Alaska. But swash oscillations only amplify coastal EWLs over short periods (i.e., seconds to minutes), whereas wave set-up represents a relatively sustained

Box 3.1 (cont.): Wave Contributions to Extreme Water Levels

contribution during storm events with about a 10% to 80% contribution to EWLs, with the highest values in the tropics (Figure Box 3.1d). As these examples indicate, when omitting wave-driven processes, coastal flood risk can be significantly underestimated for open-coast beaches, especially along U.S. island coastlines. Including wave-driven processes will be a focus of subsequent Task Force attention leading up to the Sixth National Climate Assessment (NCA6).

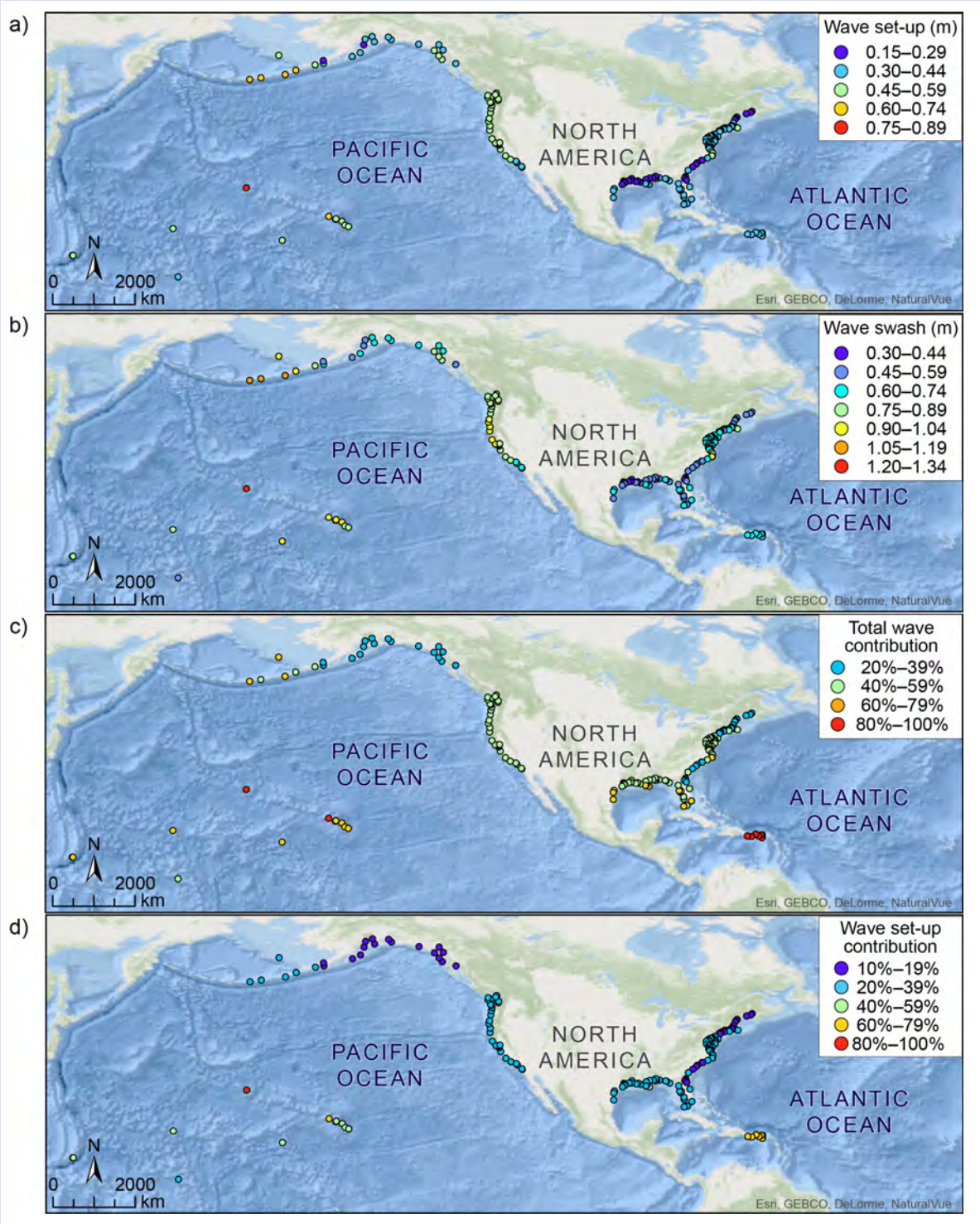


Figure Box 3.1. Water level contribution due to a) wave set-up and b) wave swash; c) percent contribution of wave-driven water levels (i.e., wave run up = wave set-up and swash) relative to all components: tide, storm surge, and waves; and d) percent contribution of wave set-up relative to the sum of tide, storm surge, and wave set-up based on model reanalysis of Vitousek et al. (2017).

Section 4: Use Cases

Below are four use cases, which use

- the (regional frequency analysis) RFA-based extreme water levels (EWLs) to map (at city scales) the annual probabilities/frequencies for the NOAA minor (disruptive), moderate (typically damaging), and major (often destructive) high tide flooding (HTF) layer classifications that are nationally calibrated to those used in weather-warning forecasting by NOAA;
- the relative sea level (RSL) projections and the RFA-based EWLs to incorporate trends (e.g., sea level rise projections) into design engineering criteria for risk management and adaptive planning;
- the RSL projections and RFA-based EWL probabilities with maps of NOAA minor, moderate, and major HTF layers to assess current and future vulnerabilities to combined storm and wastewater systems; and
- vertical land motion (VLM) rates inherent to the RSL projections are compared to rates from new satellite technologies at very high spatial resolution to showcase possibilities to monitor current rates from space and further localize the RSL projections.

The goal is to contextualize how the emerging science and this report's datasets can assist in developing products suitable for approaching (mapping, designing, or bounding) important problems in coastal risk assessment and management.

4.1. Mapping of NOAA High Tide Flood Thresholds and Flood Frequencies

High tide flooding[29] is increasingly common due to years of RSL rise. NOAA has been 1) documenting changes in minor HTF patterns since 2015, with about 100 NOAA tide gauges along the U.S. coastlines, and 2) providing a yearly coastal HTF outlook for these locations for the coming year,[30] as well as projections for the next several decades based on RSL projections from NCA4/Sweet et al., 2017. NOAA has also mapped the three HTF depth-severity (minor, moderate, and major) categories based on the relationship with tide range (Sweet et al., 2018) to show the spatial extent of associated impacts (see Figure 3.7). The minor HTF maps are provided in the NOAA SLR Viewer,[31] and all three map layers are accessible through NOAA map services.[32]

In an effort to provide better flood exposure information, NOAA is developing a product with input from partners (e.g., the Federal Emergency Management Agency [FEMA]) to assign exceedance probabilities using the RFA-based EWLs to the minor, moderate, and major HTF categories as shown for Charleston, South Carolina, and West Palm Beach, Florida (Figure 4.1). The annual event frequency shown for each NOAA HTF "zone" is assigned to the particular flood height. For example, the moderate HTF zone in Charleston is shown as the orange-brown layer in Figure 4.1a, which includes all land elevations between the minor HTF height threshold (0.570 m above mean higher high water [MHHW]; see Table A1.2) and the moderate HTF threshold (0.853 m above MHHW). This moderate HTF zone is expected to be completely (up to 0.853 m above MHHW) at risk of flooding, with an average event frequency between about 1 event/year and 0.2 events/year. A frequency range is provided to partially address the 95% confidence intervals in both the EWL statistics and the mapping data. In the case of local maps, like Charleston and West Palm Beach, the average event frequency for each NOAA HTF layer is a constant across the area shown.

These types of products can help inform the probability of higher-frequency, lower-impact events. As agencies (e.g., FEMA) start to develop products that provide more comprehensive hazard and risk information

[29] https://oceanservice.noaa.gov/facts/high-tide-flooding.html

[30] https://tidesandcurrents.noaa.gov/HighTideFlooding_AnnualOutlook.html

[31] https://coast.noaa.gov/slr/

[32] https://coast.noaa.gov/arcgis/rest/services/dc_slr/Flood_Frequency/MapServer

(e.g., graduated flood risk; see The Future of Flood Risk Data[33]), there is a need to better define and resolve the probabilities of these more frequent flood conditions. In addition, considering today's height-severity flood thresholds in the face of sea level rise (see Figure 1.3), understanding the event probabilities in this more frequent space is critical. Such information would help graduate the flood probabilities more comprehensively than FEMA's binary 1% annual chance floodplain definition and allow for a more comprehensive picture of structure-level risk.

How Can This Be Done?

The process to spatially assign probabilities again relies on a relationship to tide range (see Figure A2.5), with tide range values obtained by subtracting VDatum's MHHW and mean lower low water [MLLW] modeled tidal surfaces.[34] Using VDatum's tide range and the regional regression equations (Figure A2.5) to obtain a local index (u), the EWL return level (or rather, average event frequency) curves for the associated grid are downscaled to individual VDatum grid cells (~100 m) using Equation 1 in Section 3.2. With these downscaled curves, the HTF levels at each VDatum cell—also based on VDatum's tide range (i.e., great diurnal tide range [GT] tide datum) relationships (Sweet et al., 2018)—are intersected with the localized frequency curve (expected values) for the cell in order to determine event frequencies on a cell-by-cell basis. The average event frequencies are then associated with their respective mapped inundation footprints (3–5 m horizontal resolution). To refine the data, they were clipped to the coastal HUC (hydrologic unit code) 12 watersheds[35] that overlapped VDatum model data. This was done in order to provide a probability in watersheds that contained source VDatum data only.

The value of these data is that we can now provide not only the mapped inundation extent of each of the three HTF levels (see Figure 3.7) but also the probability, or event frequencies, for each level on high-resolution inundation data (Figure 4.1). By leveraging the relationship between the local indices (u) to GT on a regional basis, the EWL statistics can provide event frequencies for 1) most water levels or flood heights of interest and 2) most locations, even if there is not a local tide gauge nearby to assist coastal managers when planning for potential impacts to their communities. In terms of the mapped product and inherent uncertainties, it should be recognized that the VDatum model's standard error is on the order of 15 cm,[36] which is similar to that of the LIDAR elevation data.[37] The associated 95% confidence intervals from both VDatum and the LIDAR used in the mapping is then (standard error x 1.96) about 30 cm and similar to that of the EWL at the 1 event/year frequency (0.3 m median) using tide range to spatially derive EWL_{local} (Figure A2.5), although it increases to about 0.9 m at the 0.01 events/year frequency. Thus, it is recommended that these maps be used cautiously in any type of application.

Both NOAA and FEMA are currently exploring methods to further localize the $EWL_{gridded}$ probabilities, such as using NOAA short-term gauges (e.g., Section 3.4) and multidecadal hindcast modeling to develop a higher resolution set of local indices (u). FEMA is working to merge the higher-frequency portion of the EWL distributions (e.g., > 0.05 events/year) with the FEMA EWL stillwater datasets (some of which are shown in Figure 3.5). These efforts will serve, in general, to refine coastal exposure by today's standards and, specifically, minor to major HTF probabilities to better understand and communicate the Nation's coastal flood risk through products such as FEMA's National Risk Index.[38]

[33] https://www.fema.gov/fact-sheet/future-flood-risk-data-ffrd

[34] https://vdatum.noaa.gov/

[35] https://www.usgs.gov/core-science-systems/ngp/national-hydrography/watershed-boundary-dataset?qt-science_support_page_related_con=4 - qt-science_support_page_related_con

[36] https://vdatum.noaa.gov/docs/est_uncertainties.html

[37] https://www.usgs.gov/ngp-standards-and-specifications/lidar-base-specification-online

[38] https://hazards.fema.gov/nri/

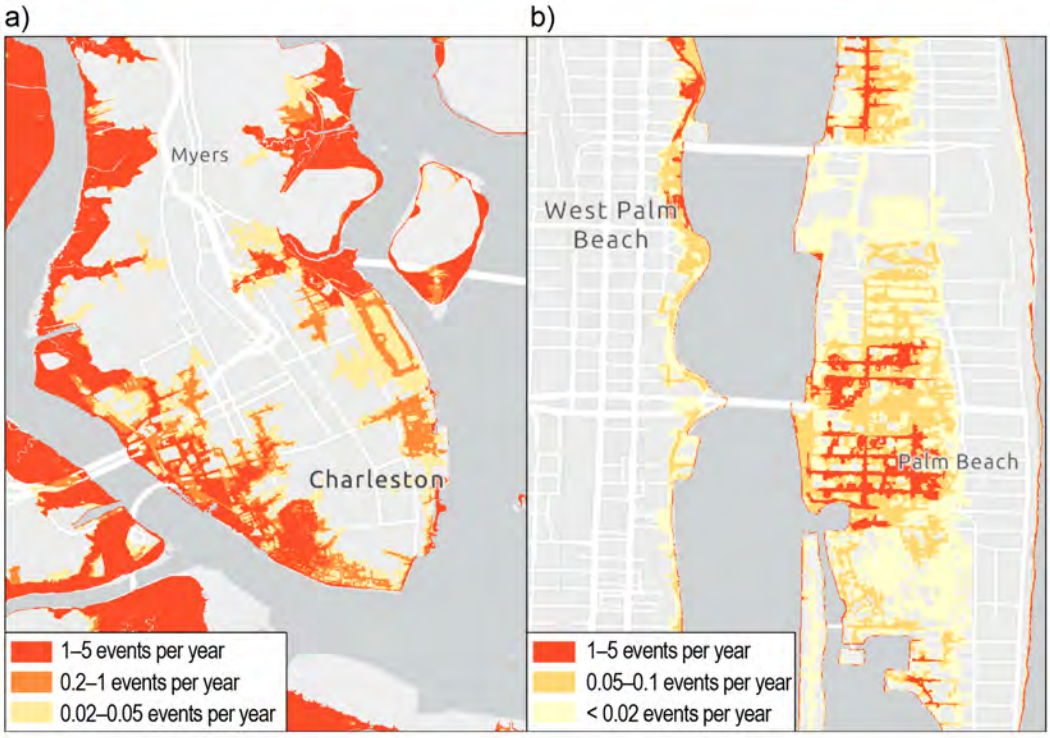


Figure 4.1: Maps of the NOAA minor, moderate, and major high tide flooding layers for a) Charleston, South Carolina, and b) West Palm Beach, Florida (as in Figure 3.7 but providing average event frequencies for each layer). Note: the shoreline on these maps is mean higher high water, but to be useful for decision-making, a conversion to land-based heights (e.g., NAVD88) should be made.

4.2. Application of Scenarios, Observation-Based Extrapolations, and Extreme Water Levels

Because future sea level rise amounts are inherently uncertain, planners and engineers who engage in addressing adaptation to future sea level rise in coastal communities often adopt a scenario approach. Based on several national and regional sea level projections (Hall, Weaver et al., 2019; Parris et al., 2012; USACE, 2014; Hall et al., 2016; Sweet et al., 2017), many communities have developed their own specific scenario sets and guidelines for how to use them. In this section, the application of the regional sea level scenarios (see Section 2) that leverage the newly developed observation-based extrapolations (see Section 2.3) and the EWL probabilities produced using the RFA (see Section 3) are illustrated for representative locations around the United States.

This use case is not meant to provide standardized planning guidance for using information on sea level rise projections; rather, it is provided as an example of applying concepts of time-varying extreme value probabilities due to sea level rise, risk reduction, and adaptive planning that may be used in practice (Salas and Obeysekera, 2014; Salas et al., 2018). One of the primary tasks in coastal infrastructure projects is to determine the design elevation (also known as the return level) of a particular structure (e.g., seawall or building) for a desired level of risk or probability. Such design problems typically require the knowledge of advanced statistical methods associated with extreme values such as those illustrated in the commonly referenced textbook by Coles (2001).

The use case is illustrated for 10 tide gauges around the United States (Figure 4.2). For reference, the upper-bounding scenarios of the observation-based extrapolations for 2050 (see Table 2.2) and the RFA-based EWL distribution parameters (Section 3) are provided in Table 4.1. The EWL probability parameters are necessary to replicate this use case, and they are specifically from a Generalized Pareto Distribution (GPD) peaks-

over-threshold approach (Coles 2001): a) the local Index, u; b) rate of exceedances above the local index, λ; c) scale, σ_{RFA}; and d) shape, ξ (see Section A2 for more details). In the examples below, the upper-bounding scenario is used (Figure 4.3a) with the corresponding return level curves for the selected tide-gauge locations (Figure 4.3b).



Figure 4.2: Tide gauges selected for the application of sea level scenarios and extreme water level methods.

Table 4.1: Tide-gauge locations, scenarios bounding the observation-based extrapolations, and the extreme value distribution Generalized Pareto Distribution (GPD) model parameters estimated using the regional frequency analysis (RFA).

Tide-gauge location details			Upper-bounding scenarios circa 2050 of the observation-based extrapolations	RFA-based GPD parameters			
NOAA ID	Location	Region	Upper Bound	Local Index u	λ	σ_{RFA}	ξ
1612340	Honolulu, HI	Haw.	Int	0.248	3.19	0.218	0.066
8518750	The Battery, NY	NE	Int	0.546	2.98	0.261	0.179
8638610	Sewells Point, VA	NE	Int	0.502	2.95	0.332	0.067
8723214	Virginia Key, FL	SE	Int-High	0.284	3.00	0.152	0.251
8726520	St. Petersburg, FL	E. Gulf	High	0.337	2.99	0.266	0.354
8729840	Pensacola, FL	E. Gulf	High	0.345	2.85	0.212	0.456
8771450	Galveston Pier 21, TX	W. Gulf	Int-High	0.366	2.75	0.289	0.340
9410660	Los Angeles, CA	SW	Int-High	0.472	3.21	0.150	−0.063
9414290	San Francisco, CA	SW	Int-High	0.375	3.15	0.211	0.038
9447130	Seattle, WA	NW	Int	0.541	3.07	0.233	−0.110

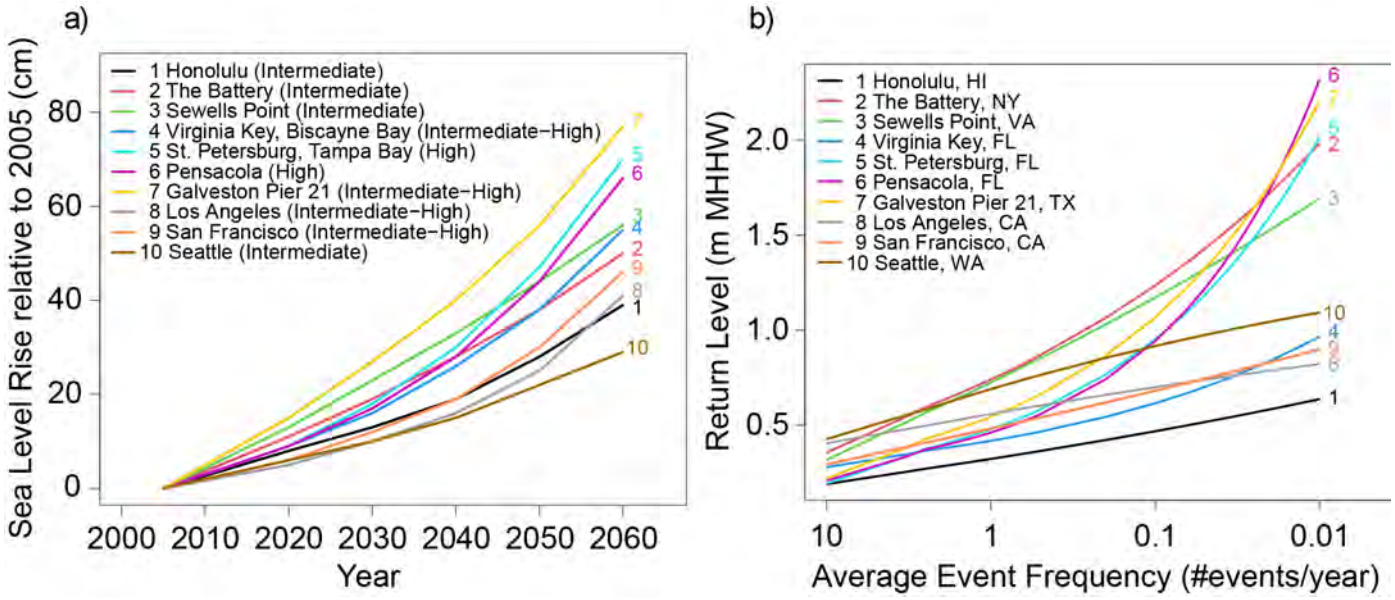


Figure 4.3: a) RSL projections for the scenarios providing the upper bound to observation-based extrapolations to 2060 for the selected tide gauges. The corresponding scenario for each tide gauge is shown in parentheses in the legend. b) RFA-based EWL (see Section 3) return level curves relative to the 1983–2001 MHHW tidal datum. Notes: (1) to be useful for decision-making, a conversion to land-based heights (e.g., geodetic datum such as NAVD88) should be made. (2) Average event frequency (x-axis label) is the reciprocal of average recurrence interval, which is also known as return period.

As shown in Figure 4.3a, 2005 is the reference year for the projection scenarios. However, the return level curves shown in Figure 4.3b are referenced to the year 2000. The return level curves are first adjusted to the year 2005 by raising the curves by an amount equivalent to the local trend in the flood index (u) from 2000 to 2005 (see Table A1.3). Alternatively, the RSL offsets (see Table A1.2) could be applied, with differences between the two insignificant to the results here.

Accounting for Time-Varying Relative Sea Level Rise

A particular scenario depicts the changes in RSL at a selected location. A common assumption is that as RSL rises, the EWLs also increase, and that must be accounted for in the changing behavior of the probability distribution of the EWLs. One approach for developing a time-varying extreme value distribution is to assume that one or more parameters (location, scale, and shape) are functions of time or some other covariate (e.g., El Niño–Southern Oscillation index; Coles, 2001; Menendez and Woodworth, 2010). When two or more parameters evolve with time (i.e., strong nonstationarity), the paradigm shifts from a "stationary" approach, typically used for planning infrastructure until recently, to one reflecting significant temporal change in the probability distribution. A common practice is to remove the trend in the extreme dataset and then to assume the distribution of the detrended extremes to be stationary. This approach is similar to the case when only the location parameter is varying with time and the other parameters are constant.

In the ensuing sections, it is assumed that only the location parameter (i.e., local index, u, in GPD) changes as a function of RSL (i.e., per the specified sea level scenario). This may be expressed as

$$F(z) = GPD(\mathrm{u}(RSL), \tilde{\sigma}, \xi)$$

where u is the RFA/GPD local index that is a function of RSL, and $\tilde{\sigma}$ and ξ are scale and shape parameters, respectively, which are assumed to be constant over time. However, this assumption does not preclude the analysis of using a higher degree of temporal variability (e.g., both u and $\tilde{\sigma}$ are functions of RSL or some other covariate). As a consequence of the above assumption, the local index u is adjusted by a magnitude δ (i.e., the regional mean sea level change from the reference year) obtained from a selected scenario.

For planning infrastructure using the scenario's RSL projections and the EWL probabilities, two approaches are illustrated: 1) recurrent flood frequency and 2) time-varying average recurrence interval (ARI; which is the reciprocal of average event frequency [AEF]) and risk.[39] While the infrastructure designs are based on a variety of factors, one or both of these approaches may be used to support that process (e.g., height of a seawall or base-flood elevation). In this use case, the term "flood" could pertain to a particular NOAA HTF level or an arbitrary probabilistic EWL level, although not necessarily to imply a meteorological (e.g., storm) event.

Designs Based on Recurrent Flood Frequency

In many U.S. coastal locations, the frequency of flooding is increasing, mostly due to rising sea levels (Sweet et al., 2021). A community may tolerate infrequent flooding initially, but at some point, when the sea level rise is significant, the flooding frequency will increase, which in turn may exceed that community's risk tolerance for flooding. Using the extreme value distributions and the sea level scenarios, it is possible to predict the time-varying change in frequency (e.g., as in Figure 3.9). In case of the GPD, the recurrent flood frequency (number of exceedances above a return level [z]) may be computed as (Buchanan et al., 2017)

$$N(z,\delta) = \lambda\left(1 + \frac{\xi(z-[u+\delta])}{\tilde{\sigma}}\right)^{\frac{-1}{\xi}} \text{ for } \xi \neq 0$$

where δ is the change in RSL (relative to the project construction year) obtained from Figure 4.3a.

In the example used here, the planning problem may be stated as follows: What should the initial return level (used for the design) be to ensure that the recurrent flood frequency is limited to a specified number of events at the end of the design life? It is now possible to lay this out graphically, as shown in Figure 4.4 for two tide gauges (Sewells Points, Virginia, and Galveston Pier 21, Texas).

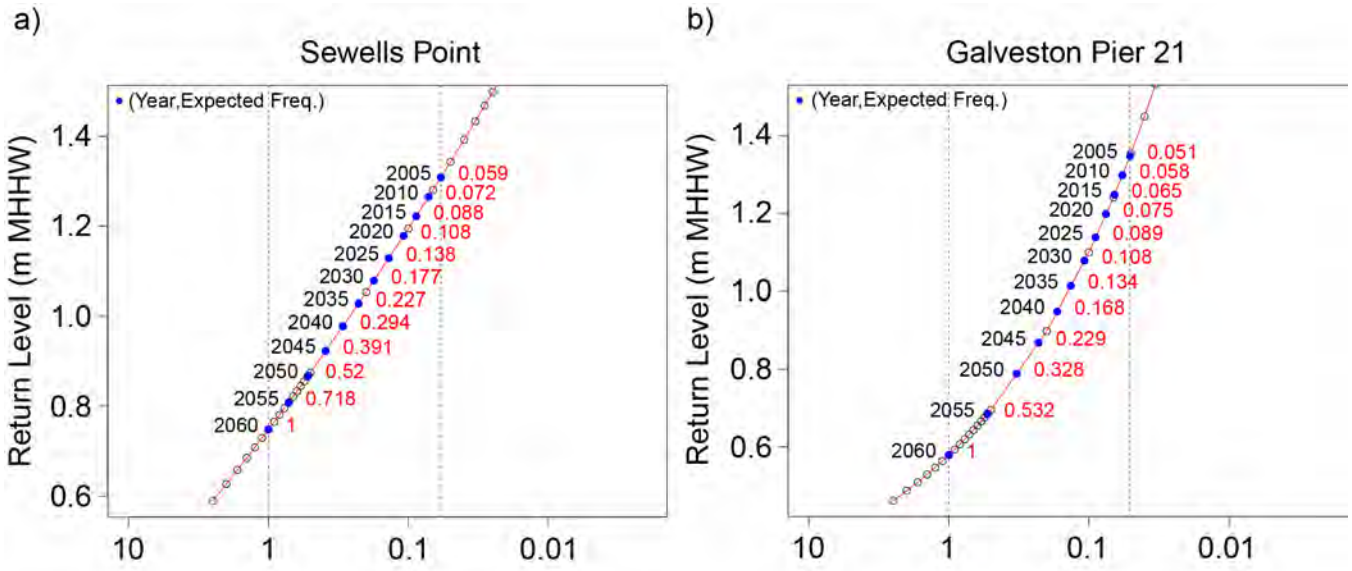


Figure 4.4: Recurrent flood frequency estimates for a) Sewells Point (Norfolk), Virginia, and b) Galveston Pier 21, Texas. For both, the relative sea level projection for the scenarios and the return level are the same as in Table 4.1. Note: to be useful for decision-making, a conversion of the return level to land-based heights (e.g., geodetic datum such as NAVD88) should be made.

In Figure 4.4, the number to the right of each point along the curve shows the recurrent flood frequency, N, corresponding to the year indicated on the left. For this example, it was assumed that by 2060, the desired value of N = 1, and the design AEF necessary for this criterion, is indicated in Figure 4.4 (AEF = 0.06 events/year for Sewells Point and AEF = 0.05 events/year for Galveston Pier 21). The corresponding design return levels are 1.31 m and 1.35 m, respectively, relative to MHHW datum. A summary of results for all 10 tide

[39] In the context of Section 4.2, risk is defined as the probability of one or more events exceeding a given height threshold over the life of a project.

gauges is shown in Table 4.2. The design average event frequency required in 2005 to meet the flood frequency criteria shows significant variability across the sites. The design return level depends on two factors: 1) the magnitude of the sea level rise from 2005 to 2060 (end of the design life); and 2) the slope (a function of the scale and shape parameters) of the return level curve (Figure 4.3b).

Table 4.2: Summary of design parameters to constrain the average event frequency, N, to 1 per year by 2060 (end-year of the design life). The 2005–2060 RSL projections are the local values associated with the scenarios providing the upper bound to the regional observation-based extrapolations shown in Table 2.2. Note: to be useful for decision-making, a conversion of the return level to land-based heights (e.g., geodetic datum such as NAVD88) should be made.

NOAA ID	Location	Relative Sea level rise (in meters from 2005 to 2060)	Return level (m above 1983–2001 MHHW) corresponding to AEF = 1 year	Return level (m above 1983–2001 MHHW) required in 2005 to ensure N = 1 by 2060	Design average event frequency (events/year) required in 2005 to achieve N = 1 by 2060
1612340	Honolulu, HI	0.39	0.33	0.72	<0.01
8518750	The Battery, NY	0.50	0.76	1.26	0.10
8638610	Sewells Point, VA	0.56	0.75	1.31	0.06
8723214	Virginia Key, FL	0.55	0.44	0.99	0.01
8726520	St. Petersburg, FL	0.70	0.49	1.19	0.05
8729840	Pensacola, FL	0.66	0.47	1.13	0.06
8771450	Galveston Pier 21, TX	0.77	0.58	1.35	0.05
9410660	Los Angeles, CA	0.41	0.57	0.98	<0.01
9414290	San Francisco, CA	0.46	0.49	0.95	<0.01
9447130	Seattle, WA	0.29	0.70	0.99	0.05

Design Based on Time-Varying Exceedance Probabilities

Average recurrence interval is used to describe EWL probabilities in the following examples to directly relate to and build off of a couple of recent, relevant focused studies on the topic. Interpretation of the results should follow guidelines of the U.S Army Corps of Engineers (USACE, 1994).

In current practice, the projects with a longer design life (> 25 years) typically use a low average event frequency (<0.1 events/year) or, equivalently, a high/long ARI (> 10 years or more). At high recurrence intervals, the peaks-over-threshold and the annual maxima recurrence intervals converge (Langbein, 1949), although not necessarily where tropical storm surges are present (Wahl et al., 2017). Revisiting the concepts of traditional ARI and risk concepts for annual maxima in time-varying frameworks has been addressed recently (e.g., Salas and Obeysekera, 2014). The application of time-varying ARI and risk concepts is illustrated by converting the GPD model to an equivalent annual maxima model, which in this case is the GEV distribution. The equivalent annual-maxima modeling approach, as used here, will also facilitate the direct application of emerging risk and recurrent interval concepts already developed for situations of time-varying extreme probabilities (Salas and Obeysekera, 2014; Salas et al., 2018; Obeysekera and Salas, 2020).

The cumulative distribution function (CDF) of the GEV model of annual maxima is expressed as

$$F(z) = exp\left\{-\left[1+\xi\left(\frac{z-\mu}{\sigma}\right)\right]^{-\frac{1}{\xi}}\right\}$$

where μ, σ, ξ are the location, scale, and shape parameters of the GEV (Coles 2001).

For computing u, the local index is further adjusted to reflect the translation of the return level curve from 2000 to the reference year (i.e., 2005). The GEV scale parameter, $\sigma = \tilde{\sigma}\lambda^{\xi}$, where the at-site scale parameter $\tilde{\sigma}$, is computed as $\tilde{\sigma} = \sigma_{RFA}{}^{*}u$. For this use case, the adjusted local index is computed as $u_{adj} = u * s\,(2005–2000)$, where s is the trend of the local index u at the site (see Table A1.3). If desirable, other adjustment procedures may be used. Finally, the time-varying GEV model assumes that only the location parameter, μ, changes with sea level change, δ and the time varying annual extreme value distribution is given by

$$F^{t}(z,\delta) = exp\left\{-\left[1+\xi\left(\frac{z-(\mu+\delta)}{\sigma}\right)\right]^{-\frac{1}{\xi}}\right\}$$

The exceedance probability, p_t, which corresponds to an initial return level (z_{q0}, initial design), changes with time because of the rising RSL, δ (Figure 4.5). Consequently, the ARI is not a fixed measure but decreases with increasing sea level.

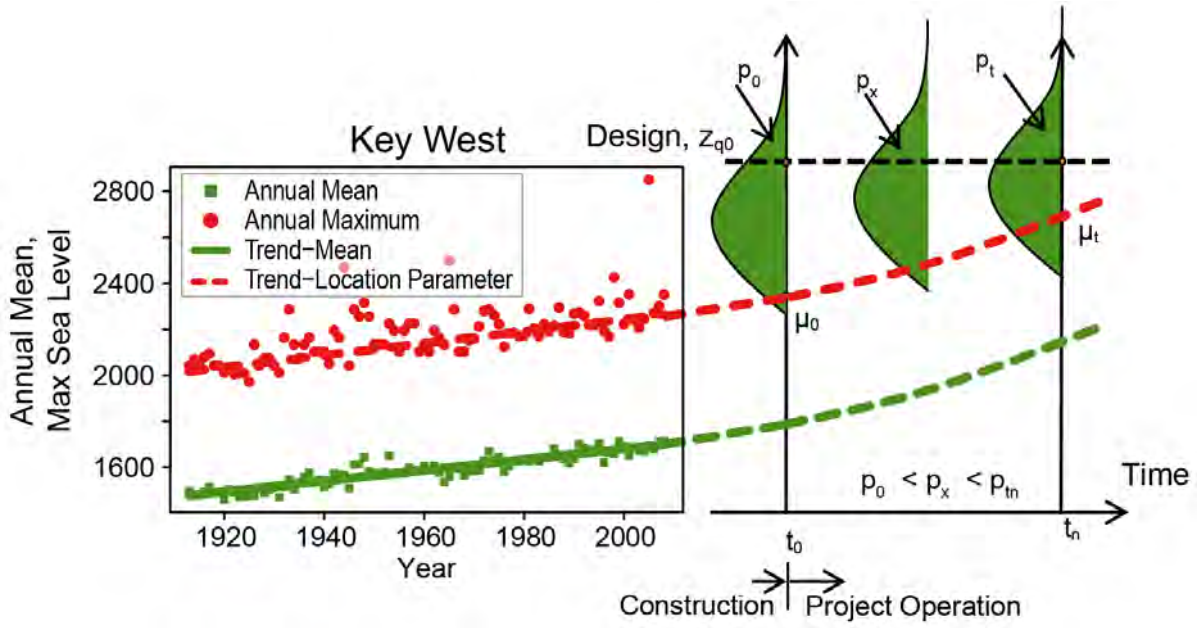


Figure 4.5: Conceptual illustration of increasing exceedance probability (hence decreasing average recurrence interval) that assumes that the location parameter is a function of the magnitude of the relative sea level rise.

The traditional concept of the ARI is the average waiting time for between two successive exceedances of the return level. Using the same definition but in a time-varying exceedance probability framework (Figure 4.5), an equivalent measure of ARI (T) may be derived as (Cooley, 2013; Salas and Obeysekera, 2014)

$$T = 1 + \sum_{x=1}^{\infty}\prod_{t=1}^{x}(1-p_t)$$

where $p_t = 1 - F^{t}(z, \delta)$ i is the time-varying exceedance probability. If a project is designed for a return period, $T_0[t = t_0]$, then $T < T_0$ implies that the actual recurrence interval due to rising RSL will be less.

The methods described in the preceding paragraphs are applied to the 10 tide-gauge locations shown in Figure 4.2. For illustration, it was assumed that the projection scenario for each tide gauge would continue beyond 2060. However, the methodology described above can be used with any other scenario. The derived GEV parameters for each gauge are shown in Table 4.3.

Table 4.3: The parameters of generalized extreme value computed using the peaks-over-threshold Generalized Pareto Distribution model (Coles 2001).

NOAA ID	Location	At-site scale parameter	Local index adjustment from 2000–2005 (m)	GEV location parameter	GEV scale parameter	GEV shape parameter
1612340	Honolulu, HI	0.054	0.007	0.330	0.058	0.066
8518750	The Battery, NY	0.142	0.016	0.757	0.173	0.179
8638610	Sewells Point, VA	0.167	0.023	0.748	0.179	0.067
8723214	Virginia Key, FL	0.048	0.026	0.444	0.063	0.251
8726520	St. Petersburg, FL	0.090	0.014	0.494	0.132	0.354
8729840	Pensacola, FL	0.073	0.012	0.474	0.118	0.456
8771450	Galveston Pier 21, TX	0.106	0.033	0.579	0.149	0.340
9410660	Los Angeles, CA	0.071	0.005	0.565	0.066	−0.063
9414290	San Francisco, CA	0.079	0.010	0.492	0.083	0.038
9447130	Seattle, WA	0.126	0.010	0.701	0.111	−0.110

The ARI curves, T, as a function of T_0, for all 10 tide gauge locations are shown in Figure 4.6a. This figure demonstrates that, in all cases, the actual ARI is less than the design recurrence interval. For instance, for a location near Pensacola, Florida, if a project is designed for T_0 = 100 years, the actual ARI, due to future RSL rise (Table 4.1, "Upper Bound" column), is only about 50 years. As another example, for a location near The Battery, New York City, a project may need to be designed for T_0 = 90 years if the desired ARI under its associated (Table 4.1, "Upper Bound" column) RSL rise scenario is 40 years.

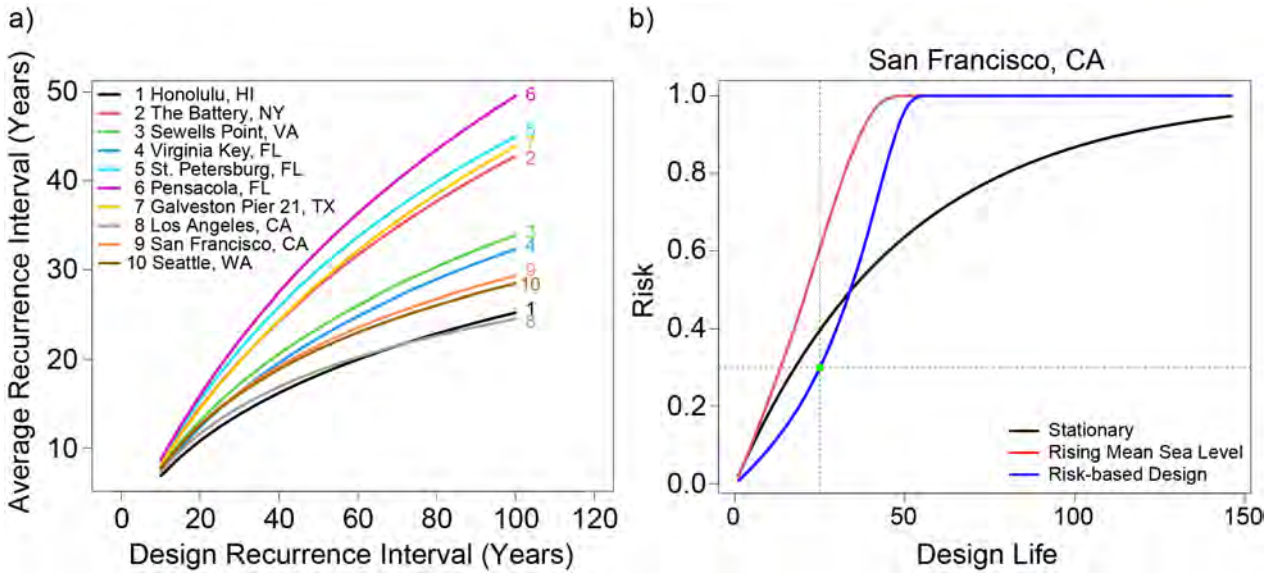


Figure 4.6: a) Average recurrence interval (due to rising RSL) curves (T versus T_0) at each tide gauge using the selected scenario's RSL projection (see Table 4.1). b) Risk curves as a function of design life: stationary (black curve), actual risk resulting from incorporating the site's RSL scenario projection (red curve), and risk curve for a specific risk (blue curve).

Risk-Based Design

Under stationary conditions, the risk (defined as the probability of one or more exceedances above the design elevation) is a function of the life of the project, n. The risk formula under stationarity is given by $R = 1 - (1 - 1/T_0)^n$. For example, there is about a (R = 0.26) 26% chance of experiencing an event with an ARI of (T_0) 100 years over the course of (n) 30 years under a non-changing (stationary statistical) environment. As the length of the design life increases, risk also increases. Under conditions of time-varying exceedance probability, p_t, the risk (R) formula is (Salas and Obeysekera, 2014)

$$R = 1 - \prod_{t=1}^{n}(1 - p_t)$$

With rising relative sea levels, p_t increases, and the risk is higher than that under stationarity. This increase in risk is illustrated for the San Francisco, California, tide gauge in Figure 4.6b when the initial design, T_0 = 50 years (the event level with a 50-year ARI). The black curve in Figure 4.6b shows the increasing risk as the design life becomes longer even under stationarity. For instance, if the design life, equals 25 years, this risk is about 0.4 (40%). However, when the local sea level rise scenario is incorporated, the risk over a given life of the project increases more rapidly, exceeding the corresponding risk under stationarity (see red curve in Figure 4.6b). In the above example, when n = 25 years, the risk will increase to about 60% due to the RSL scenario projection. Moreover, the RSL rise causes the risk to approach 100% (R = 1) when the design life is about 50 years or more. In the risk-based design approach, one can specify the tolerable risk and determine the initial design period (or return level).

One option is to design a project in such a way that the resulting increasing risk profile due to application of the scenario's RSL projection is at or below that under stationarity. While the risk-reduction approach described below is illustrated for a selected RSL scenario for the future, it can be implemented for multiple scenarios, leading to a variety of risk-reduction options depending on the future RSL scenarios. In such a broader application, a risk-based framing founded on risk tolerance may be adopted.

Considering uncertainty in the sea level rise projections, one may wish to approach the problem using concepts of dynamically adaptive planning. In the example shown in Figure 4.6b (blue curve), two parameters are specified to illustrate this concept. First, it is assumed that the project will be constructed in, for example, two or more phases. Considering such a planning assumption, phase I is 25 years long (i.e., n = 25 years), and the maximum tolerable risk during this phase is 0.3 (30%), as opposed to the 60% risk mentioned above. The blue curve shows the risk profile for such a design. This curve was computed by constraining R = 0.3 when n = 25, as shown by the green dot in Figure 4.6b. The implication of this adaptive approach is that the initial return level will need to increase from 0.84 m MHHW to 0.93 m MHHW (Table 4.4), and the corresponding initial ARI has to increase from 50 years to 125 years. In this approach, one must also assume that the project will be expanded after that initial period, and measures must be adopted to prevent locking in the design and preempting the planners from expanding it into a bigger project after the initial 25-year period. For example, the foundation design of the project may need to assume the eventual capacity expansion and allow for it in the initial design. This approach of dynamically adaptive planning is becoming increasingly popular as a way to deal with deep uncertainties associated with sea level rise.

Table 4.4 shows that with a relatively small increase in initial design elevation, the risk can be managed to a desirable level. In this example, however, the ultimate design (at the end of the full design life; e.g., 50 or 100 years) needs to be assessed to ensure that resources (e.g., land) that may be needed for the build-out are considered.

Table 4.4: Results of the risk-based design for all tide gauges shown in Figure 4.2. Average recurrence interval (ARI) is listed and is the reciprocal of average event frequency. Values in the last column have been rounded to the closest 5-year interval. Note: to be useful for decision-making, a conversion of the return level to land-based heights (e.g., geodetic datum such as NAVD88) should be made.

NOAA ID	Location	Design return level for T_0 = 50 years (m above MHHW)	Design return level to constrain risk to 30% over a 25-year period (m MHHW)	Average recurrence interval (ARI) of the design to constrain probability (risk) to 30% over a 25-year period
1612340	Honolulu, HI	0.59	0.69	>100
8518750	The Battery, NY	1.74	1.95	90
8638610	Sewells Point, VA	1.55	1.75	>100
8723214	Virginia Key, FL	0.78	1.00	>100
8726520	St. Petersburg, FL	1.61	1.88	80
8729840	Pensacola, FL	1.75	2.09	75
8771450	Galveston Pier 21, TX	1.79	2.13	85
9410660	Los Angeles, CA	0.79	0.86	>100
9414290	San Francisco, CA	0.84	0.93	>100
9447130	Seattle, WA	1.05	1.13	>100

4.3. Growing Risk to Combined Storm and Wastewater Systems from Sea Level Rise

Sea level rise is causing HTF to become more severe—more frequent, deeper, and more widespread—in terms of its impacts (Sweet et al., 2021). Coastal areas that are not exposed to HTF now may become so in the coming decades. As the footprint of flooding expands, water from adjacent estuaries and bays will flood into communities and encounter previously unaffected urban infrastructure.

Many places already see backflow from tidal waters through stormwater pipes that spill out of catch basins into neighborhood streets. Cities with combined sewer systems often have backflow preventers on their vulnerable outfall pipes (EPA, 1995a, 1995b). However, combined sewers will be open to inflow from surface flooding. If floodwater in the streets encounters a catch basin that connects to a combined sewer system, then high tide waters will enter the sewer. At best, the tide waters will be on their way to the sewage treatment plant; at worst, a combined sewer outflow would be triggered if the sewer pipes cannot handle the volume of water.

While Camden, New Jersey, has taken action to prevent runoff from entering its system,[40] tidal inflow is a novel problem. Identification of risks like this can provide lead time to take adaptation actions. Still, in some combined sewer communities, such as Camden, the onset of risk can arrive well before midcentury. Mapping shows that minor HTF at a height of 0.58 m above current MHHW tidal datum (Table A1.3) begins to have a footprint in Camden neighborhoods served by combined sewers (red shade in Figure 4.7, spanning from MHHW to 0.58 m [1.9 feet] above MHHW; locations are provided by the New Jersey Department of Environmental Protection[41]). By the time the tide reaches the moderate (0.86 m above MHHW) and major

[40] https://www.epa.gov/arc-x/camden-new-jersey-uses-green-infrastructure-manage-stormwater

[41] https://njdep.maps.arcgis.com/apps/Viewer/index.html?appid=70dd49de342949ca933e840d0c530fc7

(1.25 m above MHHW) HTF levels, the extent of flooding increases dramatically, and many intersections will be flooded.

The Camden region currently (circa 2020) experiences

- about 2 events/year (or about 4 days/year per Figure 3.8b) of minor HTF;
- 0.2 events/year of moderate HTF; and
- 0.03 events/year of major HTF,

based on the EWL_{local} directly across the Delaware River at the NOAA tide gauge in Philadelphia. The EWL-based probabilities support actual observations in 2020, when the Camden/Philadelphia region experienced 4 days of minor HTF, with 4–8 days projected to occur in 2021 (Sweet et al., 2021).

Considering the Intermediate scenario, which is the upper-bounding scenario for this region's RSL observation-based extrapolations (see Table 2.2), a rise of 0.19 m by 2030 (measured since 2005) is projected to result in

- 5–10 events/year (on the order of 10–20 days/year) of minor HTF,
- 0.6 events/year of moderate HTF, and
- 0.07 events/year of major HTF.

By 2050, a 0.38 m RSL rise is projected (above 2005 levels) for this area, resulting in

- >10 events/year (perhaps >20 days/year) of minor HTF,
- about 3 events/year (6 days/year) of moderate HTF, and
- 0.3 events/year of major HTF.

So, within about the next 30 years (by 2050), a surface flood regime shift with subsurface impacts is projected to occur in Camden, considering current RSL rise trajectories. By then, moderate and major HTF (flooding upwards of 0.9 m and 1.2 m above MHHW, respectively) is projected to occur with similar frequencies/probabilities as minor (about 0.6 m above MHHW) and moderate HTF occur today. With nearly 4 high tides per event (1 event lasts about 2 days; 2 high tides occur almost every day), this implies that by 2050, upwards of 80 tides per year or more at the minor HTF level are projected, with about 12 of those tides per year exceeding the moderate HTF level and a 0.3 events/year frequency of major HTF flooding. Any time street intersections are underwater, tidal waters could flow down catch basins into the combined system (Figure 4.7). Beyond 2050, HTF frequency, depth, and extent will continue to grow. It is unclear how this increased flood frequency will affect the combined sewer system's functionality and surrounding water quality.

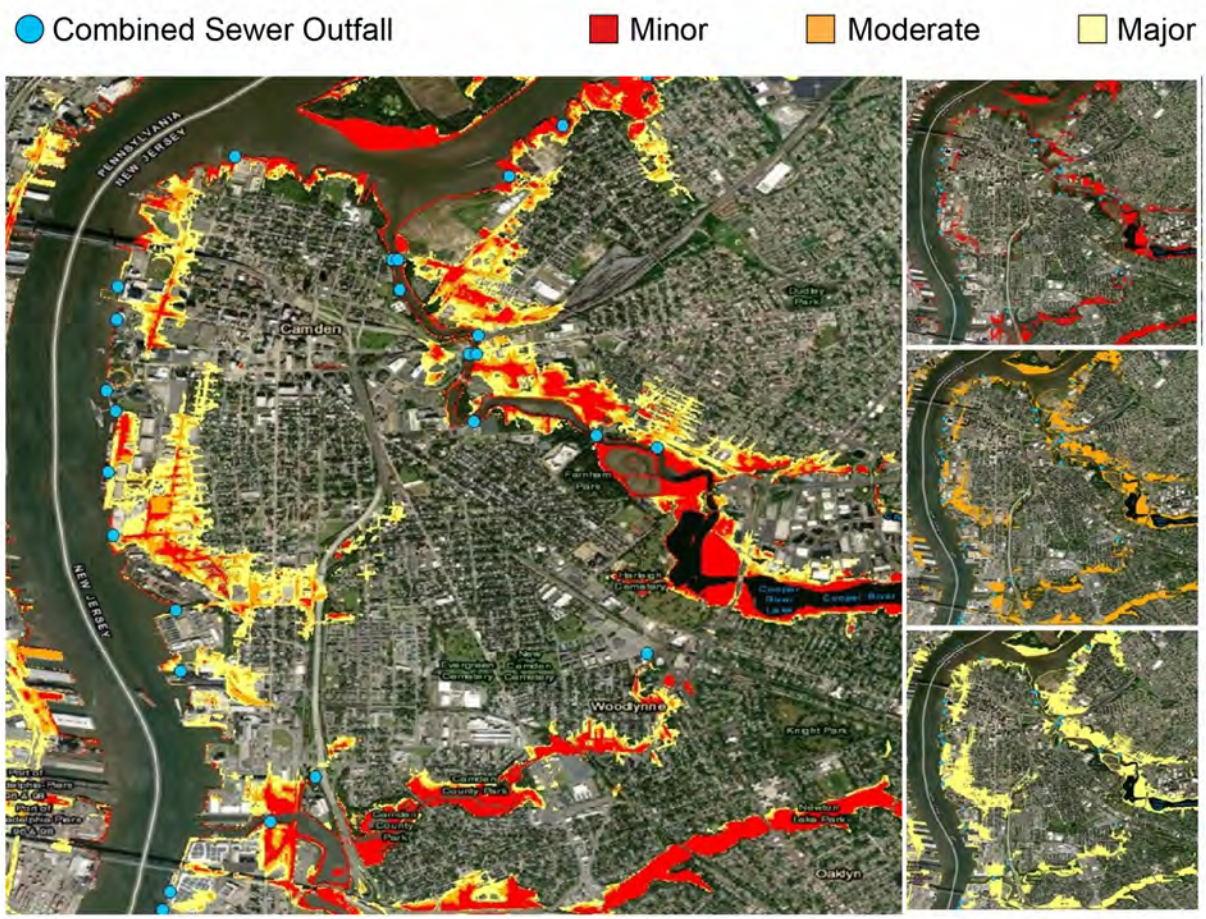


Figure 4.7: Location of combined stormwater and sewer system outfalls that are likely draining regions exposed to HTF within the Camden, New Jersey, region, with the minor (red: MHHW to 0.58 m [1.9 feet] above MHHW), moderate (orange: MHHW to 0.86 m [2.8 feet] above MHHW), and major (yellow: MHHW to 1.25 m [4.1 feet] above MHHW) HTF layers stacked in the enlarged map and individual layers mapped to the right. Note: heights are relative to the 1983–2001 tidal epoch, and to be useful for decision-making, a conversion to land-based heights (e.g., NAVD88) should be made.

4.4: Use of InSAR Technology for Determining Regional Vertical Land Motion and Its Suitability for Computing Long-Term Sea Level Rise Projections

Vertical land motion is an important component of RSL rise, leading to changes in the height of the ocean relative to land. Vertical land motion is not a singular phenomenon but instead results from various processes that display different patterns in space and time. These patterns have different impacts from place to place, especially in coastal settings where many of them operate at the same time and can serve to either increase RSL (subsidence) or decrease RSL (uplift). For much of the coastal United States, subsidence is driven on local scales by both natural processes, such as compaction of river sediments, and unnatural, human-caused reasons, such as groundwater and fossil fuel withdrawal; on larger scales, subsidence is driven by glacial isostatic adjustment (GIA). On the other hand, in some regions, such as southern Alaska, GIA leads to high rates of uplift in coastal regions. For example, Grand Isle, Louisiana, has experienced more than 0.9 m (3 feet) of RSL rise, whereas Juneau, Alaska, has experienced more than 1.2 m (4 feet) of RSL fall based on a 100-year historical linear rate value,[42] in large part due to VLM. For perspective, the national median RSL rise along U.S. coastlines during this 100-year period was about 0.25–0.30 m (see Figure 1.2b).

[42] https://tidesandcurrents.noaa.gov/sltrends/

Accurate future projections of VLM require an understanding of and accounting for the underlying processes and the time and space scales on which they vary. In this report, VLM projections are based in part on analysis of past observations. Vertical land motion rates are estimated at tide-gauge locations as well as at 1-degree grids using a statistical model of tide-gauge observations (Kopp et al., 2014; Sweet et al., 2017; Fox-Kemper et al., 2021; Garner et al., 2021). The model assesses RSL change across the global tide-gauge network[43] with data through about 2019 and separates the tide-gauge observations into 3 modes: 1) a global rise signal (Dangendorf et al., 2019), 2) a long-term linear—but regionally varying—rate, and 3) local effects that vary in time and by region. It is the second mode that defines this report's linear VLM rates, which have been incorporated into the RSL projections for each GMSL rise scenario. These rates are assumed to be linear over the past record and to persist linearly into the future over the length of the projected record. Assumed persistence may not necessarily be valid over the long term (e.g., if groundwater pumping ceases) but may be necessary due to a lack of data. As shown in Figure 4.8a, high rates of subsidence are estimated along the entire Gulf Coast, and moderate rates of subsidence are assessed along the entire East Coast. On the other hand, high rates of uplift are estimated for the southern coast of Alaska.

Over the past couple of decades, GPS stations have provided estimates of VLM in coastal areas across the United States. These GPS-based VLM estimates provide a comparison to the VLM rates in this report, albeit with a couple of caveats. First, the record lengths over which the GPS-based estimates are computed are significantly shorter than the tide-gauge data records used to infer the VLM rates in this report. Second, many tide-gauge locations do not have a co-located GPS station. While it is not possible to extend the record lengths of the available GPS measurements, the second challenge has been addressed using the GPS-imaging technique discussed in Hammond et al. (2021), which leverages the GPS network in coastal areas of the United States to generate VLM estimates at all tide-gauge locations (Figure 4.8b). Note that negative values of VLM reflect subsidence while positive values reflect uplift. To determine the VLM contribution to RSL at the coast, the negative and positive direction would be reversed. Broadly, the GPS-based estimates are consistent with the VLM estimates contained in this report. However, when subtracting the VLM rates in this report from the GPS-derived rates, differences become apparent (Figure 4.8c). The largest differences are found along the Southern Alaska coastlines, where rates of uplift are very large, and along the entire Gulf Coast, where subsidence rates are large. The rates are further compared in Figure 4.8d, which again reflects general agreement between the two sets of estimates, although at roughly 75% of the gauges, the tide-gauge-based VLM estimate in this report is greater (less negative in the case of subsidence) than that from GPS. In other words, there are generally higher rates of subsidence indicated in the GPS rates when compared to the VLM estimates in this report.

This comparison with the GPS is not intended to be an assessment of the accuracy of VLM rates and associated projections included in this report. Instead, it highlights some of the challenges associated with both estimating VLM rates at the coast and then projecting these into the future, particularly away from the tide-gauge and GPS stations. The spatial variability and local drivers of VLM are clear in Figure 4.8, and extending the tide-gauge-centered estimates to fill in spatial gaps either through the projection framework in this report or with GPS imaging is challenging to validate, particularly as these methods are not intended to capture VLM varying on small spatial scales. An opportunity is provided, however, by new technologies using satellite-based advanced Interferometric Synthetic Aperture Radar (InSAR) analysis, which can provide higher spatial resolution measurements of VLM rates. Calibrated to land GPS station estimates, measurements of land elevations over time by InSAR are producing VLM rates for large swaths or the U.S. coastal plain (e.g., Bekaert et al., 2017; Buzzanga et al., 2020; Bekaert et al., 2019; all InSAR VLM estimates are publicly available through references). Having a higher-resolution assessment of VLM rates can in turn help communities understand where VLM is now occurring at very fine scales (e.g., street block level) and help make informed decisions of how continued VLM will contribute to future RSL projections. Furthermore, InSAR provides an

[43] https://www.psmsl.org/data/

additional component to the coastal VLM observing network. Integrated assessments across tide gauges, GPS, and InSAR are likely to be most useful for inferring VLM rates and projecting these rates forward at the spatial scales key to coastal communities. Following is a case study of how the InSAR VLM connects to this VLM-observing network. In general, as there is the possibility of using a user-defined VLM rate within the RSL projections, we examine other sources of VLM that may offer options.

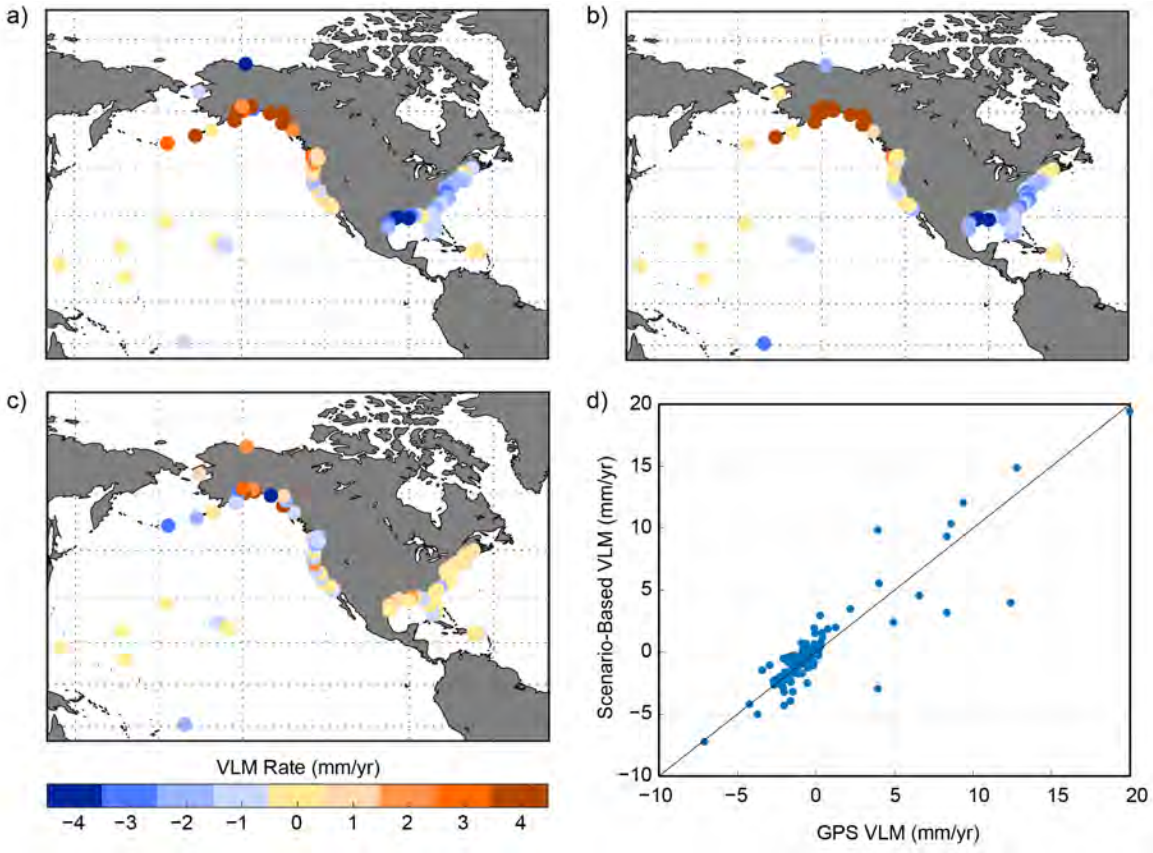


Figure 4.8: Comparison of vertical land motion (VLM) rate estimates (mm/year) from a) the scenario-based framework used in this report, and b) GPS-imaging estimates from Hammond et al. (2021). c) The difference between GPS-derived rates and scenario-derived rates and d) a comparison of the VLM estimates at the U.S. tide-gauge locations are also shown. Negative values of VLM reflect subsidence, while positive values reflect uplift.

Hampton Roads, Virginia

The historical long-term linear RSL rise rate at the Sewells Point, Virginia, tide gauge[44] is about 4.7 mm/year. More than half of this rate is estimated to be from downward VLM or subsidence with a rate of about 2.9 mm/year, which is close to previous estimates (Zervas, 2013; Kopp et al., 2014; Sweet et al., 2017). This subsidence is driven by both GIA and more localized groundwater withdrawal. If assumed to be linear and persistent into the future, VLM will contribute about 0.29 m to projections of RSL over the next 100 years. For example, by 2050 under the Intermediate-Low and Intermediate scenarios, the amount of RSL rise is projected to be between about 0.4 m and 0.45 m, respectively, with about 35% and 30% of that rise amount, respectively, from VLM.

However, VLM rates across the Hampton Roads region are not uniform. A past study (Eggleston and Pope, 2013) leveraged a variety of in situ observations to find a spatially varying pattern of subsidence ranging from 1.8 to 4.4 mm/year in the region from 1940 to 1971. The variations were connected to groundwater withdrawal in the region, which was captured via this assessment even with an effective spatial resolution on the order of tens of kilometers. More recently, InSAR rate maps have shown a range of subsidence from

[44] https://tidesandcurrents.noaa.gov/stationhome.html?id=8638610

about 1 mm to 5 mm/year in the region over the time period from 2014 to present, with locally higher rates (Figure 4.9; Buzzanga et al., 2020). Importantly, the satellite-based assessment revealed spatial variations on sub-kilometer scales, with some of the most prominent features in the spatial map connected to specific construction projects and land-use changes. With an average rate of subsidence around 3 mm/year over the course of the 21st century, VLM could contribute about 0.3 m to projected RSL, with locally higher amounts elsewhere in the region. Furthermore, comparing the InSAR-derived spatial pattern of VLM to that in either Eggleston and Pope (2013) or the gridded rates in this report provides important information about the linearity of VLM and the timescales on which VLM varies. There are considerable differences between the different assessments, indicating a shift in rates over the time periods considered. While it is necessary to consider the uncertainty in the VLM rate estimates and differences in measurement type, users of VLM information should assess land-use changes over the time periods considered along with the relevant processes driving VLM in the region. InSAR-derived VLM maps will play an increasingly key role in this assessment due to the spatial coverage and resolution provided by the satellites.

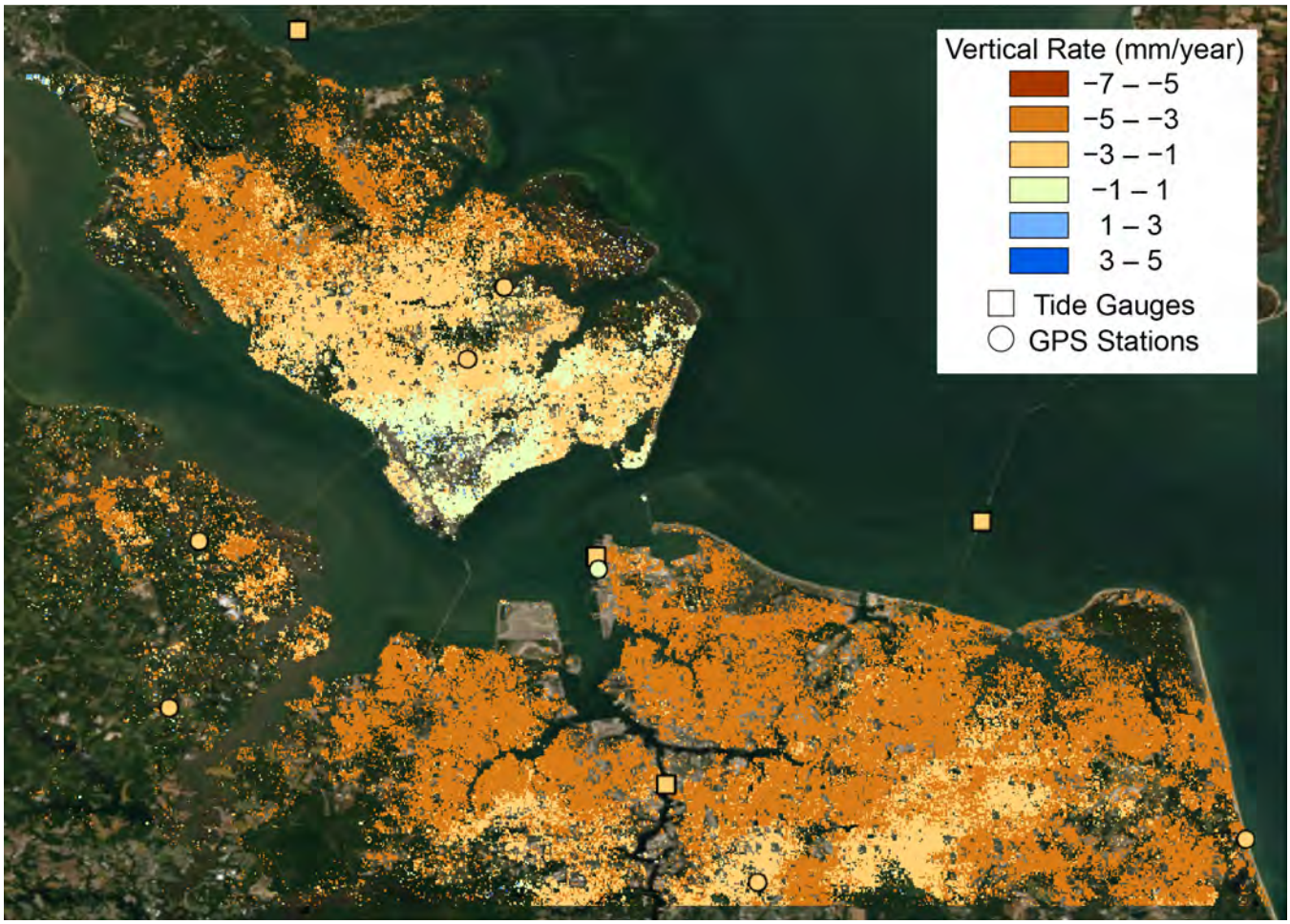


Figure 4.9: Map showing VLM rates (mm/year) for the Hampton Roads region displayed on top of satellite imagery. Higher rates of subsidence are indicated by darker orange colors. Of particular interest is the range of rates in such a small region (e.g., on the order of up to 5 mm/year difference in places). Based on Buzzanga et al. (2020).

Observing and Projecting Coastal Vertical Land Motion

While InSAR-measured VLM provides advantages over other measurement platforms in terms of spatial coverage and resolution, it should be considered in the context of the larger observing network when assessing VLM at the coast. In particular, InSAR serves two potential roles. First, InSAR can be used to provide ongoing monitoring of VLM at high spatial resolutions. InSAR has the potential to generate time series of VLM on a fine spatial scale. Subsidence "hotspots" can be identified along with abrupt shifts in VLM, which can assist in planning and executing adaptation efforts. For coastal communities attempting to alleviate subsidence in their region through efforts such as groundwater reinjection, InSAR provides a potentially better alternative to in situ monitoring to assess the effectiveness of these efforts. Second, InSAR can serve to assess spatial variability in VLM, filling in the gaps between tide gauges and GPS stations in coastal regions. The observations can then be combined in a statistical framework to provide more accurate projections of VLM with better estimates of uncertainty.

Assessing VLM with InSAR is not without challenges, however, although many of these are being addressed in ongoing and planned efforts. First, to be useful for assessing long-term VLM rates with the still relatively short satellite records, the shorter-term VLM rates can be calibrated and tied into the existing National Spatial Reference System (NSRS)[45] to improve accuracy and representativeness of long-term changes. Second, the availability and coverage of GPS in coastal regions impact the accuracy of VLM by InSAR. To provide a measurement of absolute VLM, InSAR needs to be tied to available GPS measurements. In areas with large gaps between GPS stations, this can lead to reduced accuracy of the InSAR estimates. Ideally, analysis would be conducted to determine optimal GPS station spacing for maintaining integrity of the InSAR-derived velocity field in various environments, including, but not limited to, regions of coastal subsidence, landslide/earthquake/volcanic activity, high plains aquifer depletion, and aquifer depletion in a tectonic area. Finally, InSAR VLM estimates are computationally expensive to perform over large regions, making national coverage a challenge. Efforts are underway, however, to generate a consistent surface displacement product (a preliminary step to estimating VLM) for the United States. A generalized approach for generating absolute VLM estimates from this product could then be created, paving the way for ongoing monitoring of VLM along the U.S. coastlines at high spatial resolutions.

To improve projections of VLM, InSAR alone is not sufficient. Instead, InSAR should be analyzed in tandem with available tide-gauge, GPS, and any other available in situ observations to assess both the spatial variability of VLM rates and potential non-linearities in the VLM rates estimated over these records. These non-linearities are critical for determining the future contribution of VLM to RSL. For example, the long-term rate assessed at a tide gauge as done in this report could differ significantly from the rate of VLM over the past decade because of a sustained land-use change. The comparison between the two types of VLM estimates in Figure 4.9 indicate that these shifts may be present at some locations along the U.S. coastlines and need to be assessed to improve projections of VLM.

[45] https://oceanservice.noaa.gov/education/tutorial_geodesy/geo08_spatref.html

Section 5: Conclusions

Sea level rise driven by global climate change is a clear and present risk to the United States, now and for the foreseeable future. It is the goal of the Sea Level Rise and Coastal Flood Hazard Scenarios and Tools Interagency Task Force to continue to provide projections and future scenarios to assist decision-makers for both planning and risk-bounding purposes. This report builds upon the progress made in Sweet et al. (2017), updating the GMSL scenarios and the associated local and regional RSL projections to reflect recent advances in sea level science, as well as expanding the types of scenario information provided to better serve stakeholder needs for coastal risk management and adaptation planning.

The major findings of this report are as follows:

Multiple lines of evidence provide increased confidence, regardless of the emissions pathway, in a narrower range of projected global, national, and regional sea level rise at 2050 than previously reported (Sweet et al., 2017).

Both trajectories assessed by extrapolating rates and accelerations estimated from historical tide-gauge observations, and model projections, fall within the same range in all cases, giving higher confidence in these relative sea level (RSL; land and ocean height changes) rise amounts by 2050. Specifically, RSL along the contiguous U.S. (CONUS) coastline is expected to rise, on average, as much over the next 30 years (0.25–0.30 m over 2020–2050) as it has over the last 100 years (1920–2020). Due to processes driving regional changes in sea level, the report found regional differences in both the modeled scenarios and observation-based extrapolations, with higher RSL rise along the East (0–5 cm higher on average than CONUS) and Gulf Coasts (10–15 cm higher) as compared to the West (10–15 cm lower) and Hawaiian/Caribbean (5–10 cm lower) Coasts.

For coastlines outside CONUS, and for individual regions and locations within CONUS, the projections can differ from the aforementioned mean values. In addition, it is important to note that the projections do not include natural year-to-year sea level variability that occurs along U.S. coastlines in response to climatic modes such as the El Niño–Southern Oscillation. Nevertheless, if we assume that regional sea level will keep following its present trajectory for the coming three decades, most U.S. regions are mostly tracking between the Intermediate-Low and Intermediate-High scenarios. Although the near-term observation-based extrapolations will continue to evolve over time with new observations and analyses, this updated information should help inform both near-term decisions and projects that may require decades' worth of planning prior to actual implementation.

By 2050, the expected relative sea level (RSL) will cause tide and storm surge heights to increase and will lead to a shift in U.S. coastal flood regimes, with major and moderate high tide flood events occurring as frequently as moderate and minor high tide flood events occur today. Without additional risk-reduction measures, U.S. coastal infrastructure, communities, and ecosystems will face significant consequences.

Minor/disruptive high tide flooding (HTF; about 0.55 m above mean higher high water [MHHW]) is projected to increase from a U.S average frequency of about 3 events/year in 2020 to >10 events/year by 2050. The projected increases for moderate/typically damaging (about 0.85 m above MHHW) and major/often destructive (about 1.20 m above MHHW) HTF are 0.3 events/year in 2020 to about 4 events/year in 2050 and 0.04 events/year in 2020 to 0.2 events/year by 2050, respectively. Across all severities (minor, moderate, major), HTF along the U.S. East and Gulf Coasts will largely continue to occur at or above the national average frequency.

In other words, much of the coastline is already close to a flood regime shift with respect to flood frequency and, consequently, damages. Only a small height difference (0.3–0.7 m) currently separates infrequent, damaging, or destructive HTF from the current regime of more frequent, so-called nuisance, flooding (whose impacts are in fact already remarkable throughout dozens of densely populated coastal cities). Decades ago, powerful storms were what typically caused coastal flooding, but due to RSL rise, even today's common wind events and seasonal high tides are already regularly flooding communities, and they will do so to an ever greater extent in the next few decades, affecting homes and businesses, overloading stormwater and wastewater systems, infiltrating coastal groundwater aquifers with saltwater, and stressing coastal wetlands and estuarine ecosystems.

Higher global temperatures increase the chances of higher sea level by the end of the century and beyond. The scenario projections of relative sea level (RSL) along the contiguous U.S. (CONUS) coastline are about 0.6–2.2 m in 2100 and 0.8–3.9 m in 2150 (relative to sea level in 2000); these ranges are driven by uncertainty in future emissions pathways and the response of the underlying physical processes.

With an increase in average global temperature of 2°C above preindustrial levels, and not considering the potential contributions from ice-sheet processes with limited agreement (low confidence) among modeling approaches, the probability of exceeding 0.5 m rise globally (0.7 m along the CONUS coastline) by 2100 is about 50%. With 3°–5°C of warming under high emissions pathways, this probability rises to >80% to >99%. The probability of exceeding 1 m globally (1.2 m CONUS) by 2100 rises from <5% with 3°C warming to almost 25% with 5°C warming. Considering low-confidence ice-sheet processes and high emissions pathways with warming approaching 5°C, these probabilities rise to about 50%, 20%, and 10% of exceeding 1.0 m, 1.5 m, or 2.0 m of global rise by 2100, respectively. While these low-confidence ice-sheet processes are unlikely to make significant contributions with 2°C of warming, how much warming might be required to trigger them is currently unknown.

In addition, as a result of improved understanding of the timing of possible large future contributions from ice-sheet loss, the "Extreme" scenario from the 2017 report (2.5 m GMSL rise by 2100) is now viewed as less plausible and has been removed from consideration. Nevertheless, the increased acceleration in the late 21st century and beyond means that the other high-end scenarios provide pathways that potentially reach this threshold in the decades immediately following 2100 (and continue rising). Regionally, the projections are near or higher than the global average in 2100 and 2150 for almost all U.S. coastlines due to vertical land motion (VLM); gravitational, rotational, and deformational effects due to land ice loss; and ocean circulation changes. Largely due to VLM, RSL projections are lower than the global amounts along the southern Alaska coast and are higher along the Eastern and Western Gulf coastlines.

Monitoring the sources of ongoing sea level rise and the processes driving changes in sea level is critical for assessing scenario divergence and tracking the trajectory of observed sea level rise, particularly during the time period when future emissions pathways lead to increased ranges in projected sea level rise.

Efforts are currently under way to narrow the uncertainties in ice-sheet dynamics and future sea level rise amounts in response to increasing greenhouse gas forcing and associated global warming. Early indicators of changes in sea level rise trajectories can serve to trigger adaptive management plans and are identified through continuous monitoring and assessment of changes in sea level (on global and local scales) and of the key drivers of sea level change that most affect U.S. coastlines, such as ocean heat content, ice-mass loss from Greenland and Antarctica, vertical land motion, and Gulf Stream system changes.

As emphasized in the summary findings above, beyond 2050 the amount of sea level rise is strongly affected by future global warming. By reducing greenhouse gas (GHG) emissions, severe and transformative

impacts occurring later this century or early next century along U.S. coastlines are more likely to be avoided. As GHG emissions and global temperatures continue to rise, the likelihood of very high U.S. sea level rise does too. If global warming reaches 2°C (warming levels are already >1°C), corresponding to a 50% chance that U.S. sea level as a whole will rise at least 0.7 m by 2100 and 1.2 m by 2150 (measured since 2000), major HTF by 2100 would occur more often than minor HTF occurs today in many coastal communities if risk-reduction action is not taken. If global mean temperatures were to rise as high as about 3°–5°C, much larger amounts of sea level rise would become increasingly possible, as instabilities in ice-sheet dynamics would potentially come into play. Constant monitoring of global to local sea levels and their source contributions by Federal agencies, such as NOAA and NASA, will be key to help assess potential trajectory divergence for triggering adaptive management plans.

The updated sea level scenarios and the EWL probability datasets in this study are being delivered or planned via numerous agency data servers, tools, and associated guidance products. Additionally, this report is a key technical input to the Fifth National Climate Assessment (NCA5 currently under way), and the datasets and derived information are being delivered to the NCA5 author teams. In terms of next steps, the Task Force will continue to refine these sea level projections and extreme (e.g., high tides, storms) water level probabilities while working to improve understanding of the implications of these projections for coastal hazards (e.g., flooding, erosion, and rising water tables), societal exposure and risk, infrastructure vulnerability, ecosystem health (including habitat transformation/loss), and cascading societal impacts. In order to do so, additional and improved observations and more sophisticated modeling approaches that incorporate the relevant physical processes (e.g., waves; see Box 3.1) will be needed at the regional scale, with local granularity to assess the impacts of these coastal hazards. Such information is expected to ultimately feed into the next generation of interagency reports and assessments to enable informed climate adaptation planning.

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Section 7: References

Bamber, J.L. and W.P. Aspinall, 2013: An expert judgement assessment of future sea level rise from the ice sheets. *Nature Climate Change*, 3 (4), 424–427. https://doi.org/10.1038/nclimate1778

Bamber, J.L., M. Oppenheimer, R.E. Kopp, W.P. Aspinall, and R.M. Cooke, 2019: Ice sheet contributions to future sea-level rise from structured expert judgment. *Proceedings of the National Academy of Sciences of the United States of America*, 116 (23), 11195–11200. https://doi.org/10.1073/pnas.1817205116

Baranes, H.E., J.D. Woodruff, S.A. Talke, R.E. Kopp, R.D. Ray, and R.M. DeConto, 2020: Tidally driven interannual variation in extreme sea level frequencies in the Gulf of Maine. *Journal of Geophysical Research: Oceans*, 125 (10), e2020JC016291. http://dx.doi.org/10.1029/2020JC016291

Barnard, P.L., L.H. Erikson, A.C. Foxgrover, J.A. Finzi Hart, P. Limber, A.C. O'Neill, M. van Ormondt, S. Vitousek, N. Wood, M.K. Hayden, and J.M. Jones, 2019: Dynamic flood modeling essential to assess the coastal impacts of climate change. Scientific reports, 9 (1), 1–13. https://doi.org/10.1038/s41598-019-40742-z

Befus, K.M., P.L. Barnard, D.J. Hoover, J.A. Finzi Hart, and C.I. Voss, 2020: Increasing threat of coastal groundwater hazards from sea-level rise in California. *Nature Climate Change*, 10 (10), 946–952. https://doi.org/10.1038/s41558-020-0874-1

Bekaert, D.P.S., B.D. Hamlington, B. Buzzanga, and C.E. Jones, 2017: Spaceborne synthetic aperture radar survey of subsidence in Hampton Roads, Virginia (USA). Scientific Reports, 7 (1), 1–9. https://doi.org/10.1038/s41598-017-15309-5

Bekaert, D.P.S., C.E. Jones, K. An, and M.-H. Huang, 2019: Exploiting UAVSAR for a comprehensive analysis of subsidence in the Sacramento Delta. *Remote Sensing of Environment*, 220, 124–134. https://doi.org/10.1016/j.rse.2018.10.023

Bloemen, P., T. Reeder, C. Zevenbergen, J. Rijke, and A. Kingsborough, 2018: Lessons learned from applying adaptation pathways in flood risk management and challenges for the further development of this approach. *Mitigation and Adaptation Strategies for Global Change*, 23 (7), 1083–1108. https://doi.org/10.1007/s11027-017-9773-9

Bodnar, A.N., 1981: Estimating Accuracies of Tidal Datums from Short Term Observations. Technical Report NOS CO-OPS 077. National Oceanic and Atmospheric Administration, National Ocean Service, Center for Operational Oceanographic Products and Services, Silver Spring, MD, 40 pp. https://tidesandcurrents.noaa.gov/publications/NOAA_Technical_Report_NOS_COOPS_077.pdf

Boening, C., J.K. Willis, F.W. Landerer, R.S. Nerem, and J. Fasullo, 2012: The 2011 La Niña: So strong, the oceans fell. *Geophysical Research Letters*, 39 (19). https://doi.org/10.1029/2012GL053055

Bos, M.S., R.M.S. Fernandes, S.D.P. Williams, and L. Bastos, 2013: Fast error analysis of continuous GNSS observations with missing data. *Journal of Geodesy*, 87 (4), 351–360. http://dx.doi.org/10.1007/s00190-012-0605-0

Bos, M.S., S.D.P. Williams, I.B. Araújo, and L. Bastos, 2014: The effect of temporal correlated noise on the sea level rate and acceleration uncertainty. *Geophysical Journal International*, 196 (3), 1423–1430. http://dx.doi.org/10.1093/gji/ggt481

Bromirski, P.D., A.J. Miller, R.E. Flick, and G. Auad, 2011: Dynamical suppression of sea level rise along the Pacific coast of North America: Indications for imminent acceleration. *Journal of Geophysical Research*, 116, C07005. https://doi.org/10.1029/2010jc006759

Buchanan, M.K., M. Oppenheimer, and R.E. Kopp, 2017: Amplification of flood frequencies with local sea level rise and emerging flood regimes. *Environmental Research Letters*, 12 (6), 064009. https://doi.org/10.1088/1748-9326/aa6cb3

Buzzanga, B., D.P.S. Bekaert, B.D. Hamlington, and S.S. Sangha, 2020: Toward sustained monitoring of subsidence at the coast using InSAR and GPS: An application in Hampton Roads, Virginia. *Geophysical Research Letters*, 47 (18), e2020GL090013. https://doi.org/10.1029/2020GL090013

Calafat, F.M., D.P. Chambers, and M.N. Tsimplis, 2012: Mechanisms of decadal sea level variability in the eastern North Atlantic and the Mediterranean Sea. *Journal of Geophysical Research: Oceans*, 117, C09022. https://doi.org/10.1029/2012JC008285

Calafat, F.M. and M. Marcos, 2020: Probabilistic reanalysis of storm surge extremes in Europe. *Proceedings of the National Academy of Sciences*, 117 (4), 1877–1883. http://dx.doi.org/10.1073/pnas.1913049117

CCRM, 2019: Recommendations for Sea Level Rise Projections: A Report for the Governor's Coastal Climate Resiliency Plan. Center for Coastal Resources Management, Virginia institute of Marine Science, Gloucester Point, VA, 6 pp. https://www.naturalresources.virginia.gov/media/governorvirginiagov/secretary-of-natural-resources/images/1c.-Sea-level-rise-projections-for-Virginia-planning-purposes-(2)-FINAL-10_31.pdf

Chao, B.F., Y.-H. Wu, and Y.S. Li, 2008: Impact of artificial reservoir water impoundment on global sea level. *Science*, 320 (5873), 212–214. https://doi.org/10.1126/science.1154580

Church, J.A., P.U. Clark, A. Cazenave, J.M. Gregory, S. Jevrejeva, A. Levermann, M.A. Merrifield, G.A. Milne, R.S. Nerem, P.D. Nunn, A.J. Payne, W.T. Pfeffer, D. Stammer and A.S. Unnikrishnan, 2013: Sea Level Change. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter13_FINAL.pdf

Coles, S., 2001: *An Introduction to Statistical Modeling of Extreme Values*. Springer-Verlag, London, 224 pp.

Coles, S.G., and M.J. Dixon, 1999: Likelihood-based inference for extreme value models. *Extremes*, 2, 5–23. https://doi.org/10.1023/A:1009905222644

Cooley, D., 2013: Return periods and return levels under climate change. In: *Extremes in a Changing Climate*. AghaKouchak, A., D. Easterling, K. Hsu, S. Schubert, and S. Sorooshian, Eds. Springer, Dordrecht, Netherlands, 97–114.

Dalrymple, T. (1960). Flood Frequency Analyses, Manual of Hydrology: Part 3. U.S. Geological Survey Water-Supply Paper 1543-A. U.S. Geological Survey, Reston, VA, 86 pp. https://doi.org/10.3133/wsp1543A

Dangendorf, S., C. Hay, F.M. Calafat, M. Marcos, C.G. Piecuch, K. Berk, and J. Jensen, 2019: Persistent acceleration in global sea-level rise since the 1960s. *Nature Climate Change*, 9 (9), 705–710. https://doi.org/10.1038/s41558-019-0531-8

DeConto, R.M., D. Pollard, R.B. Alley, I. Velicogna, E. Gasson, N. Gomez, S. Sadai, A. Condron, D.M. Gilford, E.L. Ashe, R.E. Kopp, D. Li, and A. Dutton, 2021: The Paris Climate Agreement and future sea-level rise from Antarctica. *Nature*, 593 (7857), 83–89. https://doi.org/10.1038/s41586-021-03427-0

Dokka, R.K., 2011: The role of deep processes in late 20th century subsidence of New Orleans and coastal areas of southern Louisiana and Mississippi. *Journal of Geophysical Research*, 116, B06403. https://doi.org/10.1029/2010JB008008

Edwards, T.L., S. Nowicki, B. Marzeion, R. Hock, H. Goelzer, H. Seroussi, N.C. Jourdain,D.A. Slater, F.E. Turner, C.J. Smith, C.M. McKenna, E. Simon, A. Abe-Ouchi, J.M. Gregory, E. Larour, W.H. Lipscomb, A.J. Payne, A. Shepherd, C. Agosta, P. Alexander, T. Albrecht, B. Anderson, X. Asay-Davis, A. Aschwanden, A. Barthel, A. Bliss, R. Calov, C. Chambers, N. Champollion, Y. Choi, R. Cullather, J. Cuzzone, C. Dumas, D. Felikson, X. Fettweis, K. Fujita, B.K. Galton-Fenzi, R. Gladstone, N.R. Golledge, R. Greve, T. Hattermann, M.J. Hoffman, A. Humbert, M. Huss, P. Huybrechts, W. Immerzeel, T. Kleiner, P. Kraaijenbrink, S. Le clec'h, V. Lee, G.R. Leguy, C.M. Little, D.P. Lowry, J.-H. Malles, D.F. Martin, F. Maussion, M. Morlighem, J.F. O'Neill, I. Nias, F. Pattyn, T. Pelle, S.F. Price, A. Quiquet, V. Radić, R. Reese, D.R. Rounce, M. Rückamp, A. Sakai, C. Shafer, N.-J. Schlegel, S. Shannon, R.S. Smith, F. Straneo, S. Sun, L. Tarasov, L.D. Trusel, J. Van Breedam, R. van de Wal, M. van den Broeke, R. Winkelmann, H. Zekollari, C. Zhao, T. Zhang, and T. Zwinger, 2021: Projected land ice contributions to twenty-first-century sea level rise. *Nature*, 593 (7857), 74–82. https://doi.org/10.1038/s41586-021-03302-y

Eggleston, J. and J. Pope, 2013: Land Subsidence and Relative Sea-Level Rise in the Southern Chesapeake Bay Region. Circular 1392. U.S. Geological Survey, Reston, VA, 30 pp., http://dx.doi.org/10.3133/cir1392

EPA, 1995a: Combined Sewer Overflows: Guidance for Long-Term Control Plan. EPA/832-B-95-002. U.S. Environmental Protection Agency, Office of Wastewater Management, Washington, DC, 201 pp. https://www.epa.gov/sites/default/files/2015-10/documents/owm0272_0.pdf

EPA, 1995b: Combined Sewer Overflows: Guidance for Nine Minimum Controls. EPA 832-B-95-003. U.S. Environmental Protection Agency, Office of Wastewater Management, Washington, DC, 69 pp. https://www.epa.gov/sites/default/files/2015-10/documents/owm0030_2.pdf

Farrell, W.E. and J.A. Clark, 1976: On postglacial sea level. *Geophysical Journal International*, 46 (3), 647–667. https://doi.org/10.1111/j.1365-246X.1976.tb01252.x.

Fasullo, J. T., Boening, C., Landerer, F. W., & Nerem, R. S. (2013). Australia's unique influence on global sea level in 2010–2011. Geophysical Research Letters, 40 (16), 4368–4373. https://doi.org/10.1002/grl.50834

Fasullo, J.T. and R.S. Nerem, 2018: Altimeter-era emergence of the patterns of forced sea-level rise in climate models and implications for the future. *Proceedings of the National Academy of Sciences*, 115 (51), 12944–12949. https://doi.org/10.1073/pnas.1813233115

FEMA, 2016a: Guidance for Flood Risk Analysis Mapping: Coastal Flood Frequency and Extreme Value Analysis. Guidance Document 76. Federal Emergency Management Agency, Hyattsville, MD, 22 pp. https://www.fema.gov/sites/default/files/2020-02/Coastal_Flood_Frequency_and_Extreme_Value_Analysis_Guidance_Nov_2016.pdf

FEMA, 2016b: Guidance for Flood Risk Analysis Mapping: Statistical Simulation Methods. Guidance Document 77. Federal Emergency Management Agency, Hyattsville, MD, 37 pp. https://www.fema.gov/sites/default/files/documents/fema_coastal-statistical-simulation-methods_nov-2016.pdf

Fox-Kemper, B., H.T. Hewitt, C. Xiao, G. Aðalgeirsdóttir, S.S. Drijfhout, T.L. Edwards, N.R. Golledge, M. Hemer, R.E. Kopp, G. Krinner, A. Mix, D. Notz, S. Nowicki, I.S. Nurhati, L. Ruiz, J.-B. Sallée, A.B.A. Slangen, and Y. Yu, 2021: Ocean, Cryosphere and Sea Level Change. In: *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [MassonDelmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press. In Press. https://www.ipcc.ch/report/ar6/wg1/

Frau, R., M. Andreewsky, and P. Bernardara, 2018: The use of historical information for regional frequency analysis of extreme skew surge. *Natural Hazards and Earth System Sciences*, 18 (3), 949–962. https://doi.org/10.5194/nhess-18-949-2018

Frederikse, T., K. Simon, C.A. Katsman, and R. Riva, 2017: The sea-level budget along the Northwest Atlantic coast: GIA, mass changes, and large-scale ocean dynamics. *Journal of Geophysical Research: Oceans*, 122, 5486–5501. https://doi.org/10.1002/2017JC012699

Frederikse, T., F. Landerer, L. Caron, S. Adhikari, D. Parkes, V.W. Humphrey, S. Dangendorf, P. Hogarth, L. Zanna, L. Cheng, and Y.-H. Wu, 2020: The causes of sea-level rise since 1900. *Nature*, 584 (7821), 393–397. https://doi.org/10.1038/s41586-020-2591-3

Fu, X., 2020: Measuring local sea-level rise adaptation and adaptive capacity: A national survey in the United States. *Cities*, 102, 102717. https://doi.org/10.1016/j.cities.2020.102717.

Garner, G.G., T. Hermans, R.E. Kopp, A.B.A. Slangen, T.L. Edwards, A. Levermann, S. Nowikci, M.D. Palmer, C. Smith, B. Fox-Kemper, H.T. Hewitt, C. Xiao, G. Aðalgeirsdóttir, S.S. Drijfhout, T.L. Edwards, N.R. Golledge, M. Hemer, R.E. Kopp, G. Krinner, A. Mix, D. Notz, S. Nowicki, I. S. Nurhati, L. Ruiz, J-B. Sallée, Y. Yu, L. Hua, T. Palmer, and B. Pearson, 2021. IPCC AR6 Sea-Level Rise Projections. Version 20210809. PO.DAAC, CA, USA. Dataset accessed [2021-09-01]. https://podaac.jpl.nasa.gov/announcements/2021-08-09-Sea-level-projections-from-the-IPCC-6th

Gill, S., G. Hovis, K. Kriner, and M. Michalski, 2014: Implementation of Procedures for Computation of Tidal Datums in Areas with Anomalous Trends of Relative Mean Sea Level. NOAA Technical Report NOS CO-OPS 068. National Oceanic and Atmospheric Administration, National Ocean Service, Silver Spring, MD, 58 pp. https://tidesandcurrents.noaa.gov/publications/NOAA_Technical_Report_NOS_COOPS_68.pdf

Guza, R.T. and E.B. Thornton, 1982: Swash oscillations on a natural beach. *Journal of Geophysical Research*, 87 (C1), 483–491. https://doi.org/10.1029/JC087iC01p00483

Haasnoot, M., J.H. Kwakkel, W.E. Walker, and J. ter Maat, 2013: Dynamic adaptive policy pathways: A method for crafting robust decisions for a deeply uncertain world. *Global Environmental Change*, 23 (2), 485–498. https://doi.org/10.1016/j.gloenvcha.2012.12.006

Haasnoot, M., S. Brown, P. Scussolini, J.A. Jimenez, A.T. Vafeidis, and R.J. Nicholls, 2019: Generic adaptation pathways for coastal archetypes under uncertain sea-level rise. *Environmental Research Communications*, 1 (7), 071006. https://doi.org/10.1088/2515-7620/ab1871

Habel, S., C.H. Fletcher, T.R. Anderson, and P.R. Thompson, 2020: Sea-level rise induced multi-mechanism flooding and contribution to urban infrastructure failure. *Scientific Reports*, 10 (1), 3796. http://dx.doi.org/10.1038/s41598-020-60762-4

Hall, J.A., S. Gill, J. Obeysekera, W. Sweet, K. Knuuti, and J. Marburger, 2016: Regional Sea Level Scenarios for Coastal Risk Management: Managing the Uncertainty of Future Sea Level Change and Extreme Water Levels for Department of Defense Coastal Sites Worldwide. U.S. Department of Defense, Strategic Environmental Research and Development Program, Alexandria, VA, 224 pp. https://climateandsecurity.files.wordpress.com/2014/01/regional-sea-level-scenarios-for-coastal-risk-management_managing-uncertainty-of-future-sea-level-change-and-extreme-water-levels-for-department-of-defense.pdf

Hall, J.W., H. Harvey, and L.J. Manning, 2019: Adaptation thresholds and pathways for tidal flood risk management in London. *Climate Risk Management*, 24, 42–58. https://doi.org/10.1016/j.crm.2019.04.001

Hall, J.A., C.P. Weaver, J. Obeysekera, M. Crowell, R.M. Horton, R.E. Kopp, J. Marburger, D.C. Marcy, A. Parris, W.V. Sweet, W.C. Veatch, and K.D. White, 2019: Rising sea levels: Helping decision-makers confront the inevitable. *Coastal Management*, 47 (2), 127–150. http://dx.doi.org/10.1080/08920753.2019.1551012

Hamlington, B.D., A.S. Gardner, E. Ivins, J.T.M. Lenaerts, J.T. Reager, D.S. Trossman, E.D. Zaron, S. Adhikari, A. Arendt, A. Aschwanden, B.D. Beckley, D.P.S. Bekaert, G. Blewitt, L. Caron, D.P. Chambers, H.A. Chandanpurkar, K. Christianson, B. Csatho, R.I. Cullather, R.M. DeConto, J.T. Fasullo, T. Frederikse, J.T. Freymueller, D.M. Gilford, M. Girotto, W.C. Hammond, R. Hock, N. Holschuh, R.E. Kopp, F. Landerer, E. Larour, D. Menemenlis, M. Merrifield, J.X. Mitrovica, R.S. Nerem, I.J. Nias, V. Nieves, S. Nowicki, K. Pangaluru, C.G. Piecuch, R.D. Ray, D.R. Rounce, N.-J. Schlegel, H. Seroussi, M. Shirzaei, W.V. Sweet, I. Velicogna, N. Vinogradova, T. Wahl, D.N. Wiese, and M.J. Willis, 2020a: Understanding of contemporary regional sea-level change and the implications for the future. *Reviews of Geophysics*, 58 (3), e2019RG000672. https://doi.org/10.1029/2019RG000672

Hamlington, B.D., C.G. Piecuch, J.T. Reager, H. Chandanpurkar, T. Frederikse, R.S. Nerem, J.T. Fasullo, and S.-H. Cheon, 2020b: Origin of interannual variability in global mean sea level. *Proceedings of the National Academy of Sciences*, 117 (25), 13983. http://dx.doi.org/10.1073/pnas.1922190117

Hamlington, B.D., T. Frederikse, P.R. Thompson, J.K. Willis, R.S. Nerem, and J.T. Fasullo, 2021: Past, present, and future Pacific sea-level change. *Earth's Future*, 9 (4), e2020EF001839. https://doi.org/10.1029/2020EF001839

Hammond, W.C., G. Blewitt, C. Kreemer, and R.S. Nerem, 2021: GPS imaging of global vertical land motion for studies of sea level rise. *Journal of Geophysical Research: Solid Earth*, 126 (7), e2021JB022355. https://doi.org/10.1029/2021JB022355

Hawley, W.B., C.C. Hay, J.X. Mitrovica, and R.E. Kopp., 2020: A spatially variable time series of sea level change due to artificial water impoundment. *Earth's Future*, 8 (7), e2020EF001497. https://doi.org/10.1029/2020EF001497

Hemer, Mark A., Y. Fan, N. Mori, A. Semedo, and X.L. Wang, 2013: Projected changes in wave climate from a multi-model ensemble. *Nature Climate Change*, 3 (5), 471–476. https://doi.org/10.1038/nclimate1791

Hinkel, J., J.C.J.H. Aerts, S. Brown, J.A. Jiménez, D. Lincke, R.J. Nicholls, P. Scussolini, A. Sanchez-Arcilla, A. Vafeidis, and K.A. Addo, 2018: The ability of societies to adapt to twenty-first-century sea-level rise. *Nature Climate Change*, 8 (7), 570–578. https://doi.org/10.1038/s41558-018-0176-z

Hosking, J.R.M. and J. R. Wallis, 1997: *Regional Frequency Analysis: An Approach Based on L-Moments*. Cambridge University Press, Cambridge, U.K, 224 pp.

IPCC, 2021a: Climate Change 2021: *The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press. In Press. https://www.ipcc.ch/report/ar6/wg1/

IPCC, 2021b: *Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [MassonDelmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press. In Press. https://www.ipcc.ch/report/ar6/wg1/

Karegar, M.A., T.H. Dixon, and S.E. Engelhart, 2016: Subsidence along the Atlantic Coast of North America: Insights from GPS and late Holocene relative sea level data. *Geophysical Research Letters*, 43, 3126–3133. https://doi.org/10.1002/2016GL068015

King, D., D. Schrag, Z. Dadi, Q. Ye, and A. Gosh, 2015: Climate Change: A Risk Assessment. Hynard, J. and T. Rodger, Eds. Centre for Science and Policy, Cambridge, UK, 154 pp. www.csap.cam.ac.uk/projects/climate-change-risk-assessment/

Kirwan, M.L. and K.B. Gedan, 2019: Sea-level driven land conversion and the formation of ghost forests. *Nature Climate Change*, 9 (6), 450–457. https://doi.org/10.1038/s41558-019-0488-7

Konikow, L.F., 2011: Contribution of global groundwater depletion since 1900 to sea-level rise. *Geophysical Research Letters*, 38 (17). https://doi.org/10.1029/2011GL048604

Kopp, R.E., R.M. Horton, C.M. Little, J.X. Mitrovica, M. Oppenheimer, D.J. Rasmussen, B.H. Strauss, and C. Tebaldi, 2014: Probabilistic 21st and 22nd century sea-level projections at a global network of tide-gauge sites. *Earth's Future*, 2 (8), 383–406. https://doi.org/10.1002/2014EF000239

Kopp, R.E., R.M. DeConto, D.A. Bader, C.C. Hay, R.M. Horton, S. Kulp, M. Oppenheimer, D. Pollard, and B.H. Strauss, 2017: Evolving understanding of Antarctic ice-sheet physics and ambiguity in probabilistic sea-level projections." *Earth's Future*, 5 (12), 1217–1233. https://doi.org/10.1002/2017EF000663

Kopp, R.E., E.A. Gilmore, C.M. Little, J. Lorenzo-Trueba, V.C. Ramenzoni, and W.V. Sweet, 2019: Usable science for managing the risks of sea-level rise. *Earth's Future*, 7, 1235–1269. https://doi.org/10.1029/2018EF001145

Krasting, J.P., J.P. Dunne, R.J. Stouffer, and R.W. Hallberg, 2016: Enhanced Atlantic sea-level rise relative to the Pacific under high carbon emission rates. *Nature Geoscience*, 9 (3), 210–214. http://dx.doi.org/10.1038/ngeo2641

Langbein W.B., 1949: Annual floods and the partial-duration flood series. *Eos, Transactions American Geophysical Union*, 30 (6), 879–881. https://doi.org/10.1029/TR030i006p00879

Larsen, C.F., R.J. Motyka, J.T. Freymueller, K.A. Echelmeyer, and E.R. Ivins, 2004: Rapid uplift of southern Alaska caused by recent ice loss. *Geophysical Journal International*, 158 (3), 1118–1133. http://dx.doi.org/10.1111/j.1365-246X.2004.02356.

Levermann, A., R. Winkelmann, T. Albrecht, H. Goelzer, N.R. Golledge, R. Greve, P. Huybrechts J. Jordan, G. Leguy, D. Martin, M. Morlighem, F. Pattyn, D. Pollard, A. Quiquet, C. Rodehacke, H. Seroussi, J. Sutter, T. Zhang, J. Van Breedam, R. Calov, R. DeConto, C. Dumas, J. Garbe, G.H. Gudmundsson, M.J. Hoffman, A. Humbert, T. Kleiner, W.H. Lipscomb, M. Meinshausen, E. Ng, S.M.J. Nowicki, M. Perego, S.F. Price, F. Saito, N.J. Schlegel, S. Sun, and R.S.W. van de Wal, 2020: Projecting Antarctica's contribution to future sea level rise from basal ice shelf melt using linear response functions of 16 ice sheet models (LARMIP-2). *Earth System Dynamics*, 11 (1), 35–76. https://doi.org/10.5194/esd-11-35-2020

Longuet-Higgins, M.S. and R.W. Stewart, 1963: A note on wave set-up. *Journal of Marine Research*, 21 (4), 4–10. https://images.peabody.yale.edu/publications/jmr/jmr21-01-01.pdf

Lyu, K., X. Zhang, J.A. Church, A.B.A. Slangen, and J. Hu. 2014: Time of emergence for regional sea-level change. *Nature Climate Change*, 4 (11), 1006–1010. https://doi.org/10.1038/nclimate2397

Marzeion, B., A.H. Jarosch, and M. Hofer, 2012: Past and future sea-level change from the surface mass balance of glaciers. *The Cryosphere*, 6 (6), 1295–1322. https://doi.org/10.5194/tc-6-1295-2012

Marzeion, B., R. Hock, B. Anderson, A. Bliss, N. Champollion, K. Fujita, M. Huss, W.W. Immerzeel, P. Kraaijenbrink, J.-H. Malles, F. Maussion, V. Radić, D.R. Rounce, A. Sakai, S. Shannon, R. van de Wal, and H. Zekollari, 2020: Partitioning the uncertainty of ensemble projections of global glacier mass change. *Earth's Future*, 8 (7), e2019EF001470. https://doi.org/10.1029/2019EF001470

McCallum, B.E., S.M. Wicklein, R.G. Reiser, R. Busciolano, J. Morrison, R.J. Verdi, J.A. Painter, E.R. Frantz, and A.J. Gotvald, 2013: Monitoring Storm Tide and Flooding from Hurricane Sandy along the Atlantic Coast of the United States, October 2012. Open File Report 2013-1043. U.S. Geological Survey, Reston, VA, 42 pp. http://dx.doi.org/10.3133/ofr20131043

McKenzie, T., S. Habel, and H. Dulai, 2021: Sea-level rise drives wastewater leakage to coastal waters and storm drains. *Limnology and Oceanography Letters*, 6, 154–163. https://doi.org/10.1002/lol2.10186

Menéndez, M., and P.L. Woodworth, 2010: Changes in extreme high water levels based on a quasi-global tide-gauge data set. *Journal of Geophysical Research: Oceans*, 115, C10011. https://doi.org/10.1029/2009JC005997

Merrifield, M.A., A.S. Genz, C.P. Kontoes, and J.J. Marra, 2013: Annual maximum water levels from tide gauges: Contributing factors and geographic patterns. *Journal of Geophysical Research: Oceans*, 118 (5), 2535–2546. https://doi.org/10.1002/jgrc.20173

Milne, G.A. and J.X. Mitrovica, 1998: Postglacial sea-level change on a rotating Earth. *Geophysical Journal International*, 133 (1), 1–19. https://doi.org/10.1046/j.1365-246X.1998.1331455.x

Mitrovica, J.X., M.E. Tamisiea, J.L. Davis, and G.A. Milne, 2001: Recent mass balance of polar ice sheets inferred from patterns of global sea-level change. *Nature*, 409 (6823), 1026–1029. https://doi.org/10.1038/35059054

Moftakhari, H. R., Jay, D. A., & Talke, S. A. (2016). Estimating river discharge using multiple-tide gauges distributed along a channel. *Journal of Geophysical Research: Oceans*, 121 (4), 2078–2097. https://doi.org/10.1002/2015JC010983

Moore, F.C. and N. Obradovich, 2020: Using remarkability to define coastal flooding thresholds. *Nature Communications*, 11 (1), 1–8. https://doi.org/10.1038/s41467-019-13935-3

Muis, S., M. Verlaan, H.C. Winsemius, J.C.J.H. Aerts, and P.J. Ward, 2016: A global reanalysis of storm surges and extreme sea levels. *Nature Communications*, 7 (1), 11969. http://dx.doi.org/10.1038/ncomms11969

Nadal-Caraballo, N.C., M.O. Campbell, V.M. Gonzalez, M.J. Torres, J.A. Melby, and A.A. Taflanidis, 2020: Coastal Hazards System: A probabilistic coastal hazard analysis framework. *Journal of Coastal* Research, 95 (SI), 1211–1216. http://dx.doi.org/10.2112/SI95-235.1

NGS, 2001: Geodetic Program Needs of Louisiana and Wisconsin: Report to Congress. National Oceanic and Atmospheric Administration, National Ocean Service, National Geodetic Survey, Silver Spring, MD, 38 pp. https://www.ngs.noaa.gov/PUBS_LIB/NGSreport_823.pdf

NOAA, 2003: Computational Techniques for Tidal Datums Handbook. NOAA Special Publication NOS CO-OPS 2. National Oceanic and Atmospheric Administration, National Ocean Service, Center for Operational Oceanographic Products and Services, Silver Spring, MD, 113 pp. https://tidesandcurrents.noaa.gov/publications/Computational_Techniques_for_Tidal_Datums_handbook.pdf

NOAA, 2020: Surf Zone Forecast and Coastal/Lakeshore Hazard Services. National Weather Service Instruction 10-320. National Oceanic and Atmospheric Administration, National Weather Service, 38 pp. http://www.nws.noaa.gov/directives/sym/pd01003020curr.pdf

NOAA NOS and U.S. Census Bureau, 2013: National Coastal Population Report: Population Trends from 1970 to 2020. National Oceanic and Atmospheric Administration, National Ocean Service, and U.S. Census Bureau, Silver Spring, MD, 22 pp. https://aambpublicoceanservice.blob.core.windows.net/oceanserviceprod/facts/coastal-population-report.pdf

Obeysekera, J. and J. Salas, 2020: Hydrologic designs for extreme events under nonstationarity. In: *Engineering Methods for Precipitation under a Changing Climate*. Olsen, J.R. and K.T. Adamec, Eds. American Society of Civil Engineers, 63–82. http://dx.doi.org/10.1061/9780784415528.ch04

One Climate Future, 2019: One Climate Future Climate Change Vulnerability Assessment. One Climate Future, Cities of Portland and South Portland, 181 pp. https://www.oneclimatefuture.org/wp-content/uploads/2020/12/OneClimateFuture_VulnerabilityAssessment_Final.pdf

Oppenheimer, M., B.C. Glavovic , J. Hinkel, R. van de Wal, A.K. Magnan, A. Abd-Elgawad, R. Cai, M. Cifuentes-Jara, R.M. DeConto, T. Ghosh, J. Hay, F. Isla, B. Marzeion, B. Meyssignac, and Z. Sebesvari, 2019: Sea Level Rise and Implications for Low-Lying Islands, Coasts and Communities. In: *IPCC Special Report on the Ocean and Cryosphere in a Changing Climate* [H.-O. Pörtner, D.C. Roberts, V. Masson-Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, A. Alegría, M. Nicolai, A. Okem, J. Petzold, B. Rama, N.M. Weyer (eds.)]. In Press. https://www.ipcc.ch/site/assets/uploads/sites/3/2019/11/08_SROCC_Ch04_FINAL.pdf

Parris, A., P. Bromirski, V. Burkett, D. Cayan, M. Culver, J. Hall, R. Horton, K. Knuuti, R. Moss, J. Obeysekera, A. Sallenger, and J. Weiss, 2012: Global Sea Level Rise Scenarios for the US National Climate Assessment. NOAA Tech Report OAR CPO-1. National Oceanic and Atmospheric Administration, Climate Program Office, 37 pp. https://repository.library.noaa.gov/view/noaa/11124

Perica, S., S. Pavlovic, M. St. Laurent, C. Trypaluk, D. Unruh, and O. Wilhite, 2018: Precipitation-Frequency Atlas of the United States. Volume 11, Version 2.0 Texas. National Oceanic and Atmospheric Administration, National Weather Service, Silver Spring, MD. https://repository.library.noaa.gov/view/noaa/22619

Piecuch, C. G. and, & Quinn, K. J. 2016: El Niño, La Niña, and the global sea level budget. *Ocean Science*, 12 (6), 1165–1177. https://doi.org/10.5194/os-12-1165-2016

Reguero, B.G., M. Menéndez, F.J. Méndez, R. Mínguez, and I.J. Losada. 2012: A Global Ocean Wave (GOW) calibrated reanalysis from 1948 onwards. *Coastal Engineering*. 65, 38–55. https://doi.org/10.1016/j.coastaleng.2012.03.003

Richter, K., B. Meyssignac, A.B.A. Slangen, A. Melet, J.A. Church, X. Fettweis, B. Marzeion, C. Agosta, S.R.M. Ligtenberg, G. Spada, M.D. Palmer, C.D. Roberts, and N. Champollion, 2020: Detecting a forced signal in satellite-era sea-level change. *Environmental Research Letters*, 15 (9), 094079. https://doi.org/10.1088/1748-9326/ab986e

Rydlund, P. H. Jr., B. J. Densmore (2012). Methods of practice and guidelines for using survey-grade Global Navigation Satellite Systems (GNSS) to establish vertical datum in the United States Geological Survey. Chapter 1 of Section D, Field Survey Methods, Book 11, *Collection and Delineation of Spatial Data*. U.S. Geological Survey, Reston, Virginia, 102 pp. with appendixes. http://pubs.usgs.gov/tm/11d1/

Salas, J.D., and J. Obeysekera, 2014: Revisiting the concepts of return period and risk for nonstationary hydrologic extreme events. *Journal of Hydrologic Engineering*, 19 (3) 554–568. https://doi.org/10.1061/(ASCE)HE.1943-5584.0000820

Salas, J.D., J. Obeysekera, and R. Vogel, 2018: Techniques for assessing water infrastructure for nonstationary extreme events: A review. *Hydrologic Science Journal*, 63 (3), 325–352. https://doi.org/10.1080/02626667.2018.1426858

Salas, J.D. and J. Obeysekera, 2019: Probability distribution and risk of the first occurrence of k extreme hydrologic events. *Journal of Hydrologic Engineering*, 24 (10), 04019032. https://doi.org/10.1061/(ASCE)HE.1943-5584.0001809

Slangen, A.B.A., M. Carson, C.A. Katsman, R.S.W. van de Wal, A. Köhl, L.L.A. Vermeersen, and D. Stammer, 2014: Projecting twenty-first century regional sea-level changes. *Climatic Change*, 124 (1), 317–332. http://dx.doi.org/10.1007/s10584-014-1080-9

Stockdon H.F., R.A. Holman, P.A. Howd, and A.H. Sallenger, Jr., 2006: Empirical parameterization of setup, swash, and runup. *Coastal Engineering*, 53 (7), 573–588. https://doi.org/10.1016/j.coastaleng.2005.12.005

Sutton, R.T., 2019: Climate science needs to take risk assessment much more seriously. *Bulletin of the* American *Meteorological Society*, 100 (9), 1637–1642. https://doi.org/10.1175/BAMS-D-18-0280.1

Sweeney, B. and A. Becker, 2020: Considering future sea level change in maritime infrastructure design: A survey of US Engineers. *Journal of Waterway, Port, Coastal, and Ocean Engineering*, 146 (4), 04020019. http://dx.doi.org/10.1061/(ASCE)WW.1943-5460.0000583

Sweet, W.V. and J. Park, 2014: From the extreme to the mean: Acceleration and tipping points of coastal inundation from sea level rise. *Earth's Future*, 2 (12), 579–600. https://doi.org/10.1002/2014EF000272

Sweet, W.V., J. Park, S. Gill, and J. Marra, 2015: New ways to measure waves and their effects at NOAA tide gauges: A Hawaiian-network perspective. *Geophysical Research Letters*, 42 (21), 9355–9361. https://doi.org/10.1002/2015GL066030

Sweet, W.V., R.E. Kopp, C.P. Weaver, J. Obeysekera, R.M. Horton, E.R. Thieler, and C. Zervas, 2017: Global and Regional Sea Level Rise Scenarios for the United States. NOAA Technical Report NOS CO-OPS 083. National Oceanic and Atmospheric Administration, National Ocean Service, Center for Operational Oceanographic Products and Services, Silver Spring, MD, 75 pp. https://tidesandcurrents.noaa.gov/publications/techrpt83_Global_and_Regional_SLR_Scenarios_for_the_US_final.pdf

Sweet, W.V., G. Dusek, J. Obeysekera, and J.J. Marra, 2018: Patterns and Projections of High Tide Flooding Along the U.S. Coastline Using a Common Impact Threshold. NOAA Technical Report NOS CO-OPS 086. National Oceanic and Atmospheric Administration, National Ocean Service, Silver Spring, MD, 44 pp. https://tidesandcurrents.noaa.gov/publications/techrpt86_PaP_of_HTFlooding.pdf

Sweet, W.V., G. Dusek, G. Carbin, J.J. Marra, D. Marcy, and S. Simon, 2020a: 2019 State of U.S. High Tide Flooding with a 2020 Outlook. NOAA Technical Report NOS CO-OPS 092. National Oceanic and Atmospheric Administration, National Ocean Service, Silver Spring, MD, 24 pp. https://tidesandcurrents.noaa.gov/publications/Techrpt_092_2019_State_of_US_High_Tide_Flooding_with_a_2020_Outlook_30June2020.pdf

Sweet, W.V., A.S. Genz, J. Obeysekera, and J.J. Marra. 2020b: A regional frequency analysis of tide gauges to assess Pacific coast flood risk. *Frontiers in Marine Science*, 7, 883. https://doi.org/10.3389/fmars.2020.581769

Sweet, W.V., S. Simon, G. Dusek, D. Marcy, W. Brooks, M. Pendleton, and J. Marra, 2021: 2021 State of High Tide Flooding and Annual Outlook. NOAA High Tide Flooding Report. National Oceanic and Atmospheric Administration, National Ocean Service, Silver Spring, MD, 28 pp. https://tidesandcurrents.noaa.gov/publications/2021_State_of_High_Tide_Flooding_and_Annual_Outlook_Final.pdf

Tebaldi, C., B.H. Strauss, and C.E. Zervas, 2012: Modelling sea level rise impacts on storm surges along US coasts. *Environmental Research Letters*, 7 (1), 014032. https://doi.org/10.1088/1748-9326/7/1/014032

Thompson, P.R., M.J. Widlansky, B.D. Hamlington, M.A. Merrifield, J.J. Marra, G.T. Mitchum, and W. Sweet, 2021: Rapid increases and extreme months in projections of United States high-tide flooding. *Nature Climate Change*, 1–7. https://doi.org/10.1038/s41558-021-01077-8

USACE, 1994: Engineering and Design: Hydrologic Frequency Estimates. ER 1110-2-1450. U.S. Army Corps of Engineers, Washington, DC, 8 pp. https://www.publications.usace.army.mil/Portals/76/Publications/EngineerRegulations/ER_1110-2-1450.pdf

USACE. 2014. Procedures to Evaluate Sea Level Change: Impacts, Responses, and Adaptation. Technical Letter 1100-2-1. U.S. Army Corps of Engineers, Washington, DC, 254 pp. https://www.publications.usace.army.mil/portals/76/publications/engineertechnicalletters/etl_1100-2-1.pdf

USACE MRG&P, 2017: 2015 Updated Atlas of U.S. Army Corps of Engineers Historic Daily Tide Data in Coastal Louisiana. MRG&P Report No. 14. U.S. Army Corps of Engineers, Mississippi River Geomorphology and Potamology Program, New Orleans, LA, 41 pp. https://erdc-library.erdc.dren.mil/jspui/bitstream/11681/25484/1/MRG%26P%20Report%20No%2014.pdf

USGCRP, 2017: *Climate Science Special Report: Fourth National Climate Assessment, Volume I* [Wuebbles, D.J., D.W. Fahey, K.A. Hibbard, D.J. Dokken, B.C. Stewart, and T.K. Maycock (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 470 pp. doi:10.7930/J0J964J6

USGCRP, 2018: *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 1515 pp. doi:10.7930/NCA4.2018

Vitousek, S., P.L. Barnard, C.H. Fletcher, N. Frazer, L. Erikson, and C.D. Storlazzi, 2017: Doubling of coastal flooding frequency within decades due to sea-level rise. *Scientific Reports*, 7 (1), 1–9. http://dx.doi.org/10.1038/s41598-017-01362-7

Vousdoukas, M.I., L. Mentaschi, E. Voukouvalas, M. Verlaan, S. Jevrejeva, L.P. Jackson, and L. Feyen, 2018: Global probabilistic projections of extreme sea levels show intensification of coastal flood hazard. *Nature Communications*, 9 (1), 2360. http://dx.doi.org/10.1038/s41467-018-04692-w

Wada, Y., L.P.H. Van Beek, F.C. Sperna Weiland, B.F. Chao, Y.-H. Wu, and M.F.P. Bierkens, 2012: Past and future contribution of global groundwater depletion to sea-level rise. *Geophysical Research Letters*, 39 (9). https://doi.org/10.1029/2012GL051230

Wada, Y., M.-H. Lo, P.J.F. Yeh, J.T. Reager, J.S. Famiglietti, R.-J. Wu, and Y.-H. Tseng, 2016: Fate of water pumped from underground and contributions to sea-level rise. *Nature Climate Change*, 6 (8), 777–780. http://dx.doi.org/10.1038/nclimate3001

Wahl, T., I.D. Haigh, R.J. Nicholls, A. Arns, S. Dangendorf, J. Hinkel, and A.B. Slangen, 2017: Understanding extreme sea levels for broad-scale coastal impact and adaptation analysis. *Nature Communications*, 8 (1), 16075. http://dx.doi.org/10.1038/ncomms16075

Wang, J., Church, J. A., Zhang, X., & Chen, X. (2021). Reconciling global mean and regional sea level change in projections and observations. *Nature Communications*, 12 (1), 1–12. https://doi.org/10.1038/s41467-021-21265-6

WCRP Global Sea Level Budget Group, 2018: Global sea-level budget 1993–present. *Earth System Science Data*, 10, 1551–1590. http://dx.doi.org/10.5194/essd-10-1551-2018

Weaver, C.P., R.H. Moss, K.L. Ebi, P.H. Gleick, P.C. Stern, C. Tebaldi, R.S. Wilson, and J.L. Arvai, 2017: Reframing climate change assessments around risk: Recommendations for the US National Climate Assessment. *Environmental Research Letters*, 12 (8), 080201. https://doi.org/10.1088/1748-9326/aa7494

Werners, S.E., R.M. Wise, J.R.A. Butler, E. Totin, and K. Vincent, 2021: Adaptation pathways: A review of approaches and a learning framework. *Environmental Science & Policy*, 116, 266–275. https://doi.org/10.1016/j.envsci.2020.11.003

Yin, J., M.E. Schlesinger, and R.J. Stouffer, 2009: Model projections of rapid sea-level rise on the northeast coast of the United States. *Nature Geoscience*, 2 (4), 262–266. https://doi.org/10.1038/ngeo462

Zervas, C., 2013: Extreme Water Levels of the United States 1893–2010. NOAA Technical Report NOS CO-OPS 067. National Oceanic and Atmospheric Administration, National Ocean Service, Silver Spring, MD, 212 pp. https://tidesandcurrents.noaa.gov/publications/NOAA_Technical_Report_NOS_COOPS_067a.pdf

Section A1: Tables and Figures

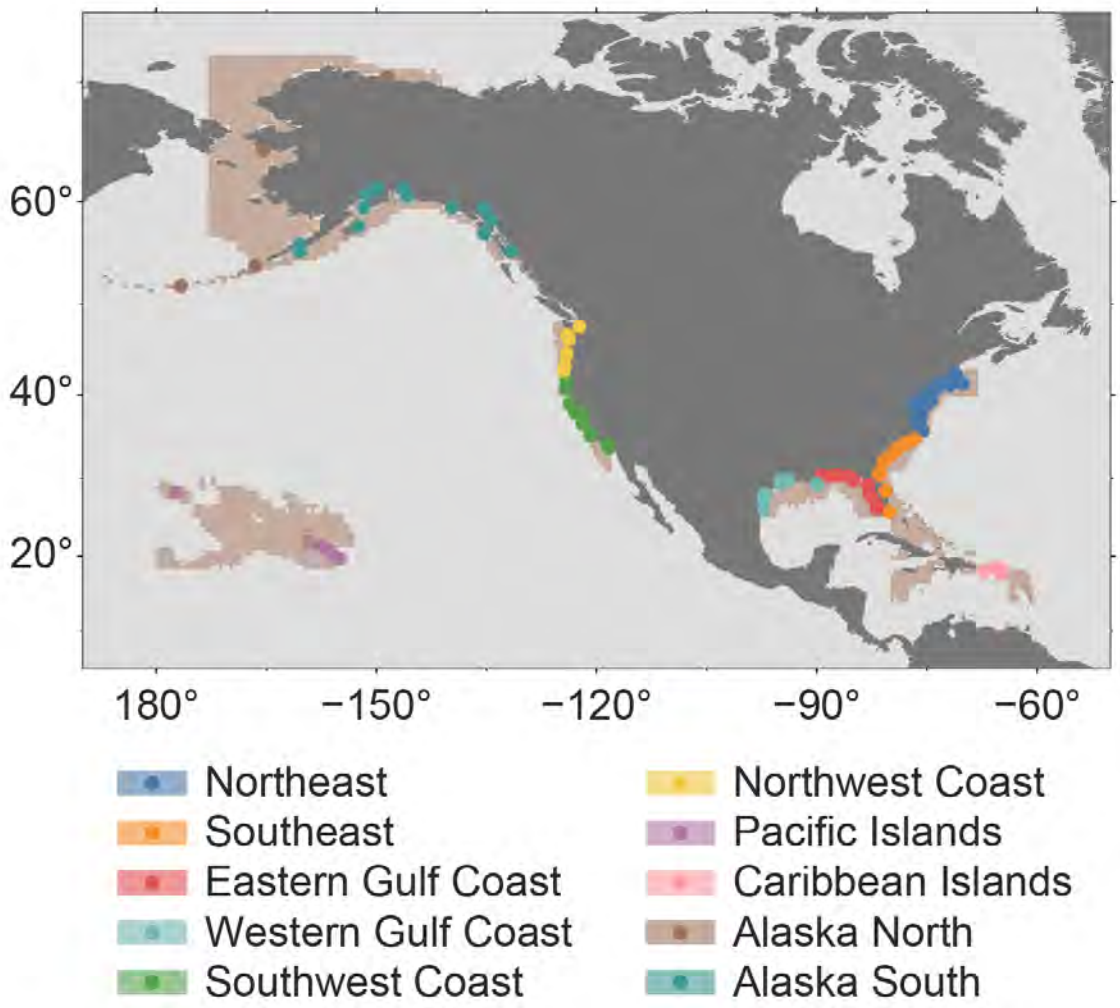


Figure A1.1: Region definitions for observation-based extrapolations and scenarios in Section 2. These regions are used both to group tide gauges and also to generate regional averages for the gridded scenarios. A bathymetry mask is used to define the regions for the gridded scenarios.

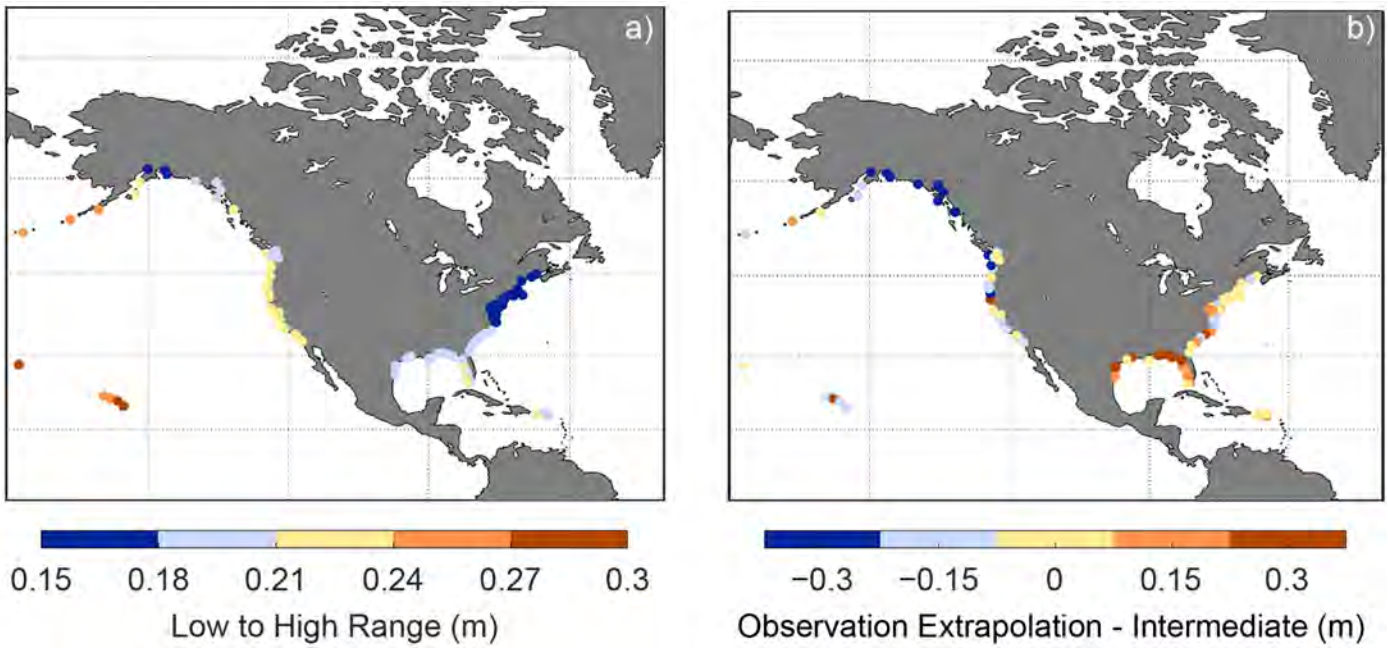


Figure A1.2. Shown for each tide gauge record with at least 30 years of record length between 1970 and 2020 are a) range, in meters, between median projection of Low and High Scenarios in 2050, and b) difference, in meters, between median observation-based extrapolation and Intermediate scenario in 2050.

Table A1.1: Projections methods employed.

Driver of GMSL or RSL change	Kopp et al. (2014) projection method (used in Sweet et al., 2017)	AR6 (Fox-Kemper et al., 2021) projection methods (used here)
Thermal expansion	CMIP5 ensemble drift-corrected zostoga	Two-layer model with climate sensitivity calibrated to the IPCC assessment and expansion coefficients calibrated to emulate CMIP6 models
Greenland ice sheet	*Likely* range from IPCC AR5, with shape of tails based on structured expert judgment (Bamber and Aspinall, 2013)	1. Emulated ISMIP6 simulations through 2100 (Edwards et al., 2021), extended after 2100 based on constant post-2100 rates 2. Structured expert judgment (Bamber et al., 2019)
Antarctic ice sheet	*Likely* range from IPCC AR5, with shape of tails based on structured expert judgment (Bamber and Aspinall, 2013)	1. Emulated ISMIP6 simulations through 2100 (Edwards et al., 2021), extended after 2100 with constant rates based on the IPCC AR5 parametric Antarctic Ice Sheet model (Church et al., 2013) 2. LARMIP-2 simulations (Levermann et al., 2020) augmented by AR5 surface mass balance model (Church et al., 2013), extended past 2100 based on constant rates 3. Single ice-sheet model incorporated marine ice cliff instability (DeConto et al., 2021) 4. Structured expert judgment (Bamber et al., 2019)
Glaciers	Distribution based on Marzeion et al. (2012) surface mass balance model	Emulated GlacierMIP (Marzeion et al., 2020; Edwards et al., 2021) extended after 2100 with IPCC AR5 parametric model refit to GlacierMIP (Marzeion et al., 2020)
Land water storage	Groundwater depletion: Population/groundwater depletion relationship calibrated based on Konikow (2011) and Wada et al. (2012) Water impoundment: Population/dam impoundment relationship calibrated based on Chao et al. (2008)	Groundwater depletion: Updated population/groundwater depletion relationship calibrated based on Konikow (2011) and Wada et al. (2012, 2016) Water impoundment: Population/dam impoundment relationship calibrated based on Chao et al. (2008), adjusted for new construction, following Hawley et al. (2020) for 2020 to 2040
Ocean dynamic sea level	Distribution derived from CMIP5 ensemble zos field	Distribution derived from CMIP6 ensemble zos field after linear drift removal
Gravitational, rotational, and deformational effects	Sea-level equation solver (Mitrovica et al., 2011) driven by projections of ice-sheet and glacier changes	Sea-level equation solver (Slangen et al., 2014) driven by projections of ice-sheet, glacier, and land water storage changes
GIA and other drivers of VLM	Spatiotemporal statistical model of tide-gauge data	Spatiotemporal statistical model of tide-gauge data (updated from Kopp et al., 2014)

Table A1.2: Offsets, in meters, for different time periods and for each region considered in Section 2. These offsets are assessed using the trajectory determined from the available tide-gauge data in each region.

	1992–2000	2000–2005	2005–2020
Contiguous U.S.	0.02	0.03	0.08
Northeast	0.03	0.02	0.09
Southeast	0.03	0.02	0.09
Eastern Gulf	0.03	0.02	0.1
Western Gulf	0.05	0.04	0.14
Southwest	0.01	0.01	0.05
Northwest	0.01	0.01	0.04
Hawaiian Islands	0.02	0.02	0.06
Caribbean	0.02	0.01	0.06

Table A1.3: Regional designation, tide gauge information, extreme water level metadata, and high tide flood heights.

US Region	EWL Grid No.	NOAA ID	Location	Latitude	Longitude	Tide Range (m)	Flood Index u (m, MHHW)	u Trend (mm/yr)	Epoch of u	Minor Flood (m, MHHW)	Moderate Flood (m)	Major Flood (m)
Pacific	39509	1611400	Nawiliwili, HI	21.95	−159.36	0.558	0.244	1.7	1983–2001	0.522	0.817	1.192
	39511	1612340	Honolulu, HI	21.31	−157.87	0.580	0.248	1.3	1983–2001	0.523	0.817	1.193
	39511	1612480	Mokuoloe, HI	21.43	−157.79	0.646	0.265	2.0	1983–2001	0.526	0.819	1.196
	39153	1615680	Kahului, HI	20.90	−156.48	0.686	0.252	2.1	1983–2001	0.527	0.821	1.197
	39154	1617433	Kawaihae, HI	20.04	−155.83	0.659	0.237	7.9	1983–2001	0.526	0.820	1.196
	38795	1617760	Hilo, HI	19.73	−155.06	0.731	0.272	3.1	1983–2001	0.529	0.822	1.199
	37704	1619000	Johnston Atoll	16.74	−169.53	0.674	0.295	2.2	1983–2001	0.527	0.820	1.197
	42004	1619910	Midway Islands	28.21	−177.36	0.381	0.303	1.9	1983–2001	0.515	0.811	1.185
	36941	1630000	Apra Harbor, Guam	13.44	144.65	0.715	0.249	4.2	1983–2001	0.529	0.821	1.199
	36941	1631428	Pago Bay, Guam	13.43	144.80	0.525	0.287	4.2	1983–2001	0.521	0.816	1.191
	26574	1770000	American Samoa	−14.28	189.32	0.848	0.338	3.8	1983–2001	0.497	0.788	1.167
	35169	1820000	Kwajalein	8.73	167.74	1.194	0.446	3.1	1983–2001	0.548	0.836	1.218
	39117	1890000	Wake Island	19.29	166.62	0.718	0.295	2.1	1983–2001	0.529	0.822	1.199
NE	47859	8410140	Eastport, ME	44.90	−66.98	5.874	0.930	2.1	1983–2001	0.735	0.976	1.405
	47858	8411250	Cutler Naval Base, ME	44.64	−67.30	4.133	0.716	2.4	1983–2001	0.665	0.924	1.335
	47857	8413320	Bar Harbor, ME	44.39	−68.21	3.465	0.657	2.1	1983–2001	0.639	0.904	1.309
	47496	8418150	Portland, ME	43.66	−70.25	3.019	0.605	1.9	1983–2001	0.621	0.891	1.291
	47496	8419317	Wells, ME	43.32	−70.56	2.914	0.667	3.5	1983–2001	0.617	0.887	1.287
	47496	8423898	Fort Point, NH	43.07	−70.71	2.864	0.662	3.5	1983–2001	0.615	0.886	1.285
	47136	8443970	Boston, MA	42.35	−71.05	3.131	0.634	2.8	1983–2001	0.625	0.894	1.295
	46777	8447386	Fall River, MA	41.70	−71.16	1.456	0.566	3.5	1983–2001	0.558	0.844	1.228
	46778	8447930	Woods Hole, MA	41.52	−70.67	0.672	0.446	3.2	1983–2001	0.527	0.820	1.197
	46778	8449130	Nantucket Island, MA	41.29	−70.10	1.089	0.418	3.8	1983–2001	0.544	0.833	1.214
	46777	8452660	Newport, RI	41.51	−71.33	1.174	0.478	2.8	1983–2001	0.547	0.835	1.217

Table A1.3 (cont.): Regional designation, tide gauge information, extreme water level metadata, and high tide flood heights.

US Region	EWL Grid No.	NOAA ID	Location	Latitude	Longitude	Tide Range (m)	Flood Index u (m, MHHW)	u Trend (mm/yr)	Epoch of u	Minor Flood (m, MHHW)	Moderate Flood (m)	Major Flood (m)
NE (cont.)	46777	8452944	Conimicut Light, RI	41.72	–71.34	1.398	0.560	3.5	1983–2001	0.556	0.842	1.226
	46777	8454000	Providence, RI	41.81	–71.40	1.476	0.549	2.3	1983–2001	0.559	0.844	1.229
	46777	8454049	Quonset Point, RI	41.59	–71.41	1.249	0.547	3.5	1983–2001	0.550	0.837	1.220
	46776	8461490	New London, CT	41.36	–72.09	0.930	0.468	2.6	1983–2001	0.537	0.828	1.207
	46776	8465705	New Haven, CT	41.28	–72.91	2.045	0.603	3.5	1983–2001	0.582	0.861	1.252
	46775	8467150	Bridgeport, CT	41.17	–73.18	2.231	0.555	3.0	1983–2001	0.589	0.867	1.259
	46777	8510560	Montauk, NY	41.05	–71.96	0.771	0.487	3.4	1983–2001	0.531	0.823	1.201
	46416	8514560	Port Jefferson, NY	40.95	–73.08	2.181	0.527	2.5	1983–2001	0.587	0.865	1.257
	46416	8516945	Kings Point, NY	40.81	–73.76	2.378	0.638	2.5	1983–2001	0.597	0.873	1.267
	46415	8518750	The Battery, NY	40.70	–74.01	1.542	0.546	3.1	1983–2001	0.562	0.846	1.232
	46415	8519483	Bergen Point, NY	40.64	–74.14	1.681	0.549	4.4	1983–2001	0.567	0.850	1.237
	46415	8531680	Sandy Hook, NJ	40.47	–74.01	1.593	0.552	2.7	1983–2001	0.564	0.848	1.234
	46056	8534720	Atlantic City, NJ	39.36	–74.42	1.403	0.534	4.1	1983–2001	0.556	0.842	1.226
	45697	8536110	Cape May, NJ	38.97	–74.96	1.659	0.486	4.7	1983–2001	0.566	0.850	1.236
	46055	8537121	Ship John Shoal, NJ	39.31	–75.38	1.894	0.578	3.5	1983–2001	0.576	0.857	1.246
	46055	8540433	Marcus Hook, PA	39.81	–75.41	1.871	0.563	3.5	1983–2001	0.575	0.856	1.245
	46055	8545240	Philadelphia, PA	39.93	–75.14	2.039	0.462	3.1	1983–2001	0.582	0.861	1.252
	46055	8551762	Delaware City, DE	39.58	–75.59	1.830	0.540	3.5	1983–2001	0.573	0.855	1.243
	46055	8551910	Reedy Point, DE	39.56	–75.57	1.779	0.423	4.1	1983–2001	0.571	0.853	1.241
	45696	8555889	Brandywine Shoal, DE	38.99	–75.11	1.676	0.616	3.5	1983–2001	0.567	0.850	1.237
	45696	8557380	Lewes, DE	38.78	–75.12	1.418	0.530	3.5	1983–2001	0.557	0.843	1.227
	45696	8570280	Ocean City, MD	38.33	–75.08	1.187	0.413	3.5	1983–2001	0.547	0.836	1.217
	45696	8570283	Ocean City Inlet, MD	38.33	–75.09	0.751	0.360	3.5	1983–2001	0.530	0.823	1.200
	45695	8571421	Bishops Head, MD	38.22	–76.04	0.624	0.503	3.5	1983–2001	0.525	0.819	1.195

Table A1.3 (cont.): Regional designation, tide gauge information, extreme water level metadata, and high tide flood heights.

US Region	EWL Grid No.	NOAA ID	Location	Latitude	Longitude	Tide Range (m)	Flood Index u (m, MHHW)	u Trend (mm/yr)	Epoch of u	Minor Flood (m, MHHW)	Moderate Flood (m)	Major Flood (m)
NE (cont.)	45695	8571892	Cambridge, MD	38.57	−76.07	0.622	0.414	4.9	1983–2001	0.525	0.819	1.195
	46054	8573364	Tolchester Beach, MD	39.21	−76.25	0.527	0.484	2.5	1983–2001	0.519	0.814	1.189
	46055	8573927	Chesapeake City, MD	39.53	−75.81	0.980	0.470	3.8	1983–2001	0.539	0.829	1.209
	46054	8574070	Havre De Grace, MD	39.54	−76.09	0.746	0.482	3.5	1983–2001	0.530	0.822	1.200
	46054	8574680	Baltimore, MD	39.27	−76.58	0.506	0.443	3.2	1983–2001	0.520	0.815	1.190
	45695	8575512	Annapolis, MD	38.98	−76.48	0.438	0.430	3.7	1983–2001	0.518	0.813	1.188
	45695	8577330	Solomons Island, MD	38.32	−76.45	0.449	0.398	6.0	1983–2001	0.518	0.813	1.188
	45694	8594900	Washington, DC	38.87	−77.02	0.965	0.461	3.3	1983–2001	0.539	0.829	1.209
	45337	8631044	Wachapreague, VA	37.61	−75.69	1.376	0.508	5.4	1983–2001	0.564	0.850	1.234
	45337	8632200	Kiptopeke, VA	37.17	−75.99	0.896	0.435	4.7	1983–2001	0.536	0.827	1.206
	45695	8635150	Colonial Beach, VA	38.25	−76.96	0.591	0.406	4.7	1983–2001	0.524	0.818	1.194
	45336	8635750	Lewisetta, VA	38.00	−76.46	0.458	0.420	5.6	1983–2001	0.518	0.814	1.188
	45336	8636580	Windmill Point, VA	37.62	−76.29	0.424	0.419	5.2	1983–2001	0.532	0.828	1.202
	45336	8637689	Yorktown, VA	37.23	−76.48	0.786	0.567	3.5	1983–2001	0.531	0.824	1.201
	44977	8638610	Sewells Point, VA	36.95	−76.33	0.841	0.502	4.6	1983–2001	0.534	0.825	1.204
	44977	8638863	CBBT, VA	36.97	−76.11	0.885	0.503	6.0	1983–2001	0.535	0.827	1.205
	44977	8639348	Money Point, VA	36.78	−76.30	0.977	0.528	5.6	1983–2001	0.539	0.829	1.209

Table A1.3 (cont.): Regional designation, tide gauge information, extreme water level metadata, and high tide flood heights.

US Region	EWL Grid No.	NOAA ID	Location	Latitude	Longitude	Tide Range (m)	Flood Index u (m, MHHW)	u Trend (mm/yr)	Epoch of u	Minor Flood (m, MHHW)	Moderate Flood (m)	Major Flood (m)
SE	44978	8651370	Duck, NC	36.18	−75.75	1.124	0.494	4.6	1983–2001	0.545	0.834	1.215
	44619	8652587	Oregon Inlet, NC	35.80	−75.55	0.360	0.384	4.6	1983–2001	0.514	0.811	1.184
	44619	8654400	Cape Hatteras, NC	35.22	−75.64	1.056	0.412	3.2	1983–2001	0.542	0.832	1.212
	44619	8654467	USCG Hatteras, NC	35.21	−75.70	0.186	0.598	3.2	1983–2001	0.507	0.806	1.177
	44259	8656483	Beaufort, NC	34.72	−76.67	1.079	0.362	3.8	1983–2001	0.543	0.832	1.213
	44258	8658120	Wilmington, NC	34.23	−77.95	1.427	0.327	2.3	1983–2001	0.557	0.843	1.227
	44258	8658163	Wrightsville Beach, NC	34.21	−77.79	1.366	0.564	3.2	1983–2001	0.555	0.841	1.225
	43898	8661070	Springmaid Pier, SC	33.66	−78.92	1.707	0.493	2.9	1983–2001	0.568	0.851	1.238
	43897	8662245	Oyster Landing, SC	33.35	−79.19	1.561	0.496	3.2	1983–2001	0.562	0.847	1.232
	43538	8665530	Charleston, SC	32.78	−79.93	1.757	0.453	3.3	1983–2001	0.570	0.853	1.240
	43537	8670870	Fort Pulaski, GA	32.03	−80.90	2.287	0.500	3.3	1983–2001	0.591	0.869	1.261
	42818	8720030	Fernandina Beach, FL	30.67	−81.47	1.999	0.473	2.3	1983–2001	0.580	0.860	1.250
	42818	8720218	Mayport, FL	30.40	−81.43	1.508	0.378	2.6	1983–2001	0.557	0.842	1.227
	42818	8720357	St Johns River, FL	30.19	−81.69	0.312	0.333	3.2	1983–2001	0.512	0.809	1.182
	42459	8720587	St. Augustine Beach, FL	29.86	−81.26	1.569	0.531	3.2	1983–2001	0.563	0.847	1.233
	42101	8721604	Trident Pier, FL	28.42	−80.59	1.193	0.407	5.1	1983–2001	0.537	0.825	1.207
	41024	8723214	Virginia Key, FL	25.73	−80.16	0.667	0.317	5.1	1983–2001	0.518	0.811	1.188
	40664	8723970	Vaca Key, FL	24.71	−81.11	0.297	0.249	4.2	1983–2001	0.512	0.809	1.182
	40664	8724580	Key West, FL	24.56	−81.81	0.551	0.262	2.5	1983–2001	0.522	0.817	1.192

Table A1.3 (cont.): Regional designation, tide gauge information, extreme water level metadata, and high tide flood heights.

US Region	EWL Grid No.	NOAA ID	Location	Latitude	Longitude	Tide Range (m)	Flood Index u (m, MHHW)	u Trend (mm/yr)	Epoch of u	Minor Flood (m, MHHW)	Moderate Flood (m)	Major Flood (m)
E. Gulf	41382	8725110	Naples, FL	26.13	−81.81	0.875	0.323	2.9	1983–2001	0.535	0.826	1.205
	41382	8725520	Fort Myers, FL	26.65	−81.87	0.401	0.325	3.1	1983–2001	0.516	0.812	1.186
	41740	8726384	Port Manatee, FL	27.64	−82.56	0.669	0.260	6.6	1983–2001	0.527	0.820	1.197
	41740	8726520	St Petersburg, FL	27.76	−82.63	0.688	0.337	2.8	1983–2001	0.528	0.821	1.198
	41740	8726607	Old Port Tampa, FL	27.86	−82.55	0.749	0.304	3.2	1983–2001	0.530	0.822	1.200
	41740	8726667	Mckay Bay Entrance, FL	27.91	−82.43	0.814	0.320	3.2	1983–2001	0.533	0.824	1.203
	41740	8726724	Clearwater Beach, FL	27.98	−82.83	0.841	0.294	7.1	1983–2001	0.540	0.831	1.210
	42457	8727520	Cedar Key, FL	29.14	−83.03	1.157	0.415	2.2	1983–2001	0.546	0.835	1.216
	42456	8728690	Apalachicola, FL	29.73	−84.98	0.492	0.390	3.0	1983–2001	0.520	0.815	1.190
	42814	8729108	Panama City, FL	30.15	−85.67	0.409	0.368	2.5	1983–2001	0.516	0.812	1.186
	42814	8729210	Panama City Beach, FL	30.21	−85.88	0.420	0.348	4.3	1983–2001	0.517	0.813	1.187
	42812	8729840	Pensacola, FL	30.40	−87.21	0.383	0.345	2.4	1983–2001	0.515	0.811	1.185
	42812	8732828	Mobile Bay, AL	30.42	−87.83	0.490	0.519	4.3	1983–2001	0.520	0.815	1.190
	42811	8735180	Dauphin Island, AL	30.25	−88.08	0.367	0.354	4.3	1983–2001	0.512	0.808	1.182
	42811	8736897	Mobile, AL	30.65	−88.06	0.517	0.535	4.3	1983–2001	0.521	0.816	1.191
	42811	8737048	Mobile State Docks, AL	30.71	−88.04	0.501	0.439	4.3	1983–2001	0.520	0.815	1.190
	42811	8741533	Pascagoula NOAA Lab, MS	30.37	−88.56	0.466	0.494	4.3	1983–2001	0.519	0.814	1.189
	42810	8747437	Bay Waveland Yacht Club, MS	30.33	−89.33	0.529	0.498	4.6	1983–2001	0.522	0.816	1.192

Table A1.3 (cont.): Regional designation, tide gauge information, extreme water level metadata, and high tide flood heights.

US Region	EWL Grid No.	NOAA ID	Location	Latitude	Longitude	Tide Range (m)	Flood Index u (m, MHHW)	u Trend (mm/yr)	Epoch of u	Minor Flood (m, MHHW)	Moderate Flood (m)	Major Flood (m)
W. Gulf	42092	8760922	Pilots Station East, SW Pass, LA	28.93	−89.41	0.356	0.399	4.3	2012–2016	0.514	0.811	1.184
	42451	8761724	Grand Isle, LA	29.26	−89.96	0.323	0.309	7.8	2012–2016	0.428	0.725	1.098
	42809	8761927	New Canal Station, LA	30.03	−90.11	0.164	0.485	5.6	1983–2001	0.507	0.805	1.177
	42450	8762075	Port Fourchon, LA	29.11	−90.20	0.368	0.298	4.3	2012–2016	0.515	0.811	1.185
	42449	8764227	Amerada Pass, LA	29.45	−91.34	0.487	0.535	4.3	1983–2001	0.519	0.815	1.189
	42449	8765251	Cypremort Point, LA	29.71	−91.88	0.518	0.458	4.3	1983–2001	0.521	0.816	1.191
	42448	8766072	Freshwater Canal Locks, LA	29.56	−92.31	0.657	0.696	4.3	1983–2001	0.526	0.820	1.196
	42806	8767816	Lake Charles, LA	30.22	−93.22	0.427	0.494	4.3	1983–2001	0.517	0.813	1.187
	42447	8768094	Calcasieu Pass, LA	29.77	−93.34	0.589	0.465	6.1	1983–2001	0.524	0.818	1.194
	42447	8770570	Sabine Pass North, TX	29.73	−93.87	0.488	0.368	6.1	1983–2001	0.520	0.815	1.190
	42446	8770613	Morgans Point, TX	29.68	−94.99	0.398	0.488	3.1	1983–2001	0.535	0.831	1.205
	42446	8771013	Eagle Point, TX	29.48	−94.92	0.338	0.331	13.8	1983–2001	0.494	0.790	1.164
	42446	8771341	Galveston Bay Entrance, TX	29.36	−94.72	0.510	0.499	6.1	1983–2001	0.520	0.815	1.190
	42446	8771450	Galveston Pier 21, TX	29.31	−94.79	0.429	0.366	6.5	1983–2001	0.517	0.813	1.187
	42446	8771510	Galveston Pleasure Pier, TX	29.29	−94.79	0.622	0.425	6.5	1983–2001	0.525	0.819	1.195
	42086	8772440	Freeport, TX	28.95	−95.31	0.536	0.391	9.0	1983–2001	0.521	0.816	1.191
	42086	8772447	USCG Freeport, TX	28.94	−95.30	0.549	0.460	6.1	1983–2001	0.522	0.816	1.192
	42084	8774770	Rockport, TX	28.02	−97.05	0.111	0.336	5.7	2002–2006	0.504	0.803	1.174
	41725	8775870	Corpus Christi, TX	27.58	−97.22	0.497	0.391	4.8	1983–2001	0.529	0.824	1.199
	41366	8779770	Port Isabel, TX	26.06	−97.22	0.418	0.337	4.0	1983–2001	0.517	0.813	1.187

Table A1.3 (cont.): Regional designation, tide gauge information, extreme water level metadata, and high tide flood heights.

US Region	EWL Grid No.	NOAA ID	Location	Latitude	Longitude	Tide Range (m)	Flood Index u (m, MHHW)	u Trend (mm/yr)	Epoch of u	Minor Flood (m, MHHW)	Moderate Flood (m)	Major Flood (m)
SW	43500	9410170	San Diego, CA	32.71	−117.17	1.745	0.490	2.2	1983–2001	0.570	0.852	1.240
	43500	9410230	La Jolla, CA	32.87	−117.26	1.624	0.468	2.1	1983–2001	0.565	0.849	1.235
	43858	9410660	Los Angeles, CA	33.72	−118.27	1.674	0.472	1.0	1983–2001	0.567	0.850	1.237
	44217	9410840	Santa Monica, CA	34.01	−118.50	1.654	0.489	1.8	1983–2001	0.566	0.850	1.236
	44216	9411340	Santa Barbara, CA	34.41	−119.69	1.645	0.485	0.6	1983–2001	0.566	0.849	1.236
	44574	9412110	Port San Luis, CA	35.18	−120.76	1.623	0.449	1.0	1983–2001	0.565	0.849	1.235
	44932	9413450	Monterey, CA	36.61	−121.89	1.627	0.431	1.6	1983–2001	0.565	0.849	1.235
	45290	9414290	San Francisco, CA	37.81	−122.47	1.780	0.375	1.9	1983–2001	0.571	0.853	1.241
	45290	9414523	Redwood City, CA	37.51	−122.21	2.501	0.400	2.7	1983–2001	0.600	0.875	1.270
	45290	9414750	Alameda, CA	37.77	−122.30	2.010	0.411	0.4	1983–2001	0.580	0.860	1.250
	45290	9414863	Richmond, CA	37.93	−122.40	1.846	0.359	3.1	1983–2001	0.574	0.855	1.244
	45290	9415020	Point Reyes, CA	38.00	−122.98	1.758	0.447	2.1	1983–2001	0.570	0.853	1.240
	45649	9415144	Port Chicago, CA	38.06	−122.04	1.498	0.388	1.4	1983–2001	0.560	0.845	1.230
	45648	9416841	Arena Cove, CA	38.91	−123.71	1.787	0.500	0.6	1983–2001	0.573	0.856	1.243
	46365	9418767	North Spit, CA	40.77	−124.22	2.090	0.491	4.8	1983–2001	0.584	0.863	1.254
	46724	9419750	Crescent City, CA	41.75	−124.18	2.095	0.548	-0.8	1983–2001	0.584	0.863	1.254
	47083	9431647	Port Orford, OR	42.74	−124.50	2.220	0.594	0.2	1983–2001	0.572	0.850	1.242
	47442	9432780	Charleston, OR	43.35	−124.32	2.323	0.586	1.1	1983–2001	0.593	0.870	1.263
	47801	9435380	South Beach, OR	44.63	−124.04	2.543	0.579	1.7	1983–2001	0.602	0.876	1.272
	48161	9437540	Garibaldi, OR	45.55	−123.92	2.536	0.597	2.4	1983–2001	0.601	0.876	1.271
	48520	9439040	Astoria, OR	46.21	−123.77	2.624	0.629	−0.2	1983–2001	0.605	0.879	1.275

Table A1.3 (cont.): Regional designation, tide gauge information, extreme water level metadata, and high tide flood heights.

US Region	EWL Grid No.	NOAA ID	Location	Latitude	Longitude	Tide Range (m)	Flood Index u (m, MHHW)	u Trend (mm/yr)	Epoch of u	Minor Flood (m, MHHW)	Moderate Flood (m)	Major Flood (m)
NW	48520	9440910	Toke Point, WA	46.71	−123.97	2.720	0.807	0.6	1983–2001	0.609	0.882	1.279
	48519	9441102	Westport, WA	46.90	−124.11	2.786	0.670	1.9	1983–2001	0.611	0.884	1.281
	48878	9442396	La Push, WA	47.91	−124.64	2.577	0.766	1.9	1983–2001	0.603	0.877	1.273
	49237	9443090	Neah Bay, WA	48.37	−124.61	2.425	0.688	−1.7	1983–2001	0.597	0.873	1.267
	49238	9444090	Port Angeles, WA	48.13	−123.44	2.153	0.562	0.2	1983–2001	0.586	0.865	1.256
	49239	9444900	Port Townsend, WA	48.11	−122.76	2.597	0.538	1.7	1983–2001	0.604	0.878	1.274
	48880	9446484	Tacoma, WA	47.27	−122.41	3.595	0.517	3.4	1983–2001	0.644	0.908	1.314
	48880	9447130	Seattle, WA	47.60	−122.34	3.462	0.541	2.1	1983–2001	0.639	0.904	1.309
	49239	9449424	Cherry Point, WA	48.86	−122.76	2.788	0.585	0.4	1983–2001	0.612	0.884	1.282
	49238	9449880	Friday Harbor, WA	48.55	−123.01	2.364	0.554	1.2	1983–2001	0.595	0.871	1.265
Alaska	51743	9450460	Ketchikan, AK	55.33	−131.63	4.708	1.086	−0.4	1983–2001	2.059	2.359	2.759
	52099	9451054	Port Alexander, AK	56.25	−134.65	3.329	0.738	−5.8	1983–2001	1.031	1.331	1.731
	52457	9451600	Sitka, AK	57.05	−135.34	3.029	0.768	−2.4	1983–2001	0.883	1.183	1.583
	52817	9452210	Juneau, AK	58.30	−134.41	4.970	1.152	−15.1	2012–2016	2.319	2.619	3.019
	53175	9452400	Skagway, AK	59.45	−135.33	5.100	1.218	−19.9	2012–2016	2.456	2.756	3.156
	52815	9452634	Elfin Cove, AK	58.19	−136.35	3.360	1.149	−5.8	1983–2001	1.048	1.348	1.748
	53171	9453220	Yakutat, Yakutat Bay, AK	59.55	−139.73	3.070	0.891	−10.7	2012–2016	0.902	1.202	1.602
	53524	9454050	Cordova, AK	60.56	−145.75	3.838	0.937	0.8	1983–2001	1.344	1.644	2.044
	53882	9454240	Valdez, AK	61.13	−146.36	3.702	0.878	−5.8	1983–2001	1.253	1.553	1.953
	53520	9455090	Seward, AK	60.12	−149.43	3.238	0.884	−4.0	1983–2001	0.983	1.283	1.683
	53159	9455500	Seldovia, AK	59.44	−151.72	5.499	1.350	−9.8	2012–2016	2.906	3.206	3.606
	53518	9455760	Nikiski, AK	60.68	−151.40	6.262	1.254	−9.9	2012–2016	NaN	NaN	NaN
	53879	9455920	Anchorage, AK	61.24	−149.89	8.889	1.269	−2.7	1983–2001	NaN	NaN	NaN
	52440	9457292	Kodiak Island, AK	57.73	−152.51	2.675	0.715	−9.2	2012–2016	0.743	1.043	1.443

Table A1.3 (cont.): Regional designation, tide gauge information, extreme water level metadata, and high tide flood heights.

US Region	EWL Grid No.	NOAA ID	Location	Latitude	Longitude	Tide Range (m)	Flood Index u (m, MHHW)	u Trend (mm/yr)	Epoch of u	Minor Flood (m, MHHW)	Moderate Flood (m)	Major Flood (m)
Alaska (cont.)	52079	9457804	Alitak, AK	56.90	−154.25	3.578	0.908	−5.8	2012–2016	1.174	1.474	1.874
	51714	9459450	Sand Point, AK	55.34	−160.50	2.204	0.737	1.4	1983–2001	0.615	0.915	1.315
	51712	9459881	King Cove, AK	55.06	−162.33	2.082	0.753	−5.8	1983–2001	0.592	0.892	1.292
	50262	9461380	Adak Island, AK	51.86	−176.63	1.131	NaN	NaN	NaN	0.572	0.872	1.272
	50623	9461710	Atka, AK	52.23	−174.17	1.041	0.424	−5.8	1983–2001	0.584	0.884	1.284
	50629	9462450	Nikolski, AK	52.94	−168.87	1.213	0.537	−5.8	1983–2001	0.563	0.863	1.263
	50990	9462620	Unalaska, AK	53.88	−166.54	1.098	NaN	NaN	NaN	0.576	0.876	1.276
	51714	9463502	Port Moller, AK	55.99	−160.57	3.175	0.697	−5.8	1983–2001	0.952	1.252	1.652
	52422	9464212	Village Cove, AK	57.13	−170.29	1.005	NaN	NaN	NaN	0.589	0.889	1.289
	54940	9468756	Nome, AK	64.50	−165.43	0.464	NaN	NaN	NaN	0.719	1.019	1.419
	56018	9491094	Red Dog Dock, AK	67.58	−164.07	0.269	NaN	NaN	NaN	0.787	1.087	1.487
	57111	9497645	Prudhoe Bay, AK	70.40	−148.53	0.214	NaN	NaN	NaN	0.808	1.108	1.508
Carib	38168	9751364	St. Croix, VI	17.75	−64.71	0.226	0.205	2.4	1983–2001	0.509	0.807	1.179
	38527	9751381	St. John, VI	18.32	−64.72	0.252	0.210	2.4	1983–2001	0.510	0.808	1.180
	38168	9751401	Lime Tree Bay, VI	17.69	−64.75	0.216	0.154	3.0	1983–2001	0.509	0.806	1.179
	38527	9751639	Charlotte Amalie, VI	18.34	−64.92	0.240	0.172	2.3	1983–2001	0.510	0.807	1.180
	38526	9752695	Vieques Island, PR	18.09	−65.47	0.225	0.190	2.4	1983–2001	0.509	0.807	1.179
	38525	9755371	San Juan, PR	18.46	−66.12	0.481	0.191	2.4	1983–2001	0.519	0.814	1.189
	38165	9759110	Magueyes Island, PR	17.97	−67.05	0.204	0.157	1.9	1983–2001	0.508	0.806	1.178
	38524	9759938	Mona Island, PR	18.09	−67.94	0.247	0.257	2.4	1983–2001	0.510	0.807	1.180

Section A2: Methods Appendix: Extreme Water Levels and Alaska Coastal Flood Height

A2.1: Data and Regional Frequency Analysis

A regional frequency analysis (RFA) of NOAA tide gauges is used to estimate extreme water levels (EWLs) along U.S. coastlines at and away from tide gauges. The RFA method (Hosking and Wallis, 1997) is based on the assumption that similar physical forcing across a region will produce a similar frequency of events and a probability density up to a local index (u), which is a local scaling factor that captures response peculiarities (Dalrymple, 1960). An RFA uses regional sets of data that have been locally normalized by their respective local index with a statistical heterogeneity test (H value) to assess the extent that the data are sufficiently similar. Using statistical L-moments, heterogeneity is a measure of the variation between sites of a location's summary distribution statistics and the amount of dispersion expected if the locations were indeed a homogeneous region (Hosking and Wallis, 1997). If $H < 1$, the region is considered acceptably homogeneous. If $1 \leq H < 2$, the region is considered possibly heterogeneous but acceptable for our study. If $H \geq 2$, then the tide-gauge group is definitely heterogeneous and not suitable for analysis. Once the regional bounds are established whose data are acceptably homogeneous, the aggregated data are fit with an extreme value distribution.

This study uses hourly and "top ten" data from all NOAA tide gauges[46] with at least 10 years of record (Figure A2.1). Water levels are put onto the mean higher high water (MHHW) tidal datum and detrended (the trend value is retained and shown in Table A1.3) relative to the midpoint of the current national datum tidal epoch (1983–2001), which is similar for NOAA EWL procedures using a single-gauge analysis (Zervas, 2013; Extreme Water Levels[47]). From the datasets, daily highest water levels are picked and declustered at each tide gauge using a 4-day storm window to ensure event independence. The 98th percentile of the

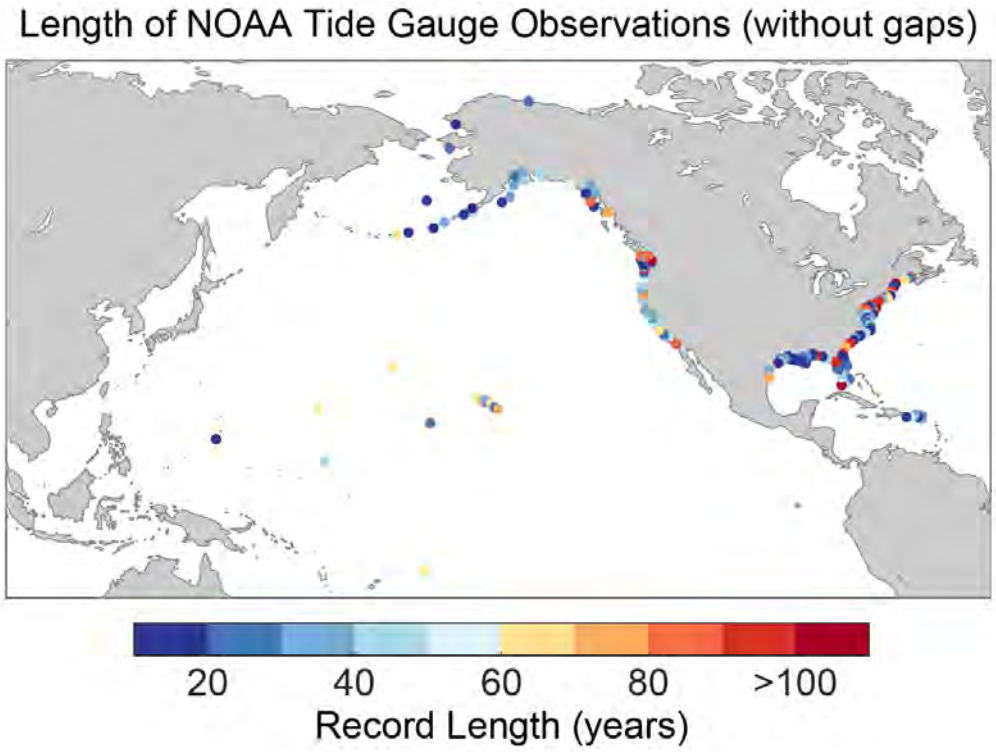


Figure A2.1: NOAA tide gauges used in the regional frequency analysis to generate extreme water level probabilities for U.S. coastlines.

[46] https://tidesandcurrents.noaa.gov/
[47] https://tidesandcurrents.noaa.gov/est/

declustered daily highest levels at each tide gauge is used as the local index (u) to normalize the data for the RFA process.

To form regions, the tide-gauge data is aggregated across a 400 km radius, similar to methods of Hall et al. (2016) but from the midpoint of a continuous set of coastline-intersecting 1-degree grids instead of site-specific installations. A maximum of 10 and a minimum of 3 tide gauges are included for each grid. Next, the regional data are spatially declustered with an additional 4-day event (i.e., storm) window to ensure that only the maximum water level within a region is retained (keep only the highest peak water levels for a particular event). Then, the statistical heterogeneity measure is estimated to ensure that the grouped tide-gauge data are sufficiently homogeneous (H < 2). In some instances, when a region surrounding a grid centroid

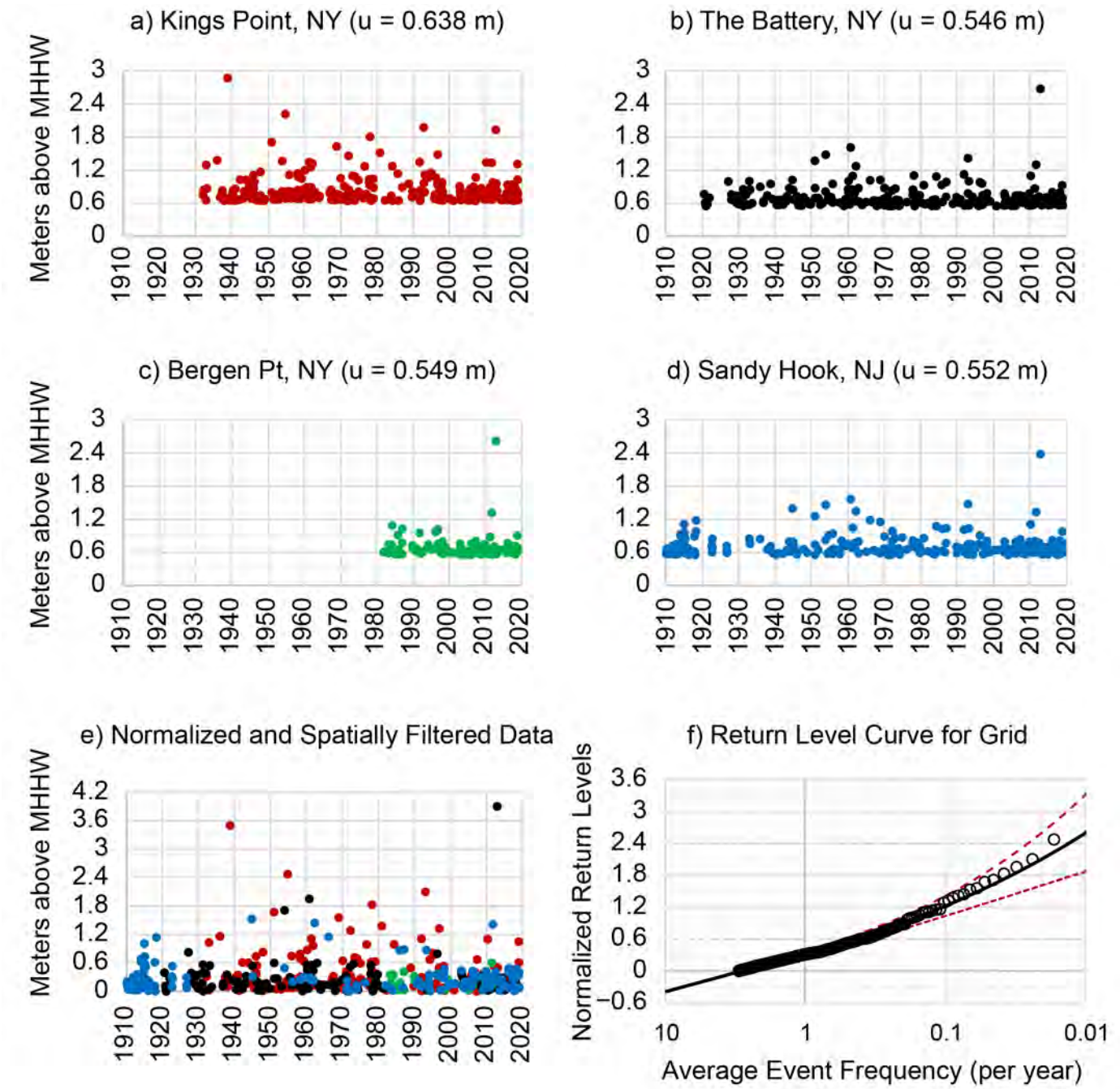


Figure A2.2: Example of data from grid number 46415 showing exceedances above each local index (u) relative to the 1983–2001 mean higher high water (MHHW) tidal datum at a) Kings Point, New York; b) The Battery, New York; c) Bergen Point, New York; and d) Sandy Hook, New Jersey, which are e) aggregated into a single dataset and f) fit by a Generalized Pareto Distribution to form a return level interval curve for the grid.

has H ≥ 2, tide gauges farthest away are sequentially dropped until homogeneity is achieved. In the end, all 1-degree grids along the contiguous United States (CONUS) had H < 2 (considered acceptably homogeneous) except a grid (number 48519) along the Northwest Pacific coastline, which, along with the Hawaiian and other U.S. Pacific Islands, uses the much larger physical-process regions identified and quantified in Sweet et al. (2020b). Grids along the Alaska coastline are fairly well resolved by the RFA except along the western and northern coasts.

An example is shown for grid number 46415, which is where the NOAA tide gauge at The Battery in New York City (NYC) is located (Figure A2.2). Four tide gauges are included in this grid (Kings Point, New York; The Battery, New York; Bergen Point, New York; and Sandy Hook, New Jersey [Figure A2.2a–d]), and their data are considered homogeneous (H value of 0.32). After the 4-day spatial filtering for events, each of the tide-gauge datasets is normalized by (divided by) its respective local index (u) value and aggregated as shown in Figure A2e.

A2.2: Gridded (Regional) Extreme Water Level Probabilities

With the tide gauges identified for each 1-degree grid, the aggregated and normalized datasets are fit with a Generalized Pareto Distribution (GPD; Coles, 2001). Using the penalized maximum likelihood method (Coles and Dixon, 1999; Frau et al., 2018; Sweet et al., 2020b), expected and 95% confidence interval (2.5th% and 97.5th% levels) values are estimated for the gridded EWL probabilities and defined as:

1)
$$G\,(Z;\,u,\alpha,\xi)\;=\;\lambda\left[1+\xi\left(\frac{z-u}{\alpha}\right)\right]^{-1/\xi}$$

where G is the exceedance probability (P[Z > z]), λ is the probability of an individual (normalized) observation exceeding the local index (u), α is the scale parameter, and ξ is the shape parameter. It is assumed that the distribution of the number of exceedances per year follows a Poisson distribution and that the return level for an EWL of height (Z) is given by:

2)
$$Z_N = u + \frac{\alpha}{\xi}\left[\left(Nn_y\lambda\right)^{\xi} - 1\right]$$

where N is the average recurrence interval (referred to in this study as the average event frequency, which is the reciprocal value), n_y is number of days per year (365.25), and λ is the average number of event exceedances per year (about 3 on average across all tide gauges in the study). To estimate EWLs with return levels with a 10 events/year frequency, we extrapolate the gridded GPD model with a logarithmic fit for return levels between the 0.5–3 events/year frequencies. A return level interval curve fit to the aggregated data (Figure A2.2e) for the grid where NYC is located is shown in Figure A2.2f.

A2.3: Localized Extreme Water Level Probabilities

When fitting a GPD to the RFA of aggregated tide-gauge data, the local EWL (EWL_{local}) probabilities including the model of expected values and their 95% confidence interval at a particular location are given as

3)
$$EWL_{local} = EWL_{gridded} * u_{local} + u_{local}$$

where $EWL_{gridded}$ is the gridded return level for a particular coastal 1-degree grid and u_{local} is the local index used in both the RFA and GPD processes. The value of u is a height (98th percentile of 4-day event filtered daily highest water level) above the local MHHW tidal datum for the current (1983–2001) national tidal datum epoch (NTDE) or for a modified 5-year epoch. The associated uncertainty of the $EWL_{gridded}$ estimated during the RFA is expressed as $\sigma_{gridded.}$ When localized at a tide gauge used in the formulation of the grids (see Figure A1), u is assumed to have no uncertainty. However, just as the location parameters in generalized extreme value (GEV) have time-dependent characteristics (Menéndez and Woodworth, 2010), it is recognized that u would experience similar behavior, but that is not quantified in this study.

In this RFA framework, it is possible to estimate EWL_{local} from the $EWL_{gridded}$ probabilities (expected values and 95% confidence interval) through the use of other sources of data. Specifically, the local indices needed to localize the $EWL_{gridded}$ values can either be 1) obtained from short-term tide-gauge data (or by targeted deployments) within a particular grid that is not included in the RFA formulation (<10 years; Figure A2.3) or 2) based on an underlying relationship between regional sets of local index (u) values and tide range available from, for example, NOAA VDatum.[48] In both cases, we establish large U.S. coastal regions (note: these are slightly different than the regions discussed in Sections 2 and 3 of the report and shown in Figure A1.1) that encompass several 1-degree grids to quantify information needed to obtain local indices and/or estimate variance/uncertainties (e.g., RMSE). These alternative methods, which are discussed below, may be of interest to coastal communities that are not co-located to a tide gauge used in this study but have predictions of tide range or have access to or are planning temporary tide-gauge installations to establish tidal datums and/or EWLs.

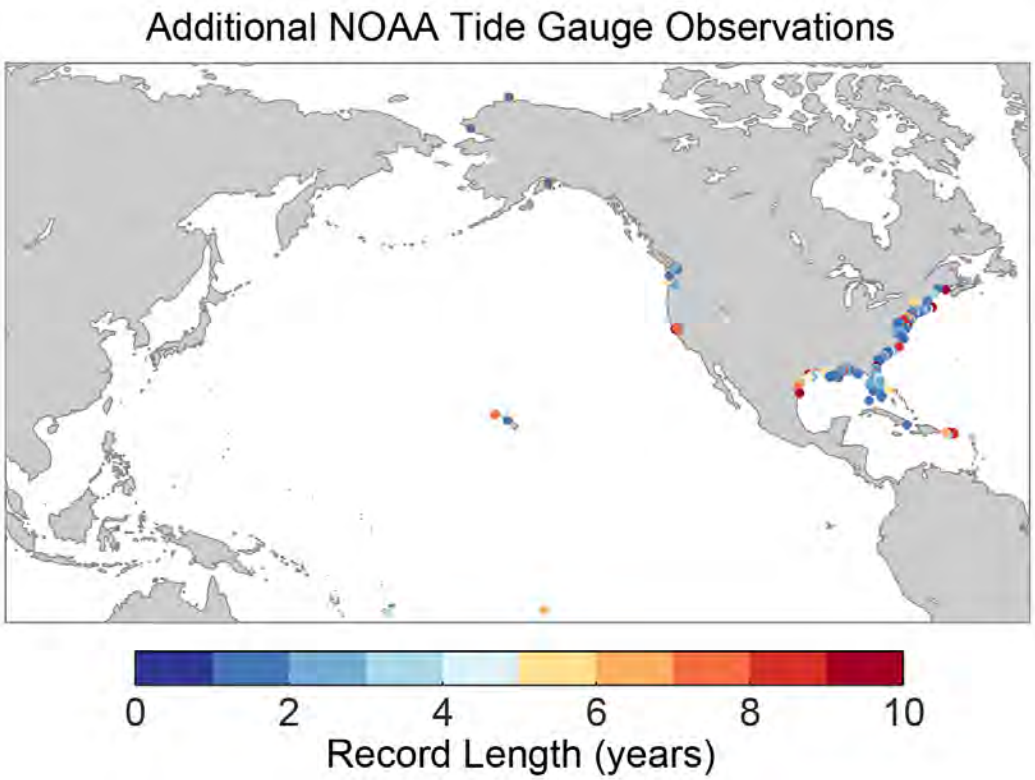


Figure A2.3: Additional tide-gauge data available from NOAA that can be used to localize the 1-degree gridded set of regional frequency analysis-based extreme water level probabilities. See https://tidesandcurrents.noaa.gov/.

A2.3.1: Local Index Estimates from Short-Term Installations

When other sets of tide/water level data are available, a local index can be directly estimated to obtain EWL_{local} probabilities from the $EWL_{gridded}$ probabilities. The first step for using data that are not from NOAA would be to estimate a local MHHW tidal datum using, for example, NOAA's online datum tool.[49] Following Equation 3 above, there will be some uncertainty in the local index value that is dependent on record length (e.g., 1–10 years). To account for short-record uncertainty in the local indices (u), RMSE (1 standard error) is estimated for regional estimates of u for the tide gauges used in the RFA (see Figure A2.1). Root mean square error is estimated using a logarithmic fit over a 19-year record length (Figure A4). To compute the RMSE, the maximum absolute differences are computed between u derived over the entire record and for progressively longer consecutive record lengths between 2001 and 2019 at each tide gauge (e.g., 19 discrete 1-year

[48] https://vdatum.noaa.gov/
[49] https://access.co-ops.nos.noaa.gov/datumcalc/

records; 18 consecutive 2-year records). The maximum (absolute) difference is used to account for interannual variability that can be significant (e.g., during phases of El Niño–Southern Oscillation [ENSO]). This difference is considered the error in estimating u for shorter records, and the average of the absolute differences across the regional set of tide gauges is considered the bias. The standard deviation of the absolute differences is also computed across all tide gauges, and an estimate of the RMSE is then computed as the square

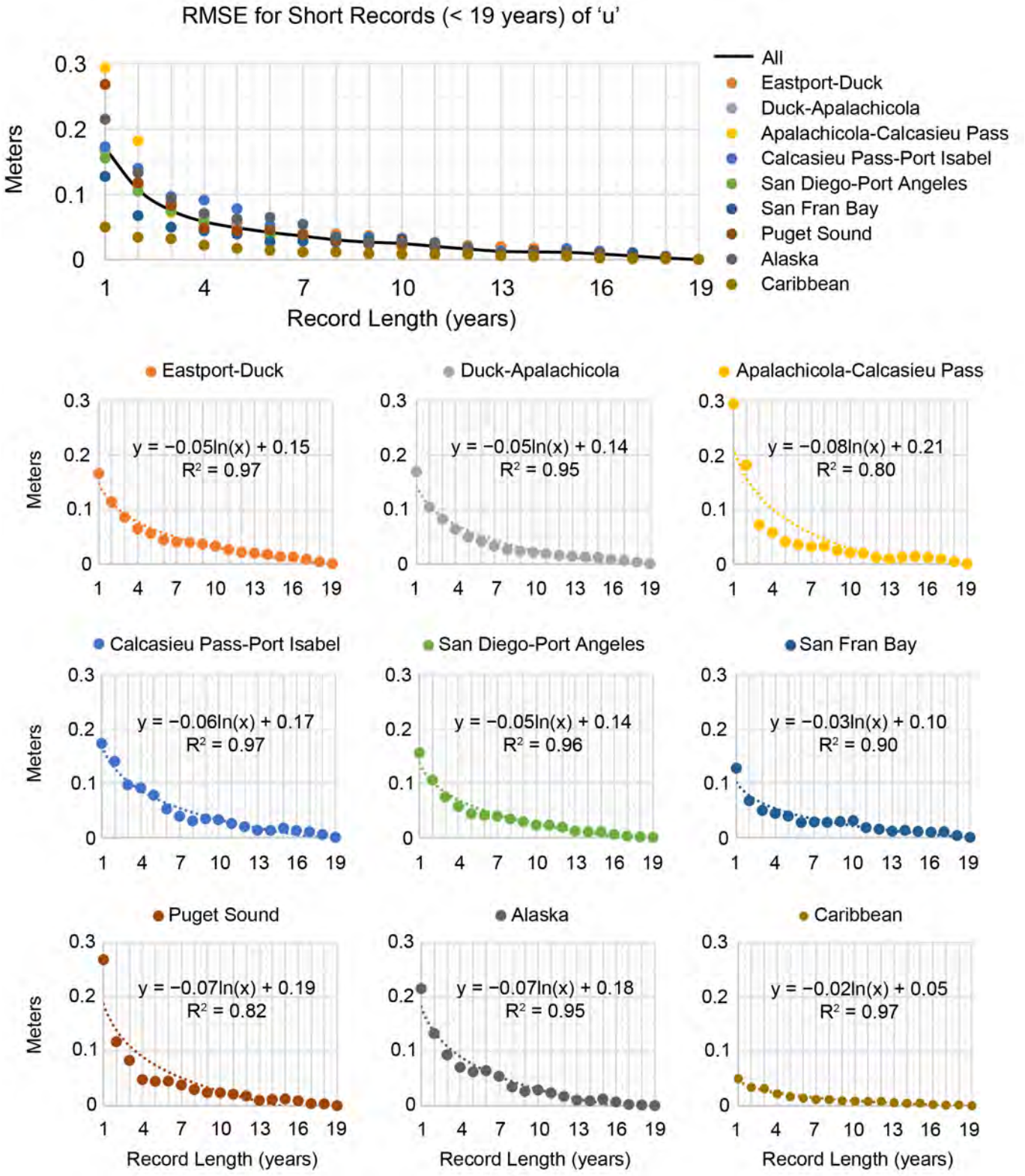


Figure A2.4: Root mean square error for regional estimates of flood indices (u) based on 1–19 years of consecutive data over the 2001–2019 period, based on regional sets of tide gauges used in this study. Note: these regions are not the same as those shown in Figure A1.1 and used to describe results in Sections 2 and 3 of the report.

root of the sum of the square of the bias and the standard deviation (variance). The estimates for Hawaiian and U.S. Pacific Islands follow estimates of Sweet et al. (2020b).

A2.3.2: Obtaining a Local Index from Tide Range Information

Another method to obtain an estimate of a local index (u) and its uncertainty is based on a dependency (correlation) that exists with tide range (great diurnal [GT]) along most coastal regions similar to findings of Merrifield et al. (2013). In essence, tide range (GT), which represents the spread between MHHW and mean lower low water (MLLW), partially quantifies the variance of the daily highest water level distribution and the height of the local index u. Figure A2.5 illustrates the regression-based relationships between tide range and u along U.S. coastal regions (these are the same regions used in Figure A2.4). All regressions are significant above the 90% significance level (p values < 0.1) and applicable for the 1983–2001 tidal epoch. For the Hawaiian and U.S. Pacific Islands, the Pacific-wide regression of Sweet et al. (2020b) is used.

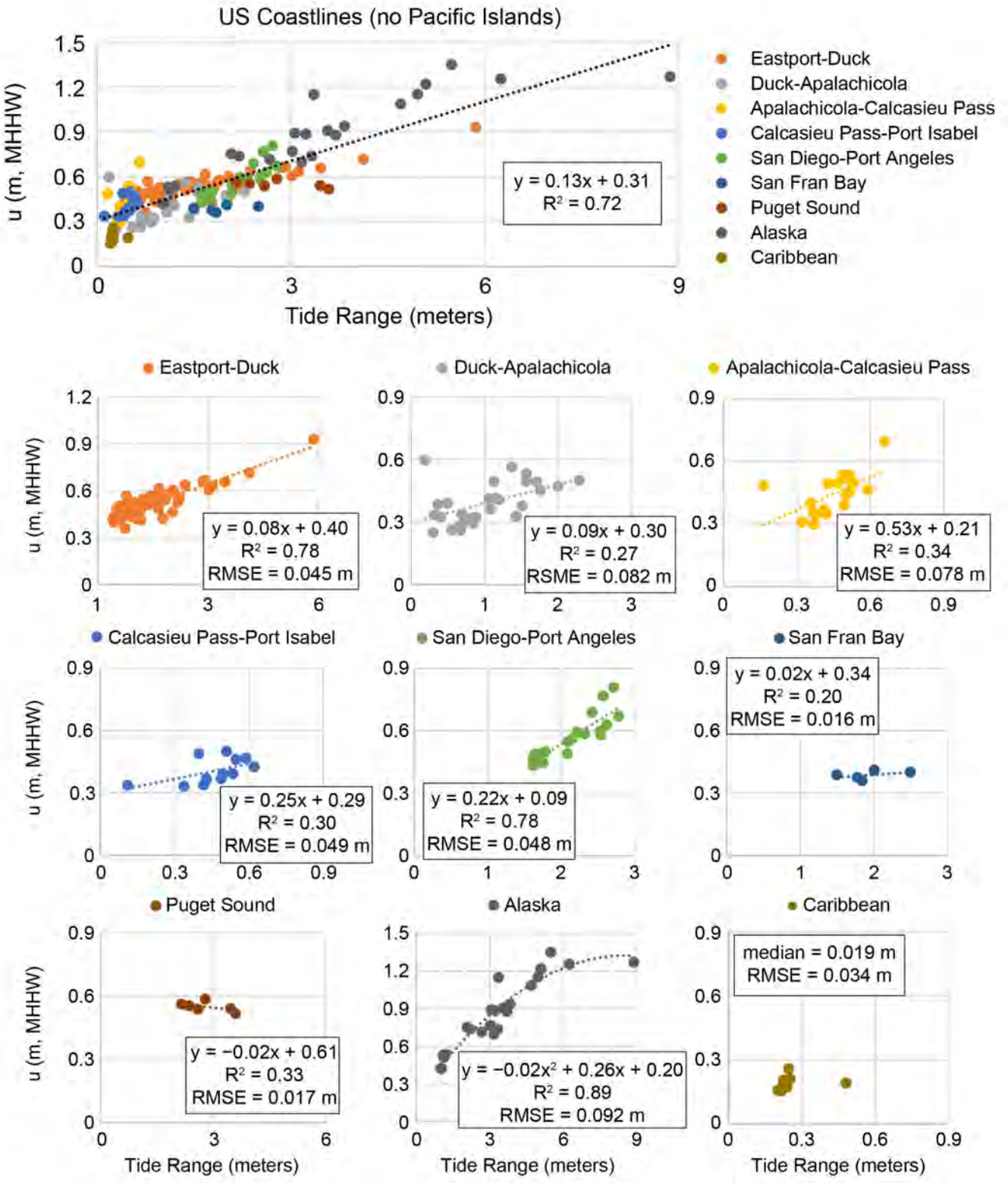


Figure A2.5: Tide range to local index (u) regressions with equations, goodness of fit (R^2), and root mean squared error (RMSE) shown by regions. Note: all local indices (u) are relative to the 1983–2001 tidal datum epoch. In the equations, y represents the local index (u) and x represents tide range.

A2.3.3: Uncertainties Using Alternative Methods to Estimate EWL_{local} Probabilities

When using either alternative method (tide range or short-record estimates) to obtain a local index (u), the uncertainty estimates of EWL_{local} probabilities will include additional uncertainty in u (σ_u). Following methods of Sweet et al. (2020b), it can be shown that

4) $$\sigma_{EWL(local)} = [(1 + \mu_{EWLgridded})^2 + \sigma^2_{EWLgridded}]\sigma_u^2 + \mu_u^2\sigma^2_{EWLgridded}$$

where $\mu_{EWLgridded}$ and μ_u are the expected values of the gridded return levels and the expected value of u, for example, estimated by the tide-range and u dependency (see Figure A2.5), respectively, σ_u^2 is the uncertainty inherent to any u-prediction relationship (e.g., RMSE). Thus, there is an additive uncertainty in u as estimated from this relationship, which would introduce additional uncertainty in estimates of EWL_{local}.

A2.3.4: Adjusting Local Extreme Water Level Probabilities to Time Periods

To adjust the EWL_{local} probabilities to a different sea level other than the current tidal epoch (e.g., from 1992 to 2000 or 2005 so as to apply the sea level rise scenarios), RSL estimates using the trends inherent to the hourly data used to compute the local index (u) should be applied (Table A1.3) to the epoch-specific EWL_{local} probabilities themselves. For tide gauges used in the RFA analysis and with more than 20 years of data, the local u trend can be used; otherwise, a median regional trend as defined in Figures A2.4 and A2.5 can be used. Alternatively, the RSL offsets derived from the regional observational RSL data (Table A1.2) could be used with differences between methods considered insignificant. For example, to estimate probabilities for the year 2000, the EWL_{local} probabilities values would be increased by an amount equal to the trend in u (or the median u trend value for the region) multiplied by 8 years (since 1992, which is the midpoint of the 1983–2001 epoch). The same procedure should be followed to adjust EWL_{local} probabilities for a given location estimated via the tide range regression (see Figure A5). In the case of a short-term estimate of u, similar procedures should be followed if local tidal datums have been computed and adjusted to the national tidal datum epoch (e.g., using the CO-OPS Tidal Analysis Datum Calculator[50]); in the case where no epoch can be established (see the CO-OPS Tidal Analysis Datum Calculator for guidance), then the measurements will be assumed to be referenced to the period of collection, and trend adjustment may be less straightforward.

A2.4: Alaska Coastal Flood Heights

To assess flood exposure, the coastal high tide flooding (HTF) heights of Sweet et al. (2018) are used for all U.S. coastlines outside of Alaska. Used in NOAA annual outlooks (e.g., Sweet et al., 2021; The State of High Tide Flooding and Annual Outlook[51]), these heights are a best-fit solution (regression) to the dozens of National Weather Service (NWS) emergency response warning thresholds established at many (but not all) NOAA tide gauges along the country's coastline. The NWS thresholds are used to communicate expected or ongoing coastal flood hazards to the public (NOAA, 2020), but often their depth-severity thresholds vary according to specific features near the tide gauge that affect both the associated flood frequency and the degree of broader vulnerabilities. Along the Alaska coastline, we follow the methodologies of Sweet et al. (2020b), who used a slight modification to assess "damaging flood heights" for the Pacific Basin coastlines. Here, the Alaska flood heights are based on a quadratic regression model using only Pacific Coast NWS minor flood heights and considered for only tide ranges below 6 meters (Figure A2.6a). To obtain moderate and major flood heights for Alaska, 0.3 m and 0.7 m are added to the regression, which is approximately the median difference between these heights and those for minor flooding along CONUS (Sweet et al., 2018). With flood heights defined nationally, minor, moderate, and major HTF are defined as occurring when water levels reach or exceed heights of about (median values) 0.55 m, 0.85 m, and 1.2 m above MHHW, respectively, and linearly vary with tide range (Figures A2.6b–d).

[50] https://access.co-ops.nos.noaa.gov/datumcalc/index.jsp
[51] https://tidesandcurrents.noaa.gov/HighTideFlooding_AnnualOutlook.html

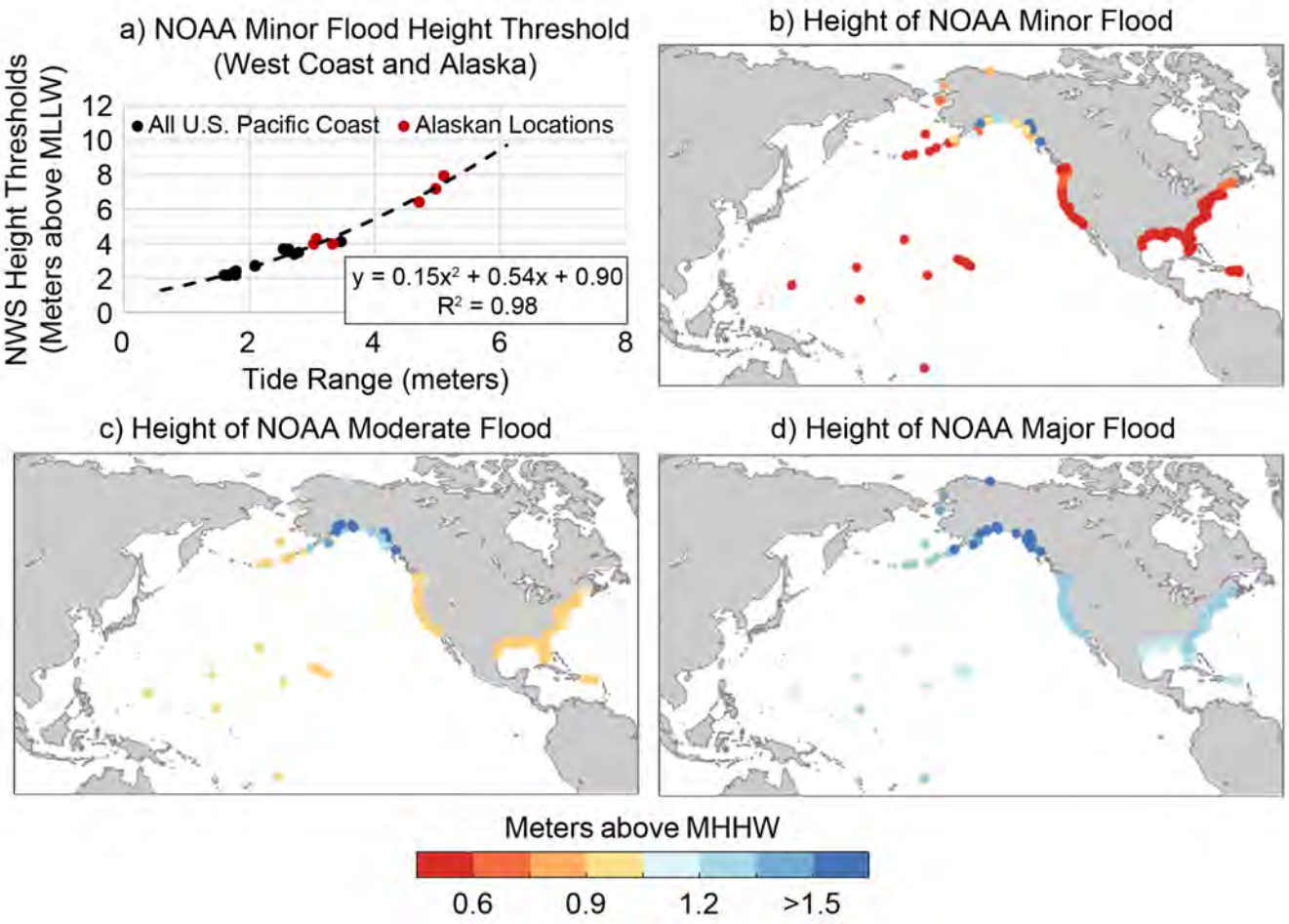


Figure A2.6: a) Quadratic regression of U.S. West Coast minor flood heights of NOAA's National Weather Service, following methods of Sweet et al. (2020b), to obtain a minor HTF definition for Alaska's coastline. The NOAA flood heights for b) minor, c) moderate, and d) major HTF are shown relative to mean higher high water.

8. Acronyms

Note: state abbreviations have been omitted

AIS: Antarctic ice sheet
AEF: average event frequency
AMOC: Atlantic meridional overturning circulation
AR5: [IPCC] Fifth Assessment Report
AR6: [IPCC] Sixth Assessment Report
ARI: average return interval
C: celsius
CDF: cumulative distribution function
cm: centimeter
CMIP5: Coupled Model Intercomparison Project Phase 5
CMIP6: Coupled Model Intercomparison Project Phase 6
CONUS: contiguous United States
CO-OPS: Center for Operational Oceanographic Products and Services
CoSMoS: Coastal Storm Modeling System
DRSL: Department of Defense Regional Sea Level [database]
ENSO: El Niño–Southern Oscillation
EPA: Environmental Protection Agency
EWL: extreme water level
FEMA: Federal Emergency Management Agency
FFRD: Future of Flood Risk Data
GCM: global climate model
GEV: generalized extreme value
GHG: greenhouse gas
GIA: glacial isostatic adjustment
GlacierMIP: Glacier Model Intercomparison Project
GMSL: global mean sea level
GPD: Generalized Pareto Distribution
GPS: Global Positioning System
GRD: gravitational, rotational, and deformational
GT: great diurnal tide range
HTF: high tide flood, flooding
HUC: hydrologic unit code
InSAR: Interferometric Synthetic Aperture Radar
IPCC: Intergovernmental Panel on Climate Change
ISMIP6: Ice Sheet Model Intercomparison Project for CMIP6
JPM–OS: joint probability method–optimal sampling [procedure]
LARMIP-2: Linear Antarctic Response Model Intercomparison Project [version 2]
m: meter
MHHW: mean higher high water
MICI: marine ice cliff instability
MLLW: mean lower low water
mm: millimeter
NASA: National Aeronautics and Space Administration
NAVD88: North American Vertical Datum of 1988
NCA: National Climate Assessment
NCA5: Fifth National Climate Assessment
NCA4: Fourth National Climate Assessment
NOAA: National Oceanic and Atmospheric Administration
NOC: National Ocean Council

NSRS: National Spatial Reference System
NTDE: national tidal datum epoch
NWS: National Weather Service
NYC: New York City
PDO: Pacific Decadal Oscillation
R^2: goodness of fit
RFA: regional frequency analysis
RMSE: root mean square error
RSL: relative sea level
SOST: Subcommittee on Ocean Sciences and Technology
SSP: Shared Socioeconomic Pathway
USACE: U.S. Army Corps of Engineers
USGCRP: U.S. Global Change Research Program
USGS: U.S. Geological Survey
VDatum: Vertical Datum Transformation
VLM: vertical land motion


NOAA
NASA
US Army Corps of Engineers
USGS
science for a changing world
RUTGERS
UNIVERSITY | NEW BRUNSWICK
FEMA
FIU
Institute of Environment
Florida International University

EARTHJUSTICE

December 23, 2022

Electronically Submitted & Emailed

Governor Josh Green, M.D.
State of Hawai'i
https://governor.hawaii.gov/contact-us/contact-the-governor

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Honoapi'ilani Highway Improvements
https://www.honoapiilanihwyimprovements.com/#stay-involved

Re: Honoapi'ilani Improvements, West Maui, Ukumehame to Launiupoko—EIS Preparation Notice

Dear Governor Green, Ms. Sullivan, and Mr. Yoshioka,

Earthjustice hereby submits public comments on the proposed Honoapi'ilani Highway Improvements, West Maui, Ukumehame to Launiupoko ("Project"), for which an Environmental Impact Statement Preparation Notice ("EISPN") was published in The Environmental Notice on November 23, 2022. As discussed below, federal and state law require that environmental review for the Project analyze the growth-inducing impacts of realigning and widening Honoapi'ilani Highway, including the potential for the Project to facilitate development along the new transportation corridor.

Background

In November 2015, notice of a final environmental impact statement ("FEIS") for the Olowalu Town Master Plan ("Olowalu Plan") was published in The Environmental Notice.[1] The FEIS

[1] Office of Environmental Quality Control, *The Environmental Notice* (Nov. 8, 2015) at 6-7, which can be viewed at https://files.hawaii.gov/dbedt/erp/The_Environmental_Notice/2015-11-08-TEN.pdf (last visited Dec. 21, 2022).

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was prepared pursuant to the Hawai'i Environmental Policy Act ("HEPA"), Hawai'i Revised Statutes ("HRS") chapter 343 by Olowalu Town, LLC, and Olowalu Ekolu, LLC. The Olowalu Plan proposed development of approximately 1,500 new single-family and multi-unit homes and associated infrastructure over a period of ten years.[2]

Earthjustice submitted testimony to the accepting agency—the Hawai'i Land Use Commission—urging the Commission to reject the FEIS for numerous legal flaws, including that because the Olowalu Plan appeared to be dependent upon the Hawai'i Department of Transportation's ("HDOT's") and the Federal Highway Administration's ("FHA's") plans to realign the Honoapi'ilani Highway, the FEIS should be coordinated with or include the environmental review documents that were being prepared for the proposed highway realignment.[3] At a public meeting before the Commission that included two full days of public testimony, the Project faced "fierce opposition" from a groundswell of community members.[4] Public opposition included concerns about further offshore degradation caused by construction runoff. Moreover, the Hawai'i Office of Planning opposed the project due to the FEIS's lack of a complete traffic impact analysis report.

The Commission voted 6-to-1 in favor of rejecting the FEIS.[5] The Commission noted that the FEIS's traffic impact assessment report was based on widening the Honoapi'ilani Highway, but it was unclear whether HDOT's and FHA's highway realignment project would involve widening.[6]

Seven years later, HDOT and FHA have resumed plans to realign the Honoapi'ilani Highway, including near Olowalu Town. Although one of the EISPN's stated objectives is to have "sufficient right-of-way width to accommodate a future four-lane facility throughout the project limits," the EISPN makes no mention of how any of the realignment routes and road widening under consideration could impact growth and development, including in Olowalu Town.

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[2] FEIS at 9. Volume I of the FEIS can be viewed at https://luc.hawaii.gov/wp-content/uploads/2015/10/FEIS-Vol-I-of-IV.October-2015_Part1.pdf (last visited Dec. 20, 2022).

[3] *See* Attachment: Earthjustice written testimony (Nov. 18, 2015) at 2, 5.

[4] *Olowalu town development faces fierce opposition*, Maui News (Nov. 19, 2015), https://www.mauinews.com/news/local-news/2015/11/olowalu-town-development-faces-fierce-opposition/ (last visited Dec. 20, 2022).

[5] Land Use Commission Meeting Minutes (Dec. 7, 2015) at 13. The LUC's meeting minutes can be viewed at https://files.hawaii.gov/luc/minutesofmtgs/2015/12072015kahului.pdf (last visited Dec. 20, 2022).

[6] Findings of Fact, Conclusions of Law, and Decision and Order Denying the Acceptance of a Final Environmental Impact Statement (Dec. 11, 2015) at 14. The LUC's Order can be viewed at (https://luc.hawaii.gov/wp-content/uploads/2015/10/A10-786-FOF-COL-DO-DENY-FEIS-ORDR.pdf (last visited Dec. 20, 2022).

The EIS Should Consider the Growth-Inducing Effects of Project Alternatives

The EISPN acknowledges that HDOT, in cooperation with FHA, will prepare for the Project a joint environmental impact statement ("EIS") under both the federal National Environmental Policy Act ("NEPA") and HEPA. Therefore, both NEPA and HEPA requirements apply to the Project. *See* Haw. Admin. R. § 11-200.1-31(5). Under both statutes, the EIS for the Project must analyze the growth-inducing indirect effects of facilitating development or other changes in the pattern of land use caused by increasing traffic capacity through the Project area and realigning the highway mauka. The EIS must specifically consider how realigning and widening the highway would allow for development in Olowalu Town along the lines of the development considered in the Olowalu Plan FEIS, discussed above.

NEPA regulations define "indirect effects" to include "growth inducing effects and other effects related to induced changes in the pattern of land use, population density and growth rate, and related effects" on the environment. 40 C.F.R. § 1508.1(g)(2). Where transportation infrastructure expansions have the potential to create additional demand, "agencies must analyze the impacts of the increased demand attributable to the [infrastructure project] as growth-inducing effects falling under [NEPA's] purview." *Barnes v. U.S. Dep't of Transp.*, 655 F.3d 1124, 1139 (9th Cir. 2011). In *Barnes*, the Ninth Circuit considered the "unique potential to create demand" presented by construction of an additional runway at an Oregon airport and concluded that NEPA required the EIS for the runway expansion to analyze growth-inducing indirect impacts "even if the stated purpose of the project is to increase safety and efficiency." *Id*. HDOT's proposed realignment of Honoapi'ilani Highway, which would double traffic capacity from two to four lanes in the project area,[7] and could facilitate development makai of the realigned highway, has the potential to create demand for residential and commercial development along the widened, realigned route, including in Olowalu Town. These potential growth-inducing effects should be analyzed in the Project's EIS.

Using language nearly identical to that in the NEPA regulations, HEPA's administrative rules also require analysis of indirect effects (also termed "secondary effects" or "secondary impacts"). Haw. Admin. R. § 11-200.1-2; *see also Kia'i Wai v. Dep't of Water*, 151 Hawai'i 442, 455, 517 P.3d 725, 738 (2022). In *Kia'i Wai*, the Hawai'i Supreme Court addressed the HEPA review process for a new water main that would substantially increase water transmission capacity and potentially lead to increased water use. *Id.* at 456, 517 P.3d at 739. The Court held that because the increased pipeline capacity would "facilitate additional water use," HEPA required analysis of these "reasonably foreseeable" additional uses. *Id.* at 458, 517 P.3d at 741. Citing *Barnes*, the Court observed that "the relief line upgrade [was] akin to replacing a two-lane road with a four-lane highway: even if the old road needed to be fixed anyway, that does not change the fact that the new highway adds additional capacity, nor does it alleviate the environmental impacts of the upgrade." *Id.* at 459, 517 P.3d at 742. Thus, HEPA requires HDOT to analyze the reasonably foreseeable growth-inducing effects of doubling traffic capacity through the Project area and realigning the highway mauka, including the potential for additional residential and

[7] EISPN at 13, 15.

commercial development along the expanded and realigned transportation infrastructure, such as in Olowalu Town.

In sum, under NEPA and HEPA, the scope of environmental review for the Project should encompass the indirect effects of realigning and widening Honoapi'ilani Highway, including the potential for the Project to induce growth and facilitate development, for each of HDOT's proposed alternatives. Please don't hesitate to contact me at mcleveland@earthjustice.org if you have any questions or would like to discuss this further.

Respectfully submitted,

/s/ Mahesh Cleveland
MAHESH CLEVELAND
Earthjustice

Attachment:

Earthjustice Testimony on Behalf of Maui Tomorrow Foundation Regarding the Final Environmental Impact Statement for the Olowalu Town Master Plan (Nov. 18, 2015)

EARTHJUSTICE

ALASKA CALIFORNIA FLORIDA MID-PACIFIC NORTHEAST NORTHERN ROCKIES
NORTHWEST ROCKY MOUNTAIN WASHINGTON, D.C. INTERNATIONAL

EDMUND ACZON, CHAIR
JONATHAN LIKEKE SCHEUER, VICE-CHAIR
STATE OF HAWAI'I LAND USE COMMISSION

TESTIMONY ON BEHALF OF MAUI TOMORROW FOUNDATION
REGARDING THE FINAL ENVIRONMENTAL IMPACT STATEMENT
FOR THE OLOWALU TOWN MASTER PLAN (DKT. NO. A10-786)

November 18, 2015 – 9:30 a.m.
Maui Arts & Cultural Center, Haynes Meeting Room

Aloha Chair Aczon and Commissioners:

My name is Summer Kupau-Odo, and I am an attorney in the Mid-Pacific office of Earthjustice, a national, non-profit, public interest environmental law firm. The Mid-Pacific office has been offering pro bono legal services in Hawai'i for over twenty-five years, and has represented dozens of environmental, Native Hawaiian, and community organizations in enforcing environmental laws. Earthjustice submits this testimony on behalf of its client Maui Tomorrow Foundation, and respectfully urges you to reject the final environmental impact statement submitted for the Olowalu Town Master Plan (FEIS).

The FEIS has numerous content inadequacies, which Maui Tomorrow Foundation and other concerned community groups and individuals will address. The scope of this testimony addresses a procedural violation of Hawai'i's environmental review laws: the absence of federal agency cooperation in the preparation of the FEIS.

The FEIS does not satisfy at least one of the three criteria for acceptability enumerated in Hawai'i Administrative Rule (HAR) § 11-200-23(b)(1). Pursuant to this rule, before this Commission may deem the FEIS acceptable, it must find that "[t]he procedures for . . . the preparation and submission of the statement . . . have all been completed satisfactorily as specified in [HAR chapter 11-200.]" HAR § 11-200-25(1) requires that when an action is subject to both the National Environmental Policy Act (NEPA), 42 U.S.C. § 4321 *et seq*., and the Hawai'i Environmental Policy Act (HEPA), Hawai'i Revised Statutes (HRS) chapter 343, the applicant "shall notify the responsible federal agency, the [Office of Environmental Quality Control], and any agency with a definite interest in the action (as prescribed by chapter 343, HRS) of the situation." Additionally, the same rule requires state agencies, such as this Commission, to "cooperate with federal agencies to the fullest extent possible to reduce duplication between federal and state requirements[,] . . . [including the preparation of] joint environmental impact statements with concurrent public review and processing at both levels of government." HAR § 11-200-25(2); HRS § 343-5(h) (requiring same).

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As discussed in further detail below, the Olowalu Town Master Plan is subject to several federal laws, and is dependent on federal actions that trigger environmental review under NEPA. Yet, there has been no coordination with federal agencies in the preparation of the EIS. The Olowalu Town FEIS is the product of a deficient process that violates HAR § 11-200-25, and, accordingly, this Commission cannot deem it acceptable pursuant to HAR § 11-200-23(b)(1).

The Olowalu Town Master Plan is Subject to Federal Environmental Review Under NEPA

A federal Clean Water Act permit is required.

Based on information in the FEIS, the Olowalu Town Master Plan cannot be implemented without a federal permit issued by the Army Corps of Engineers (the Army Corps or Corps), to discharge dredged or fill material into waters of the U.S., pursuant to section 404 of the Clean Water Act, 33 U.S.C. § 1344. On July 9, 2010, the Army commented on the environmental impact statement preparation notice and advised the applicant to submit a request for an approved jurisdictional determination for water bodies that fall within the project area (FEIS Vol. I). Robert Hobdy was commissioned to prepare an Aquatic Resource Survey, dated May 2011 (FEIS Vol. IV Appendix F1). Utilizing the Corps' approved jurisdictional determination form, Hobdy concluded that six aquatic features within the project area—Olowalu Stream, Kapa'iki Village Drainage Channel, Kapa'iki Fishpond, and three unnamed tributaries—constitute waters of the U.S. Based on Hobdy's analysis, before any of these areas can be dredged or filled, the applicant must obtain a section 404 permit. *See* 33 U.S.C. §§ 1311, 1344 (prohibiting the discharge of dredged or fill material into waters of the U.S. without a permit).

The Olowalu Town Master Plan proposes to construct a 160-foot wide bridge crossing at Olowalu Stream (FEIS p. 234), as part of a larger plan to relocate the Honoapi'ilani Highway mauka of its current location and through the applicant's land. Building such infrastructure in a water of the U.S. constitutes a discharge of fill material requiring a permit. *See* 33 C.F.R. § 323.2(f) ("The term discharge of fill material . . . generally includes . . . [p]lacement of fill that is necessary for the construction of any structure or infrastructure in a water of the United States; the building of any structure, infrastructure, or impoundment requiring rock, sand, dirt, or other material for its construction . . . .").

Overall, the Olowalu Town Master Plan proposes construction of 1,500 residential dwelling units, including houses, apartments, townhouses, cottages, farmsteads, in addition to stores, schools, parks, community centers, and all of the necessary infrastructure to support these improvements, including roadways, drainage systems, and a wastewater treatment facility with constructed wetlands. The applicant anticipates these construction activities will extend across 434 acres of the approximately 636 acres of the project site. (Carlsmith Ball letter, dated Nov. 9, 2015, p. 3.) Comparing the conceptual master plan map for alternative 1 in Figure

4 of the FEIS with the maps in Hobdy's reports showing the locations of the six jurisdictional waters, it appears the extensive construction under the master plan will occur across all six water bodies, not just Olowalu Stream. These construction activities will likely cause discharges of fill material into these waters. *See* 33 C.F.R. § 323.2(e)(2) ("Examples of such fill material include, but are not limited to: rock, sand, soil, clay, plastics, construction debris, wood chips, . . . and materials used to create any structure or infrastructure in the waters of the United States."). These activities may also cause discharge of dredged material, *i.e.*, "material that is excavated or dredged from waters of the United States." 33 C.F.R. § 323.2(c).

For instance, comparing Figure 4 with Hobdy's assessment of the Kapa'iki Fishpond, the Olowalu Town Master Plan proposes to remove the section of the Honoapi'ilani Highway that crosses the Kapa'iki Fishpond drainage pipe (which runs to the ocean). Such an extraction will likely cause the discharge of fill material, and, depending on what the applicant plans to do thereafter, possibly the discharge of dredged material, into the fishpond, as well as the ocean.

For all of these reasons, the applicant must secure a federal permit before commencing construction.

The need for a Section 404 permit triggers NEPA review.

The United States Court of Appeals for the Ninth Circuit has held that the issuance of a Section 404 permit constitutes a federal action triggering environmental review under NEPA. *See Save Our Sonoran, Inc. v. Flowers*, 408 F.3d 1113, 1121 (9th Cir. 2004) ("A section 404 permit issued by the Corps is a 'Federal action' to which NEPA applies."). This means that the Corps has an independent obligation to determine the potential impact of a project, and not just on the waters within the Corps' jurisdiction, but on the environment at large. *See id.* at 1122. *See also* C.F.R. Title 40, chapter V (Council on Environmental Quality NEPA regulations); C.F.R. Title 33, chapter II, part 230 (Army Corps procedures for implementing NEPA).

HEPA and NEPA Mandate Joint Cooperation with the Army Corps, and Likely the Federal Highway Administration, in the Preparation of the Olowalu Town EIS

Where both NEPA and HEPA apply to an action, joint cooperation among federal and state agencies is required.

NEPA's applicability to the Olowalu Town Master Plan invokes additional legal obligations for the applicant, as well as this Commission, in fulfilling the state EIS laws. Where an action is subject to both NEPA and HEPA, HEPA and its implementing regulations require state agencies, including this Commission, to cooperate with federal agencies to the fullest extent possible, including preparing joint environmental impact statements and conducting concurrent public review and processing at both levels of government. HRS § 343-5(h); HAR § 11-200-25(2). Similarly, NEPA's implementing regulations require federal agencies, including

the Army Corps, to cooperate with state and local agencies to the fullest extent possible, 40 C.F.R. § 1506.2(b), (c), including preparing joint environmental impact statements and holding joint public hearings, *id.* This process must begin at the earliest possible time. *Id.* § 1501.2(d)(3).

There has been no cooperation with the Army Corps in preparing the FEIS, and, therefore, the FEIS was produced in violation of state and federal law.

Under HEPA, the Applicant Must Notify the Army Corps of NEPA Applicability

HEPA places the onus on the applicant to notify the Army Corps that NEPA applies to its project. When NEPA applies to a private action, HAR § 11-200-25(1) requires the applicant to notify: (1) "the responsible federal agency"; (2) the Office of Environmental Quality Control (OEQC); and (3) "any agency with a definite interest in the action." The FEIS does not state the applicant notified any of these agencies of NEPA applicability. Instead, in its response to a comment from the state Department of Health, Clean Water Branch (letter dated October 26, 2015), the applicant states it will contact the Army Corps later, "[a]s the project progresses towards implementation." Later is too late; HAR § 11-200-25(1) requires the applicant to have contacted the Army Corps, OEQC, and other interested agencies long ago. *See id.* ("The applicant or agency, *upon discovery of its proposed action being subject to both chapter 343, HRS, and the National Environmental Policy Act*, shall notify the responsible federal agency, ... " (emphasis added).

Cooperation with the Federal Highway Administration is Likely Required.

The Olowalu Town Master Plan seeks to relocate a portion of Honoapi'ilani Highway mauka from its existing location, and to utilize parts of the remnant roadway as a "coastal roadway." (FEIS p. 234.) The FEIS estimates the cost of the highway relocation to be $18 million, and designates as an "unresolved issue," the applicant's total financial contribution for area roadway improvements. (FEIS p. 398.) What is not addressed in the FEIS is the extent of federal agency involvement in the highway realignment, and whether any federal funds will be used. These are critical facts that need clarification now, because federal assistance with the highway realignment is another trigger for federal environmental review under NEPA, thereby necessitating cooperation with an additional federal agency, the Federal Highway Administration (FHA). *See* 40 C.F.R. § 1508.18(b) ("Federal actions tend to fall within one of the following categories: . . . (4) Approval of specific projects, such as construction or management activities located in a defined geographic area. Projects include actions approved by permit or other regulatory decision as well as federal and federally assisted activities.").

Notably, the Honoapi'ilani Highway is already designated a "federal-aid highway,"[1] and currently, the state Department of Transportation (HDOT) and FHA are in the process of preparing a joint draft EIS for plans to realign, improve, and widen the highway from Mā'alaea to Launiupoko, which encompasses Olowalu. The FEIS references ongoing negotiations between the applicant and HDOT, and proposes to relocate and widen the highway through its lands "in conjunction with" HDOT's Mā'alaea to Launiupoko project. (FEIS p. 234.) Thus, it appears the Olowalu Town Master Plan is dependent on HDOT's plans. HDOT has apparently taken this view, stating, in its January 26, 2015 letter to the applicant (FEIS Vol. II), that it expected roadway improvements to be provided *prior to the issuance of a certificate of occupancy*. Legally, then, because a project that FHA is administering is a necessary part of the Olowalu Town Master Plan, the federal nexus for involving FHA in the environmental review process for the Olowalu Town Master Plan is present. *See* 40 C.F.R. § 1508.18; Lathan v. Brinegar, 506 F.2d 677, 693 (9th Cir. 1974) (requiring "full, fair bona fide compliance with NEPA" when reviewing an agency decision with respect to a federal-aid highway project).

In addition to being legally required, it makes good sense that the Olowalu Town EIS incorporate all information concerning environmental impacts of the HDOT highway project. As HDOT pointedly stated in its January 26, 2015 letter:

> It is recommended that Olowalu Town expand its environmental impact statement (EIS) to consider the Federal environmental efforts the HDOT is currently conducting for its preparation of the EIS for the Honoapiilani Highway Realignment Project from Launiupoko to Maalaea. The Olowalu Town's EIS should be consistent with HDOT's federal environmental documents in matters of alternative alignment analysis, historic and cultural preservation, and endangered species, etc.

This Commission simply cannot accept the FEIS knowing there is additional, material information already being compiled into an EIS through the joint efforts of another state agency and a federal agency, which, as discussed below, has presumably accessed the expertise of other federal agencies pursuant to obligations under the Endangered Species Act. As HDOT advises, the Olowalu Town EIS should, at minimum, include information from HDOT/FHA's Mā'alaea-Launiupoko EIS.

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[1] The Federal-Aid Highways 2035 Transportation Plan for the District of Maui (July 2014) designates the Honoapi'ilani Highway (Route 30) a "federal-aid highway" between Main Street (Wailuku) and Front Street (Lahaina). "Federal-aid highway" means "a public highway eligible for assistance under [Title 23 chapter 1 of the U.S.C.] other than a highway functionally classified as a local road or rural minor collector." 23 U.S.C. § 101(a)(6).

Subsequent Preparation of a Federal EIS Does Not Cure the FEIS's Illegality

Accepting the FEIS would deprive state and county decision makers of additional information that would be obtained through joint federal-state environmental review.

The Army Corps and FHA Must Comply with the Endangered Species Act

The FEIS notes the presence of four species in the project area listed under the Endangered Species Act (ESA): the endangered nēnē, the endangered hawksbill sea turtle, the endangered Hawaiian monk seal, and the threatened green sea turtle. (FEIS pp. 107-17.) The presence of these listed species triggers obligations under the ESA for the Army Corps and FHA before they can issue a Section 404 permit and offer federal assistance for the highway realignment.

Section 7(a)(2) of the ESA directs each federal agency to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. 16 U.S.C. § 1536(a)(2). If listed species or critical habitat units are present, the federal agency must determine if the proposed action may affect the species or habitats, in which case, the agency must initiate at least informal consultation with the U.S. Fish & Wildlife Service (USFWS) and/or the National Marine Fisheries Service (NMFS), to obtain their expertise in determining the action's impact on those species and habitats.

Under the ESA, the applicant cannot unilaterally determine whether the Olowalu Town Master Plan is likely to adversely affect listed species or critical habitat. Accepting the FEIS and prior to collaboration with the Army Corps and the FHA would deprive state and county decision makers of important information concerning endangered and threatened species.

The FEIS also does not adequately address the potential for a "take" of the four listed species found in the project area. Section 9 of the ESA makes it unlawful for any person to "take," that is, "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct[,]" any endangered species. 16 U.S.C. §§ 1532(19), 1538(1)(b). Section 10 of the ESA addresses situations in which projects may result in the incidental take of listed species, and provides for incidental take permits where the applicant develops and obtains approval of a habitat conservation plan. *See id*. § 1539.

In response to the Maui County Department of Planning's comment regarding the draft EIS's failure to discuss how water features might attract more nēnē to the area, the possibility of incidental "takes," and cooperation with the FWS (FEIS Vol. II, October 26, 2015 letter to William Spence, Director, Dept. of Planning p. 10), the applicant concluded, without any data or input from the FWS, that water features or irrigated parks in the master plan "are not dangerous to nene," and that these features "do not create a take.'" However, according to the

applicant's wastewater management plan prepared by Brown & Caldwell, the proposed location for the Honoapi'ilani Highway realignment is next to the 4.7 acres of soil aquifer treatment (SAT) basins and near to the constructed wetlands meant to attract birds. (FEIS Appendix Q pp. 1-3, 8-1 to 8-3 & Fig. 3.2.) The FEIS does not address whether the location of the highway next/near to water features within the project—the constructed wetlands, SAT basins, as well as the Olowalu Stream—will increase the potential for a "take" of nēnē.

The FEIS does not discuss the potential for incidental take of the three listed marine species at all.

This is an important topic that must be thoroughly discussed in the FEIS as a potential impact, and it raises the specter of liability under the ESA, for not just the applicant, but state agencies, including this Commission, that approve a private project that causes a "take" of listed species. This is all the more reason why cooperation in the preparation of the Olowalu Town EIS between the applicant, this Commission, and the Army Corps and FHA is imperative.

Federal Environmental Review is Required Now, at the Early Planning Stages

The fact that federal environmental review must occur before the Army Corps issues a Section 404 permit and before the FHA provides assistance with the Honoapi'ilani Highway realignment makes the FEIS legally deficient, and this will not be cured by future NEPA compliance. The timing of environmental review is key under both HEPA and NEPA. As the Hawai'i Supreme Court reaffirmed in the Koa Ridge case:

> [B]oth federal and state courts have recognized that environmental review must occur early enough to function practically as an input into the decision making process. In construing [NEPA], for example, the United States Court of Appeals for the Ninth Circuit cautioned that an assessment must be prepared early enough so that it can serve practically as an important contribution to the decision making process and will not be used to rationalize or justify decisions already made. . . . [T]he rationale behind this rule is that inflexibility may occur if delay in preparing an EIS is allowed: After major investment of both time and money, it is likely that more environmental harm will be tolerated. . . . Accordingly, decisions reflecting environmental considerations can most easily be made when other basic decisions are also being made, that is, during the early stages of project conceptualization and planning.

Sierra Club v. Office of Planning, 109 Hawai'i 411, 419, 126 P.3d 1098, 1106 (2006) (internal quotation marks, brackets, emphasis, and citations omitted). *See also Metcalf v. Daley*, 214 F.3d 1135, 1145 (9th Cir. 2000) ("NEPA's effectiveness depends entirely on involving environmental considerations in the initial decisionmaking process."); 40 C.F.R. § 1502.5(b) ("For applications to the agency[,] . . . [f]ederal agencies are encouraged to begin preparation of [environmental]

assessments or statements earlier, preferably jointly with applicable State or local agencies.”). The federal agencies must be involved in the EIS process before the Olowalu Town Master Plan obtains any entitlements, so that decision makers, including this Commission, have the benefit of federal input, which would include the expertise of the Army Corps and FHA, and because endangered and threatened species fall within the project area, the input of FWS and NMFS.

This Commission Cannot Accept the FEIS in its Current Form

In sum, the FEIS does not comport with the criterion in HAR § 11-200-23(b)(1) that the procedures for preparing and submitting the FEIS be completed in accordance with HAR chapter 11-200, because there has been no cooperation with federal agencies to comply with NEPA, in violation of HAR § 11-200-25. Simply put, because federal laws apply to this project, any EIS this Commission sanctions must include the environmental concerns of the relevant federal agencies, and, more importantly, thorough evaluation of every environmental impact they, with their federal resources, experience, and expertise, may foresee. Accordingly, this Commission cannot lawfully accept the FEIS in its current form.

The applicant still has the option of submitting a revised draft EIS, *see* HAR § 11-200-23(e), but only after it undertakes joint environmental review with the Army Corps and FHA.

Mahalo for the opportunity to testify.

Honoapi‘ilani Highway Improvements Consultation Comments

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PROJECT DESCRIPTION:

The State Department of Transportation is proposing to realign the Honoapi‘ilani Highway to provide a reliable transportation facility in West Maui and improve Honoapi‘ilani Highway‘s resiliance by reducing the highways vulnerability to coastal hazards.

LONG RANGE DIVISION COMMENTS:

The realignment of Honoapi‘ilani Highway out of the Sea-Level Rise Exposure Area (SLR-XA) is supported in the Maui County General Plan and more specifically by the West Maui Community Plan. However, multimodal transportation options and Complete Streets elements should be incorporated into the Honoapi‘ilani Highway Improvements. In addition, thoughtful consideration should be given to the road design to ensure the realigned highway retains and enhances the existing character and scenic resources found in Ukumehame and Olowalu. The inclusion of trees and landscaping appropriate to the microclimate is also important.

GENERAL COMMENTS

The realignment of Honoapi‘ilani Highway out of the SLR-XA is supported by the West Maui Community Plan (WMCP), the Maui Island Plan (MIP) and the Countywide Policy Plan (CWPP) (see WMCP Policy 2.2.10, and Action 2.21; MIP 6.4.3 Action 3; CWPP H.1.b.). The design of the Honoapi‘ilani Highway Improvements will need to incorporate multimodal and Complete Street design elements, while thoughtfully considering the existing character and scenic resources of the communities through which it passes (MIP 6.4.3 a, and b; CWPP H.1.b, c, and g).

- **WMCP 2.2.10 |** Improve resilience of the transportation system to climate change related hazards such as sea level rise, flooding, and wildfires.
- **WMCP Action 2.21** | Work in partnership with the State Department of Transportation to prioritize and facilitate realignment of Honoapi‘ilani Highway out of the coastal hazard zone, and manage public lands makai of the realigned highway as wetlands, public parks, and open space.

- **MIP | Goal 6.4 |** An interconnected, efficient, and well-maintained, multimodal transportation system.
  Objective 6.4.3 | An island-wide, multimodal transportation system that respects and enhances the natural environment, scenic views, and each community’s character.
  6.4.3 a. Ensure that the roadway and transit alignments respect the natural environment and scenic views.
  6.4.3 b. Ensure that roadways and transit systems in rural areas and small towns enhance community character.

6.4.3-Action 3 | Urge the State to relocate Honoapi‘ilani Highway mauka between the Pali and Puamana, and develop a network of parks and open space on the makai side of the highway, in accordance with the Pali to Puamana Master Plan.

- **CWPP | H.** Diversify Transportation Options
  Goal: Maui County will have an efficient, economical, and environmentally sensitive means of moving people and goods.
  Objective 1: Provide an effective, affordable, and convenient ground-transportation system that is environmentally sustainable.
  b. Plan for the efficient relocation of roadways for the public benefit.
  c. Support the use of alternative roadway designs, such as traffic-calming techniques and modern roundabouts.
  d. Increase route and mode options in the ground-transportation network.
  e. Ensure that roadway systems are safe, efficient, and maintained in good condition.
  g. Design new roads and roadway improvements to retain and enhance the existing character and scenic resources of the communities through which they pass.

CONCERNS AND OPPORTUNITIES

Multimodal Transportation

The Maui County General Plan, including the West Maui Community Plan, supports transportation projects that increase active transportation, including biking and walking, and transit services. Honoapi‘ilani Highway is the primary connection between West Maui and the rest of the island of Maui. Designing the realigned portions of the highway to support transit, bike and pedestrian access would provide multiple benefits from resilience actions by increasing transportation options and making walking and bicycling safe and easy between and within communities.

- **WMCP 2.2.1** | Improve West Maui’s active transportation network by increasing multimodal transportation options, incorporating Complete Streets, adding new sidewalks, and improving existing sidewalks and other pedestrian and bicycle facilities.
- **WMCP 2.1.4** | Prioritize projects that provide multiple benefits from resilience actions.
- **WMCP 2.2.5 |** Support increased transit service within and between West Maui’s neighborhoods, parks, and commercial areas, and between the Kahului Airport and West Maui hotels.
- **WMCP 2.5.9 |** Encourage and increase active transportation options throughout West Maui to promote public health and reduce auto use and carbon emissions.

- **MIP| Goal 6.4** | An interconnected, efficient, and well-maintained, multimodal transportation system

Objective 6.4.1 | Provide for a more integrated island-wide transportation and land use planning program that reduces congestion and promotes more efficient (transit-friendly) land use patterns.

6.4.1.a. Plan for an integrated multi-modal transportation system comprised of public transit, bicycle, pedestrian, automobile, and other transportation modes.

6.4.1.b. Refocus transportation investment from the construction of additional roadways only for the automobile to the expansion of a multimodal transportation system.

6.4.1.c. Encourage the use of "complete streets" design methods.

- **MIP | Goal 6.5** An island-wide transit system that addresses the needs of residents and visitors and contributes to healthy and livable communities.
  Objective 6.5.1 | An integrated transit system that better serves all mobility needs of Maui's residents and visitors.

  6.5.1.b. Expand regional and inter-regional transit services, where appropriate, in heavily traveled corridors and within communities.

  6.5.1.e. Require new development where appropriate, to provide right-of-ways (ROWs) to accommodate transit circulation and support facilities.

  6.5.1.f. Identify, protect, and preserve, or acquire corridors for future inter-community transit use, including but not limited to, rail and also multimodal use corridors.

- **CWPP | H.** Diversify Transportation Options
  Goal: Maui County will have an efficient, economical, and environmentally sensitive means of moving people and goods.
  Objective 2: Reduce the reliance on the automobile and fossil fuels by encouraging walking, bicycling, and other energy-efficient and safe alternative modes of transportation.

  a. Make walking and bicycling transportation safe and easy between and within communities.

  b. Require development to be designed with the pedestrian in mind.

  c. Design new and retrofit existing rights-of-way with adequate sidewalks, bicycle lanes, or separated multi-use transit corridors.

  d. Support the development of a countywide network of bikeways, equestrian trails, and pedestrian paths.

<u>Trees and Landscaping</u>

The West Maui Community Plan and Countywide Policy Plan support the inclusion of trees along public right of ways. The West Maui Community Plan specifies the use of native trees and landscaping that is appropriate to the microclimate. Trees and other appropriate landscaping should be included in the realigned Honoapi'ilani Highway Improvements.

- **WMCP 2.1.11** | Require new developments to install landscaping that reduces water use, using drought resistant and micro-climate appropriate design and plants including native

species, and gray water and water catchment systems where the State Department of Health allows it.

- **WMCP 2.3.4 |** All development must implement recommendations of the Maui County Planting Plan for street and parking area trees, encouraging the use of native and endemic plants. Plants that are on the Hawai‘i Pacific Weed Risk Assessment list must not be used.
- **WMCP 2.3.12** | Design landscape barriers along major roadways in such a manner as to maintain existing views of the mountains and ocean to the extent possible.
- **WMCP 2.5.5** | Include native trees that are appropriate for the microclimate in parks, along streets, trails, and greenways, and throughout the community to provide shade, beauty, and reduce sediment runoff.

- **CWPP | H.** Diversify Transportation Options
  Goal: Maui County will have an efficient, economical, and environmentally sensitive means of moving people and goods.
  Objective 4: Improve and expand the planning and management of transportation systems.
    h. Accommodate the planting of street trees and other appropriate landscaping in all public rights-of-way.

Natural and Cultural Resources

The Maui County General Plan, the MIP and the WMCP all support protecting and enhancing natural and cultural resources. This includes using Low Impact Development strategies and vegitated buffers around gulches and wetlands, giving consideration to how agriculture areas will be impacted, particularly where there is active subsitance farming or lo‘i cultivation, and ensuring access to kuleana lands. It is noted that the project proponents have consulted with community members in development of the Environmental Impact Statement Preparation Notice, including the Aha Moku Council and Lineal Decedents. As final alignment and design for Honoapi‘ilani Highway Improvements are refined, protecting, and enhancing natural and cultural resources should be a priority. Continued involvement and collaboration with community members as plans are refined is encouraged.

- **WMCP 2.2.9 |** Protect and enhance natural and cultural resources during implementation of transportation projects through early consultation and community engagement with resource management agencies, residents, and cultural practitioners.
- **WMCP 2.3.1 |** Ensure new development projects provide continued access to kuleana lands protected under Section 7-1, Hawai‘i Revised Statutes.
- **WMCP 2.3.2 |**Gulches, as identified in the map in Figure 2.3 of this Plan, must remain in open space and no new permanent structures may be developed in or within 100 feet of the top of the bank of identified gulches, unless Low Impact Development strategies are implemented to prevent stormwater runoff.
- **WMCP 2.3.3** |Protect ocean and stream water quality by requiring that wetlands, as defined by traditional historic knowledge or by Section 404 of the Clean Water Act, be preserved with vegetated buffer areas that are adequate to protect them from pollutants.

- **WMCP 2.3.5 |** Require implementation of Low Impact Development practices in developments in West Maui to reduce stormwater runoff and protect water quality.
- **WMCP 2.3.8 |** Preserve and protect the region's cultural resources and traditional lifestyles, including agricultural pursuits, such as subsistence agriculture on lands owned by the State Department of Hawaiian Home Lands in Honokōwai and loʻi cultivation of Native Hawaiians in Honokōhau Valley, Kahoma Valley, Kauaʻula Valley, Olowalu, and Ukumehame.
- **WMCP 2.3.10 |** Existing areas of open space, including agricultural lands and gulches, should be viewed as a resource to be protected and enhanced.
- **WMCP 2.3.13 |** The marine and nearshore environment and open space areas are important assets of the region and should be protected and preserved. Habitat connectivity for threatened and endangered species, watersheds, undeveloped shoreline areas and other environmentally sensitive lands must be preserved.
- **WMCP 2.3.16 |** All development projects must engage in consultation with the Aha Moku ʻo Maui representative associated with the project area – either Moku ʻo Lāhainā or Moku ʻo Kāʻanapali – and provide evidence of this engagement to the Department.
- **WMCP 2.3.18 |** Any ground-altering activities in the areas described in this Plan's ascription list must have a cultural monitor on site, due to the sensitive nature of these areas, until cultural overlay policies are established by the Council. See Appendix C | Cultural Reserve Ascription List.

▪ **MIP | Goal 2.1 |** Our community respects and protects archaeological and cultural resources while perpetuating diverse cultural identities and traditions.
Objective 2.1.3 | Enhance the island's historic, archaeological, and cultural resources.
2.1.3.f | Support opportunities for public involvement with the intent to facilitate the protection and restoration of historic and archeological sites, including consultation with stakeholders.
2.1.3.g | Encourage the resolution of land title questions relating to Land Commission Awards and Royal patents.
2.1.3.h | Ensure compliance with historic preservation laws, and discourage demolition of properties that are determined to be eligible for listing on the National or State Register of Historic Places.

o **CWPP| B**. Preserve Local Cultures and Traditions |
Goal: Maui County will foster a spirit of pono and protect, perpetuate, and reinvigorate its residents' multi-cultural values and traditions to ensure that current and future generations will enjoy the benefits of their rich island heritage.
Objective 1: Perpetuate the Hawaiian culture as a vital force in the lives of residents.
a. Protect and preserve access to mountain, ocean, and island resources for traditional Hawaiian cultural practices.
f. Recognize and preserve the unique natural and cultural characteristics of each ahupuaʻa or district.
h. Ensure the protection of Native Hawaiian rights.

Objective 2 | Emphasize respect for our island lifestyle and our unique local cultures, family, and natural environment.

d. Recognize the interconnectedness between the natural environment and the cultural heritage of the islands.

Trails

The protection and enhancement of trails is encouraged throughout the Maui County General Plan. While it is not expected that the Honoapiʻilani Highway Improvements will develop additional trails, preservation of existing trails and options for new connections should be incorporated.

- **WMCP 2.5.8 |** Ensure existing government trails are preserved through the subdivision process or other approval process, such as land use designation change; reviews under Chapter 343, Hawaiʻi Revised Statutes; and reviews under Chapter 205A, Hawaiʻi Revised Statutes. Refer to the West Maui Trails Map (Figure 2.4, pg. 61) and consult with the Nā Ala Hele Trails and Access Program.
- **WMCP 2.5.3 |** Support the development of trails and greenways in West Maui as part of a larger integrated recreation and transportation network and manage existing public mauka to makai access along the tops of gulches as identified in Figure 2.3 (pg. 60) to prevent the spread of rapid ʻŌhiʻa death, feral ungulates, and other invasive species in upper watersheds.

- **MIP | GOAL 2.1 |**Our community respects and protects archaeological and cultural resources while perpetuating diverse cultural identities and traditions.
  OBJECTIVE 2.1.1 | An island culture and lifestyle that is healthy and vibrant a smeasured by the ability of residents to live on Maui, access and enjoy the natural environment, and practice Hawaiian customs and traditions in accordance with Article XII, Section7, Hawai`i State Constitution, and Section7-1, Hawai`i Revised Statutes(HRS).
  2.1.1.c Ensure traditional public access routes, including native Hawaiian trails, are maintained for public use.
- **MIP | Goal 6.6** |Maui will have a diverse range of active and passive recreational parks, wilderness areas, and other natural-resource areas linked, where feasible, by a network of greenways, bikeways, pathways, and roads that are accessible to all
  Objective 6.6.3 | An expanded network of greenways, trails, pathways, and bikeways.
  6.6.3.c Collaborate with the State and private land owners to ensure perpetual access and proper stewardship of traditional trails and access systems.

- **CWPP | H.** Diversify Transportation Options
  Goal: Maui County will have an efficient, economical, and environmentally sensitive means of moving people and goods.

Objective 2: Reduce the reliance on the automobile and fossil fuels by encouraging walking, bicycling, and other energy-efficient and safe alternative modes of transportation.

e. Support the reestablishment of traditional trails between communities, to the ocean, and through the mountains for public use.

- **CWPP | G.** Improve Parks and Public Facilities
  Goal: A full range of island-appropriate public facilities and recreational opportunities will be provided to improve the quality of life for residents and visitors.
  Objective 1 | Expand access to recreational opportunities and community facilities to meet the present and future needs of residents of all ages and physical abilities.

  a. Protect, enhance, and expand access to public shoreline and mountain resources.

  b. Expand and enhance the network of parks, multi-use paths, and bikeways.

Undergrounding Utlities

Undergrounding utilities is supported throughout the Maui County General Plan. This may be an opportunity to work with MECO to underground utilities in the area where improvements are being implemented.

- **WMCP 2.5.20** | Promote the placement of utilities underground in new areas of development and in existing areas, where possible, unless desecration of iwi kūpuna is likely to occur or if the development lies within areas of significant cultural resources in the proposed cultural overlay, a permit will be required.

- **CWPP | I.** Improve Physical Infrastructure
  Goal: Maui County's physical infrastructure will be maintained in optimum condition and will provide for and effectively serve the needs of the County through clean and sustainable technologies.
  Objective 4: Improve the planning and management of infrastructure systems.

  j. Promote the undergrounding of utility and other distribution lines for health, safety, and aesthetic reasons.

Scenic Resources and Community Character

Ensuring scenic vistas and community character are considered and retained in the design of new roads or roadway improvements is supported in the WMCP, the MIP and the CWPP. While it is evident that the Honoapi'ilani Highway Improvements have considered the impacts of the alignment on the character and scenic resources of the surrounding area, it will also be important consider the character and scenic resources of the surrounding area in the design of the road and how it interacts with the surrounding communites.

- **WMCP 2.3.11|** Protect public mauka to makai view corridors in each subarea and scenic vistas.

- **MIP| Goal 6.4 |** An interconnected, efficient, and well-maintained, multimodal transportation system
  Objective 6.4.2| Safe, interconnected transit, roadway, bicycle, equestrian, and pedestrian network.
  6.4.2.a Ensure transit-, roadway-, and pedestrian-facilities design and level-of-service standards respect the unique character of our communities.
  Objective 6.4.3 | An island-wide, multimodal transportation system that respects and enhances the natural environment, scenic views, and each community's character.
  6.4.3.c Design all transit systems to respect visual corridors and Maui's character.

- **CWPP | H.** Diversify Transportation Options
  Goal: Maui County will have an efficient, economical, and environmentally sensitive means of moving people and goods.
  Objective 1: Provide an effective, affordable, and convenient ground-transportation system that is environmentally sustainable.
  - **g.** Design new roads and roadway improvements to retain and enhance the existing character and scenic resources of the communities through which they pass.

<u>Parks and Open Space</u>

Although this is not part of the scope of this project the realignement will offer the possibilty to achieve goals supported by the Maui County General Plan regarding protection and enhancement of shoreline resources, the developement of Parks and Open Space, and altenative modes of transportation makai of the realigned highway.

- **WMCP 2.1.5 |** Protect the shoreline and beaches by preserving waterfront land within the SLR-XA as open space wherever possible.

- **MIP | Goal 6.4 |** An interconnected, efficient, and well-maintained, multimodal transportation system
  Objective 6.4.2: Safe, interconnected transit, roadway, bicycle, equestrian, and pedestrian network.
  6.4.2.e Consider identification, acquisition where appropriate, and utilization of abandoned rightof-ways for bikeways, pedestrian pathways, and open-space networks.

- **MIP | Goal 6.6** Maui will have a diverse range of active and passive recreational parks, wilderness areas, and other natural-resource areas linked, where feasible, by a network of greenways, bikeways, pathways, and roads that are accessible to all
  Objective 6.6.3 An expanded network of greenways, trails, pathways, and bikeways.
  6.6.3.a Link existing and future park sites, natural areas, the shoreline, and residential areas with a network of bikeways, pedestrian paths, trails, and greenways.

6.6.3.b Support the implementation of plans and programs that facilitate pedestrian mobility and access to active and passive recreation areas and sites.

- **CWPP | H.** Diversify Transportation Options
  Goal: Maui County will have an efficient, economical, and environmentally sensitive means of moving people and goods.
  Objective 1: Provide an effective, affordable, and convenient ground-transportation system that is environmentally sustainable.
  f. Preserve roadway corridors that have historic, scenic, or unique physical attributes that enhance the character and scenic resources of communities.

- **CWPP | A.** Protect the Natural Environment
  Goal: Maui County's natural environment and distinctive open spaces will be preserved, managed, and cared for in perpetuity.
  Objective 2: Improve the quality of environmentally sensitive, locally valued natural resources and native ecology of each island.
  a. Protect and restore nearshore reef environments and water quality.
  e. Mitigate the negative effects of upland uses on coastal wetlands, marine life, and coral reefs.

- **CWPP | L.** Mitigate Climate Change and Work Toward Resilience
  Goal: Minimize the causes and negative effects of climate change.
  Objective 2: Reduce the impacts of sea-level rise by acknowledging climate change, adapting, mitigating, and planning accordingly.
  Policies:
  a. Evaluate development to assess potential short-term and long-term sea-level rise impacts on nearshore environments.
  b. Improve efforts to mitigate and plan for the impact of sea-level rise.
  c. Protect undeveloped beaches, dunes, and ecosystems, and restore natural shoreline processes.
  e. Strengthen coastal-zone management, re-naturalization of shorelines, where possible, and filtration or treatment of urban and agricultural runoff.

REGION 9
SAN FRANCISCO, CA 94105

February 26, 2025

Richelle Takara, Division Administrator
Federal Highways Administration, Hawai'i Division
300 Ala Moana Boulevard, Room 3-229
Honolulu, Hawaii 96850

Ken Tatsuguchi, Project Engineer
Hawaii Department of Transportation Highways, Planning Branch
869 Punchbowl Street, Room 301
Honolulu, Hawaii 96813

Subject: EPA Comments for the Draft Environmental Impact Statement for the Honoapiilani Highway Improvements Project Maui, Hawaii (CEQ# 20250002)

Dear Richelle Takara and Ken Tatsuguchi:

The U.S. Environmental Protection Agency has reviewed the above-referenced document pursuant to the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act (CAA). The CAA Section 309 role is unique to EPA. It requires EPA to review and comment on the environmental impact of any proposed federal action subject to NEPA's environmental impact statement requirements and to make its comments public.

EPA 309 Review Summary

EPA did not identify significant concerns to be addressed in the final EIS. We acknowledge and recognize our colleagues in the state for continuing the NEPA process to analyze and deliver this project following the devastating wildfire impacts to Lahaina just north of the proposed project area. We provided scoping comments to the Hawaii Department of Transportation and Federal Highways Administration and accepted the invitation to provide early coordination as defined in Title 23 United States Code Section 139(d) and (5), and Title 40 Code of Federal Regulations, part 1508.5 on April 29, 2022. We note that many of our scoping comments were adopted in the development of the Draft EIS, and that our November 1, 2024, comments on the Administrative Draft EIS regarding aquatic resources and community engagement were fully addressed in the Draft EIS. We appreciate HDOT and FHWA's emphasis of continuing community dialogue (page 3.7-14) as it pertains to protecting cultural resources pursuant to the National Historic Preservation Act, Section 106.

The EPA appreciates the opportunity to review this DEIS. If you have any questions, please contact me at (415) 972-3659 or the NEPA reviewer, Zac Appleton, at (415) 972-3321 or appleton.zac@epa.gov.

Sincerely,

Francisco Dóñez
Manager
Environmental Review Section 2

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

In Reply Refer To:
2023-0041712-S7-001

March 6, 2025

Comment Log Submission No. 84

Richelle M. Takara, P.E.
Division Administrator
U.S. Department of Transportation
Federal Highway Administration
300 Ala Moana Blvd., Rm 3-299
Honolulu, Hawai‘i 96850

Subject: Comments on Honoapi‘ilani Highway Realignment Project Draft Environmental Impact Statement, Maui

Dear Richelle Takara:

This letter is in response to your January 6, 2025, request for U.S. Fish and Wildlife Service (Service) comments on the draft Environmental Impact Statement (DEIS) for the Honoapi‘ilani Highway Improvement Project (HDA-HI, Federal-aid Project No. RAEM-030-1(059)). During the coordinating agency comment period, you specifically requested our comments on Chapters 3.9 (Water Resources, Wetlands, and Floodplains), 3.10 (Flora and Fauna, Endangered Species), and 5.0 (Preferred Alternative).

This letter has been prepared under the authority of and in accordance with provisions of the Endangered Species Act of 1973 (16 U.S.C. 1531 *et seq*.), as amended (ESA). Mahalo for incorporating our standard and project specific recommended avoidance and minimization measures for ESA listed species into the DEIS and for continuing to collaborate with us to refine, develop, and implement project specific avoidance and minimization measures to avoid adverse impacts. Additionally, we appreciate your efforts to incorporate our Best Management Practices (BMPs) for Work In and Around Aquatic Environments.

Chapter 3.9: Water Resources, Wetlands, and Floodplains

- We recommend culverts and bridges over streams be designed with the height and width to handle periodic massive surges of water from torrential rain events that are known to occur in the area. Due to climate change, 100-year storms may become more frequent. Flooding has the potential to destroy ae‘o (Hawaiian stilt, *Himantopus mexicanus knudseni*) and nēnē (Hawaiian goose, *Branta sandvicensis*) nests that may be found in the project area. Additionally, ensuring culverts and bridges have the height and width to handle 100-year storm torrential rains may also minimize impacts to other trust

resources protected under the Fish and Wildlife Coordination Act. These recommendations also apply to Appendix 3.10 section 2.2.1.

- For erosion control during construction, we recommend using materials (e.g., biosock) that are at least 3 feet (ft) in diameter to reduce chances of runoff into the ocean during torrential rain. The typical 1 ft diameter biosock will likely not serve as an adequate barrier during torrential rainfall, especially in an area that is highly degraded, expansive ephemeral wetland habitat combined with known high flow rates in streams during these storm events. Sedimentation runoff onto the beach and into the ocean degrades sea turtle habitat and has the potential to bury sea turtle nests. This emphasizes the importance of incorporating our Best Management Practices (BMPs) for Work In and Around Aquatic Environments to minimize project impacts. These BMPs may also help minimize impacts to other trust resources protected under the Fish and Wildlife Coordination Act.

Chapter 3.10 Flora and Fauna, Endangered Species and Appendix 3.10

- The DEIS describes monitoring for waterbirds by a qualified biologist, but then follows up with: *The contractor will assign dedicated, trained, competent personnel to perform daily visual monitoring and nest surveys prior to the start of and during construction work to check for listed species bird nests. The daily monitoring protocol would include designated personnel to walk the project site every morning prior to the start of construction work to determine if any ESA-listed species nests are present at the work site and note if any listed individuals were present.*
    - All surveys to detect for the presence of aeʻo nests and aeʻo exhibiting defensive nest protection behavior should be carried out by a qualified biologist with knowledge of the species' life history. If heavy rains result in ephemeral wetlands, ʻalae keʻokeʻo (Hawaiian coot, *Fulica alai*) should be surveyed for as well.
- The DEIS describes morning surveys and monitoring for nēnē by a qualified biologist, but then follows up with: *The contractor will assign dedicated, trained, competent personnel to perform daily visual monitoring and nest surveys prior to the start of and during construction work to check for listed species bird nests. The daily monitoring protocol would include designated personnel to walk the project site every morning prior to the start of construction work to determine if any ESA-listed species nests are present at the work site and note if any listed individuals were present*.
    - All surveys to detect for presence of nēnē nests and nēnē exhibiting defensive nest protection behavior should be carried out by a qualified biologist with knowledge of the species' life history.
- We recommend including all final biological survey and monitoring protocols in the final EIS under Appendix 3.10. We encourage your team to submit draft survey and monitoring protocols/standard operating procedures to our office for review and comments prior to finalization. We also encourage incorporating adaptive management into these procedures and triggers for modifying them.
- The draft EIS states additional biological surveys will be performed by trained biologists in areas of "permanent BMPs." The Service recommends providing more details about this objective, including protocols and habitat features that support listed species in the draft EIS.

- We recommend that *temporary* signs be placed around the project area during construction to remind workers of the potential presence of aeʻo and nēnē and to drive slowly (10 miles per hour as stated in the DEIS). Additionally, *permanent* signs should be placed along the highway through the Ukumehame wetland area alerting drivers of the potential presence of aeʻo and nēnē and for reducing the speed limit through the area to minimize injury and mortality to listed birds from vehicle strikes.
- Avoid placing staging areas in or directly adjacent to wetland habitat (jurisdictional and nonjurisdictional) and streambanks identified by the consultants to avoid and minimize impacts to habitat that supports listed waterbirds and nēnē.
- Any hazing that occurs to nēnē must follow the 4(d) rule. We recommend keeping a copy of the regulations at the on-site office for easy reference. A key section of the 4(d) rule follows:
    - Before implementing any such intentional harassment activities during the nēnē breeding season (September through April), a qualified biologist knowledgeable about the nesting behavior of nēnē must survey in and around the area to determine whether a nest or goslings are present. If a nest is discovered, the Service must be notified within 72 hours and the following measures implemented to avoid disturbance of nests and broods:
        - No disruptive activities may occur within a 100-ft (30-meter) buffer around all active nests and broods until the goslings have fledged;
        - Brooding adults (i.e., adults with an active nest or goslings) or adults in molt may not be subject to intentional harassment at any time; and
        - The landowner must arrange follow-up surveys of the property by qualified biologists to assess the status of birds present.
- Hawaiian yellow-faced bees are known to occur in scattered populations along the western coastline of Mauna Kahālāwai (Maui Komohana or West Maui Mountains). Coastal populations of yellow-faced bees occur in habitat along rocky shorelines with naupaka (*Scaevola taccada*) and tree heliotrope (*Heliotropium arboreum*) with either landscaped vegetation, nonnative kiawe (*Neltuma pallida*), or bare rock inland. Bees are restricted to an extremely narrow corridor, typically 33 to 66 ft (10 to 20 meters) wide, and do not occur on barren sandy beaches or inland, or on landscaped native plants on hotel grounds. Documented nectar plants include naupaka, ʻilima (*Sida fallax*), ʻakoko (*Euphorbia* spp.), pua kala (*Argemone glauca*), naio (*Myoporum sandwicense*), and tree heliotrope. Threats to yellow-faced bees include habitat destruction and modification from land use change, nonnative plants, ungulates, and fire, along with predation by nonnative ants and wasps. Mahalo for including the Service's avoidance and minimization measures for coastal Hawaiian yellow-faced bees:
    - If an action will occur in or adjacent to known occupied habitat, a buffer area around the habitat may be required and can be worked out on a site-specific basis through consultation with the Service.
    - For coastal species, protect all coastal strand habitat from human disturbance, including:
        - No fires or wood collecting.

        - Leave woody debris in place.
        - Restrict vehicles to existing roads and trails.
        - Post educational signs to inform people of the presence of sensitive species.
    - Avoiding disturbance (i.e., humans, machines, cars, staging) of coastal vegetation on the makai side of the original road will help avoid and minimize impacts to yellow-faced bees.
- Table 3.9.10 states that project effects on listed waterbirds and nēnē would be minimal due to the implementation of avoidance and minimization measures outlined in Appendix 3.10. The project may potentially impact aeʻo and nēnē. Therefore, we recommend that the cumulative impacts analysis in the draft EIS include an assessment for the construction phase and the normal operations phase. This should specifically address how the highway designs in the Ukumehame area will avoid car strikes and minimize impacts to aeʻo and nēnē. Additionally, we encourage your team to consider the anticipated increase in waterbird populations (aeʻo and ʻalae keʻokeʻo) and nēnē in the Ukumehame area following wetland restoration when conducting the cumulative impact analysis. Currently, neither Chapter 3.10 nor the Biological Resource Discussion in Appendix 3.10 includes an evaluation of the impacts to listed waterbirds and nēnē from the routine operations of the new highway after construction.
- The draft EIS states nighttime work is not anticipated; however, if it does become necessary, the DOT and FHWA will consult with the Service (see Appendix 3.9, page 4). Chapter 3.10, Table 3.10.9 states the project does not anticipate to impact seabirds, as standard Service seabird avoidance and minimization measures will be implemented. However, Table 3.10.5 mentions that nighttime work may occur, but not during the seabird fallout season. Please confirm whether nighttime work will occur during the seabird fallout season. If it is determined that nighttime work will occur during the seabird fallout season, we recommend contacting our office several months in advance for guidance to avoid adverse impacts to listed seabirds. Additionally, we recommend following the 2022 Maui Dark Skies Ordinance for all permanent lighting. For permanent lighting, limit these lights as human safely considerations allow, and include light frequencies and intensities that have the least impact on seabirds and sea turtles. There is also a growing body of peer-reviewed literature and seabird groups to help guide you with the most current animal friendly lighting.
- For revegetation efforts, we recommend using only native plants, in particular those documented in the biological survey: ʻilima (*Sida fallax*), ʻiliahialoʻe (*Santalum ellipticum*), ʻaʻaliʻi (*Dodonaea viscosa*), hoary abutilon (*Abutilon incanum*), akulikuli (*Sesuvium portulacastrum*), milo (*Thespesia populnea*), and naupaka (*Scaevola taccada*). If possible, we recommend avoiding disturbance to endemic plant species such as ʻiliahialoʻe that currently occupy the project area. ʻIliahialoʻe is an endemic plant species to the Hawaiian Islands. Limiting disturbance of non-listed endemic plants help to prevent their decline.
- For erosion control, we recommend following our comment in Chapter 3.9 above related to biosocks.

- To minimize collisions for seabirds, we recommend:
    - Flagging the tops of monopoles, cranes, and crane wires/cables.
    - Flagging fencing that extends above vegetation.
- To avoid and minimize invasive species potential impacts to ESA listed species, we recommend incorporating our invasive species biosecurity protocols into your project planning (Attachment A). The proposed project will be transporting a substantial amount of materials (i.e., construction materials or aggregate, etc.), vehicles, machinery, equipment, and personnel between sites, which has the potential to unintentionally introduce invasive species to the project site.
- Under Mammals, the DEIS states that ʻōpeʻapeʻa (Hawaiian hoary bat, *Lasiurus cinereus semotus*) have not been detected on Maui and cites Tomich 1986. Current data show that ʻōpeʻapeʻa do occur on Maui: https://dlnr.hawaii.gov/wildlife/files/2021/01/MauiBatsHTHFebruary2020.pdf
    - The DEIS states that if scheduling becomes a serious issue and cutting down or pruning trees taller than 15 feet cannot be avoided during the bat breeding season (June 1 through September 15), FHWA will consult with the Service. We recommend FHWA consult with us several months in advance if scheduling is anticipated to prevent implementing the Service's avoidance and minimization measures for ʻōpeʻapeʻa or any other listed species that occurs or may occur in the project area.
- Please include Service avoidance and minimization measures for sea turtles (honu (green sea turtles, *Chelonia mydas*) and honuʻea (Hawksbill sea turtles, *Eretmochelys imbricata*)). Construction on, or in the vicinity of, beaches can result in sand and sediment compaction, sea turtle nest destruction, beach erosion, contaminant and nutrient runoff, and an increase in direct and ambient light pollution, which may disorient hatchlings or deter nesting females. Off-road vehicle traffic may result in direct impacts to sea turtles or nests, and contributes to habitat degradation through erosion and compaction. Information for projects with a beach hardening, stabilization, or nourishment component: Projects that alter the natural beach profile, such as nourishment and hardening, including the placement of seawalls, jetties, sandbags, and other structures, are known to reduce the suitability of on-shore habitat for sea turtles. These types of projects often result in sand compaction, erosion, and additional sedimentation in nearshore habitats, resulting in adverse effects to the ecological community and may inhibit future sea turtle nesting. The hardening of a shoreline increases the potential for erosion in adjacent areas, resulting in subsequent requests to install stabilization structures or conduct beach nourishment in adjacent areas. Given projected sea level rise estimates, the likelihood of increase in storm surge intensity, and other factors associated with climate change, we anticipate that beach erosion will continue and likely increase. Where possible, projects should consider alternatives that avoid modifying or hardening of coastlines. Beach nourishment or beach hardening projects should evaluate the long-term effect to sea turtle nesting habitat and consider the cumulative effects. Avoidance and minimization measures include
    - No vehicle use on or modification of the beach/dune environment during the sea turtle nesting or hatching season (See nesting date ranges above).
    - Do not remove native dune vegetation.

- Have a biologist familiar with sea turtles conduct a visual survey of the project site to ensure no basking sea turtles are present.
- If a basking sea turtle is found within the project area, cease all mechanical or construction activities within 100 feet until the animal voluntarily leaves the area.
- Cease all activities between the basking turtle and the ocean.
- Remove any project-related debris, trash, or equipment from the beach or dune if not actively being used.
- Do not stockpile project-related materials in the intertidal zone, reef flats, sandy beach and adjacent vegetated areas, or stream channels.
- Optimal sea turtle nesting habitat is a dark beach free of barriers that restrict sea turtle movement. Nesting turtles may be deterred from approaching or laying successful nests on lighted or disturbed beaches. They may become disoriented by artificial lighting, leading to exhaustion and placement of a nest in an inappropriate location (such as at or below the high tide line). Hatchlings that emerge from nests may also be disoriented by artificial lighting. Inland areas visible from the beach should be sufficiently dark to allow for successful navigation by hatchlings to the ocean. To avoid and minimize project impacts to sea turtles from lighting we recommend:
  - Avoiding nighttime work during the nesting and hatching season.
  - Minimizing the use of temporary and permanent lighting on or near beaches and shield all project-related temporary and permanent lights so the light is not visible from any beach.
  - If lights can't be fully shielded or if headlights must be used, fully enclose the light source with light filtering tape or filters.
  - Incorporating design measures into the construction or operation of buildings adjacent to the beach to reduce ambient outdoor lighting such as tinting, reducing the height of exterior lighting to below 3 feet and pointed downward or away from the beach, and minimizing light intensity to the lowest level feasible and, when possible, include timers and motion sensors.
- Implementing our sea turtle avoidance and minimization measures, including our BMPs for Work In and Around Aquatic Environments, will also help avoid and minimize project impacts to sea turtle nesting habitat, including proposed critical habitat that overlaps with the northern end of the project area. Additionally, we recommend keeping workers, staging areas, and temporary resting equipment on the mauka side of the old highway, away from the beach, especially during sea turtle nesting season and within the proposed green sea turtle critical habitat.

Chapter 5.0 Preferred Alterative

- We recommend including conceptual designs of the preferred alternative viaduct through the Ukumehame area, including identified wetland habitat (jurisdictional and nonjurisdictional) in the area, architectural/design features aimed at reducing car strikes for nēnē and listed waterbirds (e.g., diversion poles and/or guardrails), and any land alterations to assist with stormwater management and highway runoff as described in section 3.9.8 of Chapter 3.

- In section 5.1.1.3, the DEIS mentions guardrails would be placed on either side of the viaduct. We recommend clarifying whether the architectural design features aimed at reducing listed bird car strikes will be placed on one side or both sides of the highway.
- We recommend providing more details about the swales (Appendix 3.10) to control stormwater, and other highway design features aimed at minimizing highway contaminant runoff into wetland habitat to reduce impacts to nēnē, ae‘o, and other listed waterbirds that may use the wetland habitat in the project area. Specifically, clarify where the stormwater will be diverted to or be collected, and will these areas have the potential to attract nēnē and listed waterbirds.
- Additionally, the proposed grassy swales adjacent to the road may increase the risk for nēnē car strikes. We recommend you inquire with the Nēnē Recovery Action Group about the proposed grassy swales and for potential alternative options for the swales, as applicable.

If you have questions pertaining to our recommendations, or our shared responsibilities under the ESA, please contact Carrie Harrington at carrie_harrington@fws.gov or 808-207-4698. When referring to this project, please include the follow reference number: 2023-0041712-S7-001.

Sincerely,

Hawai ‘i and Maui Nui Team Manager
Pacific Islands Fish and Wildlife Office

Attachment A. Service Invasive Species Biosecurity Protocol for Maui

Attachment A.

PIFWO Invasive Species Biosecurity Protocols

(Updated July 2024)

Project activities may introduce or spread invasive species, causing negative ecological consequences to new areas or islands, resulting in potential impacts to fish, wildlife, and their habitat. For example, seeds of invasive plant species (e.g., *Chromolaena odorata*, *Senecio madagascariensis*, *Cyathea cooperi*, or *Miconia calvescens*) can be inadvertently transported on equipment from a previous work site to a new site where the species are not present. Likewise, equipment used in an area infected with a pathogen or insect pest that can have ecological consequences (e.g., rapid ʻōhiʻa death (*Ceratocystis spp.*), black twig borer (*Xylosandrus compactus*), or naio thrips (*Klambothrips myopori*), if not properly decontaminated, can act as a vector to introduce the pathogen into a new area. Additionally, vehicles must be properly inspected and cleaned to ensure vertebrate or invertebrate pests do not stowaway and spread to other areas. These are just a few examples of how even well-intended project activities may inadvertently introduce or spread invasive species.

To avoid and minimize invasive species potential impacts to fish, wildlife, and their habitat we recommend incorporating general biosecurity protocols into your project planning (see below). Additional consultation is recommended if project activities involve transportation of materials, equipment, vehicles, etc. between islands or transpacific movement of materials or equipment.

Invasive Species Biosecurity Protocol

The following biosecurity protocol is recommended to be incorporated into planning for your project to avoid or minimize transportation of invasive species with potential to impact to fish, wildlife, and their habitat. Cleaning, treatment, and/or inspection activities are the responsibility of the equipment or vehicle owner and operator. However, it is ultimately the responsibility of the action agency to ensure that all project materials, vehicles, machinery, equipment, and personnel are free of invasive species before entry into a project site. Please refer to the resources listed below for current removal/treatment recommendations that may be relevant to your project.

1. Cleaning and treatment:
   Project applicants should assume that all project materials (i.e., construction materials, or aggregate such as dirt, sand, gravel, etc.), vehicles, machinery, and equipment contain dirt and mud, debris, plant seeds, and other invasive species, and therefore require thorough cleaning. Treatment for specific pests, for example, trapping and poison baiting for rodents, or baiting and fumigation for insects, should be considered when applicable. For effective cleaning we offer the following recommendations prior to entry into a project site:
   a. Project materials, vehicles, machinery, and equipment must be pressure washed thoroughly (preferably with hot water) in a designated cleaning area. Project materials, vehicles, machinery, and equipment should be visibly free of mud/dirt (excluding aggregate), seeds, plant debris, insects, spiders, frogs (including frog eggs), other vertebrate species (e.g., rodents, mongoose, feral cats, reptiles, etc.), and rubbish. Areas of particular concern include bumpers, grills, hood

compartments, wheel wells, undercarriage, cabs, and truck beds. Truck beds with accumulated material are prime sites for hitchhiking invasive species.

b. The interior and exterior of vehicles, machinery, and equipment must be free of rubbish and food, which can attract pests (i.e., rodents and insects). The interiors of vehicles and the cabs of machinery should be vacuumed clean particularly for any plant material or seeds.

2. Inspection:
    a. Following cleaning and/or treatment, project materials, vehicles, machinery, and equipment, must be visually inspected by its user, and be free of mud/dirt (excluding aggregate), debris, and invasive species prior to entry into a project site. For example, careful visual inspection of a vehicle's tires and undercarriage is recommended for any remaining mud that could contain invasive plant seeds.
    b. Any project materials, vehicles, machinery, or equipment found to contain invasive species (e.g., plant seeds, invertebrates, rodents, mongoose, cats, reptiles, etc.) must not enter the project site until those invasive species are properly removed/treated.

3. For all project site personnel:
    a. Prior to entry into the project site, visually inspect and clean your clothes, boots or other footwear, backpack, radio harness, tools and other personal gear and equipment for insects, seeds, soil, plant parts, or other debris. We recommend the use of a cleaning brush with sturdy bristles. Seeds found on clothing, footwear, backpacks, etc., should be placed in a secure bag or similar container and discarded in the trash rather than being dropped to ground at the project site or elsewhere.

4. Additional considerations:
    a. Consider implementing a Hazard Analysis and Critical Control Point (HACCP) plan (https://www.fws.gov/policy/A1750fw1.html) to improve project planning around reducing the risk of introducing or spreading invasive species.
    b. When applicable, use pest-free or low-risk sources of plants, mulch, wood, animal feed or other materials to be transported to a project site.
    c. For projects involving plants from nurseries (e.g., outplanting activities, etc.), all plants should be inspected, and if necessary, appropriately cleaned or treated for invasive species prior to being transported to the project site.
    d. Avoid unnecessary exposure to invasive species at a particular site (to the extent practical) to reduce contamination and spread. For example, if your project involves people or equipment moving between multiple locations, plan and organize timelines so that work is completed in native habitat prior to working in a disturbed location to reduce the likelihood of introducing a pest into the native habitat.
    e. Maintain good communication about invasive species risks between project managers and personnel working on the project site (e.g., conduct briefings and training about invasive species). Ensure prevention measures are communicated to the entire project team. Also consider adding language on biosecurity into

contracts or permitting mechanisms to provide clarity to all involved in the project. Report any species of concern or possible introduction of invasive species to appropriate land managers.

For current removal/treatment recommendations please refer to the following:
Hawaiian Islands:

- Hawai‘i Island – https://www.biisc.org/
- **Maui – https://mauiinvasive.org/**
- Moloka‘i - https://www.molokaiisc.org/
- Lāna‘i - https://pulamalanai.com/
- O‘ahu – https://www.oahuisc.org/
- Kaua‘i – https://www.kauaiisc.org/

Species-Specific Biosecurity Protocols

The following section contains specific protocols for a few select invasive species of concern in the Pacific Islands highlighted because of their potential to easily spread and cause great harm to native species and habitats. Other invasive species may not have existing specific protocols or may already be minimized by implementing the general invasive species protocols above (e.g., invasive plants, invertebrates, larger vertebrates). Information on other invasive species can be found in the island specific links below. As new threats emerge that require development of species-specific protocols, those may be added to this list.

Table 1. Current island distribution of invasive species with specific biosecurity protocols in the Pacific Islands (PIFWO jurisdiction).

Island	Invasive Species with Specific Protocols			
	Rapid ‘Ōhi‘a Death	**Little Fire Ant**	**Coconut Rhinoceros Beetle (CRB)**	**Brown Treesnake**
Island of Hawai‘i	widespread	widespread	detected	not present
Maui	present	incipient	detected in Nov 2023, not observed since. The state and Service recommend implementing CRB biosecurity BMPs	not present
O‘ahu	incipient	incipient	widespread	not present
Kaua‘i	widespread	not present	not present	not present

Rapid ‘Ōhi‘a Death (ROD)

If working directly with ‘ōhi‘a trees (e.g., sampling suspected trees, clearing an area of ‘ōhi‘a, etc.) or in an area(s) known to be highly infested with ROD, additional consultation is recommended.

Current Distribution of ROD: island of Hawai‘i, Maui, O‘ahu, Kaua‘i (https://cms.ctahr.hawaii.edu/rod

While ROD is not currently reported on Molokaʻi at this time, if you are in ʻōhiʻa forest it would be prudent to take precautions. Also, consider where the equiptment to be used on Molokaʻi will be coming from, and if from an island with confirmed ROD, take the necessary precautions.

Rapid ʻŌhiʻa Death (ROD) is a caused by a fungal pathogen (*Ceratocystis* spp.) that attacks and kills ʻōhiʻa trees (*Metrosideros polymorpha*). ʻŌhiʻa is endemic to the Hawaiian Islands and is the most abundant native tree species, comprising approximately 80 percent of Hawaiʻi's remaining native forests.

For more information about ROD including its current distribution, ROD science updates, and the latest on ROD protocol, please visit www.rapidohiadeath.org.

To reduce the risk of spreading ROD, the following best management practices and decontamination protocol are recommended:

Best Management Practices for ROD

1. Never transport any part of an ʻōhiʻa tree between different areas of an island or to a different island.

2. Do not use equipment from ROD infected islands on another island unless it is very specialized equipment and follows the decontamination protocol described below.

3. Avoid wounding ʻōhiʻa trees and roots with mowers, chainsaws, weed eaters, and other tools. If an ʻōhiʻa receives a minor injury like a small broken branch, then give the injury a clean, pruning-type cut (close to the main part of the trunk or branch) to promote healing, and then spray the entire wounded area with a pruning seal.

4. Always report suspect ROD ʻōhiʻa trees observed within you project area. ROD is a wilt disease that cuts off the supply of water and nutrients to the tree. The primary symptom to look for is an entire canopy or a large branch with dying leaves or red discolored leaves. Please record the GPS coordinates and location and take a picture of the tree if possible. Please report suspected ROD ʻōhiʻa trees to the following agencies:
    a. Island of Hawaiʻi – BIISC: 808-969-8268 (ohialove@hawaii.edu)
    b. Maui – MISC: 808-573-6472 (miscpr@hawaii.edu)
    c. Molokaʻi – TNC: 808-553-5236 ext. 6585 (lbuchanan@tnc.org)
    d. Oʻahu – OISC: 808-266-7994 (oisc@hawaii.edu)
    e. Kauaʻi – KISC: 808-821-1490 (kisc@hawaii.edu)

ROD Decontamination Protocol

1. Clothes, footwear, backpacks, and other personal equipment
    a. Before leaving the project site, remove as much mud and other contaminants as possible. Use of a brush with soap and water to clean gear is preferred. Footwear,

backpacks, and other gear must be sanitized by spraying with a solution of >70 percent isopropyl alcohol or a freshly mixed 10 percent bleach solution.

2. Vehicles, machinery, and other equipment
    a. Vehicles, machinery, and other equipment must be thoroughly hosed down with water (pressure washing preferred) and visibly free of mud and debris, then sprayed with a solution of >70 percent isopropyl alcohol or a freshly mixed 10 percent bleach solution. Use of a "pump-pot" sprayer is recommended for the solution and a hot water wash is preferred. Be sure to thoroughly clean the undercarriage, truck bed, bumpers, and wheel wells.
    b. If non-decontaminated personnel or items enter a vehicle, then the inside of the vehicle (i.e., floor mats, etc.) must be subsequently decontaminated by removing mud and other contaminants and sprayed with the one of the same aforementioned sanitizing solutions.

3. Cutting tools
    a. All cutting tools, including machetes, chainsaws, and loppers must be sanitized to remove visible mud and other contaminants. Tools must be sanitized using a solution of >70 percent isopropyl alcohol or a freshly mixed 10 percent bleach solution. One minute after sanitizing, one may apply an oil-based lubricant to chainsaw chains or other metallic parts to prevent corrosion as bleach is corrosive to metal.

NOTE: When using a 10 percent bleach solution, surfaces should be cleaned with a minimum contact time of 30 seconds. Bleach must be mixed daily and used within 24 hours, as once mixed it degrades. Bleach will not work to disinfect surfaces that have high levels of organic matter such as sawdust or soil. Because bleach is also corrosive to metal, a water rinse after proper sanitization is recommended to avoid corrosion.

Little Fire Ant (LFA)

For the most current status on distribution and infestations, please visit http://stoptheant.org/lfa-in-hawaii/

The little fire ant (*Wasmannia auropunctata*), or LFA, is an invasive species with a painful sting that can inhabit many different environments. In Hawai‘i, it often infests agricultural fields and farms, damaging crops and stinging unsuspecting workers. Little fire ants are also highly disruptive to native tropical ecosystems and harmful to wildlife. Slow moving, but tiny and capable of foraging 24 hours a day with multiple queens per colony, LFA is a formidable threat to biodiversity, agriculture, and quality of life on tropical islands in the Pacific.

For more information about LFA including helpful guides and workshops for treating or detecting LFA, please visit www.littlefireants.com.

To reduce the risk of spreading LFA, the following biosecurity protocol is recommended:

Biosecurity Protocol for LFA

1. For projects involving plants from nurseries (e.g., outplanting activities, etc.), all plants should be inspected for little fire ants and other pests prior to being transported to the project site. If plants are found to be infested by ants of any species, plants should be sourced from an alternative nursery and the infested nursery should follow treatment protocols recommended by the Hawai‘i Ant Lab (https://littlefireants.com/wp-content/uploads/2020-Management-of-Pest-Ants-in-Nurseries-min.pdf).

2. All work vehicles, machinery, and equipment should follow steps 1 and 2 in the "Invasive Species Biosecurity Protocol" for (1) cleaning and treatment and (2) inspection for invasive ants prior to entering a project site.

3. Any machinery, vehicles, equipment, or other supplies found to be infested with ants (or other invasive species) must not enter the project site until it is properly treated (https://littlefireants.com/how-to-treat-for-little-fire-ants-for-homeowners/#recommended-bait-products) and re-tested. Infested vehicles must be treated following recommendations by the Hawai‘i Ant Lab (https://littlefireants.com/resource-center/) or another ant control expert and in accordance with all State and Federal laws. Treatment is the responsibility of the equipment or vehicle owner. Ultimately however, it is the responsibility of the action agency to ensure that all project materials, vehicles, machinery, and equipment follow the appropriate protocol(s).

4. General Vehicle Ant Hygiene: Even the cleanest vehicle can pick up and spread little fire ant. Place MaxForce Complete Brand Granular Insect Bait (1.0 percent Hydramethylnon; https://labelsds.com/images/user_uploads/Maxforce%20Complete%20Label%201-5-18.pdf) into refillable tamper resistant bait stations. An example of a commercially available refillable tamper resistant bait station is the Ant Café Pro (https://www.antcafe.com/). Place a bait station (or stations) in the vehicle and note that larger vehicles, such as trucks, may require multiple stations. Monitor bait stations frequently (every week at a minimum) and replace bait as needed. If the bait station does not have a sticker to identify the contents, apply a sticker listing contents to the station.

5. Gravel, building materials, or other equipment such as portable buildings should be baited using MaxForce Complete Brand Granular Insect Bait (1.0 percent Hydramethylnon; https://labelsds.com/images/user_uploads/Maxforce%20Complete%20Label%201-5-18.pdf) or AmdroPro (0.73 percent Hydramethylnon; https://connpest.com/labels/AMDROPRO.pdf) following label guidance.

6. Storage areas that hold field tools, especially tents, tarps, and clothing should be baited using MaxForce Complete Brand Granular Insect Bait (1.0 percent Hydramethylnon; https://labelsds.com/images/user_uploads/Maxforce%20Complete%20Label%201-5-18.pdf) or AmdroPro (0.73 percent Hydramethylnon; https://connpest.com/labels/AMDROPRO.pdf) following label guidance.

7. Vehicles that have entered a project site known or thought to overlap with areas infested with LFA should subsequently be tested for LFA with baiting in accordance with protocol recommended by the Hawai‘i Ant Lab (https://littlefireants.com/survey-your-home-for-lfa/).

8. If LFA are detected, please report it to 808-643-PEST (Hawai‘i), 671-475-PEST (Guam), or 684-699-1575 (American Samoa). Please visit https://littlefireants.com/identification-of-little-fire-ants/ for assistance in identifying LFA.

Coconut Rhinoceros Beetle (CRB)

Current Distribution of CRB in Hawai‘i: O‘ahu, detected on Maui in November 2023 but not observed since (there are ongoing search efforts: https://governor.hawaii.gov/newsroom/hdoa-news-release-on-on-going-efforts-against-the-coconut-rhinoceros-beetle-on-maui/)

The coconut rhinoceros beetle (*Oryctes rhinoceros*), or CRB, is a large, horned scarab beetle native to Southeast Asia. An invasive pest where it occurs outside of its native range, the adult beetles primarily attack coconut palms by boring into the crowns to feed on developing leaves. It is also known to feed on bananas, sugarcane, pineapples, oil palms, and pandanus trees. The larval grub stage burrow into and feed upon decomposing mulch and vegetation. On most Pacific Islands it lacks natural predators, leading to severe declines and extirpations of palm species where it has become established. On Guam, researchers have recently documented a shift of CRB to the island's native and threatened cycad tree (*Cycas micronesica*) (Marler et al. 2020). In the Hawaiian Islands, CRB is a documented threat to archipelago's native *Pritchardia* palm species.

For more information about CRB including the current situation in Guam and high/low-risk areas on O‘ahu, please visit http://cnas-re.uog.edu/crb/ or https://www.crbhawaii.org/.
To reduce the risk of spreading CRB, the following biosecurity protocol is recommended:
Biosecurity Protocol for CRB used on O‘ahu (most can be applied to Maui)

1. Never transport green waste between islands and minimize the creation, storage, and transport of green waste within O‘ahu, this also includes:
    a. Mulch, bark, compost
    b. Soil of any kind
    c. Potted plants of any kind

    Additional consultation is recommended if the project involves transportation of materials, soil, equipment, vehicles, etc. between islands.

2. If felling or trimming palms, contact CRB Response for a free inspection ((808) 679-5244 or email at info@crbhawaii.org)

3. Keep green waste whole until it is ready to be treated and removed.
    a. Chip green waste on site and transport it on the same day to a secure and managed green waste disposal site/facility.

   b. For chipped green waste in high-risk areas, re-chip prior to movement outside the infested area, treat with pesticide (when applicable), heat treatment (>130 degrees F), spread and dry, or store in sealed durable containers.

4. Minimize accumulations of green waste by regularly treating mulch piles or depositing it in sealed green waste bins. In low-risk areas, we also recommend thinly spreading mulch (less than 2 inches deep) and allowing it to dry (no irrigation).

5. If injured or dying coconut palm trees are observed or if CRB are detected, contact CRB Response at (808) 679-5244 or email at info@crbhawaii.org or online at https://www.crbhawaii.org/report.

From:	no-reply@wspis.com
Sent:	Tuesday, April 8, 2025 6:02 PM
To:	Small, Matthew; Liebowitz, Peter; Bents, Jamie; honoapiilanieis@online.wspis.com; Mitchell, Andrew
Subject:	New Comment from HonoapiilaniHwyImprovements.com

First Name: Andrew
Last Name: Viloria
Email Address: andrewv9@hawaii.edu
Join Mailing List: False
Comment:
Aloha, I recognize this may be too late, but as a lifelong citizen I do not want this highway to cut through our only outdoor flat open firing range. It would make the inaccesibility of sport shooting that much more difficult for Hawaii citizens. Please reconsider these changes. Mahalo, Andrew

Comment Log Submission No. 85

New Comment from HonoapiilaniHwyImprovements.com

From no-reply@wspis.com <no-reply@wspis.com>
Date Tue 1/28/2025 5:46 PM
To Small, Matthew <Matthew.Small@wsp.com>; Liebowitz, Peter <Peter.Liebowitz@wsp.com>; Bents, Jamie <Jamie.Bents@wsp.com>; honoapiilanieis@online.wspis.com <honoapiilanieis@online.wspis.com>; Mitchell, Andrew <Andrew.Mitchell@wsp.com>

First Name: cesar
Last Name: martin del campo
Email Address: cesarivangarcia@gmail.com
Join Mailing List: False
Comment:
Support for Honoapi'ilani Highway Improvements Project and Request for Correct Categorization of Parcel 48002115 To: Hawai'i Department of Transportation (HDOT) Subject: Public Comment on Honoapi'ilani Highway Improvements Project – Build Alternative 1 Dear Project Team, I am writing to express my support for the Honoapi'ilani Highway Improvements Project and its goals to improve transportation infrastructure while addressing environmental and safety concerns. I appreciate the effort and planning involved in designing a project of this scale to benefit our community. However, I would like to address a critical issue regarding the classification and evaluation of Parcel 48002115, which has been flagged for full acquisition under Build Alternative 1. It is essential that the property's current and planned uses are accurately reflected in the project documentation to ensure an equitable and informed process. 1. Misclassification of Parcel Use The current project documentation categorizes Parcel 48002115 as "not in use," which does not accurately reflect its status. Specifically: The parcel is actively utilized for grass farming operations, supported by established water connections and other agricultural infrastructure. Farming activities are currently underway, generating revenue and contributing to the agricultural economy of the area. Additionally, the lot is being developed with architectural plans for a residential structure to complement its agricultural use. This active farming operation and planned development demonstrate that the parcel is a valuable and productive asset, rather than idle or undeveloped land. If you have any questions, please contact me at (202) 746-0133. Cesar El Toro Zoysia Turf - Maui Grass Farm LLC.

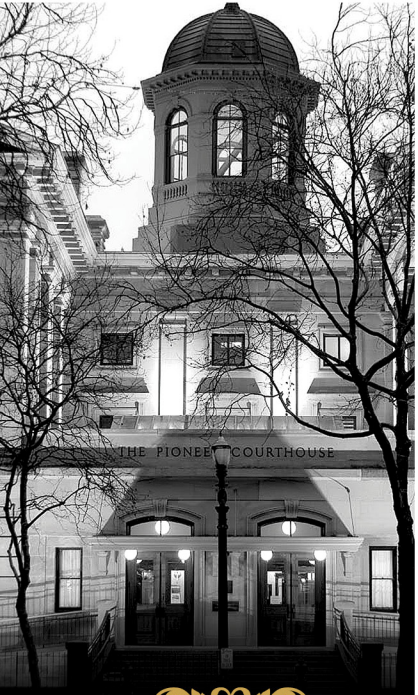
New Comment from HonoapiilaniHwyImprovements.com

From no-reply@wspis.com <no-reply@wspis.com>
Date Tue 1/7/2025 1:33 PM
To Small, Matthew <Matthew.Small@wsp.com>; Liebowitz, Peter <Peter.Liebowitz@wsp.com>; Bents, Jamie <Jamie.Bents@wsp.com>; honoapiilanieis@online.wspis.com <honoapiilanieis@online.wspis.com>

First Name: Lee
Last Name: Chamberlain
Email Address: lachamb91@gmail.com
Join Mailing List: True
Comment:
Dear Hawai'i Department of Transportation (HDOT) and Federal Highway Administration (FHWA), I am writing to express strong support for the integration of the West Maui Greenway (WMG) into the Honoapi'ilani Highway realignment project. The WMG, as part of the Hele Mai Maui Legacy Projects, offers a unique and timely opportunity to promote sustainable, multimodal transportation that strengthens resilience and community connectivity in West Maui. 1. Strategic Implementation of Segment 6 The WMG Final Report (September 2022) identified Segment 6 (Olowalu to Lahaina Pali Trailhead) as a priority due to its potential to repurpose the existing Honoapi'ilani Highway. Alternative A was evaluated as the top-performing route, benefiting from its scenic views, strong recreational connections, and the minimal need for new right-of-way (ROW). By utilizing the existing highway, this option is not only cost-effective but also highly feasible, despite its location within the sea-level rise (SLR) exposure area. 2. Compliance with the Navahine Settlement Commitments The WMG supports the Navahine Settlement's requirement to expand multimodal transportation infrastructure, including pedestrian pathways and bikeways, to reduce vehicle miles traveled (VMT) and support decarbonization goals. • Public Transit, Pedestrian, and Bikeway Expansion: The WMG aligns with interim goals for multimodal projects that integrate alternative transportation options across the state. • Specific Deadlines: Key elements, including pedestrian and cycling infrastructure, are to be incorporated into the planning and budgeting cycles starting by April 2025, in line with the Mid-Range Transportation Plan (MRTP) and the Statewide Transportation Improvement Program (STIP). • Budgeting Prioritization: Projects such as the WMG that align with decarbonization and VMT reduction goals will be prioritized, with a five-year timeline set for completion of key multimodal infrastructure expansions. 3. Integration with Complete Streets Policy The Complete Streets policy requires all transportation projects to prioritize the safety and accessibility of all users, including pedestrians, cyclists, and transit riders. • Policy Integration: The WMG is a model project for implementing Complete Streets, ensuring safe pedestrian and bike pathways, public transit access, and roadway infrastructure improvements that support walking and cycling. • Complete Streets Assessment: Beginning with the April 2025 planning cycle, all Capital Improvement Projects (CIPs), including the WMG, will undergo a Complete Streets assessment to document adherence to these principles. Any exceptions must be justified to ensure transparency and accountability. • Expenditure Prioritization: The WMG's focus on multimodal connectivity positions it for prioritization within the Complete Streets framework, ensuring that it receives the necessary funding and resources to move forward. 4. Alignment with Act 131 and the Hawai'i Bike Plan The WMG aligns with Act 131's mandate for a fully multimodal, accessible, and sustainable transportation system, as well as the Hawai'i Bike Plan's goals

of creating a statewide network of protected bikeways. Act 131 emphasizes the importance of separated pathways that improve public safety, health, and quality of life, all of which are central to the WMG's design. 5. Environmental and Permitting Benefits By repurposing the existing highway, the WMG may qualify for a Categorical Exclusion (CE) under 23 CFR 771.111(f) due to its minimal environmental impact. This reduces the need for extensive environmental reviews and allows for faster implementation while maintaining compliance with state and federal environmental standards. 6. Public Health and Emergency Preparedness The WMG contributes to improved public health outcomes by encouraging active transportation and providing equitable access to safe, recreational spaces. Additionally, the greenway can serve as a non-motorized evacuation route during emergencies, supporting West Maui's resilience and emergency response capabilities . Recommendation: I respectfully urge HDOT and FHWA to incorporate the West Maui Greenway into the Honoapi'ilani Highway realignment plan by repurposing the existing highway for Segment 6. This approach will maximize cost-efficiency, adhere to state and federal policy goals, and enhance West Maui's safety, resilience, and community connectivity. Thank you for your commitment to building a sustainable and resilient transportation future for West Maui. Sincerely, Lee Chamberlain Maui Bicycling League Advocacy Chair

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PUBLIC HEARING PRESENTATION:
DRAFT ENVIRONMENTAL IMPACT STATEMENT

HELD ON

THURSDAY, JANUARY 23, 2025

5:00 P.M.

HELD AT

LAHAINALUNA HIGH SCHOOL

980 LAHAINALUNA ROAD

LAHAINA, HAWAII 96761

PUBLIC HEARING PRESENTATION:

DRAFT ENVIRONMENTAL IMPACT STATEMENT

PUBLIC COMMENTS

TAKEN ON

THURSDAY, JANUARY 23, 2025

5:00 P.M.

MR. KAM: My name is Allen Kam. I'm from WSP. We're really happy to see you all here tonight. Happy to see you guys enjoying the open house. We're going to have that open until about 6:00 p.m. We're going to start to have a little presentation at 6:00 p.m. In the meantime please go and check out all the information that's over here.

(Public Comments:)

MS. EMMERICH: Hi, my name's Kellee Emmerich. I have been a Lahaina resident for almost 40 years. We owned a home on Lahainaluna Road. And during the Lahaina Fire we lost our home. One of my children, my daughter, and her family also lost their home in Wahikuli.

And after living in -- at the Hyatt for eight months we were -- it was very healing to move to Ukumehame. We bought a property in Ukumehame. And we put two tiny houses there, which we are

farming now. We have chickens. We planted over 20 trees. And we have a barn that we're going to be building.

And so it would be very inconvenient and disappointing if -- the higher up the highway was, it would be possibly affecting our property. And so my request is that it goes as low as possible through County land rather than through the resident -- or the residential areas or the agricultural areas or, yeah, private property.

I'm concerned also about the noise from the road noise. The closer up it comes to the -- where the people are living. So my request is that it would just stay as low as possible on the highway. I think that's it.

THE REPORTER: First and last name again?

MR. EMMERICH: Brad Emmerich.

THE REPORTER: Okay. Ready when you are.

MR. EMMERICH: So after the fire I realized that this is going to be something that takes a long time. And so I needed to find a house or something -- a place for my family to live. So that's when we lived at property there in Ukumehame.

I originally was trying to find a friend or something like that or somebody that was wanting

to allow me to put a -- either a mobile home or something on their property.

That's when somebody said, "Well, why don't you just look at the ones there in Ukumehame?" Which we had looked at earlier in the year but it was out of our ability.

Anyway, to make a long story short, so after the fire I realized it was going to take a long time before we could rebuild. So we went and found something there in Ukumehame.

And, like Kellee was saying, we were at the Hyatt for eight months. So while we were there we were working hard at trying to build something in Ukumehame. But it was difficult getting through all the process.

At any rate, now that we're there, of course, we really like the property and so we're more invested in what happens as far as the road is concerned. And there is property below us -- the property that's next to the highway that is all County property.

And there are no trespassing signs all over. But of course people have moved in there and, you know, they put up homesteads really -- gates and fences and right next to the "no trespassing" signs.

But it just -- it makes sense to me that the State would put the highway there at the County property at the bottom of Ukumehame development.

And then my other concern was the noise mitigation -- if there was a way that they could -- they would certainly -- my hope would be they would consider that because right now we can hear the highway noise.

But when we go inside, you know, then at least you can't hear it when you're inside. But if the highway was closer it gets louder. And so my hope would be that they would take that into consideration also since we are a resident -- that they would do something to try to mitigate the noise -- lessen the noise. That's it.

THE REPORTER: Perfect. Thank you.

(Break in audio.)

MR. ISHII: Hi, my name is Raymond Ishii. Is this thing on? Okay. I'm the president of the Valley Isle Sports Shooters Club, which is the oldest and largest user of Ukumehame Firing Range.

While I fully support moving the existing highway, in that there are a number of concerns I have. The roads appear to run parallel to fire lines, which we are very grateful for, although

there is a couple routes that were uncomfortably close. But my understanding is that's going to change.

The questions I have is right now to access the range and the Papalaua Wayside Park we have to drive past the range via the Viaduct exit to the Ukumehame subdivision, then backtrack on the existing highway.

The question I had, which was actually answered, was is the State going to maintain that highway to a correct standard where you can actually drive on it. And I was told that's going to be turned over to the County. So that's a County question now.

Because that section of road -- if anybody's driven it -- is probably going to fall in the ocean pretty soon. Because if you look every so often you'll see the -- basically the ocean undercutting the existing jersey barriers. So the question I have is, number one, is that road going to be maintained?

The second question I have -- to avoid that, prior on the left side of the bypass would it be possible to just simply restripe existing road and put in a turn lane so we can get direct access

and not have to basically bypass everything? That will give access to both the range and the beach park. Then, going back the other way, a merge lane.

My understanding is a viaduct is going to be 25 feet high, which is good so emergency vehicles can go under it. But the other question we had was during construction will people be allowed access basically to the range because they're going to build the viaduct over the existing road? And that's it for the range.

I have one comment though as far as the highway itself -- if there's any thought about putting protected passing lanes on that highway? Because if anybody's driven it, what happens is you get behind somebody going 20, 30 miles an hour and you got a line of cars, you know, half mile, mile long.

Then you get one guy ten cars back who's late for work and he's going to start passing people. So has there been any thought about putting passing lanes on that highway? Not the whole thing but just intermittently to let people around slow people. That's all I got.

MR. KAM: Mahalo, Mr. Ishii.

Mr. McPherson?

MR. MCPHERSON: Hi, my name is David McPherson. I live in Kipuka Village. Most people know it as Olowalu Village. I've been there for about ten years with my family.

As we look at the alternate routes, it seems -- and I would like to see it go a little bit higher away from the homes. There's a lot more space Mauka. Hopefully there's no park sites or anything that would be -- that would hinder that to be pushed further away from our homes.

We have a small little village there. And it seems like it goes, you know, fairly close. So that's one thing that I would really like to see happen is that it would be pushed further away from our homes for the noise.

And second of all, for the design team, if you thought about putting guardrails up -- I know guardrails are to stop cars when there's no other runways that they can slow down.

But guardrails keep vagrants out of State-covered lands. And that's a really -- putting guardrails up would save our County and State dollars in not having to clean up cars.

I mean, if you do the stretch from Olowalu to Ukumehame you're going to see cars littered up

there, especially if you take a helicopter and you fly over. It is unbelievable. And that takes a lot of money, a lot of effort, and it damages our wetland areas.

So to keep everybody out of there, guardrails would eliminate anybody really driving into State-covered land or places that they should not be trespassing. That's just one thing that I wanted to say on that. Thank you, everybody, for coming. Appreciate it.

MR. WOLFORD: Good evening. My name's Jason Wolford. I'm with SAST. We're a nonprofit training organization at Ukumehame Firing Range. We're a nonprofit. We teach firearm safety and training.

My concern is along with the fires when the range was closed -- people need accesses through that. So during the construction are we still going to be able to access that? Because people want to go hunt. They need to be able to sight rifles in for ethical hunting purposes and things like that.

If it's shut down another six to eight months during the construction of that, you're just going to have people going other places shooting and as well as being able to take firearms, classes, and

trainings -- and safety trainings -- which is required by the State of Hawaii.

You're basically going to be locking people out of access to these constitutional rights as well if we don't have access to that.

And my second question is I understand they're making it three lanes for finances and things like that. What happens when there's an accident on that elevated roadway?

Whether there's guardrails and the vehicles are stopped there and people need to get through or -- how are you going to get people off of that? If there's a fatality we all know the road shuts down here for six to eight hours.

How are people going to get off of that elevated roadway to be able to at least go one way or the other to get back somewhere else rather than sitting in their cars for six to eight hours?

MR. FISCHER: Hello, my name is Van Fischer. I own six acres in Olowalu right where the wai stream goes up right below where the proposed highway is going to go through.

Fortunately, the new highway that's proposed barely clips the corner of my property. So I'm grateful that it misses mine. But my neighbors

are not so fortunate.

I'm here to ask you to move the intersection of Luawai and the highway Mauka, like, 150 feet for a number of reasons. One, the way that it hits Luawai Street now is at an angle so it doesn't create a right-angle intersection.

So you're going to have to realign the side roads as opposed to realign the highway. If you just move the proposed highway up about 150 feet it changes the arc of the highway as it comes through.

And then it hits Luawai Street at a right angle so you have a proper intersection. That intersection's going to need to be signalized because it's going to be a very busy intersection going down into Olowalu Village.

Another issue is that on the back of our property lines -- Lot 20 and Lot 19 -- there's a subservice tributary to Mapua Stream.

And there's an old pumphouse right where you're putting your highway through where if you go down in there you can see there's water flowing under there. And that is a tributary into Mapua Stream, which runs right through mine and Dave's property just down further.

The rest of Mapua Stream up above is also subterranean. But in the section through our property it's an open stream and there's tons of life in there. And we would like to protect it and enhance it if possible. And putting the highway through there is not going to accomplish that.

There is a substantial topography difference between the area where the highway can go right above Lots 19 and 20 as opposed to below. There's about a 12-foot vertical bank. And if it were moved up then you wouldn't have to deal with that bank.

If you do have to deal with the bank, behind my property's going to be a 20-foot-high embankment to support that highway up there. So for these reasons I'd like to ask that you move it.

The most important reason probably is that right where you go through Lot 20 there was two parcels there -- A and B -- just on the southside of the wai stream where there was two two-and-a-half-acre parcels there with two local families who are in contract to buy those to build their homes on.

And now they can't build their homes there. You're going right through those properties. And all it would take is to move it 150 feet Mauka

into an open space tract that's already there that nobody's going to be building on.

So I would appreciate it if you would look into it. I feel really good. I spoke with Jamie about this and I feel like she really understood and cared about what I was saying. So I'm hopeful that you will take this into consideration. Thank you.

MR. NIELSON: Hello, my name is Nick Nielson. I'm a property owner in Ukumehame. Most of my concerns have been addressed so far so I'm just going to note one concern for us. We're kind of concerned about the hours of construction -- if there's going to be limits or it's going to be a 24-hour operation and how that noise will be addressed and recorded before and after construction. Will there be a decibel meter at our location now and that's compared to construction? That's it.

MS. KEAHI: Aloha. I'm Malihini Keahi. I'm from Lahaina all my life. You know, my dad was Moon Keahi. And my father used to help a lot of representatives who were trying to make a change on the west side.

And the craziest thing was that every time they wanted to add a road something else was coming. So again, you know, I live in Leali'i. I spoke my

piece up there. I think what I'm afraid of more so is the highway.

So you take up more land. You open up the highway. And then you infringe on people in Olowalu. Some of them are wanting the changes. But you know what? I think leave Olowalu as peaceful as it is.

It doesn't stop traffic to come into Lahaina. Today I had an appointment on the other side. I came back this way. Traffic was backed up on the bypass. And I think the more road you make the more people come.

And with what Lahaina has just already gone through it's, like, this is too much. It's just too much. I think Lahaina, Olowalu needs to be rethink -- I know they were wanting to make a whole village and a whole town.

That place is sacred. I think the few people that know about it and the people that have learned about it in this last 20 years is plenty enough. We need to speak -- we need to share the history of Olowalu, not condemn it because we're going to have more people coming in.

You know, that area -- it's been sacred for me all my life growing up. Whenever we were

gathering with my grandmother there we'd always end up down by Olowalu Pier and we would spend a week or a month, especially when my grandparents were alive, and we'd all gather.

Everybody who was from Pu'ukoli'i on this side of the island -- we'd go to Olowalu. That is gone now. Yeah. My babies grew up there. My grandbabies today -- they don't -- they enjoy it there because of the feeling and as we grew up there.

But Olowalu is special. And those of you that are there, you're very blessed. And I just feel that this whole highway thing -- and I know progress is progress. But, like I said, every time we add a road something else is happening. It gets developed.

All the work that Tanya did of exposing our history is going to be covered all over again. Maybe not all the areas, but most of it -- of her hard work, of our past.

And that is today that is going on -- that we get to know of our past, our history. For our children and our grandchildren and our great-grandchildren -- they'll never see that. It's going to be covered. And you add one more road --

that's not going to help.

You know what? After the fire, traffic was very little. People respected and got only on the bypass through Lahaina and Keawe. And that got all messed up, yes.

And then we asked these two, "Why couldn't you do the road Mauka and take it to Honokowai?" We said no more money. But you talk about money. So why don't you work on that part? You know, above --

MR. KAM: Three minutes is up. Please wrap up.

MS. KEAHI: So, anyway, I didn't mean to come talk but I had to say something. And I have my family Naho'oikaikas Olowalu and I was really worried where that road was going to change because they're right above the store. And that's why I'm here.

MS. KEELE: So mahalo to having this in Lahaina. I think that's really helpful. I want to recognize that, Director Sniffen, you've done this a couple times now. So thank you -- coming to the community to have conversations.

I'm happy to see so many people from the area that we're discussing because I found out about this meeting because I opened my, like, Lahaina

Strong weekly email today. So they happened to have it in there.

And so just advertisement wise if there's something better that you guys could do for future engagement because our community is really overwhelmed. And so we need to have a little bit of notice so we can plan around things.

I do want to acknowledge that in the presentation it looks like someone did realize it since you had these printed because on the boards it does say "a grassy median" and that made me very uncomfortable. So I want to make sure that we are talking about that as a native plant median and not a grassy of some sort.

And then just engagement wise, you know, I'm just kind of wondering, like, how you've done it and how much you've done because this is something that, especially on Maui, we've found is that we just -- there just isn't really engagement.

People say there's engagement and, like, yeah, some people go the meetings but, like, it's always the same groups of us that do. And I appreciate the explanation of the preferred versus the alternatives. I think that was really helpful.

I do think that cultural concerns is very

-- it's a very significant conversation for us to have. You know, we know that there's going to be Iwi where we're talking about.

And so having a plan for that -- because my understanding is, like, the state law, like, doesn't exist about it. Like, you find Iwi and you stop. And that's, like, the law. So, you know, just being mindful of those kind of things because we know that's going to happen.

And then to Dave's point, I really liked the comment about the guardrails. And I also enjoyed the comment about the passing lanes.

And I don't know that that's necessarily an option, but I do think that at the very least we should have signs that say, like, pull over to let other cars pass or something because that absolutely happens. And I think encouraging people to drive faster around isn't great.

But letting people know, like, "Hey, you're driving too slow -- get out of the way" is, like, very helpful to those in our community who have to commute every day and deal with all these tourists. And I think that's really it. Otherwise, everything's been covered. So mahalo for having this.

MS. KALUNA-PALAFOX: Aloha. Good evening. My name is Victoria Kaluna-Palafox. I live in Ukumehame. I am and we are Ukumehame restoration wetlands and restoration of Limu projects working in Ukumehame. Also working with Olowalu.

We pray that we connect with our ohanas here in Lahaina so that we can continue the growth of Limu to renourish our oceans again and to protect our wetlands. And with that, Ukumehame for many, many years has been very dry. The wetlands has had no life until a couple years ago.

If you go to Pohaku Aeko Street there's, like, a culvert they made. Over there it used to be all dry. The only time that wetlands used to fill up is when the rains used to come and a little seepage from the ocean floor.

Today in that culvert there's water in there and there's fishes. There is life right where you're thinking of putting that highway. I ask you not to do it.

I ask you to go ahead, bring your scientists, and check our 'Aina Ukumehame because it's coming alive again. There is fishes where you wouldn't think there is fishes. There are water pools in Ukumehame where there weren't water pools.

It is starting to show us.

There was one developer -- and the only developer back there -- he tried to help the community by building eight cottages. In order to get their cottages built he covered up a wetland pool and put the eight houses on it.

My question to you -- how are you going to run your highway? With a big berm or are you doing dry pipe? If it is dry pipe I am against dry pipe because the wetlands are important for us, especially at this time.

We need to start concentrating on growing food for our people. And this is where it should be -- Ukumehame Olowalu -- the largest land in Lahaina. Open, barren, good 'Aina for grow food.

The other part that I am very concerned about is all the wetland pools. There's a special one that I talked to Tanya and I talked to Pua today. It was always kept within the Kupuna's, Mana', and Mo'olelo. We have not shared that space yet.

As Olowalu has a cave up in the valley filled with water and that land belonged to the Nahina and Ho'oikaika's, today Peter Martin wants to funnel that water out.

Ukumehame is the same. It is a land of food growth. We need to look into that history. The wetlands of Ukumehame starts from the pipe and it comes almost all the way to the river.

The reason why I'm saying almost to the river is because the river's water flow comes within that passage so the wetlands could stop at one certain point. Again --

MR. KAM: Your three minutes --

MS. KALUNA-PALAFOX: Yeah. Again I will repeat -- many years from the time of the first development that area was all wet. Within the last year or so water has been seeping under the road. Kane has found his way, therefore bringing the fishes back to where they was in time past. I thank you very much for the time.

MS. MAGALLANES: Aloha mai kakou. My name is Linda Nahina Magallanes. I'm an original descendant of Olowalu -- my biggest concern. I know a lot of culture is significant in that area.

I had asked about cutting down the trees through Olowalu -- the tunnel trees. I was told they cannot. Why? You protect the trees but you're not protecting the cultural significance of Olowalu.

Every bit of Olowalu is significant

culturally. I know that because I'm also from Olowalu with the connection of my ohana Naho'oikaika and Keao. I used to live where the farm is right now that -- by the highway -- that coconut farm and butterfly -- I lived there until we moved into Lahaina.

But my biggest concern is if you put the road up higher what about the heiau on the top? That heiau is still going strong. There's also Pu'u Kilea, which is -- our Kupunas are buried on top. You're going to put one highway through that.

You have Awalua, which is the outskirt of Olowalu on the Lahaina side. Then you've got Kapa'i, which is on the Wahikuli side of Olowalu. So also these places need to be named correctly. Not -- Kapa'i is not Olowalu. That's Kapa'i.

I said this in many meetings. I came to many meetings. I also was on you guys' Zoom meeting and somebody said they was going to get back to me and to today never got back.

It really disappoints me because nobody listened because it's all about the road. If you cut the trees down, you got one road there. Use the old cane haul road. What's so hard about that?

Instead of going up -- because even on the

cane haul there's -- the cane road to the regular road has cemetery on the left. Check West Maui Land EIS and put that together with your EIS. Something will go right. That's all I got to say.

I'm kind of angry and I'm sorry by coming out like this. But nobody listening to the people who from here of Maui, of Lahaina, in Olowalu. I'm very upset because nobody listens. They're just doing what they like, put roads where they like, but not listening to the people -- listening to the money. Thank you.

MR. KALUNA-PALAFOX: I'm from Ukumehame We're the first ones that you guys gonna plow through, you know, and come into our kuleana. That's like taking a part of our livelihood. Even through how much you guys coming through, but you still coming through our kuleana. It was two generations.

For me hard because now we feel like we are losing out again, you know, the kanaka -- always the ones to lose all their -- especially for a generation. You know, how much more the kanaka people got to lose?

You know, it's already there. It's already stated. We're impacted. Land Commission

awards but they no accept one TMK over that. You know, we become a loser again. You know, we suffering already with what we get.

We see all our beaches being destroyed, being used as recreation. Ukumehame is a recreational park. Outsiders come do surf lessons and the instructor is just as White as the person that came off of the plane.

You know, I could see with a local, but no. So our land is being used as a recreation. Economy. You can make money. What about the people that already is suffering -- all the kanaka? You got to fight for Lahaina.

How is that? My wife -- generations, two generations. How come she got to fight just to stay on our land? Plenty kanaka kawai got to fight for our land. We already fighting for our water so we can make money.

The hotels, the greedy ones, sucking all up the water. But the people suffer with 20 percent of water. How is that? Even the kanaka -- they get first rights automatic -- first rights no questions asked. They get the right for the water, for the 'Aina.

You cannot just come through and think you

own and just plow through all our cultural sites or our wetlands or the river and life. I mean, I'm pure Filipino. My dad came from the Philippines. My mom born here.

But my heart is so kanaka. And I cry about all of that because I know all these kanakas out here is suffering. They're suffering. You know, I know it's hard for me. I got to see all this with my own eyes.

I mean, I'm 66 years old. I watch Maui from when I was born in to today how things look is all messed up. You know, I sorry. But the County and the State -- they making it more kapulu. You come with the machine, plow any kind, don't even -- you, sorry, but half-ass -- kapulu.

MR. KAM: That's about time.

MR. KALUNA-PALAFOX: I'm sorry. But mahalo. I hope they will get to you guys. You know, you guys -- we the first families. You guys coming through -- you know, I'm sorry. I no like you guys come through my property and my -- it's not my property, my kuleana.

And my great-great-grandkids behind me -- I'd like them live the same life as me. So fix the old highway. You guys will save a lot more money by

just fixing it. Mahalo.

MS. FELICE: You kind of just, I guess, nipped it in the bud by saying that you're not going to build a highway up north because we don't have the funding. Right? But we need another way out of Lahaina. If you were here during the fire you would understand.

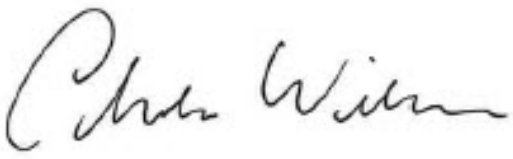
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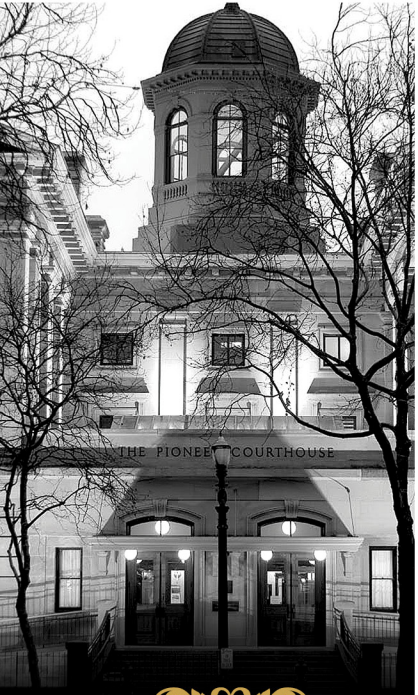
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I further certify that I am neither related to counsel or any party to the proceedings nor have any interest in the outcome of the proceedings.

IN WITNESS HEREOF, I have hereunto set my hand this 10th of February, 2025.



Chelsea Wilhelm, #3541



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PUBLIC HEARING PRESENTATION:
DRAFT ENVIRONMENTAL IMPACT STATEMENT

PUBLIC COMMENTS

TAKEN ON

TUESDAY JANUARY 28, 2025

5:00 P.M.

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PUBLIC HEARING PRESENTATION:

DRAFT ENVIRONMENTAL IMPACT STATEMENT

PUBLIC COMMENTS

TAKEN ON

TUESDAY JANUARY 28, 2025

5:00 P.M.

MS. HALLEY: My name is Nancy Halley. I've been a resident of Maui for 40 years and I have listened to discussions about moving the highway back for a long time. It's been going on for a long time, so I've kind of excited about that. I could see how it could really benefit the island.

I did have a question and I haven't read the EIS statements, I haven't read the paperwork yet so I really need to do that; and I will do that. But I was wondering about things that came into my mind were, you know, when all the -- unfortunately, all the -- the debris was moved to the Olowalu dump site and after the Lahaina fires and Bissen, Mayor Bissen, said that that will also be transported over to the Central Maui Landfill at one time.

And so I'm just kind of wondering in my mind I was thinking how is that going to impact these plans for the highway? There's been concern

about the dump site -- the current dump site possibly leaching into the coastal waters off of Olowalu; and so I'm just kind of wondering.

And then this whole movement of transport trucks moving back and forth to get to the Central Maui Landfill, so I'm just kind of wondering how that all ties into your EIS.

Have you taken a look at that and do you think that your highway proposal would affect that in some way environmentally or, you know, I still have some questions about that.

MR. DEL CAMPO: Okay. It seems like the preferred alternative -- I know it's still not the final, but it seems like our property will be impacted in the Ukumehame subdivision. I was just wondering if there's going to be someone contacting us to understand the level of impact to our farming operations or who would be the best person for me to contact in order to have a discussion?

MS. DIAS: Okay. Aloha. My name is Saman Dias and that is spelled S-a-m-a-n, last name D-i-a-s.

And I am a Maui -- West Maui resident and have been on Maui over 25 years on the west side. And I'm also the chair for Maui Bicycling League.

So I would like to first start with thanking the HDOT and FHWA and the consultants for a great job that you folks are doing. You are very appreciated.

Maui Bicycling League do not oppose to the realignment. However, we have -- we want to address some points to ensure part of the realignment that you folks do not forget the West Maui Greenway and all of you are very well aware and the community, as well. And Segments 3, 4, 5 and Segments 6 and 7 -- Segments 6 and 7 are getting affected by the realignment. Segments 3, 4, 5 also received recently acknowledgment for race grant, so this 6/7 is really important to us. We want to ensure that I'm calling it old highway after the new highway begins.

The old highway is getting realigned with Segments 3, 4, 5 and the connectivity will continue to connect 6, 7 to 3, 4, 5. So as part of the design of the old highway; it's important that we do not forget the West Maui Greenway 6 and 7; and it should be part of the design to incorporate the bicycle/pedestrian pathways specifically safe for our children, as well as for Kupuna. So do not forget that.

And, also, the new highway it is really

important that we incorporate somehow safe bicycling and pedestrian crossing. Very important, do not forget the pedestrian covered crossing to be incorporated to the new highway.

And you all are aware of the Navahine Settlement Agreement where HDOT has made commitments to reducing the carbon footprint and please use this as a opportunity to build that bike network that you all are supposed to complete in year 2030.

So these are just reinforcing, I have been talking to you folks on every opportunity. I also had sent testimonies and I'm just stating this opportunity as a way to remind again. And mahalo and thank you so much.

MS. COMCOWICH: Aloha. This is Karen Comcowich, K-a-r-e-n, C-o-m-c-o-w-i-c-h. I'm a West Maui resident. I drive the Honoapi'ilani Highway multiple times a week for commuting to and from work and I fully support this project because I see the wave impacts that are happening around the highway.

I would like to echo what Saman said that it's really important to have pedestrian access that goes across the highway and to ensure that the bicycle alignments are respected and that safe bicycling infrastructure is included in the plan.

I would also like to say that there should be a location where there's some sort of passing zone because one of the dangerous things that does happen is getting stuck behind visitors who are -- who are sightseeing while people are commuting, encourages people to pass in unsafe ways. So if there's just a passing zone so people can get around the slower drivers.

And past that, avoiding kuleana parcels as much as impacts the kuleana parcels as much as possible. I was impressed that archeological resources and the environmental resources have been thought about as much as they have in the plan.

And that's all my comments for now. I'll submit written comments.

MS. ROY: I'm agreeing with everyone else. I do drive the Pali a lot, like four times a week; and getting stuck behind slow drivers and then having crazy fast drivers trying to pass in the bad areas I think maybe widening the roads in certain areas for passing would be great.

And then also I just want to go on the record; I don't really -- I mean, I understand Route 3 and 4 just from looking at the maps, but they do worry me a little bit because they go by the

petroglyphs and recently the petroglyphs have been getting vandalized. And so I'm afraid it would kind of instigate more of that happening or maybe even roadblocks or traffic jamming up there from people pulling over to look; and that area doesn't really have a lot of parking space for people to be pulling over and looking at them.

So I'd ask you guys if you do go Route 3 and 4 to take that into consideration; and that's all I really have to say.

I do want to read up more on this. There's a lot to read up on. So -- but, yeah, that's all I'd like to say.

MR. POTTS: Okay. Yeah, so my name is Jason Potts, P-o-t-t-s.

Is there a way to ask questions on here or it's just for comments? Sorry.

MR. SHISHIDO: Yeah, you can go ahead and ask questions and I can answer.

MR. POTTS: Okay. My question was, like, with the -- the highway that's already there, specifically in Olowalu, what is going to be done with that? I haven't heard anything about that so I'm a little confused.

MR. SHISHIDO: Yes. So that would

probably get turned over to the County, you know, even when the other segments of Lahaina Bypass were constructed, you know, there was all that discussion with the County once there's, you know, a longer segment and we have dual parallel routes and the, like, existing highway would be turned over to the County.

MR. POTTS: Okay. And then my other question was I noticed on the map that the -- where was it? So it's your preferred build that's going to go through two of those large rock mounds from the old like sugarcane company, right?

I've been told that there's possibly bones in that, so what will be happen -- like, what will happen if you guys find bones during construction?

MR. SHISHIDO: So prior to construction, you know, we will be doing some sub-surface investigations.

You know, as I mentioned, there's going to be a programmatic agreement to address that and with all of that they will lay out the steps on what happens if you should discover any burials.

MR. POTTS: Okay. Perfect, yeah.

And I did submit testimony. It was through email. I'm not sure if you got it. My wife

did, also. Her family owns kuleana in the back near the petroglyphs, so hopefully, you got our testimony.

That's pretty much it. I just had those questions, so appreciate your time. Thank you.

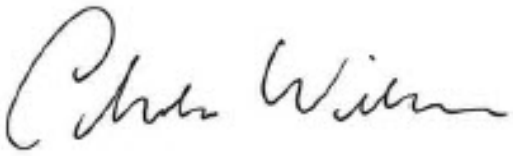
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Chelsea Wilhelm, #3541

DEIS Public Hearing Presentation

ALOHA MAI

PUBLIC HEARING PRESENTATION: DRAFT ENVIRONMENTAL IMPACT STATEMENT

Honoapiʻilani Highway Improvements
West Maui, Ukumehame to Launiupoko

DEPARTMENT OF TRANSPORTATION · STATE OF HAWAII ·

U.S. Department of Transportation
Federal Highway Administration



JANUARY 23, 2025

Honoapiʻilani Highway Improvements

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Public Involvement,
WSP

Emily Engelbart
Public Involvement,
WSP

ʻĀina Archaeology

Tanya Lee-Greig
Lead Archaeologist,
ʻĀina Archaeology

Public Hearing Agenda

- Welcome
- Presentation
  - Public Hearing Process
  - Purpose and Need
  - Alternatives
  - Environmental Screening
  - Preferred Alternative
  - Draft EIS Document and Public Availability Period
  - Project Schedule and Next Steps
- Public Testimony



Public Hearing Process

- Public hearings are your opportunity to give FHWA and HDOT your thoughts.
- Public hearings are required for Environmental Impact Statements.
- Public hearings share project information.
  - Open House area is for questions and conversations with project team
  - Presentation area is for formal presentation and public testimony
- Public hearings allow opportunity to give public testimony or one-on-one testimony to a court reporter. These will be part of the EIS records and Final EIS document.
- Written public comments are also part of the EIS record and Final EIS document.
  - Submit written comments in Open House area
  - Submit written comments to team no later than February 24, 2025



Honoapi‘ilani Highway Improvements

Why This Project?

Emergency Repairs:

- Over the past 10 years, this stretch of highway has been repaired three times after storms and high waves.
- A fourth project is currently in development to address erosion near Olowalu.

HDOT Vulnerability Assessment Findings:

- 2019 Statewide Coastal Highway Report ranks Honoapiʻilani Highway at Olowalu (#2) and Ukumehame (#12) as most critical out of 300 sites for ocean hazard vulnerability.
- 2021 HDOT Climate Adaptation Action Report Exposure Assessments found 3.2-foot Sea Level Rise Exposure; Vulnerability to hurricane-related storm surge; and Hypothetical tsunami scenario identified in the project area.

Funding Opportunities:

- HDOT secured a $22 million federal RAISE grant with the help of our Congressional Delegation, Visitor Industry, FHWA, and Maui County
- Sen. Schatz helped to secure a $23 million earmark in the 2022 OMNIBUS Bill
- Total estimated cost for this project is approximately $160 million.



Project Purpose and Need Statement

The primary purpose of this Project is to provide a reliable transportation facility in West Maui and improve Honoapi‘ilani Highway’s resilience by reducing the highway’s vulnerability to coastal hazards.

Specifically, the Project is intended to address existing coastal erosion and flooding, as well as future coastal erosion and flooding caused by anticipated sea level rise, as delineated by the SLR-XA along the stretch of highway from Ukumehame to Launiupoko, approximately milepost 11 to milepost 17.

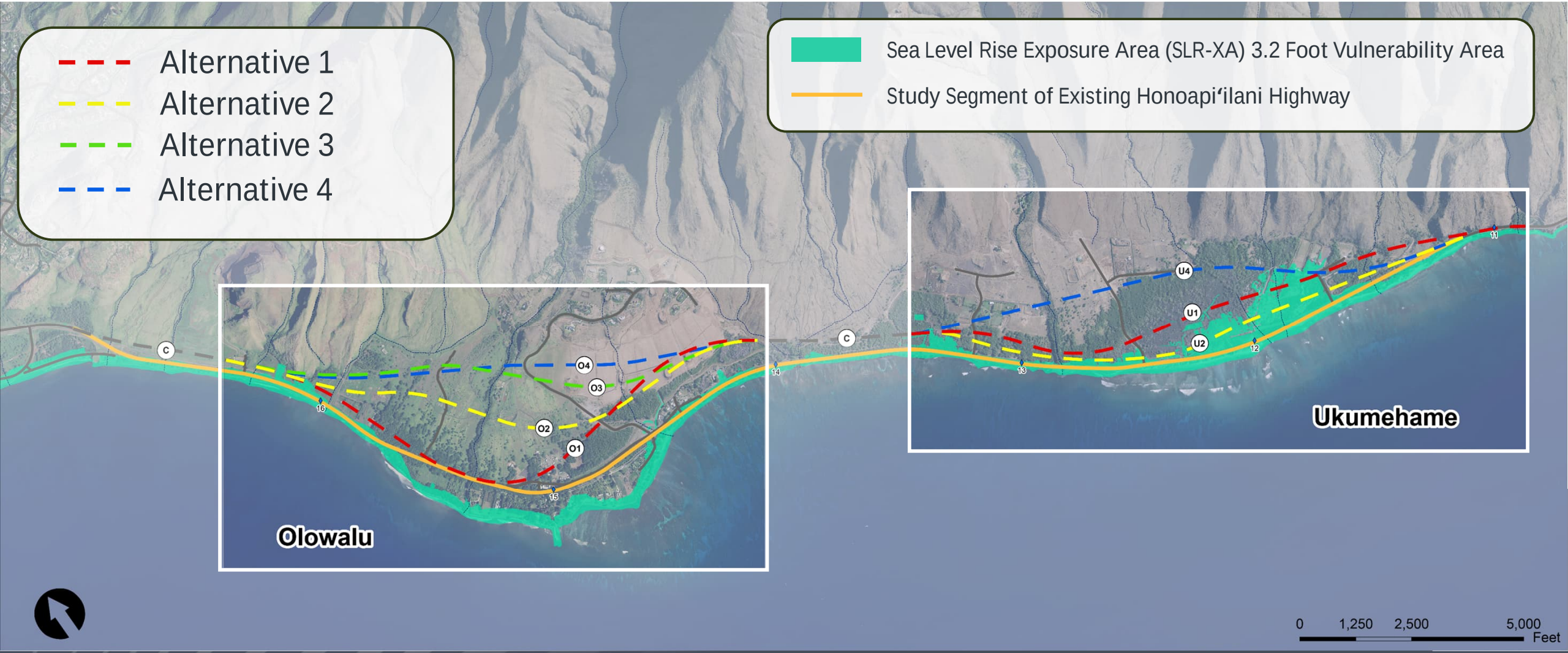


Factors in Determining Preferred Alternative

- Best opportunity to avoid and minimize adverse effects.
- Refinements to the alignment specifically address:
  - Archeological and cultural locations
  - Areas with wetlands/waters
  - Areas with known threatened and endangered wildlife
- Best accommodates environmental commitments and mitigation
- Minimizes private property acquisition

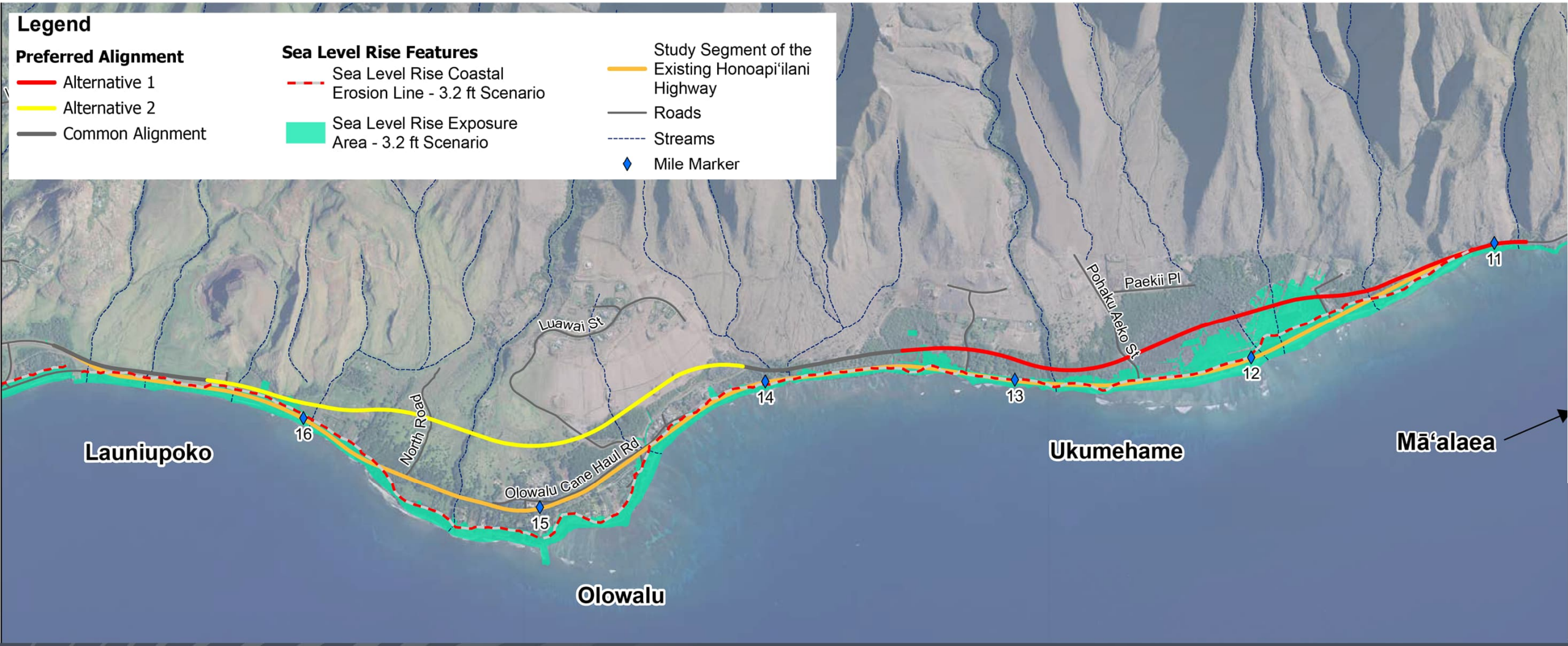
- Best opportunity to meet Purpose and Need while minimizing impacts

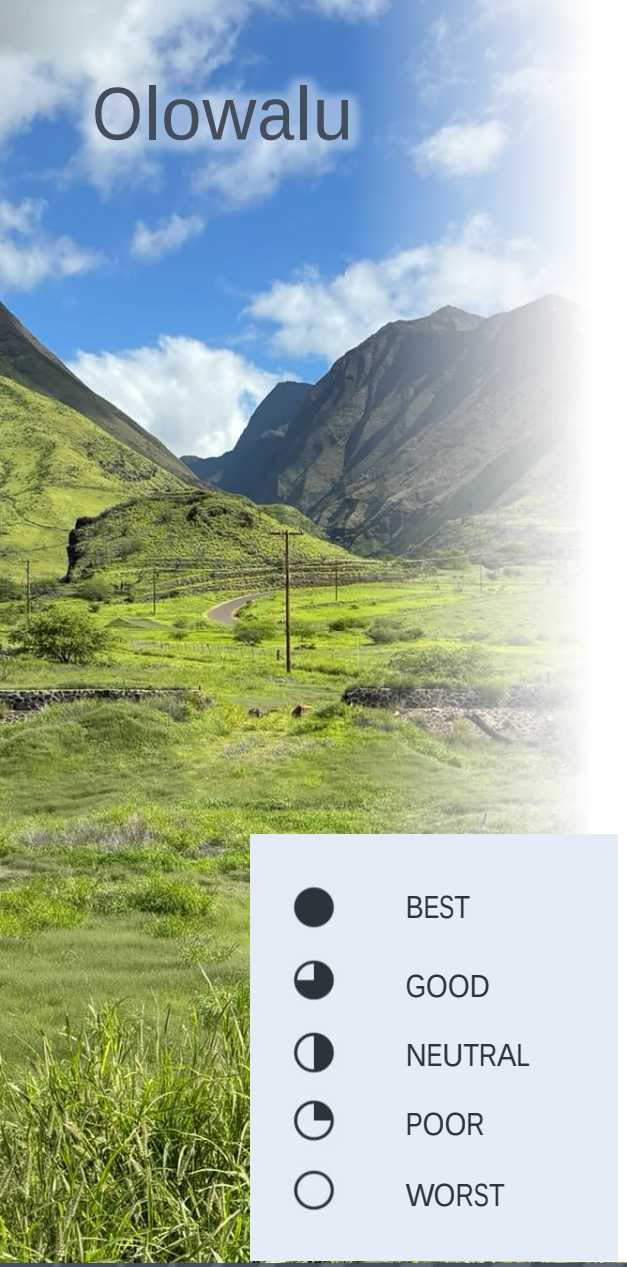
Project Alternatives



Honoapiʻilani Highway Improvements

Complete Preferred Alternative





TOPIC	NO BUILD ALTERNATIVE	BUILD ALTERNATIVE 1	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3	BUILD ALTERNATIVE 4	PREFERRED ALTERNATIVE
Preliminary Construction Cost Estimates	◕	◑	◑	◑	◑	◑
Land Use and Zoning	◑	◕	●	◕	◕	●
Agriculture and Farmlands	◕	◕	◕	◑	◑	◕
Community Services	◕	●	●	●	●	●
Land Acquisition, Displacement, and Relocation	●	◑	◑	◔	◔	◑
Parklands and Recreational Resources	●	◕	●	●	●	●
Archaeological and Architectural Historic Properties	●	◕	◕	◕	◔	●
Cultural Resources	●	◑	◕	◑	◔	●
Visual and Scenic Character	◑	◑	◕	◑	◔	◕
Water Resources, Wetlands, and Floodplains	○	◕	◕	◕	◕	◕
Flora and Fauna, Endangered Species	◑	◕	◕	◕	◕	◕
Geology, Soils, and Natural Hazards	◔	◕	●	●	●	●
Coastal Zone Management/Hawai‘i Special Management Areas	○	◕	●	●	●	●
Climate Change and Sea Level Rise	○	●	●	●	●	●
Transportation	○	◕	●	●	●	●
Air Quality and Energy	◕	●	●	●	●	●
Noise	◑	●	●	●	◔	●
Infrastructure and Utilities	◕	●	●	●	●	●
Hazardous Materials	●	◕	●	●	●	●
Environmental Justice	◕	●	●	●	●	●

● BEST

◕ GOOD

◑ NEUTRAL

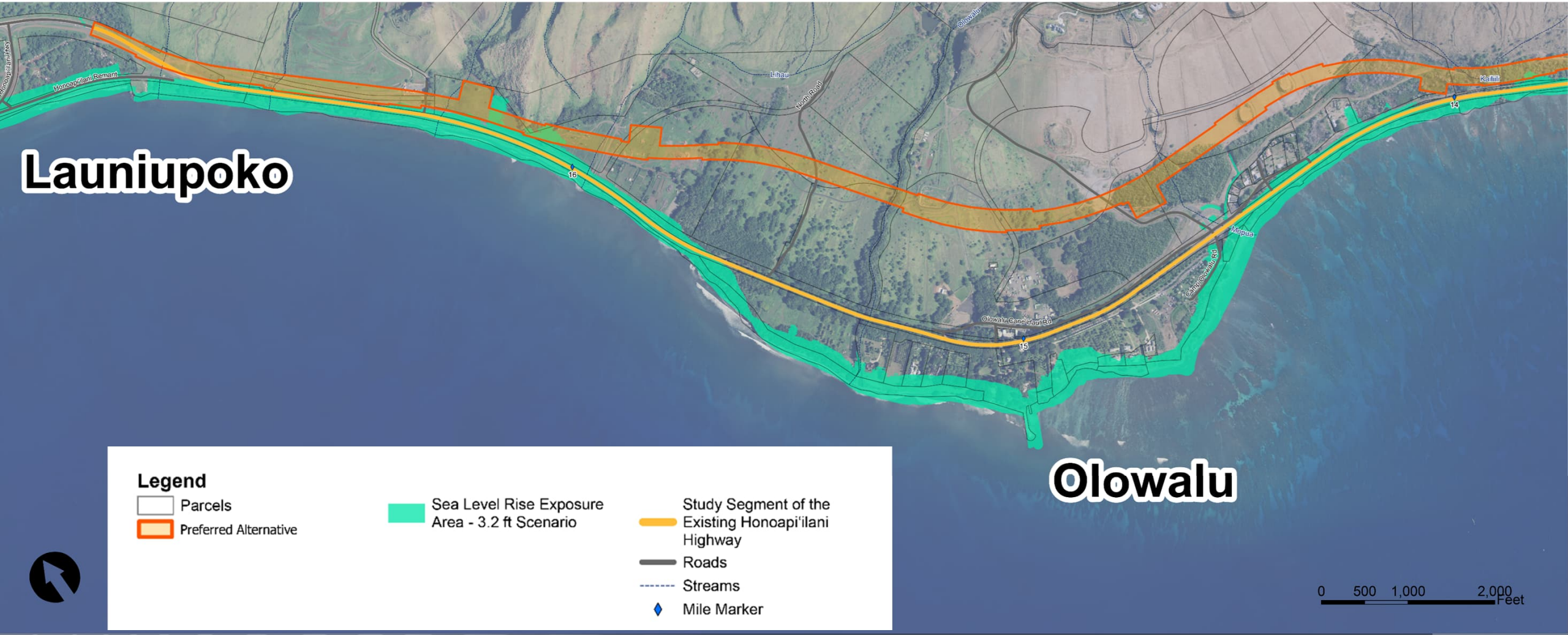
◔ POOR

○ WORST

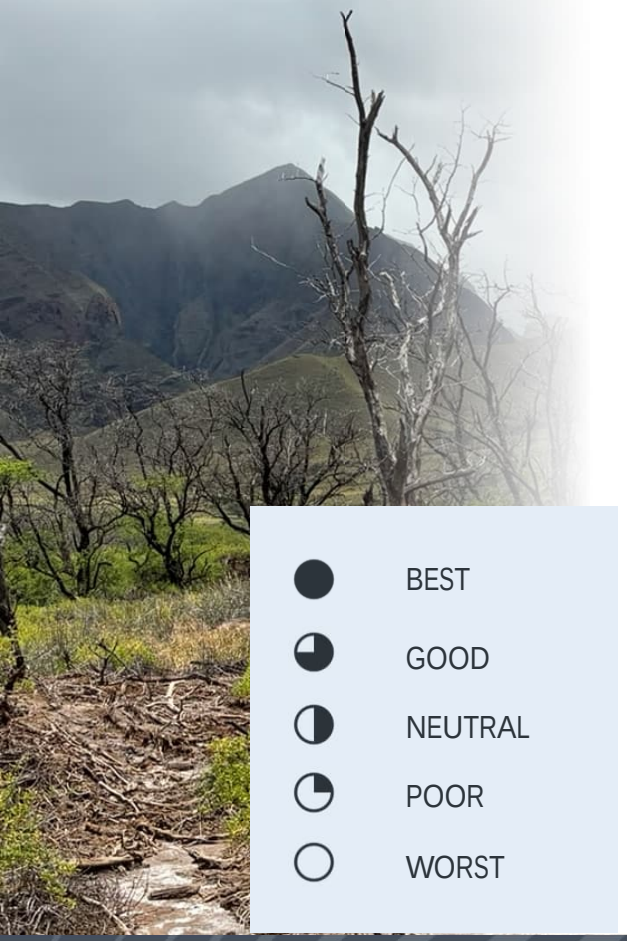
Alternative Impact Evaluation and Screening

Honoapi‘ilani Highway Improvements

Olowalu Preferred Alternative (Alternative 2)



Ukumehame



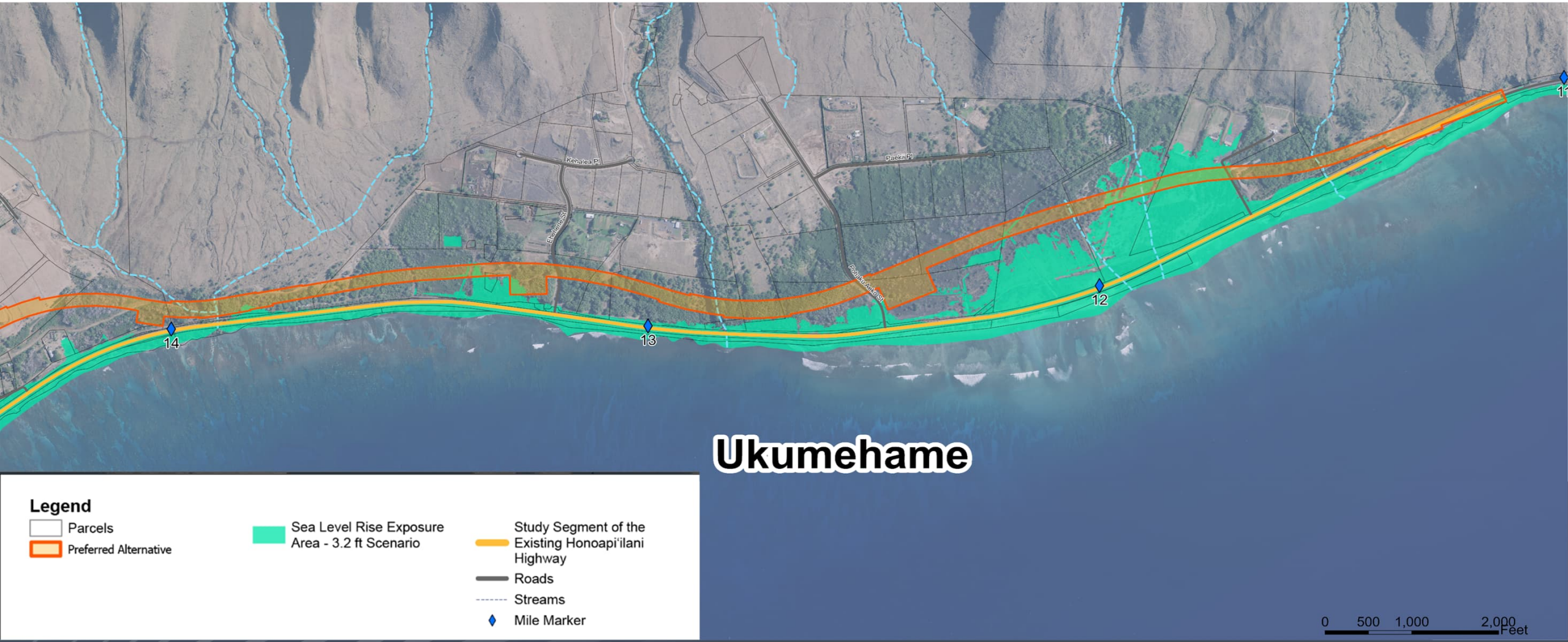
- BEST
- GOOD
- NEUTRAL
- POOR
- WORST

TOPIC	NO BUILD ALTERNATIVE	BUILD ALTERNATIVE 1	BUILD ALTERNATIVE 2 AND 3	BUILD ALTERNATIVE 4	PREFERRED ALTERNATIVE
Preliminary Construction Cost Estimates	GOOD	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL
Land Use and Zoning	NEUTRAL	BEST	BEST	POOR	BEST
Agriculture and Farmlands	GOOD	BEST	BEST	POOR	BEST
Community Services	NEUTRAL	BEST	BEST	BEST	BEST
Land Acquisition, Displacement, and Relocation	BEST	GOOD	GOOD	WORST	GOOD
Parklands and Recreational Resources	GOOD	BEST	BEST	BEST	BEST
Archaeological and Architectural Historic Properties	BEST	POOR	NEUTRAL	NEUTRAL	BEST
Cultural Resources	BEST	POOR	NEUTRAL	NEUTRAL	BEST
Visual and Scenic Character	NEUTRAL	GOOD	GOOD	POOR	GOOD
Water Resources, Wetlands, and Floodplains	POOR	NEUTRAL	WORST	GOOD	NEUTRAL
Flora and Fauna, Endangered Species	GOOD	BEST	BEST	BEST	BEST
Geology, Soils, and Natural Hazards	POOR	GOOD	BEST	BEST	BEST
Coastal Zone Management/Hawai‘i Special Management Areas	WORST	BEST	GOOD	BEST	BEST
Climate Change and Sea Level Rise	WORST	GOOD	POOR	GOOD	GOOD
Transportation	WORST	BEST	BEST	BEST	BEST
Air Quality and Energy	GOOD	BEST	BEST	BEST	BEST
Noise	GOOD	BEST	BEST	GOOD	BEST
Infrastructure and Utilities	GOOD	BEST	BEST	BEST	BEST
Hazardous Materials	BEST	BEST	BEST	BEST	BEST
Environmental Justice	NEUTRAL	BEST	BEST	BEST	BEST

Alternative Impact Evaluation and Screening

Honoapi‘ilani Highway Improvements

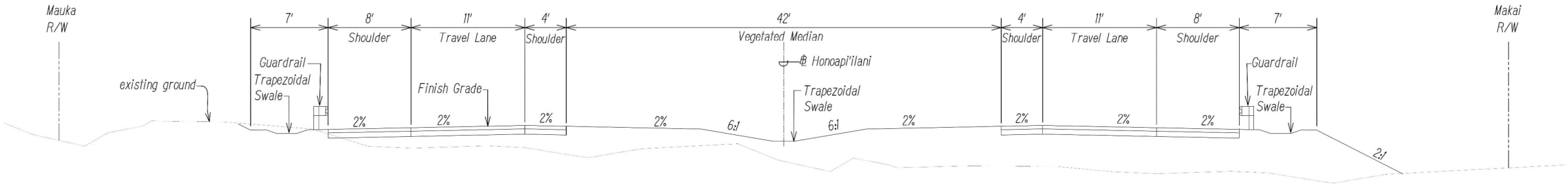
Ukumehame Preferred Alternative (Alternative 1)



Design Elements

Basic Design Elements Include:

- 45 MPH posted speed limit
- 11-ft wide travel lanes
- Paved shoulders (4-ft min. at median, 8-ft outside)
- Guardrails where appropriate
- Wide vegetated medians (for improved safety and stormwater management)
- Acceleration / deceleration lanes at intersections
- Infiltration/detention ponds

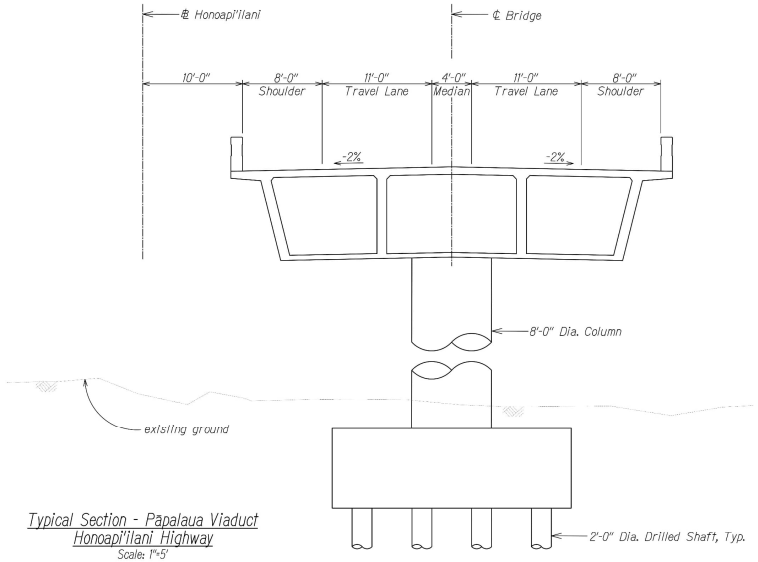


Primary Typical Section - Two Lane with Wide Vegetated Median
Honoapi'ilani Highway
Scale: 1"=5'

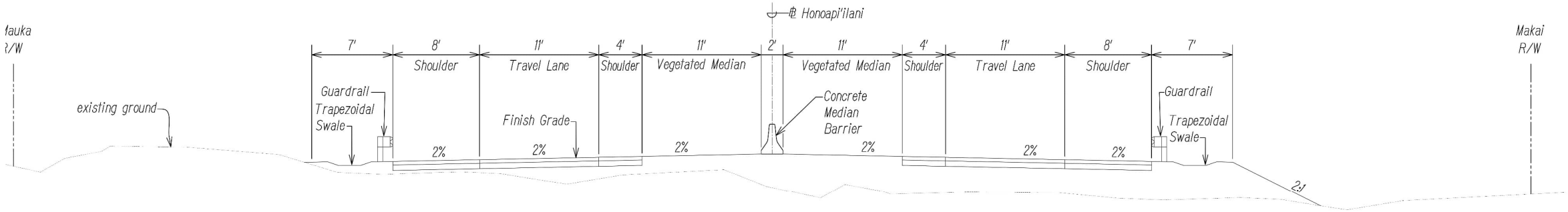
Design Elements

Variations in Design Elements Include:

- Narrower medians (to reduce footprint for preservation of archaeological and historic resources)
- Viaduct in Ukumehame (to span over sedimentation pond and wetland areas)
- Street lighting only at intersections



Typical Section - Pāpalaua Viaduct
Honoapi'ilani Highway
Scale: 1"=5'



Pinch Point Typical Section - Two Lane Narrow Vegetated Median
Honoapi'ilani Highway
Scale: 1"=5'

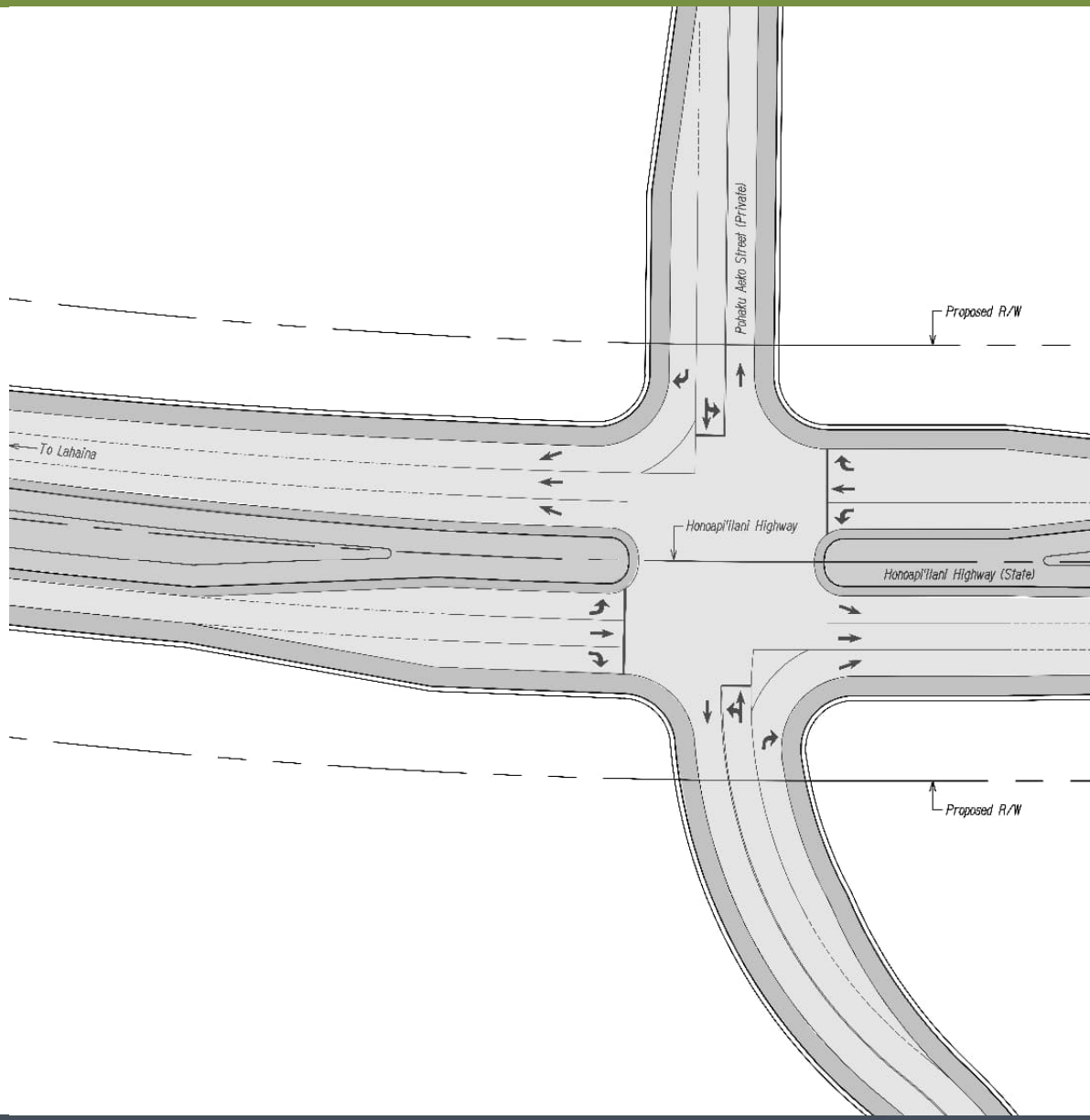
Design Elements

Typical Intersection Elements Include:

- Acceleration/deceleration lanes
- Turning lanes on main highway
- Streetlights

Proposed Intersections:

- Olowalu Recycling Center
- North Road
- Luawai Street (signalized)
- Ehehene Street
- Pohaku Aeko Street



Topics Included in this Environmental Impact Statement

Social, Economic, and Built Environment

- Land Use
- Land Acquisition, Displacement, and Relocation
- Agriculture and Farming
- Socioeconomic Conditions
- Environmental Justice
- Parklands and Recreational Facilities/ Beach Access
- Infrastructure and Utilities
- Hazardous Materials
- Visual and Scenic Character

Cultural and Historic Resources

- Archaeological and Architectural Historic Properties
- Cultural Resources and Practices

Natural Resources

- Geology and Soils
- Water Resources and Wetlands
- Flora and Fauna / Threatened and Endangered Species
- Natural Hazards
- Coastal Zone Management, Hawai'i Special Management Areas
- Climate Change and Sea Level Rise

Transportation

- Transportation Systems
- Pedestrian/Bicycle Use
- Air Quality
- Noise

Construction Impacts

Indirect and Cumulative Impacts

Other Environmental Studies Highlights

Historic and Cultural Resources
Section 106 / Chapter 6E

- Above ground surveys of archaeological and architectural resources have been completed
- The draft programmatic agreement has been drafted, but is not yet final
- Subsurface research will be completed on the preferred alternative before construction

Parks/Rec and Historic Sites
Section 4(f)

- The Draft EIS assessed several properties for Section 4(f). Only the Ukumehame Firing Range, was eligible for Section 4(f)
- The Ukumehame Firing Range is anticipated to have a "de minimis" (minimal) impact from the Preferred Alternative. This will be coordinated with the County of Maui
- A Section 4(f) de minimis evaluation will be included in the Final EIS.

Wetlands and Water Resources
Section 404

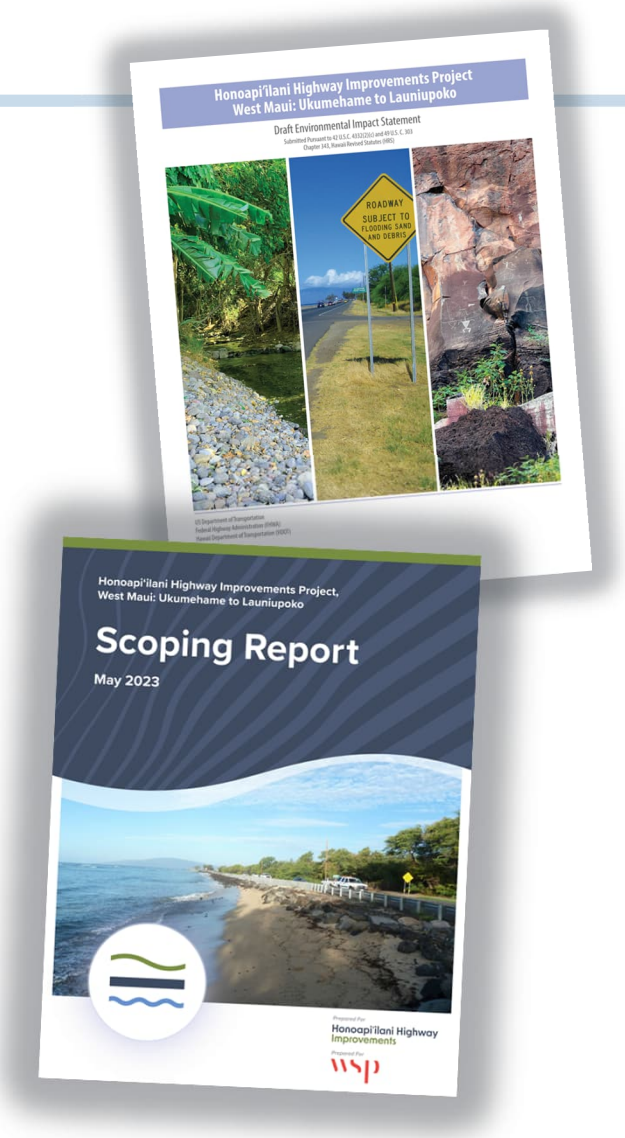
- Water features in the study area include approximately 21 acres of delineated wetlands
- Permanent impacts for the Preferred Alternative are not anticipated to exceed 0.1 acre in any delineated jurisdictional wetland.
- Compliance with Clean Water Act is ongoing through coordination with U.S. Army Corp of Engineers. Permitting will be completed during the next phase of the project

Endangered Species
Section 7 / Chapter 195d

- Two listed species observed:
  - nēnē (Hawaiian Goose)
  - ae'o (Hawaiian Stilt)
- Endangered species consultation is ongoing with USFWS. Consultation with NOAA-NMFS has been completed
- Next steps: Determine final species protection measures with USFWS

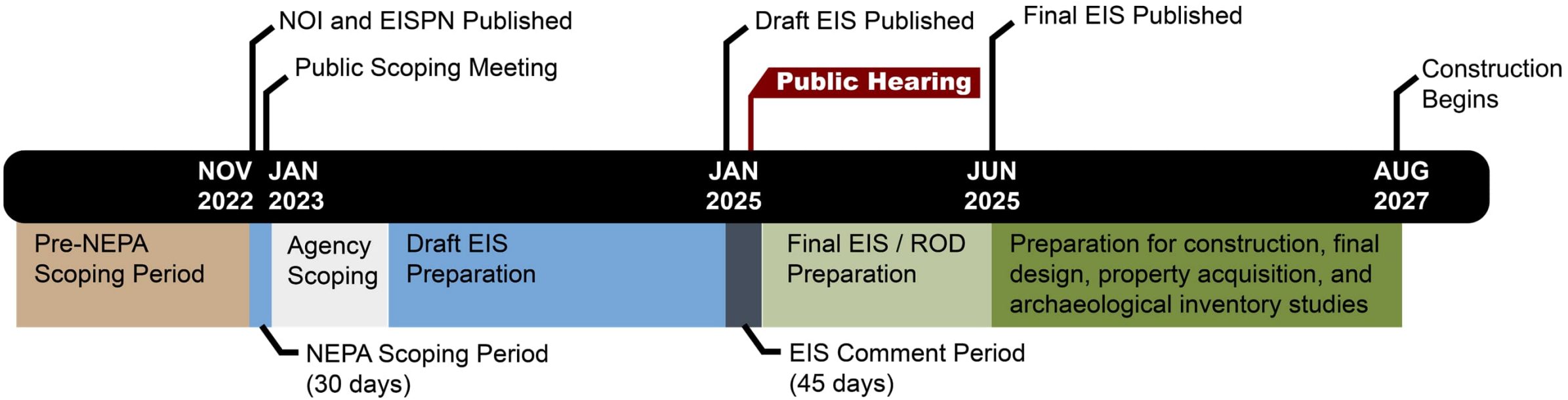
EIS Timeline

December 2021 to November 2022	Pre-NEPA/ HEPA early scoping period
November 22/23, 2022	Notice of Intent and EIS Preparation Notice
November 30, 2022	Scoping letters sent to agencies explaining the project and requesting input
December 2022	Three public scoping meetings, comment period closed December 31, 2022
May 2023	Scoping Report Published
August 2023	The Lahaina wildfire did not physically affect the highway project area; however, the environmental review timetable was extended by 10 months.
January 2025	DEIS Publication
January 2025	Public Hearings (comments due February 24, 2025)
June 2025	Anticipated FEIS/ROD Publication



Schedule and Next Steps

- Public Comment on Draft EIS ends on February 24, 2025
- Final EIS/Record of Decision expected June 2025



Providing Testimony or Comments

Provide comments in several ways:

- Verbal public testimony after project presentation
- Verbal one-on-one testimony to court reporter in designated area
- Written public comment via paper form in comment area
- On-line written public comment via website
- Email to honoapiilaniEIS@online.wspis.com



TO PROVIDE COMMENT SCAN HERE

Honoapiilanihwyimprovements.com

FHWA

@ Richelle.Takara@dot.gov

Federal Highway Administration, Hawaii Division
Attention: Richelle Takara, Division Administrator
Box 50206, 300 Ala Moana Blvd., Room 3-229
Honolulu, HI 96850

HDOT

@ Ken.tatsuguchi@hawaii.gov

Hawaii DOT Planning Branch
869 Punchbowl Street, Room 301
Honolulu, HI 96813-5097

Comment period is open until February 24th, 2025

Honoapi'ilani Highway Improvements

MAHALO

Now: PUBLIC TESTIMONY

- Meeting attendees will have 3 minutes each to share their comments
- Please come forward when your name is called to give testimony
- Please be respectful of others
- The meeting is scheduled from 5 p.m. – 8 p.m.

Questions or Comments?
Contact: Ken Tatsuguchi,
Project Manager, HDOT
Ken.tatsuguchi@hawaii.gov

Honoapi'ilani Highway Improvements