Appendix L. Cultural Impact Assessment

Cultural Impact Assessment for the Kūihelani Solar Phase 2 Project, Waikapū Ahupua‘a, Wailuku District, Maui TMK: (2) 3-8-005:002 por.

Prepared for
Kuihelani Solar Phase 2, LLC

Prepared by
Tehani Baculpo, B.A.,
Kellen Tanaka, B.A.,
and
Hallett H. Hammatt, Ph.D.

Cultural Surveys Hawai‘i, Inc.
Kailua, Hawai‘i
(Job Code: WAIKAPU 53)

July 2024

O‘ahu Office
P.O. Box 1114
Kailua, Hawai‘i 96734
Ph.: (808) 262-9972
Fax: (808) 262-4950

www.culturalsurveys.com

Maui Office
1860 Main St.
Wailuku, Hawai‘i 96793
Ph: (808) 242-9882
Fax: (808) 244-1994

Management Summary

Reference	Cultural Impact Assessment for the Kūihelani Solar Phase 2 Project, Waikapū Ahupua‘a, Wailuku District, Maui, TMK: (2) 3-8-005:002 por. (Baculpo et al. 2024)
Date	July 2024
Project Number(s)	Cultural Surveys Hawai‘i, Inc. (CSH) Job Code: WAIKAPU 53
Agencies	County of Maui Department of Planning
Land Jurisdiction	Private; MP West LLC (Fee Owner)
Project Proponent	Private; Kuihelani Solar Phase 2, LLC, a subsidiary of AES Clean Energy Development, LLC (AES)
Project Location	The study area is located on former sugarcane agricultural fields in the center of the isthmus of Maui, generally between Kuihelani Highway (Route 380) to the northwest, North Kīhei Road to the south and southwest, and Waikapū Stream and Maui Veterans Highway (Route 311) to the east. The study area comprises approximately 729.6 acres (296.26 hectares); however, the project, once constructed, is expected to occupy less than 50% of the study area. Access to the study area is provided by existing agricultural roads. The study area is depicted on portions of the 2017 Puu o Kali, Maalaea, Paia, and Wailuku U.S. Geological Survey (USGS) topographic quadrangles.
Project Description	AES is proposing to develop a 40 megawatt (MW) solar photovoltaic and 160 MW-hour (MWh) battery energy storage system within a portion of TMK: (2) 3-8-005:002. The proposed study area extends south from the footprint of an existing solar plus storage energy project that was recently constructed (AES Kuihelani Solar Plus Storage). Access to the project site will be provided by existing agricultural roads.
Project Acreage	The study area is approximately 729.6 acres (296.26 hectares); however, the project is expected to occupy less than 50% of the study area.
Document Purpose and Regulatory Context	This cultural impact assessment (CIA) supports compliance of the Kūihelani Solar Phase 2 Project with: • Ka Pa‘akai O Ka‘aina v. Land Use Commission (94 Hawai‘i 31), in which the Hawai‘i Supreme Court established a three-part analytical framework to assist the state and counties in fulfilling their constitutional obligation to preserve and protect traditional and customary practices (TCP refers to “traditional and customary practices]) exercised by Native Hawaiians, to the extent feasible;

	• the mandate set forth by the Hawai‘i State Constitution (Articles IX and XII), courts, Hawai‘i Revised Statutes (HRS), and Hawai‘i Administrative Rules (HAR) and other Hawai‘i State laws requiring government agencies to promote and preserve cultural beliefs, practices, and resources of Native Hawaiians and other ethnic groups; • and the State of Hawai‘i’s historic preservation review process under HAR §13-275-6 and §13-284-6, which require the identification and mitigation of adverse effects proposed by a potential project in order to “promote the use and conservation of historic properties for the education of the citizens of Hawai‘i” (HAR §13-275-6) This CIA contains information gathered from archival research and consultation, compiled to “analyze the impact of a proposed action on cultural practices and features associated with the project area” (Environmental Council 1997). Cultural practices and cultural features may include traditional cultural properties (TCPs), designated significant historic properties under State of Hawai‘i significance Criterion e, pursuant to HAR §13-275-6 and §13-284-6. Significance Criterion e refers to historic properties that “have an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts—these associations being important to the group’s history and cultural identity” (HAR §13-275-6 and §13-284-6). This project also includes a Ka Pa‘akai Analysis Study. In Ka Pa‘akai vs Land Use Commission, 94 Hawai‘i (2000) the Court held the following analysis must also be conducted: • The identity and scope of valued cultural, historical, or natural resources in the petition area, including the extent to which traditional and customary Native Hawaiian rights are exercised in the petition area; • the extent to which those resources—including traditional and customary Native Hawaiian rights—will be affected or impaired by the proposed action; and • the feasible action, if any, to be taken by the State to reasonably protect Native Hawaiian Rights if they are found to exist.
Results of Background Research	Background research for the proposed project yielded the following information:

	1. The current study area is located in the isthmus of Central Maui between the northwest slopes of Haleakalā and the southeast slopes of Mauna Kāhālawai (West Maui Mountains). 2. Waikapū Ahupua‘a is one of the four *ahupua‘a* (traditional land division) that make up “Nā Wai ‘Ehā” or “The Four Waters” of Maui; this includes Waihe‘e, Wailuku, Wai‘ehu, and Waikapū. 3. In the tradition of Hawaiian naming practices, the wind associated with Waikapū is called Kololio (Nakuina 1902:68) and the rain specific to this *ahupua‘a* is called Kili‘o‘opu (Akana and Gonzalez 2015:84). 4. The place name “Waikapū,” according to Pukui et al. (1974:223), literally translates to “Water of the Conch.” This is due to a cave within Waikapū Valley that reportedly housed a supernatural conch shell (named Kīhapū, blessed with the breath of Lono) that resided there until it was stolen by a supernatural dog named Puapualenalena. 5. In ancient times, Waikapū and Wailuku were agriculturally abundant lands known for their extensive *lo‘i,* or wetland taro cultivation (Handy et al. 1991:497). Handy et al. (1991:496) describe Waikapū Stream as land bound, as opposed to emptying into the ocean, with the water diverted into *lo‘i* (irrigated taro fields) and the overflow dissipating on the dry plains of the central isthmus between West and East Maui feeding the wetland of Keālia. 6. Ke Kula o Kama‘oma‘o, or the Plains of Kama‘oma‘o, is the name given to a region of sandy plains spanning portions of Wailuku and Waikapū Ahupua‘a (Emerson 1993). This area was known by Hawaiians in traditional times as a wandering place of the souls (Beckwith 1970), a place where spirits of the dead waited for a friendly escort, perhaps an *‘aumakua* (family god), to show them the way to eternity. 7. Ahulau ka Pi‘ipi‘i i Kakanilua or The Battle of Waikapū Common entailed the clash of invading Hawai‘i Island forces, headed by Kalani‘ōpu‘u with the Maui forces under Kahekili in 1776. The Big Island army was ambushed at an area close to Waikapū and was destroyed by the army of Kahekili on the plains of Kama‘oma‘o (Hokulani Holt Padilla in Hill et al. 2006). 8. The nineteenth century brought to Maui a multitude of commercial, demographic, social, and religious changes encouraged by the burgeoning foreign influx. In 1819, the first whaling ships arrived in Hawaiian waters and Lāhainā Harbor became a primary port of call for provisioning ships in the Islands. Closely following the arrival of the first whaling ships,

	the first Protestant missionaries and their families arrived in Lāhainā in 1823 (Bingham 1824). 9. During the Māhele, the lands surrounding Waikapū Commons were sold by the Department of Education in ten parcels, each amounting to more than 1,317 acres, and had Royal Patents issued for the sales in 1854. In 1875 the Board of Education sold at auction the "Land known as the ahupuaa of Waikapu, saving grants hitherto made within said ahupuaa, or sales by the board of education" to Mr. Henry Cornwell, lands extending out from Waikapū Valley to the northwestern boundary of Pulehunui Ahupua‘a (*Pacific Commercial Advertiser* 1879:5). Cornwell acquired the lands in fee-simple under Royal Patent No. 3152. The current study area is situated entirely within this land grant. No *kuleana* (land holding of a tenant or *hoa‘āina* residing in the *ahupua‘a*) awards were recorded near the study area. 10. In 1838, the Waikapū Congregational Church was established as a home-based Christian service. During World War II, Waikapū Congregational Church was turned over to the military and used as a surgical hospital. The Church building was used as a ward with an additional "nurses quarters" built off to the side of the main structure. As sugarcane cultivation began to dominate the region in the early to mid-twentieth century, residential dwellings dwindled, as did the attendees of the Waikapū Congregational Church. As full-time pastors became unnecessary, the church members voted to merge with the Kahului Church, and the Waikapū Congregational Church was abandoned to the sugarcane fields that surround it (Head 1960). 11. Henry Cornwell arrived on Maui from New York and started the Waikapu Sugar Company with James Louzada (his brother-in-law) in 1864. The two partners constructed a steam-powered sugar mill situated on a 17-acre parcel that had been part of Land Grant 2951; land originally purchased by Henry Cornwell and J. Louzada in Waikapū (Wilcox 1996:61). 12. In 1876, Henry Cornwell retired and the remaining plantation lands were sold to the new partners Colonel William H. Cornwell and Colonel G.W. Macfarlane (*Honolulu Advertiser* 1903:8). 13. Most of the Waikapū Commons and across the isthmus was covered with sugarcane by the mid-nineteenth century. Waikapu Sugar Company operated from 1862 to 1894, when it was purchased and incorporated into the holdings of Wailuku Sugar Company (Kaukali and Subica 2010). 14. In 1862, the partners of the Wailuku Sugar Company grew to include James Robinson & Company, Thomas Cummins, and J.

	Fuller (Wilcox 1996:122). In 1863, Charles Brewer became a major partner in the operation of the Wailuku Sugar Company. By 1867, the Wailuku Sugar Company had 2,250 acres planted in cane. The Wailuku Sugar Company incorporated in 1875 and began to become profitable. In 1877, the Baileys were bought out (Nellist 1925:70). 15. Beginning in 1880, the Waikapū plantation lands began to be merged with those of the Wailuku and Waihe‘e plantations. In 1905, a new sugar mill was constructed in Wailuku to accommodate the sugar brought in from the new outlying plantations, including Waikapū (Kaukali and Subica 2010:98). 16. In 1912, Hawaiian Commercial and Sugar Company (HC&S) began to modernize the existing plantation camps. Between a huge influx of immigrant workers in 1909, and the burning of village areas of Pā‘ia and Kahului to control smallpox in 1910, changes to the camp system were in full swing. The plantation workforce continued to expand until 1917, when the U.S. declared war on Germany, and the accompanying draft seriously depleted the labor pool. By 1919, postwar requirements for sugar had driven the price to an all-time high of $471.40 per ton (Burns 1991). 17. Historic properties identified during previous studies in the vicinity of the study area include clusters of human burials near the Mā‘alaea Small Boat Harbor and in the region to the northwest, in addition to the Naval Air Station (NAS) Puunene (State Inventory of Historic Places [SIHP] # 50-50-09-04164), habitation/agricultural complexes, and various historic plantation and ranching features. 18. Cultural practices and resources identified in previous cultural studies within Waikapū Ahupua‘a include *lo‘i kalo*, gathering practices for *lā‘au lapa‘au* (traditional herbal medicine), freshwater resources, and burial practices.
Results of Community Consultation	CSH initiated contact with Hawaiian organizations, agencies, and ommunity members as well as cultural and lineal descendants to identify individuals with cultural expertise and/or knowledge of the study area and vicinity. Community outreach letters were sent to 46 individuals or groups; seven responded and one of these *kama‘āina* (native born) and/or *kūpuna* (elders) met with CSH for an in-depth interview. Consultation was received from: 1. Dr. Scott Fisher, Chief Conservation Officer, Hawaiian Islands Land Trust (HILT); Chief, Maui Lana‘i Island Burial Council (MLIBC); and *kama‘āina*

Identification of Cultural Practices	Based on the results of community consultation and background research conducted as part of this CIA, CSH has identified the following cultural resources and practices within Waikapū Ahupua‘a: 1. Freshwater resources (Waikapū Stream, Keālia Pond, Pōhākea Gulch, and Pale‘a‘ahu Gulch) 2. Agricultural practices (*kalo* [taro; *Colocasia esculenta*], *‘ulu* [breadfruit; *Artocarpus altilis*], and *‘uala* [sweet potato; *Ipomoea batatas*) 3. Gathering plant resources for *lā‘au lapa‘au* in the uplands of Waikapū Valley and along Waikapū Stream 4. Burial practices *(iwi kūpuna* [ancestral remains]) No ongoing cultural practices were identified within the study area during background research and community consultation. However, the study area is located in the general vicinity of ongoing cultural practices such as *‘ulu* and *kalo* cultivation.
Identification of Impacts to Cultural Practices	No impacts to ongoing cultural practices were identified within the study area during background research and community consultation for this CIA. Consultation identified a number of concerns related to the environment and the broader community: 1. Visual impact on the natural landscape a. Dr. Fisher expressed his concern that the Kūihelani Solar Phase 2 project will negatively impact the aesthetics of the natural landscape. As another solar project, the Kūihelani Solar + Storage project, is located just north of the current project, Dr. Fisher is concerned that adding another solar project within Waikapū Ahupua‘a will result in a new monocrop of solar. 2. Impacts to freshwater resources a. Dr. Fisher also expressed his concern regarding the proposed action potentially impacting the water quality of Waikapū Stream, as it runs along the eastern boundary of the study area, and Keālia Pond, as it is the *muliwai* (river mouth) of Waikapū Stream, where many endangered and migratory birds reside.
Mitigation Possibilities Identified During Background Research and Consultation	The results of community consultation, underscored by background research conducted for this CIA, inform the following mitigation possibilities promoting and preserving cultural beliefs, practices, and resources of Native Hawaiians and other ethnic groups: 1. Although the discovery of burials within the study area is unlikely, Dr. Fisher has recommended archaeological/cultural monitoring during any ground disturbance activities.

	2. Project construction workers and all other personnel involved in the construction and related activities of the project should be informed of the possibility of inadvertent cultural finds, including human remains. In the event that any potential historic properties are identified during construction activities, all activities should cease and the SHPD should be notified pursuant to HAR §13-280-3. In the event that *iwi kūpuna* are identified, all earth moving activities in the area should stop, the area should be cordoned off, and the SHPD and Police Department should be notified pursuant to HAR §13-300-40. In addition, in the event of an inadvertent discovery of human remains, the completion of a burial treatment plan, in compliance with HAR §13-300 and HRS §6E-43, is recommended. 3. In the event that *iwi kūpuna* and/or cultural finds are encountered during construction, project proponents should consult with cultural and lineal descendants of the area to develop a reinterment plan and cultural preservation plan for proper cultural protocol, curation, and long-term maintenance.
Ka Pa‘akai Analysis	Based on information gathered from the cultural and historical background, and community consultation for this study, Camp 7, four post-Contact historic properties, and two gulches, Pōhākea and Pale‘a‘ahu, are located within the study area. Waikapū Stream also runs along the eastern edge of the study area. Camp 7 was demolished and removed to make way for the expansion of agricultural fields. Similar to Waikapū Stream, Pōhākea and Pale‘a‘ahu gulches also flow into Keālia Pond and typically only flow during stormwater events. However, Pale‘a‘ahu Gulch terminates in the central portion of the study area. It is important for the developers to design accordingly so that water quality is not impacted by the proposed action. Regarding the four historic properties identified by the companion AIS for this project, archaeological monitoring was recommended during project construction. At present, there is no documentation or testimony indicating traditional or customary Native Hawaiian rights are currently being exercised “for subsistence, cultural and religious purposes and possessed by ahupua‘a tenants who are descendants of native Hawaiians who inhabited the Hawaiian Islands prior to 1778” (Hawai‘i State Constitution, Article XII, Section 7) within the specific study area. While no cultural resources, practices, or beliefs were identified as currently existing within the study area, Waikapū Ahupua‘a maintains a rich cultural

	history in the exercise of traditional or customary Native Hawaiian rights within the project ahupua‘a. The focus of concerns are the impacts to the visual aesthetics of the natural landscape and freshwater quality.

Table of Contents

Management Summary ..... **i**

Section 1 Introduction **1**

1.1 Project Description 1
1.2 Regulatory Context 5
1.3 Document Purpose 5
1.4 Natural Environment 6
1.4.1 *Nā Lepo* (Soils) 6
1.4.2 *Nā Ua* (Rains) 10
1.4.3 *Nā Makani* (Winds) 11
1.4.4 *Nā Kahawai* (Streams and Freshwater) 12
1.4.5 *Ka Lihikai a me Ka Moana* (the Coast and Ocean) 13
1.5 Built Environment 13

Section 2 Methods **14**

2.1 Archival Research 14
2.2 Consultation 14
2.2.1 Community Outreach, Interview, and Transcription Methods 14

Section 3 Traditional Background **16**

3.1 Pre-Contact Period 16
3.1.1 Agriculture and Subsistence 16
3.2 *Nā ka‘ao a me Nā Mo‘olelo* (Legends and Stories) 17
3.2.1 Puapualenalena and Kiha-Pū 18
3.2.2 Pu‘uhele, The Traveling Hill 20
3.3 *Nā Wahi Pana* (Storied Places) 21
3.3.1 *Nā Inoa ‘Āina* (Place Names) 21
3.4 *Nā ‘Ōlelo No‘eau* (Proverbs) 29
3.4.1 *‘Ōlelo No‘eau* #1465 31
3.4.2 *‘Ōlelo No‘eau* #1481 31
3.4.3 *‘Ōlelo No‘eau* #1541 31
3.4.4 *‘Ōlelo No‘eau* #1711 31
3.4.5 *‘Ōlelo No‘eau* #1761 31
3.4.6 *‘Ōlelo No‘eau* #2300 32
3.4.7 *‘Ōlelo No‘eau* #2647 32
3.4.8 *‘Ōlelo No‘eau* #2911 32
3.4.9 *‘Ōlelo No‘eau* #2912 32
3.5 *Nā Oli* (Chants) 32
3.5.1 Ke‘elikōlani 33
3.6 *Nā Mele* (Songs) 35
3.6.1 “Nā Wai ‘Ehā O Maui” 36
3.6.2 “No Nā Wai ‘Ehā” 36
3.6.3 “Waikapū/‘Iniki Mālie” 37

Section 4 Historical Background **39**

4.1 Early Historic Period 39
4.2 The Māhele and the Kuleana Act 40

4.3 Mid- to Late 1800s 42
4.3.1 Waikapū Congregational Church 46
4.3.2 Development of Commercial Sugar in Waikapū 46
4.3.3 Organization of the Wailuku Sugar Company 51
4.3.4 The Waikapu Division of the Wailuku Sugar Company 53
4.3.5 Hawaiian Commercial and Sugar in the Central Isthmus 53
4.4 1900s 54
4.5 Contemporary Land Use 55

Section 5 Previous Archaeological Research 62

5.1 Overview 62
5.2 Previous Archaeological Studies within and Adjacent to the Study Area 62
5.2.1 Folk and Hammatt (1991) 62
5.2.2 Devereux et al. (1997); Hammatt et al. (1996); Robins et al. (1994) 73
5.2.3 Yucha et al. 2021 73

Section 6 Previous Cultural Research 75

6.1 Overview 75
6.2 Agricultural Resources 78
6.3 Freshwater Resources 78
6.4 Flora and Fauna Resources 79
6.5 *Mo‘olelo* and *Wahi Pana* 80
6.6 Burials 81

Section 7 Community Consultation 82

7.1 Overview 82
7.2 Community Outreach Letter 82
7.3 Community Outreach Table 85
7.4 Community Outreach Results 92
7.5 *Kama‘āina* Interviews 92
7.5.1 Dr. Scott Fisher 92

Section 8 Traditional Cultural Practices 95

8.1 Subsistence and Settlement Patterns 95
8.2 Freshwater Resources 96
8.3 Gathering Practices and Plant Resources 96
8.4 Ancient Warfare 96
8.5 Burials 97

Section 9 Ka Pa‘akai Analysis 98

9.1 Overview 98
9.2 Archaeological Resources 98
9.3 Burials 99
9.4 Faunal Resources 100
9.5 Earth Resources 100
9.6 Plant Resources 100
9.7 Trails 100
9.8 *Nā Wahi Pani* 101
9.9 Valued Cultural, Historical, or Natural Resources in the Study Area 101

9.10 The Extent to which Traditional and Customary Native Hawaiian Resources will be Affected by the Proposed Action 102
9.11 Feasible Action, if any, to be Taken to Reasonably Protect Native Hawaiian Rights 102

Section 10 Summary and Recommendations 103

10.1 Results of Background Research 103
10.2 Results of Community Consultation 105
10.3 Identification of Cultural Practices 105
10.4 Identification of Impacts to Cultural Practices 105
10.5 Mitigation Possibilities Identified During Background Research and Consultation 106
10.6 *Ka Pa‘akai* Analysis 106

Section 11 References Cited 108

Appendix A Community Outreach Letter 121

List of Figures

Figure 1. Portions of the 2017 Puu o Kali, Maalaea, Paia, and Wailuku USGS 7.5-minute topographic quadrangles showing the location of the study area 2
Figure 2. TMK: (2) 3-8-005 showing the location of the study area (Hawaii TMK Service 2014) 3
Figure 3. Aerial photograph showing the location of the study area (ESRI 2023).....4
Figure 4. Overlay of *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii* (Foote et al. 1972), indicating soil types within and surrounding the study area (USDA SURGGO 2001).....7
Figure 5. Newspaper clipping from the 7 January 1927 edition of the *Honolulu Advertiser* describing an 1841 discovery of human remains in the Sand Hills of Maui 30
Figure 6. Early photograph of Waikapū Valley with *lo‘i*, *‘auwai*, and dispersed homes (Waikapu Community Association 2018) 41
Figure 7. Portions of the 1996 Maalaea and 1997 Wailuku USGS 7.5-minute topographic quadrangles showing the current study area in relation to Land Grant 3152 43
Figure 8. Portion of the Dodge (1885) map of Maui (RM 1268) showing the location of the study area within Land Grant 3152 44
Figure 9. Historic photograph of the Plains of Kama‘oma‘o (background) as viewed from the vegetated alluvial slopes of Waikapū Valley (Waikapu Community Association 2018)..45
Figure 10. Historic photograph of Waikapū Congregational Church, Waiko Road, and the surrounding community (Waikapu Community Association 2018).....47
Figure 11. Waikapū Congregational Church after having its steeple removed during World War II (Waikapu Community Association 2018).....47
Figure 12. Waikapu Sugar Company mill, ca. 1890 (Waikapu Community Association 2018)...48
Figure 13. Baldwin (1930) map showing the current study area within the lands of Waikapu Sugar Company and the boundary adjacent to HC&S lands to the north (CSH Database) 49
Figure 14. Colonel William H. Cornwell in the garb of the Hawaiian Royal Court (Unknown 1893) 50
Figure 15. Newspaper announcement for the arrival of Kalākaua’s visit to W.H. Cornwell on Maui for the King’s birthday (*Evening Bulletin* 1888).....52
Figure 16. Portion of the 1930 Maui Island USGS topographic quadrangle showing plantation camps and plantation railroads around the study area vicinity 56
Figure 17. Portion of the 1942 Maui Island USGS map showing calcareous sand dunes (red), unconsolidated deposits of younger alluvium (tan), consolidated earthy deposits of older alluvium (brown) and a Pleistocene great unconformity of Kula basaltic andesites (yellow with Tk).....57
Figure 18. HC&S Company (1953) map showing the sugar plantation fields, Waikapu Pasture, Waikapu Road, and Waihe‘e Ditch 58
Figure 19. Portion of a USDA (1965) aerial image showing the study area and surrounding development.....59
Figure 20. Portions of the 1977 Maalaea and 1977 Wailuku USGS orthophotoquads showing sugar cultivation around the current study area 60
Figure 21. Portions of the 1992 Puu o Kali, 1996 Maalaea, 1997 Paia, and 1997 Wailuku USGS 7.5-minute topographic quadrangles showing the location of the study area.....61

Figure 22. Portions of the 1992 Puu o Kali, 1996 Maalaea, 1997 Paia, and 1997 Wailuku USGS 7.5-minute topographic quadrangles showing the locations of previous archaeological studies in the vicinity of the current study area 71
Figure 23. Portions of the 1992 Puu o Kali, 1996 Maalaea, 1997 Paia, and 1997 Wailuku USGS 7.5-minute topographic quadrangles showing the historic properties within the study area vicinity 72
Figure 24. Previous cultural studies within the study area vicinity shown on 1992 Puu O Kai, 1996 Maalaea, 1997 Paia, and 1997 Wailuku USGS topographic quadrangles 77
Figure 25. Community outreach letter, page one 121
Figure 26. Community outreach letter, page two 122
Figure 27. Community outreach letter, page three 123
Figure 28. Community outreach letter, page four 124
Figure 29. Community outreach letter, page five 125

List of Tables

Table 1. Place name meanings of Wailuku Moku and Waikapū Ahupua‘a in the vicinity of the study area 22
Table 2. Previous archaeological studies in the vicinity of the study area 63
Table 3.Previous cultural studies in the vicinity of the study area 75
Table 4. Summary of community outreach efforts 85

Section 1 Introduction

1.1 Project Description

At the request of Kuihelani Solar Phase 2, LLC, CSH is conducting a cultural impact assessment (CIA) and Ka Pa‘akai Analysis for the Kūihelani Solar Phase 2 project. The proposed project is located on former sugarcane agricultural fields in the center of the isthmus of Maui, generally between Kuihelani Highway (Route 380) to the northwest, North Kīhei Road to the south and southwest, and Waikapū Stream and Maui Veterans Highway (Route 311) to the east. The study area comprises approximately 729.6 acres (296.26 hectares); the project is expected to occupy less than 50% of the study area. The study area is depicted on portions of the 2017 Puu o Kali, Maalaea, Paia, and Wailuku U.S. Geological Survey (USGS) topographic quadrangles (Figure 1), a tax map plat (Figure 2), and an aerial photograph (Figure 3).

The main components of the project include a 40-megawatt (MW) ground-mounted solar photovoltaic (PV) system and a 160 MW-hour battery energy storage system, with related interconnection and ancillary facilities on land owned by MP West LLC (d.b.a. Mahi Pono). The solar PV system would include a series of solar arrays, each consisting of panels mounted on a racking system and arranged in evenly spaced rows. The energy storage system would consist of containerized lithium-ion battery units distributed throughout the solar arrays. The solar photovoltaic panels and battery units would connect via electrical wiring to a project substation and Maui Electric switchyard located within the study area. High-voltage overhead loop lines would extend from the substation and switchyard to the point of interconnection (POI) with Maui Electric’s island-wide grid. The project would include a POI on the MPP-Waena 69kV transmission line, as well as a second POI on the MPP-Waiinu 69kV transmission line, both within the study area. The project would be accessed via existing agricultural roadways that extend into the property and would utilize a network of existing and new on-site access roads. Temporary construction staging and laydown would occur within the study area.

In order to address the project’s requirements under Hawai‘i Revised Statutes (HRS) Chapter 6E and to identify historic properties, an archaeological inventory survey (AIS) was conducted by CSH in parallel with this CIA study. The AIS included a 100 percent coverage pedestrian inspection of the entire study area, a ground penetrating radar survey, observation of geotechnical testing, and the excavation of 230 AIS test trenches. A total of four post-Contact historic properties related to commercial agriculture were identified within the study area. These historic properties included a subsurface cultural deposit of historic artifacts and debris, a historic artifact scatter representing Camp 7, and two remnant agricultural water control structures. Notably, no pre-Contact historic properties or human skeletal remains were identified within the study area. The AIS report, which recommends archaeological monitoring during project construction as mitigation, will be submitted to the State Historic Preservation Division (SHPD) for review and acceptance as the next step in the historic preservation review process.

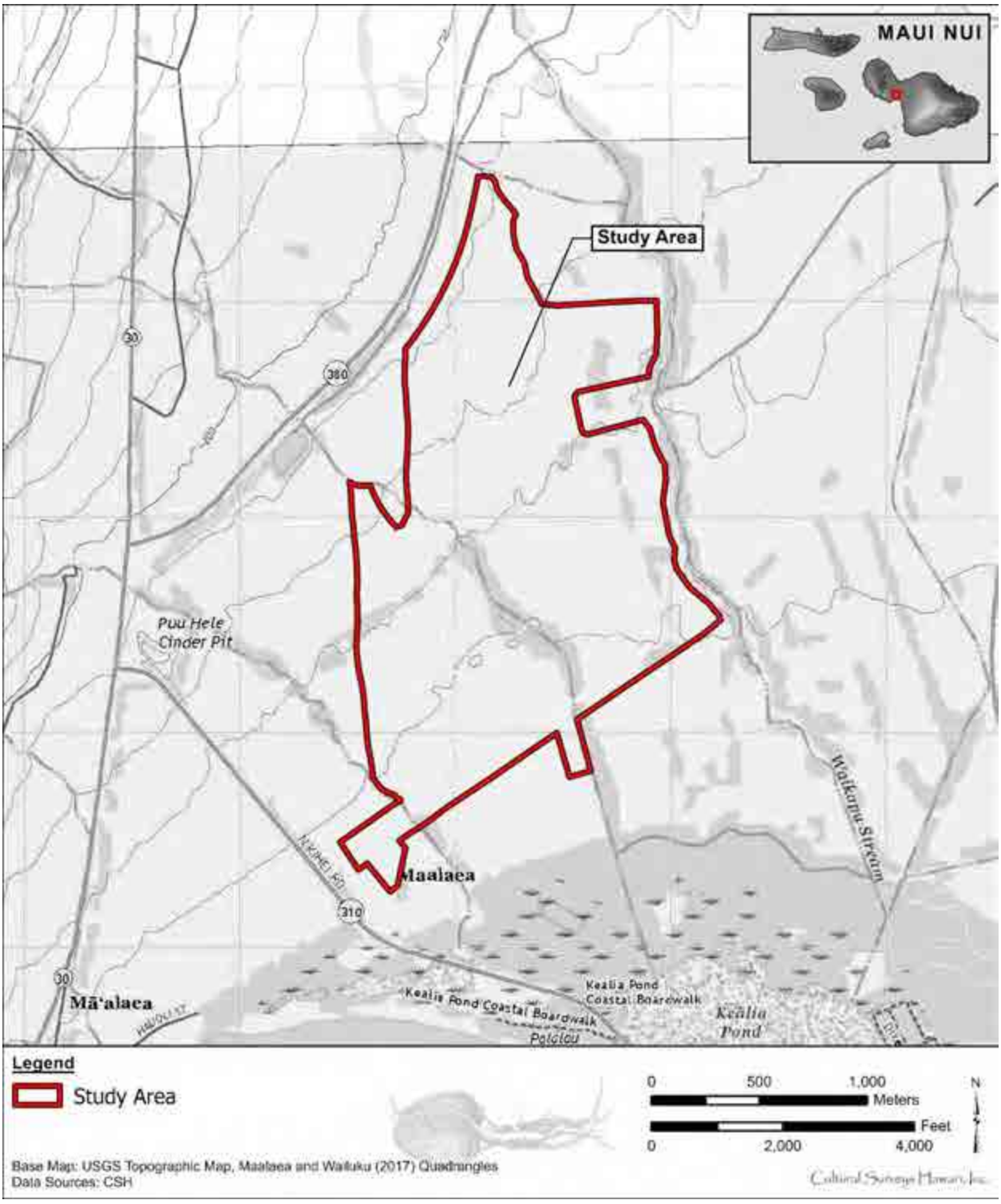


Figure 1. Portions of the 2017 Puu o Kali, Maalaea, Paia, and Wailuku USGS 7.5-minute topographic quadrangles showing the location of the study area

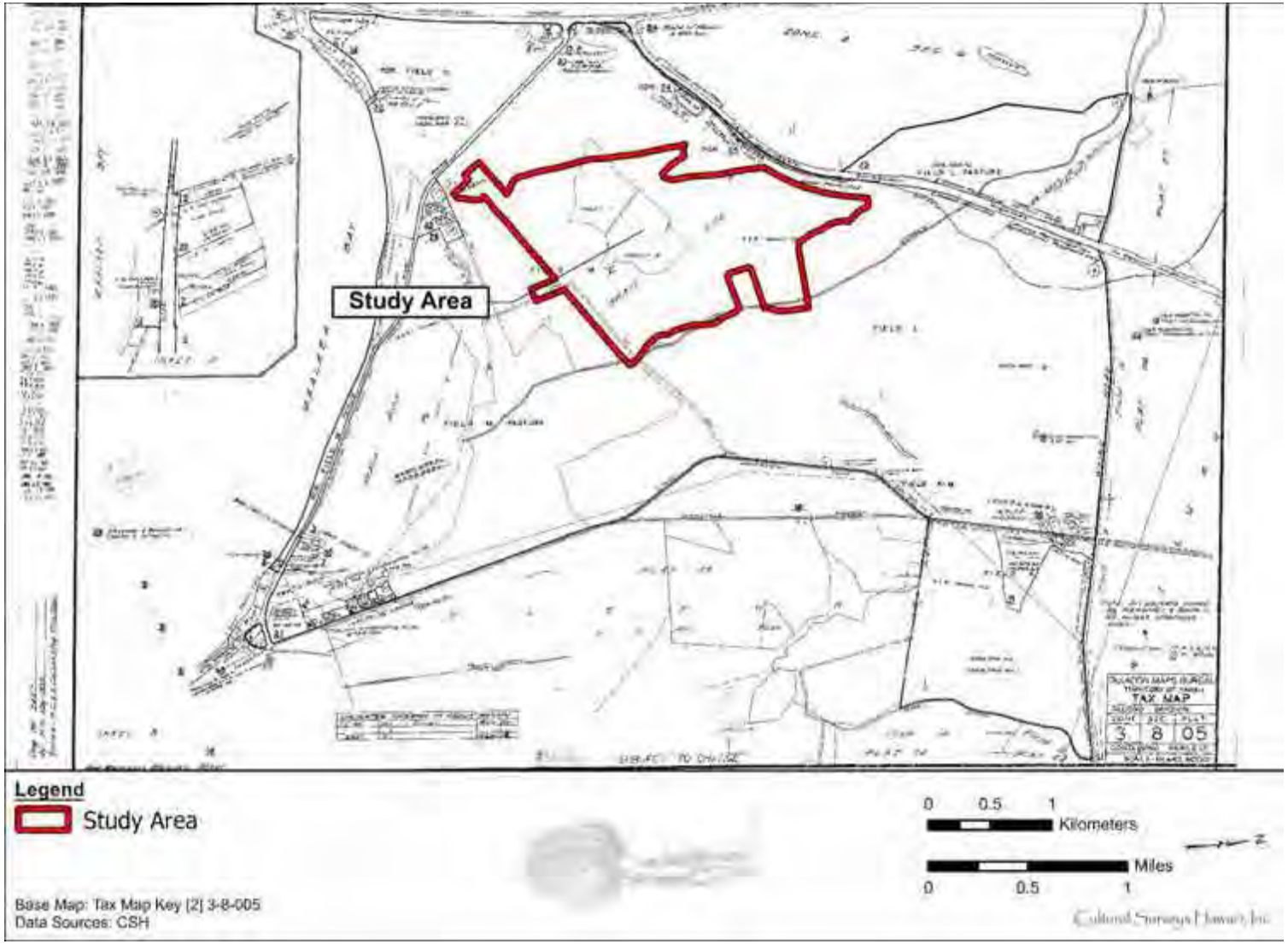


Figure 2. TMK: (2) 3-8-005 showing the location of the study area (Hawaii TMK Service 2014)

Figure 3. Aerial photograph showing the location of the study area (ESRI 2023)

1.2 Regulatory Context

This CIA supports compliance for the Kūihelani Solar Phase 2 Project with:

- Ka Pa‘akai O Ka‘aina v. Land Use Commission (94 Hawai‘i 31), in which the Hawai‘i Supreme Court established a three-part analytical framework to assist the state and counties in fulfilling their constitutional obligation to preserve and protect traditional and customary practices (TCP refers to “traditional and customary practices”) exercised by Native Hawaiians, to the extent feasible;
- The mandate set forth by the Hawai‘i State Constitution (Articles IX and XII), courts, Hawai‘i Revised Statutes (HRS), and Hawai‘i Administrative Rules (HAR) and other Hawai‘i State laws requiring government agencies to promote and preserve cultural beliefs, practices. and resources of native Hawaiians and other ethnic groups;
- and the State of Hawai‘i’s historic preservation review process under HAR §13-275-6 and §13-284-6, which requires the identification and mitigation of adverse effects proposed by a potential project in order to “promote the use and conservation of historic properties for the education of the citizens of Hawai‘i” (HAR §13-275-6).

1.3 Document Purpose

This CIA contains information gathered from archival research and consultation, compiled to “analyze the impact of a proposed action on cultural practices and features associated with the study area” (Environmental Council 1997). Cultural practices and cultural features may include traditional cultural properties (TCPs), designated significant historic properties under State of Hawai‘i significance Criterion e, pursuant to HAR §13-275-6 and §13-284-6. Significance Criterion e refers to historic properties that “have an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts—these associations being important to the group’s history and cultural identity” (HAR §13-275-6 and §13-284-6).

This project also includes a Ka Pa‘akai Analysis Study. In Ka Pa‘akai O Ka ‘Aina v. Land Use Commission, 94 Hawai‘i (2000), the Hawai‘i Supreme Court

> [...] articulated an analytical framework to assist state agencies in balancing the State‘s obligation to protect traditional and customary practices against private property (as well as competing public) interests, by requiring specific findings and conclusions about:
>
> 1. the identity and scope of ‘valued cultural, historical, or natural resources’ in the relevant area, including the extent to which traditional and customary native Hawaiian rights are exercised in releveant area;
> 2. the extent to which those resources—including traditional and customary native Hawaiian rights—will be affected or impaired by the proposed action; and
> 3. the feasible action, if any, to be taken by the [agency] to reasonably protect native Hawaiian rights if they are found to exist. [Ka Pa‘akai O Ka ‘Aina v. Land Use Comm’n, 94 Hawai‘i 31, 35, 47 and 52–53, 7 P.3d 1068, 1072, 1084 and 1089–90 (2000)]

1.4 Natural Environment

The study area is located in the isthmus of Central Maui between the northwest slopes of Haleakalā and the southeast slopes of Mauna Kahālāwai (West Maui Mountains). The study area is surrounded by portions of Pohakea Gulch northeast of North Kīhei Road, the Waihe‘e Canal near Kuihelani Highway, and Waikapū Stream along its eastern boundary. It is directly north of Keālia Pond along the leeward shore of Maui. The elevation of land within the study area ranges from approximately 14.7 m (48.2 ft) above mean sea level (AMSL) at the southern end near Mā‘alaea Harbor to 53.9 m (177 ft) AMSL at the northern end near Kuihelani Highway. The study area is presently within undeveloped former agricultural lands that were utilized for sugarcane cultivation until very recently and now heavily vegetated with grasses, shrubs, and some trees such as cane grass (*Pennisetum purpureum*) and other unidentified grasses, *kiawe* (*Prosopis pallida*), and *koa haole* (*Leucaena leucocephala*).

In 2014, the average annual air temperature for the study area was between 21.5°C (67.2°F) in February and 25.5°C (74.4°F) in August (Giambelluca et al. 2014). The land in the vicinity of the study area received a mean annual rainfall of 394.8 mm (15.5 inches) between 1978 and 2007, according to the University of Hawai‘i 2011 *Rainfall Atlas of Hawaii* (Giambelluca et al. 2013).

1.4.1 *Nā Lepo* (Soils)

According to the U.S. Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) database (U.S. Department of Agriculture 2001) and soil survey data gathered by Foote et al. (1972), the majority of soils within the study area consist of Jaucas sand, 0 to 15% slopes (JaC), Pulehu cobbly clay loam, 3 to 7% slopes (PtB), Pulehu cobbly silt loam, 0 to 3% slopes (PrA), Pulehu cobbly silt loam, 3 to 7% slopes (PrB), and Pulehu silt loam, 3 to 7% slopes (PpB) (Figure 4). Also represented are inclusions of Ewa silty clay, 0 to 3% slopes (EsA), Ewa silty clay loam, 0 to 3% slopes (EaA), Pulehu cobbly clay loam, 0 to 3% slopes (PtA), Pulehu clay loam, 0 to 3% slopes (PsA), Pulehu silt loam, 0 to 3% slopes (PpA), and Puuone sand, 7 to 30% slopes (PZUE),

Ewa series soils are described as follows:

> This series consists of well-drained soils in basins and on alluvial fans on the island of Maui and Oahu. These soils developed in alluvium derived from basic igneous rock. They are nearly level to moderately sloping. Elevations range from near sea level to 150 feet…
>
> **Ewa silty clay loam, 0 to 3 percent slopes** (EaA).—On this soil, runoff is very slow and the erosion hazard is no more than slight. In a few small, gently sloping areas were included in mapping.
>
> This soil is used for sugarcane and homesites.
>
> **Ewa silty clay, 0 to 3 percent slopes** (EsA).—This soil has a profile like that of Ewa silty clay loam, 3 to 6 percent slopes, except for the texture of the surface layer. Runoff layer is very slow, and the erosion hazard is no more than slight.
>
> This soil is used for sugarcane. [Foote et al. 1972:29–30]

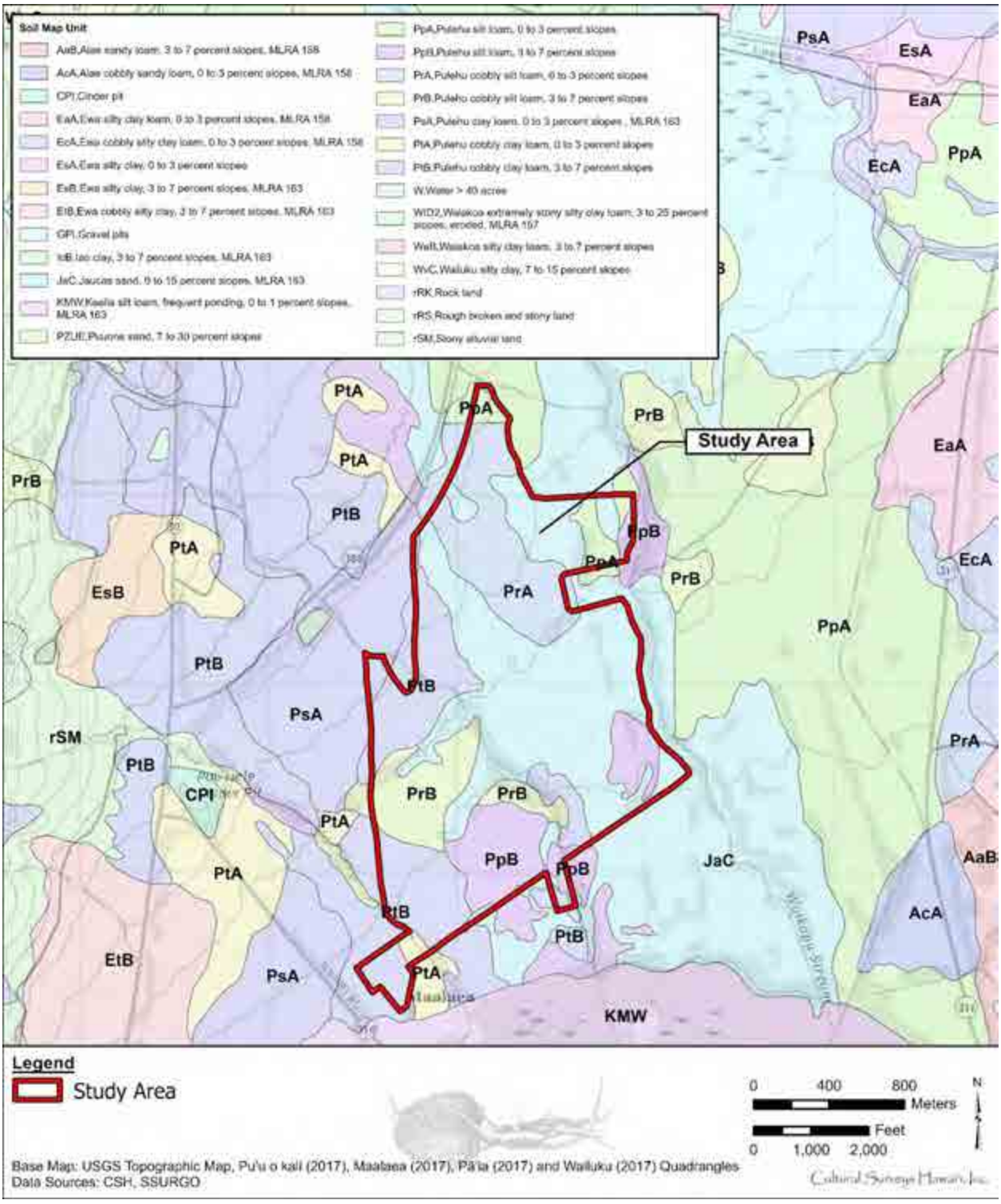


Figure 4. Overlay of *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii* (Foote et al. 1972), indicating soil types within and surrounding the study area (USDA SURGGO 2001)

Jaucas sand, 0 to 15% slopes (JaC) is described as follows:

> This series consists of excessively drained, calcareous soils that occur as narrow strips on coastal plains, adjacent to the ocean. These soils occur on all islands of this survey area. They developed in wind- and water-deposited sand from coral and seashells. … Jaucas soils are geographically associated with Pulehu, Mokuleia, Kaloko, and Lualualei soils.
>
> In many places the surface layer is dark brown as a result of accumulation of organic matter and alluvium. The soil is neutral to moderately alkaline throughout the profile.
>
> Permeability is rapid, and runoff is very slow to slow. The hazard of water erosion is slight, but wind erosion is a severe hazard where vegetation has been removed. The available water capacity is 0.5 to 1.0 inch per foot of soil. In places roots penetrate to a depth of 5 feet or more. Workability is slightly difficult because the soil is loose and lacks stability for use of equipment. [Foote et al. 1972:48]

The Pulehu series soils are described as follows:

> This series consists of well-drained soils on alluvial fans and stream terraces and in basins. […] They developed in alluvium washed from basic igneous rock. The soils are nearly level to moderately sloping. Elevations range from nearly sea level to 300 feet. […]
>
> **Pulehu clay loam, 0 to 3 percent slopes** (PsA).—This soil is on alluvial fans and stream terraces and in basins. Included in mapping were small areas of Ewa, Mala, and Waialua soils. Also included were small areas of gravelly, stony, and gently sloping soils.
>
> The surface layer is dark brown clay loam. This is underlain by dark-brown, dark grayish-brown, and brown, massive and single grain stratified loam, loamy sand, fine sandy loam, and silt loam. Below this is coarse, gravelly or sandy alluvium. The soil is neutral in the surface layer and neutral to mildly alkaline below the surface layer.
>
> Permeability is moderate. Runoff is slow, and the erosion hazard is no more than slight. The available water capacity is about 1.4 inches per foot in the surface layer and subsoil. In places roots penetrate to a depth of 5 feet or more. Low areas are subject to flooding.
>
> **Puhelu cobbly clay loam, 0 to 3 percent slopes** (PtA). —This soil is similar to Puhelu clay loam, 0 to 3 percent slopes, except that it is cobbly. This soil is used for sugarcane. Small acreages are used for pasture.
>
> **Pulehu cobbly clay loam, 3 to 7 percent slopes** (PtB).—On this soil, runoff is slow and the erosion hazard is slight. Included in mapping were small areas that have thin, stratified layers of sand and gravel at a depth of 20 to 36 inches.
>
> This soil is used for sugarcane. Small acreages are used for pasture. […]

Pulehu silt loam, 0 to 3 percent slopes (PpA).—This soil is similar to Pulehu clay loam, 0 to 3 percent slopes, except that the texture is silt loam. This soil is used for sugarcane. Small acreages are used for homesites.

Pulehu silt loam, 3 to 7 percent slopes (PpB).—This soil is similar to Pulehu clay loam, 0 to 3 percent slopes, except that the texture is silt loam. Runoff is slow, and the erosion hazard is slight. Included in mapping were small areas underlain by coral sand at a depth of 20 to 36 inches.

This soil is used for sugarcane.

Pulehu cobbly silt loam, 0 to 3 percent slopes (PrA).—This soil is similar to Pulehu clay loam, 0 to 3 percent slopes, except that the texture is silt loam and there are many cobblestones on the surface. In a few places cobblestones are common throughout the profile. Included in mapping were small areas underlain by coral sand at a depth of 20 to 36 inches.

This soil is used for sugarcane and pasture.

Pulehu cobbly silt loam, 3 to 7 percent slopes (PrB).—This soil is similar to Pulehu clay loam, 0 to 3 percent slopes, except that the texture is silt loam, and the surface layer is cobbly. Runoff is slow, and the erosion hazard is slight. Included in mapping were small areas underlain by coral sand at a depth of 20 to 36 inches.

This soil is used for sugarcane. Small areas are used for pasture. [Foote et al. 1972:115–116]

Puuone sand, 7 to 30% slopes (PZUE) is described as follows:

This series consists of somewhat excessively drained soils on low uplands on the island of Maui. These soils developed in material derived from coral and seashells. They are moderately sloping to moderately steep. […] Puuone soils are geographically associated with Iao and Jaucas soils.

[…] This soil is on sandhills near the ocean. Included in mapping were small areas of Iao and Jaucas soils. Also included were small areas where the cemented layer is less than 20 inches below the surface.

In a representative profile the surface layer is grayish-brown, calcareous sand about 20 inches thick. This is underlain by grayish-brown, cemented sand. The soil is moderately alkaline in the surface layer.

Permeability is rapid above the cemented layer. Runoff is slow, and the hazard of wind erosion is moderate to severe. The available water capacity is about 0.7 inches per foot in the surface layer and subsoil. In places roots penetrate to the cemented layer. [Foote et al. 1972:117]

1.4.2 *Nā Ua* (Rains)

Precipitation is a major component of the water cycle accountable for depositing fresh water on local flora. Pre-Contact *kānaka ʻōiwi* (Native Hawaiians) recognized two distinct annual seasons. The first, known as *kau* (period of time, especially summer) lasts typically from May to October and is a season marked by a high-sun period corresponding to warmer temperatures and steady trade winds. The second season, *hoʻoilo* (winter, rainy season) continues through the end of the year from November to April and is a much cooler period when trade winds are less frequent, and widespread storms and rainfall become more common (Giambelluca et al. 1986:17). Typically, the maximum rainfall occurs in January and the minimum in June (Giambelluca et al. 1986:17).

Similar to other islands, each small geographic area on Maui had a Hawaiian name identifying specific characteristics of its rains and winds. According to Akana and Gonzalez (2015):

> Our kupuna had an intimate relationship with the elements. They were keen observers of their environment, with all of its life-giving and life-taking forces. They had a nuanced understanding of the rains of their home. They knew that one place could have several different rains, and that each rain was distinguishingable from another. They knew when a particular rain would fall, its color, duration, intensity, the path it would take, the sound it made on the trees, the scent it carried, and the effect it had on people. [Akana and Gonzalez 2015:XV]

There were many recognized rains in the *moku* (district) of Wailuku, but the Kiliʻoʻopu rain was specifically associated with Waikapū and the larger Wailuku district (Akana and Gonzalez 2015:84).

The two *mele* (song) below, a *mele kanikau* (song of remembrance) and *mele ʻāina* or song of the land, both mention the Kiliʻoʻopu rain.

Kuʻu kāne mai ka ua Kiliʻoʻopu o Waiheʻe

ʻAuʻau ka ʻuhane i ka wai o Nīʻaukawa

Translation:

My dear husband from the Kiliʻoʻopu rain of Waiheʻe

The spirit bathes in the water of Nīʻaukawa

[Akana and Gonzalez 2015:83]

The *mele ʻāina* titled Nani Lahaina mentions the Kiliʻoʻopu of Wailuku.

He loa Puʻukoaʻe

He pāpāʻolelo na ka makani

Makani lū ʻino i nā lehua o Kaukini

Polipoli Pūlehu i ka ua Kiliʻoʻopu o Waiheʻe

Me ka ua nā māmala ʻino a ka wai

Translation:

Expansive is Puʻukoaʻe

A conversation held by the wind

Wind that violently scatters the lehua blossoms of Kaukini

Pūlehu is polished by the Kili‘o‘opu of Waihe‘e

With the rain come hard strokes of the water

[Akana and Gonzalez 2015:83]

1.4.3 *Nā Makani* (Winds)

Like rains, *makani* (winds) were named for various reasons such as describing the intensity or direction of the wind, relating the wind to a story, or even relating the wind to the landscape. David Malo, a Native Hawaiian historian, explains some general terms related to wind:

> […] There was the *kona*, a wind from the south, of great violence and of wide extent. It affected all sides of an island, east, west, north, and south, and continued for many days […] The *kona* wind often brings rain, though sometimes it is rainless […] The *hoolua*, a wind that blows from the north, sometimes brings rain and sometimes is rainless […] The *hau* is a wind from the mountains, and they are thought to be the cause of it, because this wind invariably blows from the mountains outwards towards the circumference of the island. [Malo 1951:14]

A‘e loa is a term given to the prevailing northeasterly trade winds (Nakuina 1992:138) along with *A‘e* (Pukui and Elbert 1986:3), *Moa‘e*, and *Moa‘e Lehua* (Pukui and Elbert 1986:249).

In the traditional story *The Wind Gourd of La‘amaomao*, Pāka‘a and his son Kūapāka‘a are descendants of the wind goddess La‘amaomao whose traditional home was in a gourd that also contained all of the winds of Hawai‘i. They control the winds of Hawai‘i contained in the gourd by chanting their names. Kūapāka‘a’s chant traces the winds of Maui and the *moku* of Wailuku. They are presented in Pāka‘a’s chant as follows:

Olaukoa i Ukumehame,	Olaukoa is at Ukumehame
Makani wawahi hale i Olowalu	The wind that tears apart the hale at Olowalu,
Kilihau iho no ilaila,	Kilihau is the rain there,
Kololio mai o Waikapu,	Kololio is of Waikapū,
He i‘a iki ko Wailuku,	I‘a iki is of Wailuku,
He oopu ko Waihee,	‘O‘opu is of Waihe‘e, [. . .]

[Nakuina 1902:68; 1992:63]

Additionally, four winds of the Wailuku Moku are also recounted in Sterling (1998) by an informant who relates:

Wailuku’s wind is the Makani-lawe-malie, the wind that takes it easy.

Waiehu’s wind is the Makani-hoo‘eha-ili, the wind that hurts the skin.

Waikapu’s wind is the Makani-ko-kololio, the gusty wind.

Waihee’s wind is the Makani-kili-‘o‘opu.

[Sterling 1998:62]

1.4.3.1 Maui Vortex

Pāka‘a’s wind chant recognizes an upwardly circulating wind pattern in the following lines: “*He pelu ka makani no kai, He kupa he okea ka makani”* which translates to “The wind that doubles up is of the lowlands, Kupa and Okea are the winds” (Nakuina 1902:69; Nakuina 1992:63). In the iteration of the chant found in Sterling (1998:7), *okea* is written as *okee*, meaning, “To veer, as the wind, to change, as direction; to eddy” (Pukui and Elbert 1986:281).

The Maui Vortex is a diurnal weather pattern, dissipating in the evening when the slopes of Haleakalā cool. It was modelled in 1949 by Luna Leopold, Chief Meteorologist at the Pineapple Research Institute (Leopold 1949), and again in 1966 by the National Weather Service (Peterson 1966).

1.4.4 *Nā Kahawai* (Streams and Freshwater)

Waikapū Stream is located along the eastern boundary of the study area. It is one of four major deep-valley streams (Waikapū, Wailuku, Wai‘ehu, and Waihe‘e) which comprise the *‘okana* (sub-district) known as “Nā Wai ‘Ehā,” or “The Four Waters” (Handy et al. 1991:469; Moffat and Fitzpatrick 1995:23). Handy et al. (1991:496) describe Waikapū Stream as a land-bound stream whose water was “utilized for irrigating a great acreage of sugar cane” and “formerly was diverted into lo‘i [irrigated taro patch] and its overflow was dissipated on the dry plains of the broad isthmus between West and East Maui.”

There are two gulches, Pōhākea and Pale‘a‘ahu, located within the study area. Both gulches eventually flow into Keālia Pond and ultimately into Mā‘alaea Bay. Pōhākea Gulch is included within the Pōhākea Watershed, while Pale‘a‘ahu Gulch is one of five streams that make up the Waikapū Watershed. According to Reyes et al. (2023:30), Pōhākea Gulch “typically only flows during stormwater events.” Pōhākea means “white stone” in Hawaiian. The National Hydrography Dataset (NHD) (USGS 2022) and National Wetland Inventory (NWI) (USFWS 2022) data identify Pale‘a‘ahu Gulch as an intermittent stream that connects to Keālia Pond. The Division of Aquatic Resources (DAR) (2008) classifies Pale‘a‘ahu Gulch as a non-perennial stream that terminates in the central portion of the study area.

Makai (seaward) of the study area is Keālia Pond, a salt-water marsh that serves as “an important breeding and nesting refuge for indigenous waterfowl” (Clark 1989:51). In 1992, the Keālia Pond National Wildlife Refuge was established. The refuge “encompasses approximately 700 acres and is one of the few natural wetlands remaining in the Hawaiian Islands” (USFWS 2021a). The refuge provides “nesting, feeding and resting habitat” for endangered Hawaiian waterbirds and migratory birds including the *ae‘o* (Hawaiian stilt, *Himantopus mexicanus knudseni*), *‘alae ke‘oke‘o* (Hawaiian coot, *Fulica americana alai*), *koloa maoli* (Hawaiian duck, *Anas wyvilliana*), *‘auku‘u* (black-crowned night heron, *Nycticorax nycticorax hoactli*), *kōlea* (Pacific golden plover, *Pluvialis dominica*), *hunakai* (sanderling, *Calidris alba*), *‘akeke‘e* (ruddy turnstone, *Arenaria interpres*), *‘ūlili* (wandering tattler, *Heteroscelus incanum*), northern pintail (*Anas acuta*), and northern shoveler (*Spatula clypeata*) (USFWS 2021b). The refuge is also a habitat for Blackburn’s Sphinx Moth (*Manduca blackburni*) which is “Hawai‘i’s largest native insect” found “only on Maui, Kaho‘olawe, and the island of Hawai‘i” (USFWS 2021c). The

‘ōpe‘ape‘a (Hawaiian hoary bat, *Lasiurus cinereus semotus*) “have been documented near the Refuge and may use the Refuge for foraging areas (wetlands appear to be important foraging areas)” (USFWS 2021d). The endangered *honu‘ea* (Hawksbill Turtle, *Eretmochelys imbricata*) also nest on the beach adjacent to the refuge (USFWS 2021e).

In *A Dynamic History of Climate Change and Human Impact on the Environment from Keālia Pond, Maui, Hawaiian Islands*, Stephanie Pau, Glen M. MacDonald, and Thomas W. Gillespie also noted the vegetation in the Keālia Pond region consists of “primarily *Batis maritima* (pickleweed) with a few isolated individuals of *kiawe* and *Acacia farnesiana* (*klu*) along the sand dunes to the south. Large sugarcane fields surround the site to the northwest” (Pau et al. 2012:4).

1.4.5 *Ka Lihikai a me Ka Moana* (the Coast and Ocean)

The location of Maui in the chain of Hawaiian Islands has it surrounded by four other islands. To the east is the island of Hawai‘i, south is Kaho‘olawe, southwest is Lana‘i, and O‘ahu is to the west. The short distance to the other islands allows ease of access to and from the island. The Pailolo (meaning lift and shift; Pukui et al. 1974:175) Channel separates Moloka‘i and Maui at a distance of 8 miles. The ‘Au‘au (meaning to bathe; Pukui et al. 1974:14) Channel is between Lana‘i and Maui at 8 miles apart; ‘Alalākeiki (meaning child’s wail; Pukui et al. 1974:9) separates Kaho‘olawe and Maui at 7 miles; and ‘Alenuihāhā (meaning great billows smashing; Pukui et al. 1974:10) separates Maui and Hawai‘i at 26 miles (Walker 1931:5).

1.5 Built Environment

The study area supported commercial sugarcane production until the end of 2016, when the last commercial sugarcane operations on Maui were closed. Presently, the entire area is comprised of fallow fields of sugarcane and overgrown field access roads. Kuihelani Highway (Route 380) generally defines the northwestern boundary of the study area. There is a commercial/light industrial development located on the opposite side of Kuihelani Highway. The western boundary is bordered by agricultural fields that approach North Kīhei Road, which curves along the coast near the southern boundary of the study area. The Maui Electric Company Maalaea Generating Station is off North Kīhei Road next to the southwestern corner of the study area, and the Keālia Pond Coastal Boardwalk is on the *makai* side of the road. Mehameha Loop and the Maui Veterans Highway, formerly the Mokulele Highway (Route 311), are to the east.

Section 2 Methods

2.1 Archival Research

Research centers on Hawaiian activities including *ka‘ao* (legends), *wahi pana* (storied places), *‘ōlelo no‘eau* (proverbs), *oli* (chants), *mele* (songs), traditional *mo‘olelo* (stories), traditional subsistence and gathering methods, ritual and ceremonial practices, and more. Background research focuses on land transformation, development, and population changes beginning with the early post-Contact era to the present day.

Cultural documents, primary and secondary cultural and historical sources, historic maps, and photographs were reviewed for information pertaining to the study area. Research was primarily conducted at the CSH library. Other archives and libraries including the Hawai‘i State Archives, the Bishop Museum Archives, the University of Hawai‘i at Mānoa’s Hamilton Library, Ulukau, The Hawaiian Electronic Library (Ulukau 2014), the State Historic Preservation Division (SHPD) Library, the State of Hawai‘i Land Survey Division, the Hawaiian Historical Society, and the Hawaiian Mission Houses Historic Site and Archives are also repositories where CSH cultural researchers gather information. Information on Land Commission Awards (LCAs) were accessed via Waihona ‘Aina Corporation’s Māhele database (Waihona ‘Aina 2024), the Office of Hawaiian Affairs (OHA) Papakilo Database (Office of Hawaiian Affairs 2015), and the Ava Konohiki Ancestral Visions of ‘Āina website (Ava Konohiki 2015).

2.2 Consultation

Throughout the course of this assessment, an effort was made to contact and consult with Native Hawaiian Organizations (NHO), agencies, and community members including descendants of the area, in order to identify individuals with cultural expertise and/or knowledge of the *ahupua‘a* traditional land division of Waikapū.

2.2.1 Community Outreach, Interview, and Transcription Methods

2.2.1.1 Scoping for Participants

We begin our consultation efforts with utilizing our in-house contact list from previous outreach efforts to facilitate the interview process. This list often includes *kūpuna* (elders), *kama‘āina* (native born), cultural practitioners, lineal and cultural descendants, Native Hawaiian Organizations (NHOs; includes Hawaiian Civic Clubs and those listed on the Department of Interior’s NHO list), and community groups. We also contact agencies such as SHPD, OHA, and the appropriate Island Burial Council where the proposed project is located for their response to the project and to identify lineal and cultural descendants, individuals and/or NHO with cultural expertise and/or knowledge of the study area. CSH is also open to referrals and new contacts.

2.2.1.2 Talk Story Sessions

Prior to the interview, CSH cultural researchers explain the role of a CIA, how the consent process works, the project purpose, the intent of the study, and how their *‘ike* (insight) and *mana‘o* (opinion) will be used in the report. The interviewee is given an Authorization and Release Form to read and sign.

“Talk Story” sessions range from the formal (e.g., sit down and *kūkākūkā* [consultation, discussion] in participant’s choice of place over set interview questions) to the informal (e.g., hiking to cultural sites near the study area and asking questions based on findings during the field outing). In some cases, interviews are recorded and transcribed later.

CSH also conducts group interviews, which range in size. Group interviews usually begin with set, formal questions. As the group interview progresses, questions are based on interviewee’s answers. Group interviews are always transcribed and notes are taken. Recorded interviews assist the cultural researcher in 1) conveying accurate information for interview summaries, 2) reducing misinterpretation, and 3) providing missing details for *mo‘olelo*.

CSH seeks *kōkua* (assistance) and guidance in identifying past and current traditional cultural practices of the study area. Those aspects include general history of the *ahupua‘a*; past and present land use of the study area; knowledge of cultural sites (for example, *wahi pana*, archaeological sites, and burials); knowledge of traditional gathering practices (past and present) within the study area; cultural associations (*ka‘ao* and *mo‘olelo*); referrals; and any other cultural concerns the community might have related to Hawaiian cultural practices within or in the vicinity of the study area.

2.2.1.3 Interview Completion

After an interview, CSH cultural researchers transcribe and create an interview summary based on information provided by the interviewee. Cultural researchers give a copy of the transcription and interview summary to the interviewee for review and ask them to make any necessary edits. Once the interviewee has made those edits, we incorporate their *‘ike* and *mana‘o* into the report. When the draft report is submitted to the client, cultural researchers then prepare a finalized packet of the participant’s transcription, interview summary, and any photos taken during the interview. We also include a thank you card and honoraria. This is for the interviewee’s records.

It is important to CSH cultural researchers to cultivate and maintain community relationships. The CIA report may be completed, but CSH researchers continuously keep in touch with the community and interviewees throughout the year—such as checking in to say hello via email or by phone, volunteering with past interviewees on community service projects, and sending holiday cards to them and their *‘ohana* (family). CSH researchers feel this is an important component to building relationships and being part of an *‘ohana* and community.

“*I ulu no ka lālā i ke kumu*—the branches grow because of the trunk,” an *‘ōlelo no‘eau* (#1261) shared by Mary Kawena Pukui with the simple explanation: “Without our ancestors we would not be here” (Pukui 1983:137). As cultural researchers, we often lose our *kūpuna* but we do not lose their wisdom and words. We routinely check obituaries and gather information from other informants if we have lost our *kūpuna*. CSH makes it a point to reach out to the *‘ohana* of our fallen *kūpuna* and pay our respects including sending all past transcriptions, interview summaries, and photos for families to have on file for genealogical and historical reference.

Section 3 Traditional Background

3.1 Pre-Contact Period

The division of Maui's lands into political districts occurred during the rule of Kaka‘alaneo, under the direction of his *kahuna* (priest), Kalaiha‘ōhi‘a (Beckwith 1970:383). This division resulted in 12 districts, or *moku*, during traditional times: Kula, Honua‘ula, Kahikinui, Kaupō, Kīpahulu, Hāna, Ko‘olau, Hāmākua Loa, Hāmākua Poko, Wailuku, Kā‘anapali, and Lāhainā. The study area is located in the isthmus of Central Maui between the northwest slopes of Haleakalā and the southeast slopes of Mauna Kahālāwai (West Maui Mountains). Overall, Wailuku and Waikapū Ahupua‘a share an east-west boundary and collectively constitute the entirety of the central isthmus of Maui, which is bounded by ‘Īao Valley to the west, Kahului Harbor to the north, Pā‘ia and Hāli‘imaile to the east, and Mā‘alaea Harbor to the south. These combined lands encompass a total of approximately 43,779 acres.

Waikapū is one of four *ahupua‘a* that traditionally comprise the *‘okana* (sub-district) of Maui known as "Nā Wai ‘Ehā," or "The Four Waters," so named for the four major deep-valley streams emanating from the West Maui Mountains (Handy et al. 1991:469; Moffat and Fitzpatrick 1995:23). Geographically and culturally, Nā Wai ‘Ehā consisted of four deep valley streams (Waikapu, Wailuku, Waiehu, and Waihee) that watered four distinct areas of taro land that spread out fanwise to the shoreline (Handy et al. 1991:272) with the *ahupua‘a* of both Wailuku and Waikapū extending across the isthmus of Maui to meet the traditional land boundaries of Kula Moku. These two land divisions were of primary importance due to their location across "the whole of the central isthmus so as to cut off half of the lands in the district of Kula from access to the sea," and were sometimes referred to as Na Poko (W.D. Alexander in Sterling 1998:63).

3.1.1 Agriculture and Subsistence

In ancient times, Waikapū and Wailuku were agriculturally abundant lands known for their extensive *lo‘i,* or wetland taro cultivation (Handy et al. 1991:497). In an excerpt from C.T. Cheever (in Sterling 1998:75) the remnants of the pre-Contact cultivation of ‘Īao Valley in Wailuku is described,

> As you get into the valley and vega of Wailuku, you see numerous remains of old kihapais, or cultivated lots, and divisions of land now waste, showing how much more extensive formerly was the cultivation, and proportionately numerous the people, than now […]
>
> The whole valley of Wailuku, cultivated terrace after terrace, gleaming with running waters and standing pools, is a spectacle of uncommon beauty to one that has a position a little above it. [C.T. Cheevers in Sterling 1998:75]

Similar observations were made regarding the deep valley of Waikapū, lying immediately southwest of the paramount valley of the West Maui range in Wailuku. Writing his observations from long after the period of active *lo‘i* cultivation, E.S.C. Handy (in Sterling 1998) observed,

> Spreading north and south from the base of Waikapu to a considerable distance below the valley are the vestiges of extensive wet plantations, now almost obliterated by sugar cane cultivation; a few here and there are preserved in

> plantation camps and under house garden sites along the roads. […] Far on the north side, just above the main road and at least half a mile below the entrance to the canyon, an extensive truck garden on old terrace ground shows the large area and the distance below and away from the valley that was anciently developed in terraced taro culture. On the south side there are likewise several sizeable *kuleana* where terraces are now used for truck gardening. [E.S.C. Handy in Sterling 1998:94]

Handy et al. (1991) in *Native Planters in Old Hawaii Their Life, Lore, and Environment*, describes Waikapū Stream as land bound, as opposed to emptying into the ocean, with the water diverted into *lo‘i* and the overflow dissipating on the dry plains of the central isthmus between West and East Maui (Handy et al. 1991:496) feeding the wetland of Keālia. Though there has been some speculation on the establishment of small fishing settlements with cultivation of sweet potatoes in the sandy soil or red *lepo* (dirt) near the shore, E.S.C. Handy stated that

> […] From Waihee to Waikapu there is much good land below and bounding the ancient terrace area on the *kula* and in the lower valleys which would be ideal for sweet potato culture, but it is said that little was grown in this section because there was so much taro. [Sterling 1998:63]

Beyond the alluvial sediments of the stream valley as lower elevations lead into the central isthmus of Maui, the landscape was once dominated by windswept Pleistocene sand dune deposits. The following excerpt of a newspaper article submitted to the *Pacific Commercial Advertiser* distinguishes the differences between the two areas and indicates both agricultural and pastoral use for the lands of Waikapū:

> The isthmus of Waikapu (and Wailuku) lies but little above the level of the sea, and is composed of dry sand. Since the goats and cattle have been allowed to run there, they have destroyed the vines and bushes which served to confine the sand on the windward side, and the ‘dunes’ have been driven nearly to the leeward beach, and will soon usurp the whole of the lower part of the isthmus. The wind here rushes across in fierce gusts between the two divisions of the island, and renders the navigation of the bay at times quite dangerous. On the western slope of the isthmus, and towards the windward side, lie the cultivated portions of Waikapu and Wailuku, which, with the valleys behind them, are very fertile. [Anonymous 1858]

3.2 *Nā ka‘ao a me Nā Mo‘olelo* (Legends and Stories)

Hawaiian storytellers of old were greatly honored; they were a major source of entertainment and their stories contained teachings while interweaving elements of Hawaiian lifestyles, genealogy, history, relationships, arts, and the natural environment (Pukui and Green 1995:IX). According to Pukui and Green (1995), storytelling is better heard rather than read for much becomes lost in the transfer from the spoken to the written word and *ka‘ao* are often full of *kaona* or “double meanings.”

Ka‘ao are defined by Pukui and Elbert as a “legend, tale [...], romance, [and/or], fiction” (Pukui and Elbert 1986:108). *Ka‘ao* may be thought of as oral literature or legends, often fictional or mythic in origin, and have been “consciously composed to tickle the fancy rather than to inform the mind as to supposed events” (Beckwith 1970:1). Conversely, Pukui and Elbert define *mo‘olelo*

as a “story, tale, myth, history, [and/or] tradition” (Pukui and Elbert 1986:254). The *mo‘olelo* are generally traditional stories about the gods, historic figures or stories that cover historic events and locate the events with known places. *Mo‘olelo* are often intimately connected to a tangible place or space.

In differentiating *ka‘ao* and *mo‘olelo* it may be useful to think of *ka‘ao* as expressly delving into the *wao akua* (realm of the gods), discussing the exploits of *akua* (gods) in a primordial time. However, it is also necessary to note there are exceptions, and not all *ka‘ao* discuss gods of an ancient past. *Mo‘olelo* on the other hand, reference a host of characters from *ali‘i* (royalty), to *akua* and *kupua* (supernatural beings), to finally *maka‘āinana* (commoners), and discuss their varied and complex interactions within the *wao kānaka* (realm of man). Beckwith elaborates, “In reality, the distinction between ka‘ao as fiction and mo‘olelo as fact cannot be pressed too closely. It is rather in the intention than in the fact” (Beckwith 1970:1). Thus, a so-called *mo‘olelo*, which may be enlivened by fantastic adventures of *kupua*, “nevertheless corresponds with the Hawaiian view of the relation between nature and man” (Beckwith 1970:1).

Both *ka‘ao* and *mo‘olelo* provide important insight into a specific geographical area, adding to a rich fabric of traditional knowledge. The preservation and passing on of these stories through oration remains a highly valued tradition. Additionally, oral traditions associated with the study area communicate the intrinsic value and meaning of a place, specifically its meaning to both *kama‘āina* as well as others who also value that place.

The following section presents traditional accounts of ancient Hawaiians living in the vicinity of the Kūihelani Solar Phase 2 study area. Many relate an age of mythical characters whose epic adventures inadvertently lead to the Hawaiian race of *ali‘i* and *maka‘āinana*. The *ka‘ao* in and around the study area shared below are some of the oldest Hawaiian stories that have survived. They still speak to the characteristics and environment of the area and its people.

3.2.1 Puapualenalena and Kiha-Pū

Puapualenalena was a famous *kupua*, or demigod, who was noted as a great thief and runner. He took the shape of a yellow dog in order to provide for his master, one such thing being the famous *pū* (conch shell) called Kiha-pū (Beckwith 1970:349). While there are variations to the story that place the *pū* and Pupualenalena’s recovery of the object at Waipi‘o Valley on Hawai‘i Island (Beckwith 1970:350–351), an article published in *Ka Nupepa Kuokoa* during the latter part of the nineteenth century places the *pū* in a cave in Waikapū Valley, thus contributing to the origin of the place name Waikapū. The following is a portion of the tradition as printed in original Hawaiian language account, as well as the translation:

> *O Waikapu e oleloia nei, he wahi pana no ia i kapaia e kekahi poe o ka wa kahiko, a laha loa mai a hiki i keia wa, mamuli o keia inoa. O keia wahi no hoi o Waikapu, he wahi ana ia aia iloko lilo o ke kahawai, ua mile paha a oi aku ka loa mai ke kulanakauhale aku. Aia ma ka aoao hema o ua kahawai nei, he ana, a iloko o ua ana nei he pu, a e kani mau ana oia i na wa a pau me ka ike ole ia e ka lehulehu, a he makaula nae no Kauai ka mea nana i hoolohe mai i ke kani o ua pu nei, a ua imi mai oia me ka manao e loaa. Aia hoi ma ka aoao hikina akau o ua kahawai la, mai kahi aku o ka pu e kani nei, a aia hoi maluna ae o ka pali, he ilio, o Puapualenalena kona inoa, a no kona lohe no hoi i ke kani o ua pu nei, ua imi ikaika oia i kahi e*

loaa ai, aohe nae he loaa iki, oiai ua makaala loa na mea nana ua pu nei ma ke kiai ana, aka, ua hoomau no nae ua ilio nei ma ka hoomakaulii ana i wahi e loaa ai.

A no ka manao paha o uamau mea nei nana ka mea kani, aohe kupua e lilo ai o ka laua milimili, nolaila, ua hoao laua ma ka hoohemahema liilii ana, aohe nae he lilo. Aka, iloko nae o ka la i lilo ai ia Pupualenalena, ua palaka loa laua ma ka hoomanao ana. A no ka lilo ana o ua pu nei ia Pupualenalena, mai laila mai ke kani ole ana a hiki i keia la. Ua lohe ia kona leo ma na wahi a pau o keia mau mokupuni, a ua lilo ia i mea hoouluhua i ka manao o kekahi poe. A no keia pu mai i kapaia ai ka inoa holookoa o Waikapu. Oia iho la ka moolelo no kahi i loaa mai ai keia inoa. He wahi makaikai nui ia no hoi keia e na malihini e makemake ana e ike.

No Waikapu holookoa.—He maikai no ka noho ana o ka aina; eia nae, ua hapa ka ulu nui ana o na mea kanu, no ka uuku o ka wai, i ka ua mea he nui o ka wela o ka la i keia mau la. Ua maloo na loi kalo, nakakaka ka lepo. O ka mahiko o Waikapu nei, aohe no he maloo o ke ko, no ke kamau iki no o kahi wai, a ke maloo uuku mai nei nae ma ke kauwahi.

…

W.K. KAUALILILEHUA.

Maui, Sept 13, 1872

Translation:

Waikapū is the place being mentioned, it is a legendary place that was named by some people of ancient times, and is known as such until present day. This place is Waikapū, a place located near a stream, about a mile or more from town, south of the stream, there is a cave, and in the cave was a conch shell, and every time it’s blown, no ordinary person see where the sound was coming from. A prophet from Kaua‘i is the one that heard this sound, and he searched for it thinking he was going to find it. On the northeast side of the stream, from the place where the pū is blown, on a cliff is a dog, Puapualenalena, and because he heard the sound of the pū, he searched effortlessly for it, however was not able to find it since the guardian of the pū guarded it carefully, but the dog continued, eagerly searching to find the place. Because of their (Kaua‘i prophet and Pupualenalena) ideas, the guardian (blower of the pū) believed that no demigod would be able to take it. Therefore the guardian of the pū began to neglect his responsibility, while the dog continued to search. As the day went on, it was taken by Pupualenalena. The guardian was very neglectful of his responsibility. And because it was taken by Pupualenalena, there has been no sound from this pū until today. Its sound was heard throughout all the islands, and became frustrating for some people. And from this pū, came the name in its entirety, Waikapū. That is the story of where this place got its name. This is a big touring place for people who want to see/know.

For the entire place of Waikapū – it is a good place to live; however, only a portion can be used to farm because of limited amount of water and the heat of the sun these

> days. The taro patches became dry, and the dirt cracked. As for the Waikapū farmers, there is no sugarcane due to dryness, because of little continuance of water, the dryness continues slowly.
>
> …
>
> W.K. KAUALILILEHUA.
>
> Maui, Sept 13, 1872
>
> [translated by Cori-Ann Lorenzo; Kaualililehua 1872]

3.2.2 Pu‘uhele, The Traveling Hill

Two versions of the same story presented in Beckwith's *Hawaiian Mythology* (1970:188–189) describe three hills near the shore of Mā‘alaea which are endowed with *mo‘o* or water lizard spirits: Pu‘uhele, Pu‘u-o-kali, and their first child named Pu‘u-o-inaina. Pu‘uhele is in the *ahupua‘a* of Waikapū, Pu‘u-o-kali is in the *ahupua‘a* of Waiohuli and Keokea to the southeast of Waikapū.

The Myths of Sacred Hills (Beckwith 1970:189) describes the hills of Pu‘uhele and Pu‘u-okali which are also noted to be *mo‘o*. Pu‘uhele and Pu‘u-okali have a child, Pu‘u-o-inaina, who is placed on the island of Kaho‘olawe where she becomes the wife of Ka‘akakai and Ka‘anahua, the two sons of the *kahuna,* Hua. Pu‘u-o-inaina also takes Lohiau as her husband while he was living in Mā‘alaea. This angers Pele, who cuts Pu‘u-o-inaina in two, her head becoming the rock islet of Molokini and her tail becoming the hill of Pu‘u-o-la‘i which is located to the southeast of Waikapū in Mākena (Beckwith 1970:189).

> The two hills beyond Maalaea bay on Maui are named Pu‘uhele and Pu‘u-okali. They are mo‘o beings and their first child is a daughter born of Pu‘uokali and named Pu‘u-o-inaina. She is placed on the sacred island of Kahoolawe, called at that time Kohe-malamalama. She becomes the wife of the two sons of the kahuna of Hua, Kaakakai and Kaanahua, who take the form of birds and retreat to Hanaula when the great drought comes and there alone rain falls. Pu‘u-o-inaina takes Lohiau for her husband while he is living at Maalaea. Pele is angry and cuts her in two in the middle. The tail becomes the hill Pu‘u-o-la‘i at Makena, the head becomes the rock islet of Molokini. [Beckwith 1970:189]

In *The Myth of Pu‘uhele*, which also appears in *Hawaiian Mythology*, Kahinali‘i, mother of goddesses Pele and Hi‘iaka, gives birth to Pu‘uhele, "a child born in the form a bloody foetus" (Beckwith 1970:188). After being thrown away by her sisters, Pu‘uhele crosses the channel between the islands of Hawai‘i and Maui, landing in Kaupō in the form of a beautiful woman. She travels along the coast until she reaches Wānanalua on the eastern coast of Maui where she vows to remain.

> Pu‘uhele (Traveling hill) is a child born in the form of a bloody foetus to Kahinali‘i, mother of Pele and Hi‘iaka. The sisters throw it away. The child crosses the channel of Alanuihaha between Hawaii and Maui and lands at Nu‘u in Kaupo in the form of a beautiful woman. She passes on without speaking to Nu‘u and makes friends with the beautiful Pu‘uomaiai. Manawai-nui recognizes her and calls her by name. Kanahaha sees her and falls dead and a spring gushes to this day from the hill of that name. Leho-ula follows her as she continues her route along the coast. At

> Wananalua Pu‘uhele vows to remain. When Kaihualele reproves her for trespass she dies and through her power as a god her spirit body lives on in the form of the hill Kauiki at the seashore. [Beckwith 1970:188]

There is also a Pu‘uhele in the *ahupua‘a* of Hāmoa near Hāna. Hele and Kali are also described as a “chief and chiefess of antiquity who ruled all that area and the hills were named for them” (Ashdown 1971:58).

3.3 *Nā Wahi Pana* (Storied Places)

Wahi pana are legendary or storied places in a landscape. These legendary or storied places can be a variety of natural or human-constructed features. Oftentimes dating to the pre-Contact period, many but not all *wahi pana* are connected to particular *mo‘olelo*. Dr. Davianna McGregor outlines the types of natural and human-made structures that may constitute *wahi pana*:

> Natural places have mana or spiritual power, and are sacred because of the presence of the gods, the akua, and the ancestral guardian spirits, the ‘aumakua. Human-made structures for the Hawaiian religion and family religious practices are also sacred. These structures and places include temples, and shrines, or heiau, for war, peace, agriculture, fishing, healing, and the like; pu‘uhonua, places of refuge and sanctuaries for healing and rebirth; agricultural sites and sites of food production such as the lo‘i pond fields and terraces slopes, ‘auwai irrigation ditches, and the fishponds; and special function sites such as trails, salt pans, hōlua slides, quarries, petroglyphs, gaming sites, and canoe landings. [McGregor 1996:22]

As McGregor makes clear, *wahi pana* can refer to natural geographic locations such as streams, peaks, rock formations, ridges, offshore islands and reefs, or they can refer to Hawaiian land divisions such as *ahupua‘a* or *‘ili* (traditional land division smaller than an *ahupua‘a*), and man-made structures such as fishponds. In this way, the *wahi pana* of Waikapū tangibly link the *kama‘āina* of Waikapū to their past. It is common for places and landscape features to have multiple names, some of which may only be known to certain *‘ohana* or even certain individuals within an *‘ohana*, and many have been lost, forgotten or kept secret through time. Place names also convey *kaona* and *huna* (secret) information that may even have political or subversive undertones. Before the introduction of writing to the Hawaiian Islands, cultural information was exclusively preserved and perpetuated orally. Hawaiians gave names to literally everything in their environment, including individual garden plots and *‘auwai* (water courses), house sites, intangible phenomena such as meteorological and atmospheric effects, *pōhaku*, *pūnāwai*, and many others. According to Landgraf (1994:v), Hawaiian *wahi pana* “physically and poetically describes an area while revealing its historical or legendary significance.”

3.3.1 *Nā Inoa ‘Āina* (Place Names)

In the preface of *Place Names of Hawaii* (Pukui et al. 1974:x), Samuel Elbert states,

> Hawaiians named taro patches, rocks and trees that represented deities and ancestors, sites of houses and heiau, canoe landings, fishing stations in the sea, resting places in the forests, and the tiniest spots where miraculous or interesting events are believed to have taken place.

> Place names are far from static […] names are constantly being given to new houses and buildings, land holdings, airstrips, streets, and towns and old names are replaced by new ones […] it is all the more essential, then to record the names and the lore associated with them [the ancient names] now. [Pukui et al. 1974:x]

Inherent in the statements of Elbert is the knowledge that the oldest place names held meaning and told the story of an area prior to European contact. Literal translations of place names for land areas and divisions near the project corridor are listed in Table 1 below and may provide some insight into what this area was like prior to Western Contact. Unless otherwise noted, translations are by Pukui et al. (1974).

Table 1. Place name meanings of Wailuku Moku and Waikapū Ahupua‘a in the vicinity of the study area

Name	Feature	Translation
Ahuakolea	*‘Ili*	*Lit*., “plover’s hill” (Thrum 1922:625); note *‘ili* is a land division within an *ahupua‘a*
Aikanaha	*‘Ili*	*Lit*., “possession by forties” (Thrum 1922:626); Kanahā is also a fishpond in Wailuku Ahupua‘a, name of which has been translated by Pukui et al. (1974) as “the shattered [thing]”
Hanaula	*‘Ili*	*Lit*., “red bay”
Haleki‘i	*Heiau*	*Lit*., “image house”; a *heiau* (Walker 1931; Site 44) located in Wailuku at the site of Pihana Heiau along the meander of ‘Īao Stream
‘Īao	Stream	*Lit*., “cloud supreme”; the ‘Īao Stream brings the water of the ‘Īao Valley to the ocean at Paukūkalo, a point just northwest of Kahului Harbor
Ka‘a	Point	*Lit*., “rolling”; a shoreline promontory just east of Kahului Bay
Ka‘alaea	*‘Ili*	*Lit*., “the ocherous earth”
Kahului		*Lit*., “the winning”; native name for the Kahului region is “Kaihuwa‘a” (Sterling 1998)
Kaiwaloa	Ridge	*Lit*., “the long fern”; *‘iwa* is a native fern (*Asplenium horridum*) with narrow, feather-shaped fronds (Pukui and Elbert 1986:104), may also refer to the flight of the *‘iwa* bird (*Fregata minor palmerstoni*)
Kalialinui	Gulch	Possible literal translation: “large tree or plant used for medicine” (Pukui and Elbert 1986); Kalialinui Gulch is 11 miles long, beginning on the upper slopes of Haleakalā, through the study area, and across Wailuku Ahupua‘a, terminating on the flat plains of Kahului just south of Kanahā Pond
Kanahā	Pond	Star name (Pukui and Elbert 1986); salt was gathered at Kanahā: “When the sea rose the hollows in the rocks were filled” (Sterling 1998)

Name	Feature	Translation
Kapalaalaea	*‘Ili*	*Lit*., “daubed with reddish soil” (Thrum 1922:644)
Kapilau	Ridge	*Lit*., “the stench”
Kapili iki	Gulch	“Pili” is a type of grass (*Heteropogon contortus*) used in the thatching of traditional *hale* (house) construction; “*iki*” translates to short, or small; possibly meaning “short pili [grass]”
Kapūhau (var. Pukau, Pūhau)	*‘Ili*	Pūhau—*Lit*., “the ice spring”; *pū* is short for puna (spring)
Kapukaulua		*Lit*., “the fish hole”; located in the coastal region of Pā‘ia, at the most seaward portion of Spreckelsville; close to the reported location of Papanene Heiau (Walker Site 56); the reference to the fishing area concerns the *ulua* (crevalle, jack, pompano) fish
Keālia	*‘Ili kū*; Pond	Returned by Kekuaiwa at the Māhele, retained by aupuni in Puali Komohana. LCAw 3524 to Kahele: “Apana 1. Paakai ma Kealia... 1.3 eka.” Also LCAw 3397 to Puhi, 3527 to Mohai, 3544-B to Kekoaheewale, 5277 to Kanakaloa, 5280 to Kahuku, 5285 to Kahiewalu, 5286 to Kaneaupio. *Lit.,* “the salt encrustation”
Keana	*‘Ili*	*Lit*., “the cave” (Pukui et al. 1974:103)
Kuaiwa	*‘Ili*	*Lit*., “nine times” (Thrum 1922:653) or nine generations
Loaloa (var. Kaloaloa)	*‘Ili*	“Elongated garden plot, as for sweet potatoes (so used in 1848 land claims)” (Pukui and Elbert 1986:209)
Luapua‘a (var. Kaluapuaa)	*‘Ili*	*Lit*., “hog pit”
Mā‘alaea	Village; Bay	Perhaps a contraction of Maka‘alaea (Ocherous earth beginning)
Mauna Kahālāwai		*Lit*., “the gathering of waters”; the West Maui Mountains (Pellegrino 2009)
Mau‘oni	Pond	One of the two fishponds located at the shore of Kanahā
Noho‘ana	*‘Ili*	*Lit*., “way of life” (Pukui and Elbert 1986:269)
‘Ōhi‘a	*‘Ili*	Two kinds of trees, *‘ōhi‘a‘ai* (*Eugenia malaccensis*/mountain apple) (Pukui and Elbert 1986:277) and *‘ōhi‘a lehua* (*Metrosideros macropus, M. collina polymorpha*) (Pukui and Elbert 1986:199); found in the forested regions, the fruit of the *‘ōhi‘a‘ai* was prepared by splitting and drying it in the sun (Pukui and Elbert 1986:277); the wood of the *‘ōhi‘a lehua* is hard and once used for images, spears, and mallets (Pukui and Elbert 1986:199)

Name	Feature	Translation
Palama	*‘Ili*	*Lit*., “lama wood enclosure”; lama wood (*Diospyros sanwicensis*), whose name translates to “light” or “lamp” was a type of hardwood used in *hale* construction (Abbott 1992:68); lama wood was also an integral part of *hula* ceremony where a block from the tree would be wrapped in yellow *kapa* (Hawaiian cloth) and scented with *‘ōlena* (*Curcuma longa*) to represent Laka, the goddess of hula, sister and wife of Lono (Abbott 1992:117)
Palolo	Ditch	*Lit*., “clay”
Papa‘ula		*Lit*., “red flats”; the region just inland of this promontory is presently a portion of the modern Maui Country Club golf course
Paukūkalo		*Lit*., “taro piece”; present-day shoreline community located at the northernmost region of Kahului Harbor; the ‘Īao Stream reaches the ocean at Paukūkalo, a region formerly heavily planted in *kalo.*
Pihana	*Heiau*	*Lit*., “fullness”; stories of this Wailuku Heiau include it being built in a single night by the legendary race of *menehune* (legendary small people) who brought the stones from Paukūkalo beach; also the construction of this *heiau* has been attributed to the Maui chief, Kahekili; listed as Walker Site 43
Pohakoi	Boundary	No translation; a boundary marker that runs from Ka‘ōpala to this point
Pūlehu Nui	*Ahupua‘a*	Large *pūlehu* where *pūlehu* is literally translated as “broiled”; this *ahupua‘a* abuts Wailuku and Waikapū and constitutes much of the central isthmus
Pu‘u Hele	Cinder cone	Cinder cone in the Lahaina Volcanic Series. Elevation about 160 ft after much quarrying. “Hele Hill, a prominent cone 214 feet high...” (USCP). “Cemetery and hill behind Ma‘alaea, Maui, believed once a moo. See Pu‘u-o-kali [for legend].” (PEM) *Lit*., “traveling hill”
Pu‘u Lio	Hill	*Pu‘u* is the word for hill and *li‘o* may be in reference to the bird named for the sound they make; place name possibly related to the *li‘o* bird, which is the same as the *‘a‘o* (*Puffinus auricularis newelli*) (Pukui and Elbert 1986:207)
Pu‘unēnē		*Lit*., “goose hill”; cinder cone once located inland of Papa‘ula, mined for its gravel during WWII to construct the runways at NAS Kahului
Wai‘ale	Reservoir	*Lit*., “rippling water”; reservoir located in Wailuku, fed by waters of the Spreckels Ditch

Name	Feature	Translation
Waikapū	*Ahupua‘a*	*Lit*., “water of the conch”; reference to the conch shell formerly found in a cave at Waikapū, until it was stolen by a supernatural dog, named Puapualenalena; also, the scene of a great battle, fought between Kahekili, king of Maui, and Kalani‘ōpu‘u, king of Hawai‘i Island, at Waikapū Commons
Wailuku	*Ahupua‘a*	*Lit*., “water of destruction”; possibly a reference to the battle which took place at ‘Īao between the forces of Kamehameha I and the Maui chiefs; Sterling (1998) states that Pukui et al. (1974) believes the name is older than the famous battle; Westervelt (1910) makes special reference to the waters of Wailuku in ‘Īao emptying into the Kahului Harbor

3.3.1.1 The Naming of Wailuku and Waikapū

An early legend surrounding the naming of Wailuku comes from the legend of Hi‘iaka, sister of the volcano goddess Pele, as she travelled through the Hawaiian Islands. When Hi‘iaka’s companion, Wahine‘ōma‘o complains of hunger during their travels along a *kaha* (hot dry shore) portion of northern Maui, Hi‘iaka offers a chant of supplication for nourishment from the local residents. Hi‘iaka and Wahine‘ōma‘o were met with little hospitality after their appeal for food was largely ignored by the area’s residents (Emerson 1993:74). Hi‘iaka then offered another chant making “known her wish, concluding her appeal with ominous threats against the life of the king, in case her demands were not met” (Emerson 1993:75). A portion of this chant reads:

Haki kepakepa na moku;	What wailing and beating of breast!
Pa‘iauma ka aina;	Wild anguish of child and of ghost
Uwē kamali‘i, uwē ka hanehane —	O‘er the sandy plain of Kama‘o.
Ke uwē la i ka pili,	The districts are frenzied with grief
I ke kula o Ka-ma‘o-ma‘o;	Tearing of hair and breaking of teeth
Ka‘a kumakena o Maui, e!	One wail that lifts to heaven.
la wai Maui?	Who shall be heir to this Maui land?

[Emerson 1993:75–76]

The mention of Ka-ma‘o-ma‘o is in reference to the area known as Ke Kula o Kama‘oma‘o, or the Plains of Kama‘oma‘o (*lit.,* “greenness”), a region of sandy plains spanning portions of Wailuku and Waikapū Ahupua‘a, and the location of the current study area (Pukui et al. 1974:81).

The place name Waikapū, according to (Pukui et al. 1974:223), literally translates to “Water of the Conch.” This is due to a cave within Waikapū Valley that reportedly housed a supernatural conch shell (named Kīhapū, blessed with the breath on Lono) that resided there until it was stolen by a supernatural dog named Puapualenalena (from Section 3.2.1). This conch shell, when blown, was said to resound throughout all the Hawaiian Islands (Beckwith 1970:349; Pukui et al. 1974:223). According to W.K. Kaualililehua:

> On the left side of the stream is a cave and in the cave was the conch. It sounded all the time, unseen by the public. […]
>
> On the northeast side of the stream on the opposite side of the conch that sounded, on the cliff, was a dog named Puapualenalena. Because he heard it he sought diligently to find it but did not succeed. Those who guarded the conch were very watchful […]
>
> The owners of the conch did not believe, perhaps, that a supernatural being would succeed in taking it away, so they tried to be a little careless. It was not taken, but on the day that Puapualenalena did get it away, they had been utterly careless. After he took it, it sounded no more to this day. [W.K. Kaualilileua in Sterling 1998:93]

Elspeth Sterling (1998) provides several additional accounts of the naming of the waters of Nā Wai ‘Ehā, specifically Wailuku and Waikapū, that have a grounding in the affairs of the Hawaiian people. According to H.T. Cheever (cited in Sterling 1998:63), the waters of Nā Wai ‘Ehā were named after successive events during a famous, albeit unnamed, battle:

> [. . .] Waikapu—The water where the conch was blown, and the engagement began. Waiehu—The water where the combatants smoked with dust and perspiration. Wailuku—The water of destruction, where the battle began to be fierce and fatal. Waihee—The water of total rout and defeat, where the army melted away. [H.T. Cheever in Sterling 1998:63]

C.W. Stoddard expanded on this interpretation of the place names Waikapū and Wailuku in Nā Wai ‘Ehā by relating them to the landing of Kamehameha I at Kalepolepo in the late 1700s (Sterling 1998:63) by relating that:

> Kamehameha landed at Kalepolepo and a *kapu* [taboo] was put upon the nearest stream. It became sacred to royalty, as was the custom and is known as Waikapu to this hour—that is, forbidden water.
>
> Presently the monarch began his march; and at the second stream a great battle raged, so those waters were called Luku—'to slaughter, to slay as in war, the destruction of many at once.’ [C.W. Stoddard in Sterling 1998:63]

Helen Wong Smith remarks that the Sterling notes in the Maui Historical Society mention Waikapū Stream is not the nearest stream to Kalepolepo; however, it drains into Kealia Pond, which is fairly near, and may have been the nearest running stream. An intermediate version of the name occurs in Bates’ 1854 *Sandwich Island Notes* which associates the conch shell and Kamehameha I:

> The first village of any note on the way to Wailuku is Waikapū. It contains a population of about 500. Here the forces of Kamehameha the Great once assembled for battle at the sounding of the conch shell. Hence the name Wai-ka-pu (water of the conch or trumpet. [Bates 1854:309 in Wong Smith 1991:A2]

The names and legends of the region may have their origins in one, or many, notable events that occurred in the time before Western Contact. Though opinions vary, the central isthmus of Maui was nonetheless utilized by forces entering these battles.

3.3.1.2 The Plains of Kama‘oma‘o

Ke Kula o Kama‘oma‘o, or the Plains of Kama‘oma‘o, is the name given to a region of sandy plains spanning portions of Wailuku and Waikapū Ahupua‘a (Emerson 1993). This area was known by Hawaiians in traditional times as a wandering place of the souls (Beckwith 1970), a place where spirits of the dead waited for a friendly escort, perhaps an *‘aumakua,* to show them the way to eternity:

> The worst fate that can befall a soul is to be abandoned by its aumakua and left to stray, a wandering spirit (*kuewa*) in some barren and desolate place, feeding upon spiders and night moths. Such spirits are believed to be malicious and to take delight in leading travelers astray; hence the wild places which they haunt on each island are feared and avoided. Such are the plains of Kama‘oma‘o on the island of Maui. [Beckwith 1970:154]

According to author and historian, Helen P. Hoyt (1976), Kama‘oma‘o is also a region where the “Marchers of the Night,” or *Ka huaka‘i o ka Po*, are sometimes heard and seen. When these spiritual “Night Marchers” appear, according to Beckwith (1932:199), “It is said that such a sight is fatal unless one has a relative among the dead to intercede for him.”

> The marchers carried candlenut torches which burned brightly even on a rainy night. They might even be seen in broad daylight and were followed by whirlwinds such as come one after another in columns. They cried ‘Kapu o moe!’ as a warning to stragglers to get out of the way or to prostrate themselves with closed eyes until the marchers passed. [Beckwith 1932:199]

The eternity that the souls of the dead seek is a place known as *Pō*. Beckwith (1970:163) elaborates on the significance of *Pō*, “Each human being is formed in the spring of water within the uterus of the mother and emerges from it into human life. At death he returns to the Pō again” (Beckwith 1970:163).

Ms. Holt-Padilla, Cultural Historian for the Maui Arts and Cultural Center, explains that the central isthmus was a dry, hot place with trails leading west toward Waikapū, and east along the Kīhei coastline. She stated that the guardian spirits of men, the *‘aumakua* spirits, were known to wander on the lower, sandy plains of Waikapū (Hokulani Holt Padilla in Hill et al. 2006).

Ke Kula o Kama‘oma‘o is also cited as a home to owl deities, considered one of the oldest *‘aumakua* in Hawaiian mythology. The endemic *pueo* (Hawaiian short-eared owl; *Asio flammeus sandwichensis*) was once worshiped by early Hawaiians as a god (Titcomb and Gagne 1976:123). Pueonuiakea was the name of an owl deity who traversed the Plains of Kama‘oma‘o and restored life to wandering souls (Beckwith 1970:124).

Abraham Fornander recalls the story of Pumaia who was a heroic young man that fell to the hands of a spirit. This spirit, Puukolea, had a dual body, capable of shape-shifting in ways the mere human, Pumaia, could not. After falling to Puukolea, Pumaia’s spirit returned home but continued to be chased by Puukolea. Pumaia fled till he reached the Plains of Kama‘oma‘o. There an owl diety by the name of Pueonuiokona began battling Puukolea and ultimately killed him, his entrails were scattered about the plains (Fornander 1918-1919:6:3:550–554).

Ke Kula o Kama‘oma‘o is also described as a special place for the souls of the soldiers killed at Kakanilua, or the Battle of Wailuku Common (Hokulani Holt Padilla in Hill et al. 2006).

3.3.1.3 Warfare in the Sand Hills of Nā Wai ‘Ehā

As a political center for the chiefly class of Hawaiian society, several large battles took place in the general vicinity of Wailuku, many of which included foreign armies marching through the *ahupua‘a* of Waikapū after landing their canoes on the leeward shores of the central isthmus, near Kealia. One example was the Battle of Waikapū Common, or the Ahulau ka Pi‘ipi‘i i Kakanilua. This battle entailed the clash of invading Hawai‘i Island forces, headed by Kalani‘ōpu‘u, with the Maui forces under Kahekili in 1776. According to Fornander (1880:2:152–153), following the plunder of the leeward east Maui coastline, Kalani‘ōpu‘u landed his invading troops at Mā‘alaea. The following account describes the battle on the sand hills south of Wailuku:

> The landing being effected early in the day, it was resolved to push forward at once, and ‘on to Wailuku!’ where Kahekili was residing, became the war cry of the day. The detachment or regiment known as the Alapa, mustering with several hundred men, was selected for this hazardous expedition, and with high courage they started across the isthmus of Kamaomao, known as the Waikapu common, determined, as the legend says, ‘to drink the waters of the Wailuku that day.’ This regiment was considered to be the bravest and best. […] They are said to have all been of equal stature and their spears of equal length; and the legend represents their appearance—with their feather cloaks reflecting the sunshine and the plumes of their helmets tossing in the wind—as a gorgeous and magnificent spectacle.
>
> Little did this gallant troop apprehend the terrible fate that awaited them. Little did Kalaniopuu know the wily warrior with whom he was contending. Offering no resistance to the enemy while crossing the common, Kahekili distributed his forces in various directions of the Wailuku side of the common and fell upon the [Alapa] as it was entering among the sandhills southeast of Kalua, near Wailuku. The gallant and devoted Alapa were literally annihilated; only two out of the eight hundred escaped alive. [Fornander 1880:2:152–153]

According to Ms. Holt-Padilla, the outcome of the battle for Kakanilua was not decided on the first day. The day following the “Slaughter of the Pi‘ipi‘i at Kakanilua,” the remaining forces of Kalani‘ōpu‘u were again sent to battle Kahekili’s forces, which were expected to be in Wailuku (Hokulani Holt Padilla in Hill et al. 2006). Following the humiliating defeat, Kalani‘ōpu‘u consulted his remaining fighters and his war leaders, including his favorite, the young Kamehameha. After this Kalani‘ōpu‘u and his forces proclaimed, “Tomorrow we will drink the waters of Wailuku and rest in the shade of Hekuawa” (Speakman 1978:13). In response to the invader’s renewed vigor for battle:

> Ka-hekili and his ally and nephew, the ruling chief of O‘ahu, prepared another fish net [ambush], and the fish [Hawai‘i Island warriors] swam into it. Ka-hekili’s men rose before dawn and took their stand in the sand hills, some toward the Waikapu turn. The invading force from Hawai‘i found a divided front from which the spears poured down on them ‘like a swift rainstorm.’ The terrified soldiers were surrounded and fled. [Speakman 1978:13–14]

The Big Island army was ambushed at an area close to Waikapū and was destroyed by the army of Kahekili on the plains of Kama‘oma‘o (Hokulani Holt Padilla in Hill et al. 2006). This second day of fighting was known as the battle of Kamoku‘ilima (Kamakau 1992:132). Kalani‘ōpu‘u never succeeded in taking Wailuku, and died shortly after the Battle of Wailuku Common. Upon the death of Kalani‘ōpu‘u, and the death of his sons, the young Kamehameha became the ruling chief of Hawai‘i and the mortal enemy of the now aged Kahekili (Speakman 1978:12). Kamehameha would return to Wailuku and succeed where Kalani‘ōpu‘u had failed. By 1786, Kahekili controlled Maui, Moloka‘i, Lāna‘i, and O‘ahu. This undisputed political control lasted for only a short period of time. In 1790, the last great conflict on Maui—the Battle of Kepaniwai—was fought in ‘Īao Valley in Wailuku. The Battle of Kepaniwai marked the end of the reign of Kahekili and the beginning of the early historic period and a politically unified Hawai‘i (Pukui et al. 1974).

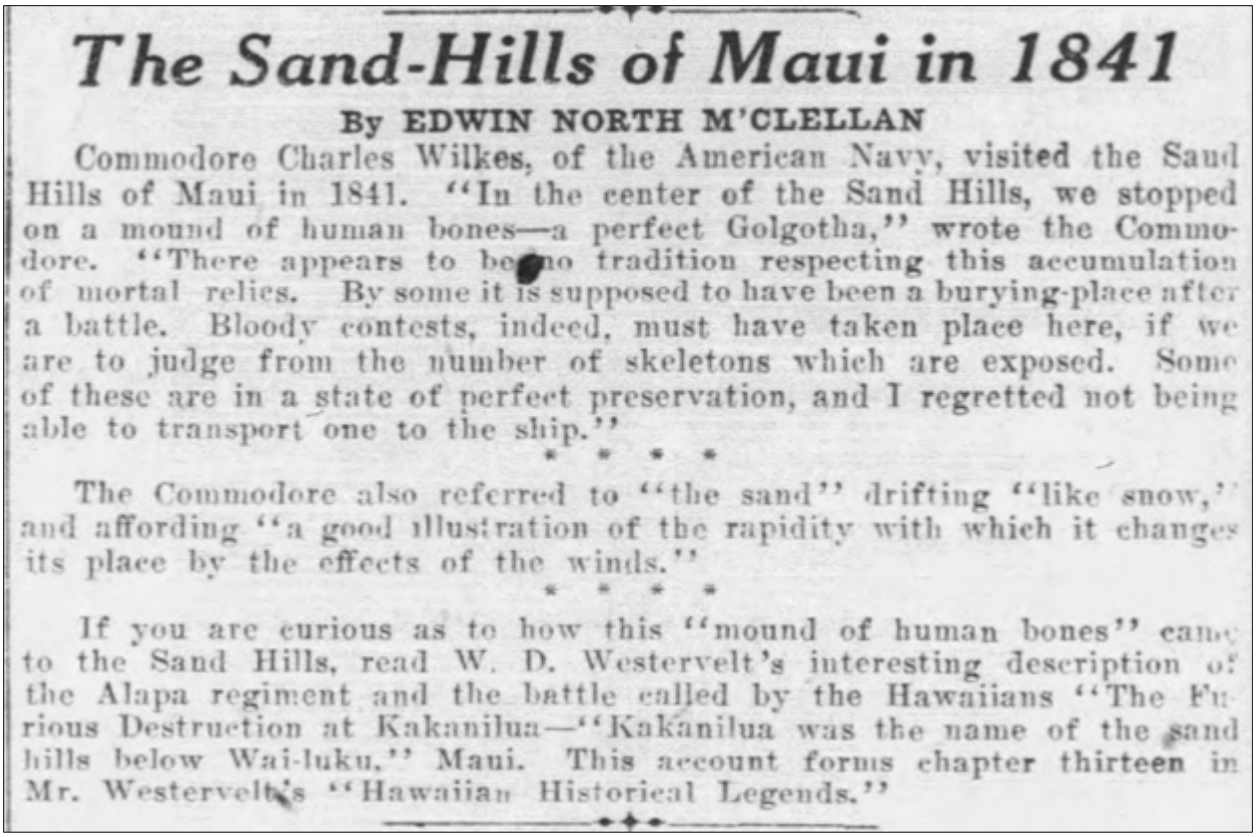
An 1841 account of Commodore Charles Wilkes of the American Navy published in the 7 January 1927 edition of the *Honolulu Advertiser* provides an early description of “a mound of human bones” thought to be the bodies of fallen warriors in the Sand Hills of Wailuku (Figure 5). The article refers to the accounts of past battles fought in Central Maui.

3.4 *Nā ‘Ōlelo No‘eau* (Proverbs)

Hawaiian knowledge was shared by way of oral histories. Indeed, one’s *leo* (voice) is oftentimes presented as *ho‘okupu* (“a tribute or gift” given to convey appreciation, to strengthen bonds, and to show honor and respect); the high valuation of the spoken word underscores the importance of the oral tradition (in this case, Hawaiian sayings or expressions), and its ability to impart traditional Hawaiian “aesthetic, historic, and educational values” (Pukui 1983:vii). Thus, in many ways these expressions may be understood as inspiring growth within reader or between speaker and listener:

> They reveal with each new reading ever deeper layers of meaning, giving understanding not only of Hawai‘i and its people but of all humanity. Since the sayings carry the immediacy of the spoken word, considered to be the highest form of cultural expression in old Hawai‘i, they bring us closer to the everyday thoughts and lives of the Hawaiians who created them. Taken together, the sayings offer a basis for an understanding of the essence and origins of traditional Hawaiian values.
>
> The sayings may be categorized, in Western terms, as proverbs, aphorisms, didactic adages, jokes, riddles, epithets, lines from chants, etc., and they present a variety of literary techniques such as metaphor, analogy, allegory, personification, irony, pun, and repetition. It is worth noting, however, that the sayings were spoken, and that their meanings and purposes should not be assessed by the Western concepts of literary types and techniques. [Pukui 1983:vii]

Simply, *‘ōlelo no‘eau* may be understood as proverbs. The Webster dictionary notes it as “a phrase which is often repeated; especially, a sentence which briefly and forcibly expresses some practical truth, or the result of experience and observation.” It is a pithy or short form of folk wisdom. Pukui equates proverbs as a treasury of Hawaiian expressions (Pukui 1995:xii). Oftentimes within these Hawaiian expressions or proverbs are references to places. This section draws from the collection of author and historian Mary Kawena Pukui and her knowledge of Hawaiian proverbs describing *‘āina* (land), chiefs, plants, and places relative to Waikapū Ahupua‘a and the larger Wailuku Moku.



The Sand-Hills of Maui in 1841

By EDWIN NORTH M'CLELLAN

Commodore Charles Wilkes, of the American Navy, visited the Sand Hills of Maui in 1841. "In the center of the Sand Hills, we stopped on a mound of human bones—a perfect Golgotha," wrote the Commodore. "There appears to be no tradition respecting this accumulation of mortal relics. By some it is supposed to have been a burying-place after a battle. Bloody contests, indeed, must have taken place here, if we are to judge from the number of skeletons which are exposed. Some of these are in a state of perfect preservation, and I regretted not being able to transport one to the ship."

* * * *

The Commodore also referred to "the sand" drifting "like snow," and affording "a good illustration of the rapidity with which it changes its place by the effects of the winds."

* * * *

If you are curious as to how this "mound of human bones" came to the Sand Hills, read W. D. Westervelt's interesting description of the Alapa regiment and the battle called by the Hawaiians "The Furious Destruction at Kakanilua—"Kakanilua was the name of the sand hills below Wai-luku," Maui. This account forms chapter thirteen in Mr. Westervelt's "Hawaiian Historical Legends."

Figure 5. Newspaper clipping from the 7 January 1927 edition of the *Honolulu Advertiser* describing an 1841 discovery of human remains in the Sand Hills of Maui

3.4.1 *‘Ōlelo No‘eau* #1465

The following *‘ōlelo no‘eau* describes the wind of Waikapū.

Ka makani kokololio o Waikapū.

The swift, gusty wind of Waikapū.

Waikapū is on Maui. [Pukui 1983:159]

3.4.2 *‘Ōlelo No‘eau* #1481

The following *‘ōlelo no‘eau* pertains to the Ke Kula o Kama‘oma‘o in Wailuku and Waikapū which were famous for its connection to wandering spirits.

Kama‘oma‘o, ka ‘āina huli hana.

At Kama‘oma‘o, land of activities.

Ghosts who do not go to the *pō* of their ancestors often wander about in certain areas. Kama‘oma‘o, Maui is such a place. The activities of such ghosts usually annoy the living. [Pukui 1983:160]

3.4.3 *‘Ōlelo No‘eau* #1541

The following *‘ōlelo no‘eau* also pertains to Ke Kula o Kama‘oma‘o.

Ka ‘ōlohe puka awakea o Kama‘oma‘o.

The bare one of Kama‘oma‘o that appears at noonday.

The plain of Kama‘oma‘o, Maui, is said to be the haunt of ghosts (*‘ōlohe*) who appear at night or at noon. Also a play on *‘ōlohe* (nude), applied to one who appears unclothed. [Pukui 1983:164]

3.4.4 *‘Ōlelo No‘eau* #1711

The following *‘ōlelo no‘eau* was said by Kalani‘ōpu‘u who believed his warriors were winning against Kahekili.

Ke inu aku la paha a‘u ‘Ālapa i ka wai o Wailuku.

My ‘Ālapa warriors must now be drinking the water of Wailuku.

Said when an unexpected success has turned into a failure. This was a remark made by Kalaniōpu‘u to his wife Kalola and son Kiwala‘ō, in the belief that his selected warriors, the ‘Ālapa, were winning in their battle against Kahekili. Instead they were being destroyed. [Pukui 1983:184]

3.4.5 *‘Ōlelo No‘eau* #1761

The following *‘ōlelo no‘eau* also pertains to Ke Kula o Kama‘oma‘o.

Ke kula o Kama‘oma‘o ka ‘āina huli hana.

The plain of Kama‘oma‘o – that is the place where plenty of work is to be found.

> A taunt to one who talks of looking for work but does not do it. The plain of Kama‘oma‘o, Maui was said to be the haunt of ghosts whose activities were often terrifying. [Pukui 1983:189]

3.4.6 *‘Ōlelo No‘eau* #2300

The following *‘ōlelo no‘eau* describes the poetic term for four *ahupua‘a* on Maui.

> Na wai ‘ehā.
>
> *The four wai*.
>
> A poetic term for these places on Maui: Wailuku, Waiehu, Waihe‘e, Waikapū, each of which has a flowing water (*wai*). [Pukui 1983:251]

3.4.7 *‘Ōlelo No‘eau* #2647

The following *‘ōlelo no‘eau* is a play on the word *luku* (destruction).

> Pili ka hanu o Wailuku.
>
> *Wailuku holds its breath.*
>
> Said of one who is speechless or petrified with either fear or extreme cold. There is a play on *luku* (destruction). Refers to Wailuku, Maui. [Pukui 1983:290]

3.4.8 *‘Ōlelo No‘eau* #2911

The following *‘ōlelo no‘eau* also describes the wind of Waikapū.

> *Waikapū i ka makani kokololio*
>
> Waikapū of the gusty wind.
>
> Refers to Waikapū, Maui [Pukui 1983:319]

3.4.9 *‘Ōlelo No‘eau* #2912

The following *‘ōlelo no‘eau* gives a short description of Wailuku.

> Wailuku i ka malu he kuawa.
>
> *Wailuku in the shelter of the valleys.*
>
> Wailuku, Maui, reposes in the shelter of the clouds and the valley. [Pukui 1983:319]

3.5 *Nā Oli* (Chants)

Oli, according to Mary Kawena Pukui (Pukui 1995:xvi–xvii) are often grouped according to content. Chants often were imbued with *mana* (divine power); such *mana* was made manifest through the use of themes and *kaona*. According to Pukui, chants for the gods (prayers) came first, and chants for the *ali‘i*, “the descendants of the gods,” came second in significance. Chants “concerning the activities of the earth peopled by common humans,” were last in this hierarchy (Pukui 1995:xvi–xvii). Emerson conversely states,

> In its most familiar form the Hawaiians–many of whom [were lyrical masters]–used the oli not only for the songful expression of joy and affection, but as the vehicle of humorous or sarcastic narrative in the entertainment of their comrades.

> The dividing line, then, between the oli and those other weightier forms of the mele, the inoa, the kanikau (threnody), the pule, and that unnamed variety of mele in which the poet dealt with historic or mythologic subjects, is to be found almost wholly in the mood of the singer. [Emerson 1965:254]

While *oli* may vary thematically, subject to the perspective of the *ho‘opa‘a* (chanter), it was undoubtedly a valued art form used to preserve oral histories, genealogies, and traditions, to recall special places and events, and to offer prayers to *akua* and *‘aumākua* (family gods) alike. Perhaps most importantly, as Alameida (1993:26) writes, “chants […] created a mystic beauty […] confirming the special feeling for the environment among Hawaiians: their *one hānau* (birthplace), their *kula iwi* (land of their ancestors).”

3.5.1 Ke‘elikōlani

In an *oli* to Ke‘elikōlani composed by Pipi (Fornander 1919-1920:6:486–487), Wailuku is mentioned in relation to “*malu kuawa*” which translates to “shelter of the valley” (Pukui and Elbert 1986:158). Also mentioned in the *oli* is the I‘a-iki wind.

Kapukoaku, kai kohola ka lani.	The standing coral of the shallow sea, the chief.
Kai luu o ke kai uli hohonu,	Overturning waves of the dark deepsea,
E kihe ai ka ihu, me he naia la.	Diving its crest there as a porpoise
E no ai i ke kapu o lakou,	According to their kapu.
5. Kanahae makawalu nono o ke ‘lii	5. Diminishing numerous noise of the chief.
Kahiki wahie aloaloa,	Kahiki scattering timber
Loaloanui ia ka lani	Exceedingly long is the chief
Kaumakamano, he mano he naha na ‘lii	Kaumakamano, a shark, a shark for chiefs.
Hookahi lau konahala ke kapu;	In one season the kapu passed;
10. Kapu hoi paha Kekelaokalani;	10. May be Kekelaokalani was kapu also.
Ka auhuhu hoi ia e lena ai ke kai,	The poison plant it was, yellowing the seas.
E onioni ai ka ia, make i ka hola;	Stupifying the fish, deadened by the intoxicating plant;
E kapalili ai i ka ili o ke kai,	Fluttering on the surface of the sea,
He kai hoonee; he kai oki apu,	A moving sea; a cross, chasing sea.
15. Kahiwalele kapu kalani, o Keelikolani la.	15. Kahiwalele kapued the chief Keelikolani;

Ku Kauiki pa kohana i ka makani,	Kauiki stands bare in the wind,
Hoohalulu i ke kai o Kaihalulu	Trembling by the sea of Kaihalulu
Ke oi a lau i ka makani,	Greatly increased by the wind,
E kali ana i ka ua Paiolopawa,	Waiting for the piolopawa rain
20. I ka hili kua ia e ke Koholalele,	20. On the stricken back of the Koholalele.
Lele ka hauli o Nalualele i kai	The dark shadow of Nalualele leaps seaward.
Ke komi komi‘a iho la e ka lau awa,	Reducing gradually the lauawa [wind].
Wai kea hana na huli ka amau,	Hana was water-whitened as the fern changed
O na malo o Kama i Kualihau e!	The malos of Kama in Kualihau.
25. ae paha aohe wahahee, aho o koe aku e!	25. Perhaps so, without falsehood, be patient till more follows.
Koe Auhi, pakele aku o Kahikihui,	Excepting Auhi, Kahikinui escaped,
Lilo aku la i na lima o ka naulu,	Taken by the force of the naulu [wind];
Ulu ae la Kalupua e ka makani,	Grown are the flowers scattered by the wind;
Lomi‘a iho la na maka o ke aalii,	Destroyed are the shoots of the aalii,
30. Enaena wela I ka la.	30. Scorced by the sun.
O Lualailua i ke kula la,	Lualailua of the plain,
Welo Waiahualele, lele ke ahi o kula maalo i ka maka;	Waiahualele fluttering, the fire of kula attracts the eye,
Weli oaka, a i uka o Koanaulu e!	Suddenly brightened up above Koanaulu!
Ae paha, oahe wahahee e hookoe aku e!	Yes, perhaps, without falsehood to be set aside.
35. Koe Wailuku i ka malu Kuawa,	35. Except Wailuku in the shade of Kuawa
Ke hoopaio la me Kaiaiki, me ke Kaahaaha.	In the contentions of Kaiaiki with Kaahaaha.
Anu o Niua, hamo ke kilioopu ka o kai,	Niua was cold; the grass waved towards the sea.
Pohu ke kaha maloko o Hupukoa,	Calm was the channel within Hupukoa,
Hoopaaia i ka uwahi a ke kai,	Withheld was the spray of the sea;

40. He uwahi kai no Papale.	40. A sea-spray for Papale
Kailiu ke hoale la, i ike kumu o ka maomao e!	Stirred up by the salt sea seeking [the] roots of green verdure,
Ae paha, aohe wahahee e hookoe aku e!	Perhaps so, without falsehood to be set aside.

[Fornander 1919-1920:6:486–487]

3.6 *Nā Mele* (Songs)

The following section draws from the Hawaiian art of *mele*, poetic song.

> Words and word combinations were studied to see whether they were auspicious or not. There were always two things to consider the literal meaning and the *kaona*, or ‘inner meaning.’ The inner meaning was sometimes so veiled that only the people to whom the chant belonged understood it, and sometimes so obvious that anyone who knew the figurative speech of old Hawai‘i could see it very plainly. There are but two meanings: the literal and the *kaona*, or inner meaning. The literal is like the body and the inner meaning is like the spirit of the poem. [Pukui 1949:247]

> The Hawaiians were lovers of poetry and keen observers of nature. Every phase of nature was noted and expressions of this love and observation woven into poems of praise, of satire, of resentment, of love and of celebration for any occasion that might arise. The ancient poets carefully selected men worthy of carrying on their art. These young men were taught the old *meles* and the technique of fashioning new ones. [Pukui 1949:247]

There are few late nineteenth, twentieth, and twenty-first century *mele* that concern or mention Waikapū Ahupua‘a. These particular *mele* may also be classified as *mele wahi pana* (songs for legendary or historic places). *Mele wahi pana* such as those presented here may or may not be accompanied by *hula* (dance) or *hula wahi pana* (dance for legendary or historic places). As the Hula Preservation Society notes,

> Hula Wahi Pana comprise a large class of dances that honor places of such emotional, spiritual, historical, or cultural significance that chants were composed for them. Only the composers of the chants could know the deepest meanings, as they would be reflections of their feelings and experiences […] Since the subjects of Wahi Pana compositions are extremely varied, their implementation through hula are as well. Coupled with the differences from one hula style and tradition to the next, Hula Wahi Pana can be exceptionally diverse. They can be done sitting or standing, with limited body movement or wide free movement; with or without the use of implements or instruments; with the dancers themselves chanting and/or playing an implement or being accompanied by the *ho‘opa‘a* [drummer and *hula* chanter (memorizer)]. Beyond the particular hula tradition, what ultimately determines the manner in which a Hula Wahi Pana is performed are the specific place involved, why it is significant, the story being shared about it, and its importance in the composer’s view. [Hula Preservation Society 2014]

3.6.1 “Nā Wai ‘Ehā O Maui”

This *mele* was composed by Alice Namakelua in 1940 for the Kamehameha Day Celebration in Honolulu. The four waters of Maui are mentioned in this *mele*.

E Maui nui o Kama	Great Maui of Kama
‘Āina ua kaulana	Famous land
O ka heke i‘o no ‘oe	You are truly superior
Ua lohe ‘ia ‘a puni ka honua	Heard around the earth
‘Āina ‘oe ua wehi	You are the land adorned
Ua ‘ohu e ka roselani	Adorned by the rose
He pua ho‘i nāu e lei	A flower for you to wear as an adornment
A e ha‘aheo mau ai ‘oe	And continue to wear in pride
Kaulana nā wai ‘ehā	Famous are the four waters
He puana he inoa he ha‘ina	A refrain, a name, an answer
Waikapū, Wailuku, Waiehu	Waikapū, Wailuku, Waiehu
A‘o Waihe‘e iho ia wai	Water descends in Waihe‘e
He inoa nēia nou	This is a name chant for you
E Maui nui o Kama	Great Maui of Kama
Ha‘aheo ‘oe i ka roselani	You are cherished with pride because of the rose
E ō mai i kou inoa	Reply to your name

[Huapala n.d.a]

3.6.2 “No Nā Wai ‘Ehā”

This twentieth century *mele* composed by Scott Hai mentions Waikapū and other locations on Hai’s beloved island home of Maui.

I Waikapū ke aloha	My love is at Waikapū
Ka makani Kokololio	The gusty wind named Kokololio
Pili i ka poli nahenahe	Held close to the soft bosom
He ‘īnikiniki mālie	Gently pinching
I Wailuku iho ‘oe	You went down to Wailuku
I ka piko a‘o ‘Īao	To the summit of ‘Īao
Lihilihi o ka pua rose	Petals of the roses
He ‘īnikiniki mālie	Gently pinching
I Waiehu iho ‘oe	You went down to Waiehu
Ka makani Hō‘ehaili	Hō‘ehaili, the wind that pierces the skin
Me ka uhi wai a‘o uka	With the thick fog of the upland
He ‘īnikiniki mālie	Gently pinching

I Waihe‘e kāua	We were at Waihe‘e
Ka makani Kili‘o‘opu	The wind named Kili‘o‘opu
Me ka wai a‘o Eleile	And the water of Eleile
He ‘īnikiniki mālie	Gently pinching
I Lahaina iho ‘oe	You went down to Lahaina
Ka makani Kaua‘ula	Kaua‘ula, the strong mountain wind
Me ka malu ulu a‘o Lele	Amid the shade of the breadfruit trees of Lele
He ‘īnikiniki mālie	Gently pinching
Ha‘ina mai ka puana	Tell the refrain
No na wai ‘ehā	Of the four water
E ho‘i no e pili	Return and let us be together
He ‘īnikiniki mālie	Gently pinching

[Huapala n.d.b]

3.6.3 “Waikapū/‘Iniki Mālie”

This song describes the winds of the four water-lands in Maui: Waikapū, Wailuku, Waiehu, and Waihe‘e. The meaning of each name is described below by Pukui et al. (1974):

> Waikapū, water of the conch. A conch found in a cave in this area could be heard anywhere throughout the Hawaiian Islands. It was stolen by a supernatural dog named Puapualenalena whose name meant yellow tail feathers. Wailuku, water of destruction. Wailuku was the battle site where Kalani‘ōpu‘u’s army was nearly annihilated by Kahekili. Waiehu, meaning water spray and Waihe‘e, meaning slipping water. [Pukui et al. 1974:223]

Waikapū makani Kokololio,	Waikapū wind in gusts,
He makani houhou ‘ili ‘inisinisi (‘inikiniki) mālie.	Skin-stinging wind gently pinching.
Wailuku makani Lawemālie,	Wailuku wind becoming gentle,
He makani houhou ‘ili ‘inisinisi (‘inikiniki) mālie.	Skin-stinging wind gently pinching.
Waiehu makani Hō‘eha‘ili	Waiehu wind paining the skin,
He makani houhou ‘ili ‘inisinisi (‘inikiniki) mālie.	Skin-stinging wind gently pinching
Waihe‘e makani Kili‘o‘opu	Waihe‘e graceful wind,
He makani houhou ‘ili ‘inisinisi (‘inikiniki) mālie.	Skin-stinging wind gently pinching.
Ha‘ina mai ana ka puana,	Tell the refrain,

He makani houhou ‘ili ‘inisinisi (‘inikiniki) mālie.	Skin-stinging wind gently pinching.

[Huapala n.d.c]

The meaning of each name is described below by Pukui et al. (1974):

> Waikapū, water of the conch. A conch found in a cave in this area could be heard anywhere throughout the Hawaiian Islands. It was stolen by a supernatural dog named Puapualenalena whose name meant yellow tail feathers. Wailuku, water of destruction. Wailuku was the battle site where Kalani‘ōpu‘u’s army was nearly annihilated by Kahekili. Waiehu, meaning water spray and Waihe‘e, meaning slipping water. [Pukui et al. 1974:223]

Section 4 Historical Background

4.1 Early Historic Period

The nineteenth century brought to Maui a multitude of commercial, demographic, social, and religious changes encouraged by the burgeoning foreign influx. In 1819, the first whaling ships arrived in Hawaiian waters and Lāhainā Harbor became a primary port of call for provisioning ships in the Islands. Closely following the arrival of the first whaling ships, the first Protestant missionaries and their families arrived in Lāhainā in 1823 (Bingham 1824). One of the first records regarding the number of residents living in the regions of Wailuku and Waikapū comes from population statistics compiled by the early missionaries who settled there. In 1829, Protestant missionaries recorded school attendance figures for the out-stations of Wailuku as consisting of 612 students, with an additional 329 students in Waikapū (Richards 1831; Waikapu Community Association 2018). Just a few years later, the mission census data of 1831-1832 records the population of Waikapū at 733 inhabitants (Schmitt 1973:18).

The use of the northern coastline landing at Kahului by early Europeans proved difficult, for far more records exist of early explorers and merchant ships at anchor off the southern, more protected coastline of Maui than along the exposed, northern coast. An account by the American missionary Rufus Anderson (1865) portrays the obstacle of landing in Wailuku District:

> We were bound to Wailuku, situated near the western side of the isthmus connecting West and east Maui. After crossing the channel the wind increased, and so rough was the sea that our landing seemed not quite safe. Mr. Alexander met us on the shore, but in such a stand-storm that we were obliged to veil our faces. We breasted the gale for a dozen miles, and near Wailuku were wet to the skin by a storm of rain. [Anderson 1865:176]

A landing on the leeward coast of the central isthmus meant the people and commerce that reached European ships came through the trails that transect the Plains of Kama‘oma‘o.

During the early and mid-1800s, the Hawaiian demography was affected by two dramatic factors: radical depopulation resulting from Western disease and nucleation around developing port towns. Traditional Hawaiian populations lived in a largely dispersed settlement pattern.

Although there were royal centers and areas of more concentrated population, these areas never came close to rivaling the populations of the historic port towns that developed on Hawai‘i’s shorelines during the 1800s. Foreign commercialism initially came to Waikapū in the form of sugar processing and coffee production (Wyllie 1854). A man by the name of Antone (Anthony) Catalena was running a cane syrup factory at Waikapū ca. 1823 and is credited with being the founder of the industry in Hawai‘i (Thrum 1874) while Antonio Silva set up a plantation and a mill in Waikapū ca. 1828 (Thurston 1906). At about the same time Silva was also engaged in coffee agriculture with trees that reportedly produced above 20 pounds annually (Wyllie 1854). The Reverend Hiram Bingham (1824) wrote the following description about an excursion he took with the Reverend William Richards, in a letter sent to the American Board of Commissioners of Foreign Missions (ABCFM) in Boston, dated 30 August 1823.

> The principal plantation in this district, called Waikapu (Wy-kah-poo) lies about midway between the two bays, watered by a small stream, descending in a south-eastern direction from the lofty mountains, that lie between Lahinah [*sic*] and that place. At this plantation which belongs to Cox [Kahekili Ke‘eaumoku] and Kaahoomanoo [Ka‘ahumanu], there are about 100 houses, six head of neat cattle, and eight horses. This is the most important, and almost the only inland settlement that I have seen in the islands. Its situation is very pleasant. You stand upon the bank of this little rivulet in the midst of the bananas [*mai‘a*; *Musa paradisiaca*], sugarcane, and taro; and the plains that lie upon the two bays spread upon your right and left, containing perhaps 100 or 150 square miles. Before you, at the distance of 15. [Bingham 1824:111]

These early commercial developments along with the establishment of the branch station of the ABCFM at Wailuku in November 1831 (Edwards 1832:403) would alter the traditional lifeways of Nā Wai ‘Ehā and Waikapū in a manner best described by Kuykendall (1938), noting that from 1830 to 1854:

> The commercial development during this period, by magnifying the importance of a few ports, gave momentum and direction to a townward drift of population; the population of the kingdom as a whole was steadily going down, but the population of Honolulu, Lahaina and Hilo was growing. [Kuykendall 1938:313]

Following this trend in the commercialization of agricultural pursuits across all islands, the remnants of indigenous agriculture either fell into disrepair or were absorbed by the developing plantations. Vestiges of extensive *lo‘i* cultivation, which spread to the north and south from the base of Waikapū to a considerable distance below the valley, remained through the 1930s. Although most of the *lo‘i* terraces in Waikapū had been plowed under by the expansion of commercial sugarcane cultivation, a few of the ancient terraces were preserved in plantation camps and under house sites as well as reused as garden sites, among which, and in addition to Hawaiian wet-taro, included Japanese dry-taro, truck gardens, and lotus for their seeds (Figure 6) (Handy et al. 1991:497).

4.2 The Māhele and the Kuleana Act

The Organic Acts of 1845 and 1846 initiated the process of the Māhele—the division of Hawaiian lands—that introduced private property into Hawaiian society. On 27 January 1848, the Crown and the *ali‘i* began to receive their land titles as *konohiki* (overseer of an *ahupua‘a*) awards. For *konohiki* lands, a claim first had to be approved by the Land Commissioners. Upon confirmation of the claim, a certificate was awarded to the claimant. This certificate was called a Land Commission Award (LCA), which confirmed the claim of an individual for a parcel. The awardee could then obtain a Royal Patent (RP) from the Minister of the Interior, which indicated the government’s interest in the land had been settled by the payment of a commutation fee. Commutation means “an exchange, or replacement.” The commutation fee was usually set at a maximum of one-third of the value of the unimproved land. The fee could be settled by the exchange of cash but was usually settled by the return of one-third of the lands (or cumulative value of the lands) originally awarded to the claimant (Chinen 1958:13).

Figure 6. Early photograph of Waikapū Valley with *lo‘i*, *‘auwai*, and dispersed homes (Waikapu Community Association 2018)

On 19 October 1849, the Hawaiian Privy Council adopted resolutions to protect the rights of Native tenants, the *maka‘āinana* (common people/tenants of the land). The Kuleana Act of 1850 confirmed these rights. Under this act, the claimant was required to produce two witnesses who knew the claimant and the boundaries of the land, knew that the claimant had lived on the land for a minimum of two years, and knew that no one had challenged the claim. The land also had to be surveyed. Native tenants or naturalized foreigners who could prove occupancy on the parcels before 1845 could be awarded lands they occupied or that they cultivated as *kuleana* awards. No commutation fee was necessary to apply for a Royal Patent for a *kuleana* award, as the commutation fee had presumably already been paid by the *ali‘i*/*konohiki* who had been awarded the entire *ahupua‘a*, or an *‘ili* (a land division within an *ahupua‘a*) in which the native tenant claimed his own small parcels (Chinen 1958:29–30).

During the Māhele, the lands surrounding Waikapū Commons were sold by the Department of Education in ten parcels, each amounting to more than 1,317 acres, and had Royal Patents issued for the sales in 1854. Later, all ten of these Royal Patents were surrendered and cancelled, and the land was quit-claimed back to the Board of Education in August 1860. In 1875 the Board of Education sold at auction the “Land known as the ahupuaa of Waikapu, saving grants hitherto made within said ahupuaa, or sales by the board of education” to Mr. Henry Cornwell, lands extending out from Waikapū Valley to the northwestern boundary of Pulehunui Ahupua‘a (*Pacific Commercial Advertiser* 1879:5). Cornwell acquired the lands in fee-simple under Royal Patent No. 3152. The study area is situated entirely within this land grant (Figure 7 and Figure 8). No *kuleana* awards were recorded near the study area. The lands purchased by Cornwell were added to the holdings of the Waikapu Sugar Plantation, originally started by Henry Cornwell and James Louzada on Grant 2951 to the north, before the plantation was sold in 1876.

4.3 Mid- to Late 1800s

A common crop on nearly all major Hawaiian Islands was sugarcane. With the passage of Hawaiian lands into the western model of privatization, coupled with the decline of the indigenous population, the wet valleys on Nā Wai ‘Ehā began to shift from subsistence farming to plantation-style sugarcane cultivation. The fertility of the river valleys of Nā Wai ‘Ehā was readily observed by visitors of the period. While traveling from Mā‘alaea to Waikapū, a late nineteenth century observer describes the following scenic views:

> It took us about an hour to drive from Maalea [*sic*] to Waikapu and we began to see some indications of the beauty which the inhabitants of Maui ascribe to their beloved isle.
>
> The mountain mass that seemed shapeless is rent by a series of deep gorges—each, we were told, a scene of bewildering beauty, both in rock-scenery and foliage. [Cummings 1881]

In general, it appears the most agriculturally fertile lands of Waikapū Ahupua‘a did not extend beyond the alluvial sediments of the stream valley as the lower elevations leading into the central isthmus of Maui are dominated by windswept Pleistocene sand dune deposits (Figure 9) (Foote et al. 1972:48, 115).

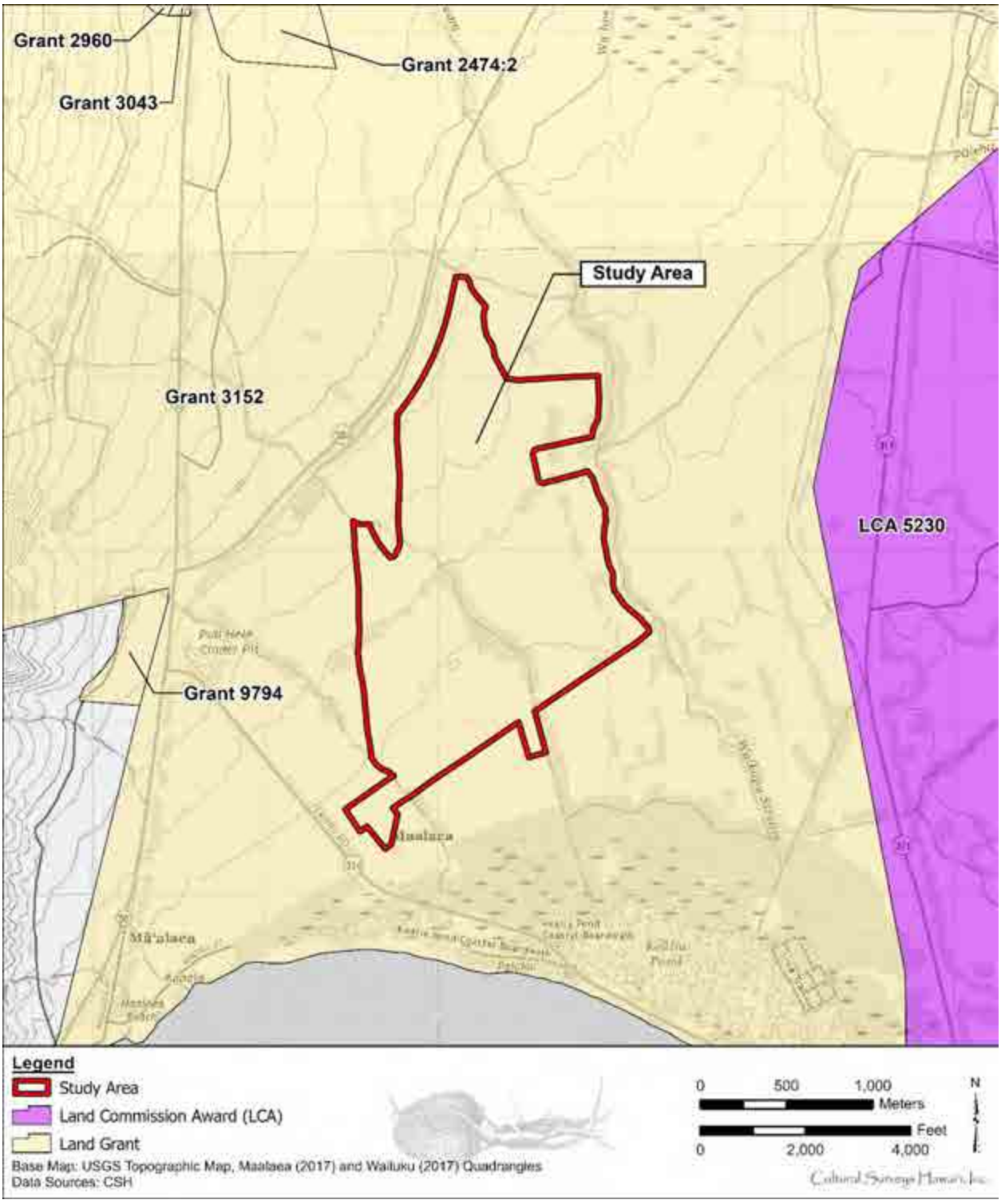


Figure 7. Portions of the 1996 Maalaea and 1997 Wailuku USGS 7.5-minute topographic quadrangles showing the current study area in relation to Land Grant 3152

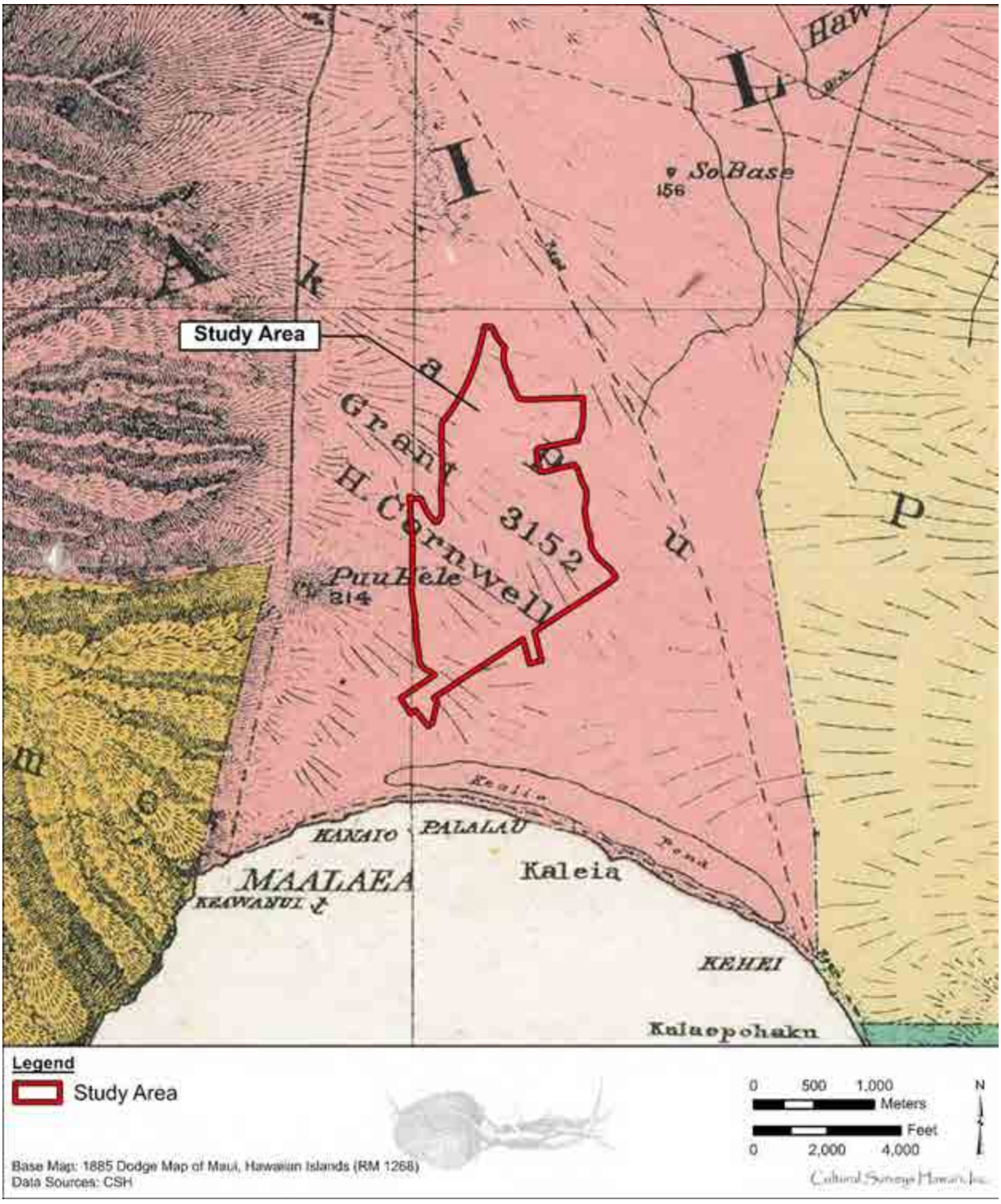


Figure 8. Portion of the Dodge (1885) map of Maui (RM 1268) showing the location of the study area within Land Grant 3152

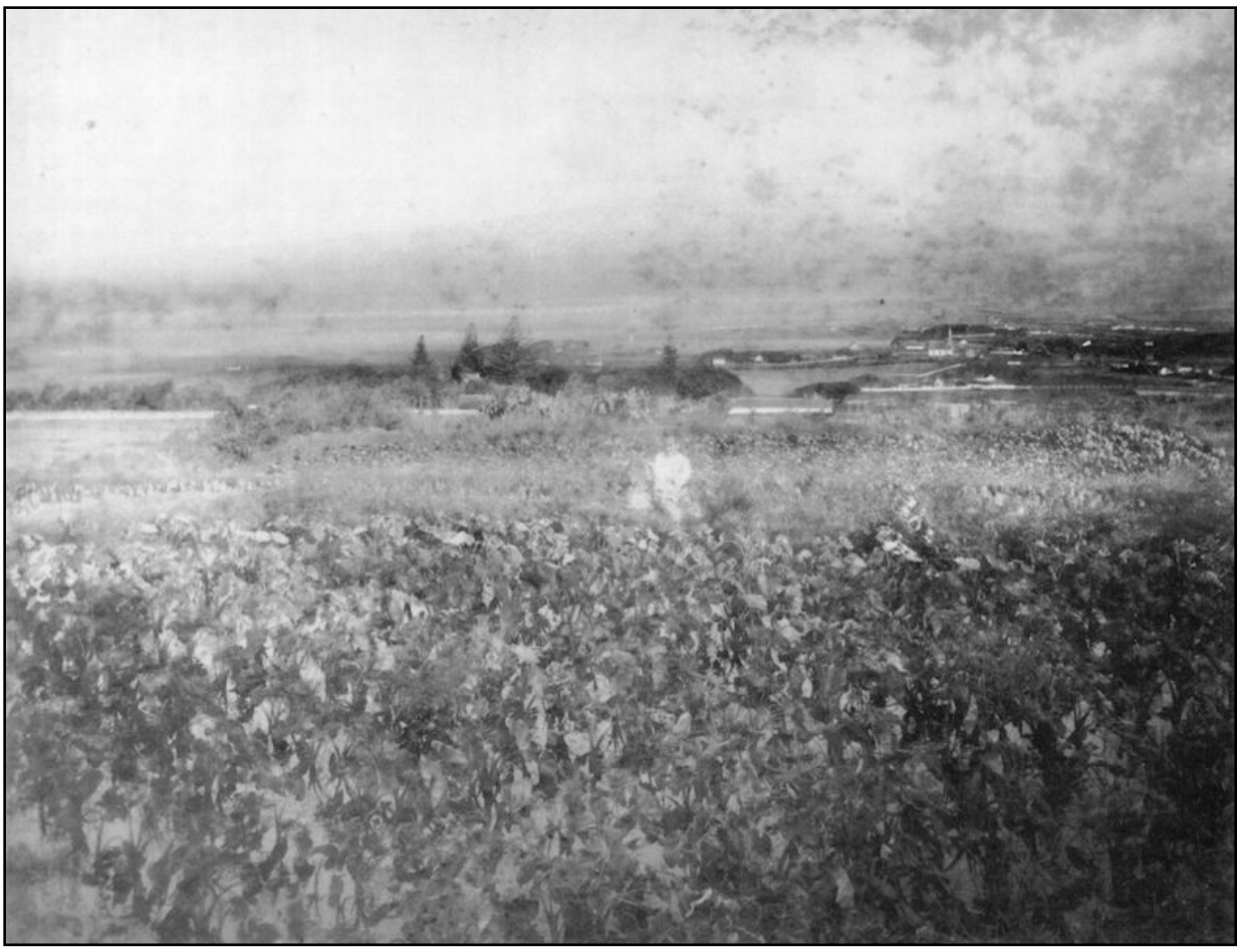


Figure 9. Historic photograph of the Plains of Kama‘oma‘o (background) as viewed from the vegetated alluvial slopes of Waikapū Valley (Waikapu Community Association 2018)

4.3.1 Waikapū Congregational Church

Prior to the surge in commercial sugarcane cultivation, Waikapū was inhabited dominantly by Hawaiian homes with nearby taro patches feeding from the waters of Waikapū Valley. The small community residing here established the Waikapū Congregational Church in 1838 as a home-based Christian service, sometimes utilizing the facilities of the distant Ka‘ahumanu Church in Wailuku. In 1868, the community was able to erect and dedicate a permanent structure (Figure 10). Residents moving to the region in 1908 recalled that “we used to have ‘hoikes’ (rally days) there and folk from all Central Maui used to attend.” According to residents, both the Wednesday night prayer services and Sunday all-day services would fill the church building to capacity (Head 1960).

During World War II, Waikapū Congregational Church was turned over to the military and used as a surgical hospital. The church building was used as a ward with an additional “nurses quarters” built off to the side of the main structure. It was during this period that the church had its steeple removed for being too clear a target for potential marauding enemy submarine gunners (Figure 11). Although the steeple was re-erected after the war, it continuously leaked and was again removed from the building. As sugarcane cultivation began to dominate the region in the early to mid-twentieth century, residential dwellings dwindled, as did attendees of the Waikapū Congregational Church. As full-time pastors became unnecessary, the church members voted to merge with the Kahului Church, and the Waikapū Congregational Church was abandoned to the sugarcane fields that surround it (Head 1960).

4.3.2 Development of Commercial Sugar in Waikapū

Henry Cornwell arrived on Maui from New York and started the Waikapu Sugar Company with James Louzada (his brother-in-law) in 1864. The two partners constructed a steam-powered sugar mill situated on a 17-acre parcel that had been part of Land Grant 2951; land originally purchased by Henry Cornwell and J. Louzada in Waikapū (Wilcox 1996:61) (Figure 12).

In 1878, Claus Spreckels bought an undivided interest in 12,000 acres of the Waikapū Commons from W.H. Cornwell and leased an additional 24,000 acres of adjacent Wailuku Commons crown lands from the government (Wilcox 1996:61). These lands would form a large portion of Hawaiian Commercial and Sugar Company (Figure 13). The economic boom resulting from the passage of the Reciprocity Treaty in 1876 encouraged sugar baron Spreckels and other Hawaiian sugar planters to invest heavily in capital improvements such as irrigation systems, mills, and railroads. The reciprocity agreement with the United States brought down the heavy cost of high tariffs on sugar. In 1876, Henry Cornwell retired and the remaining plantation lands were sold to the new partners Colonel William H. Cornwell (Figure 14) and Colonel G.W. Macfarlane (*Honolulu Advertiser* 1903:8). Henry Cornwell, originally born on Long Island in 1815, died in Waikapū in 1886 and was buried at Nu‘uanu Valley Cemetery on O‘ahu (*Honolulu Advertiser* 1886:3).

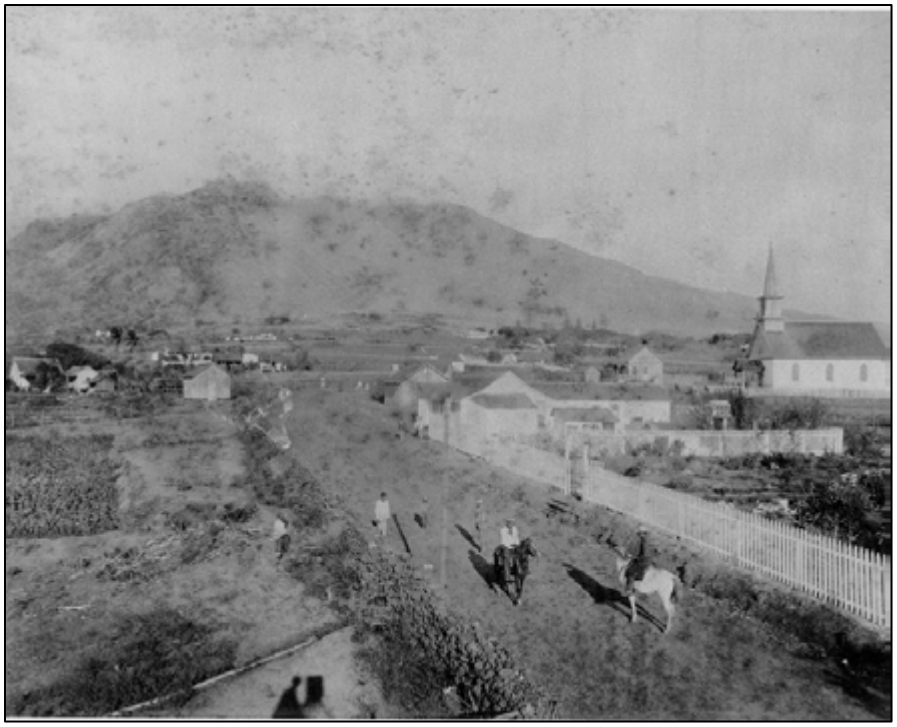


Figure 10. Historic photograph of Waikapū Congregational Church, Waiko Road, and the surrounding community (Waikapu Community Association 2018)

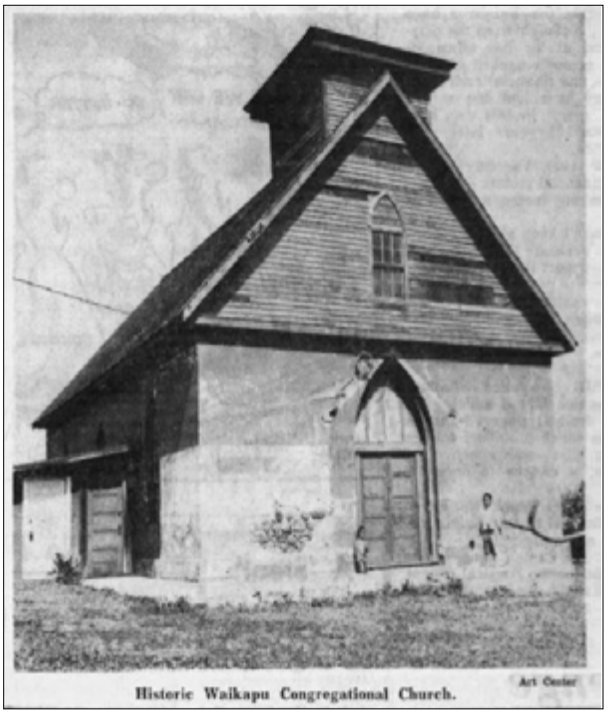


Figure 11. Waikapū Congregational Church after having its steeple removed during World War II (Waikapu Community Association 2018)

Figure 12. Waikapu Sugar Company mill, ca. 1890 (Waikapu Community Association 2018)

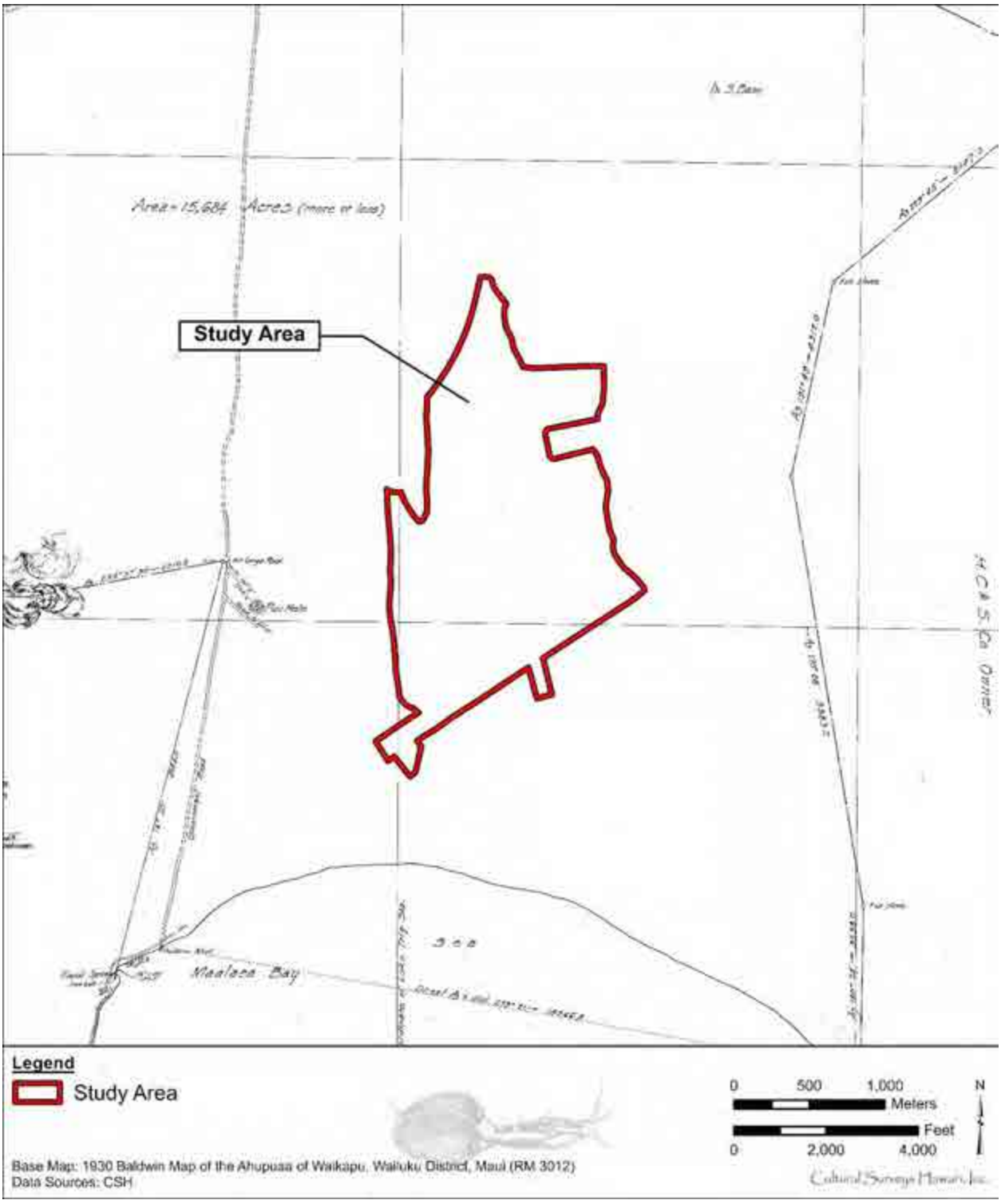


Figure 13. Baldwin (1930) map showing the current study area within the lands of Waikapu Sugar Company and the boundary adjacent to HC&S lands to the north (CSH Database)

Figure 14. Colonel William H. Cornwell in the garb of the Hawaiian Royal Court (Unknown 1893)

During his time at the head of the Waikapū plantation, Col. William H. Cornwell nourished a healthy relationship with Hawaiian royalty. As a close friend of King Kalākaua and Queen Regent Lili‘uokalani, Col. Cornwell hosted events for the monarchs on his Maui properties, including celebrations for Kalākaua’s birthday that entailed festivities and horse races (*Evening Bulletin* 1888:3) (Figure 15). Kalākaua’s annual celebrations on November 16 would be remembered well into the early twentieth century for the excitement of the horse races and the occasional after-race polo match (*Honolulu Advertiser* 1916). Col. Cornwell also was appointed a member of the king’s staff in the Revolution of 1887, elected to a four-year term as a member in the House of Nobles in 1890, and served a very short stint as the Minister of Finance in the cabinet of Queen Regent Lili‘uokalani (*Honolulu Advertiser* 1903:8).

Most of the Waikapū Commons and across the isthmus was covered with sugarcane by the mid-nineteenth century. Waikapu Sugar Company operated from 1862 to 1894, when it was purchased and incorporated into the holdings of Wailuku Sugar Company (Kaukali and Subica 2010).

4.3.3 Organization of the Wailuku Sugar Company

A Chinese planter, Hungtai, is reputed to have operated the first sugar mill at Wailuku in 1823. As early as 1840, the first sugar venture organized by the Kingdom of Hawai‘i was started by Kamehameha III (Kauikeaouli), at Wailuku (Moffat and Fitzpatrick 2004:54). The king’s Wailuku plantation and mill were described by the Protestant missionary, Richard Armstrong, in these terms:

> The King has given out small lots of land, from one to two acres, to individuals for the cultivation of cane. When the cane is ripe, the king finds all the apparatus for manufacturing and when manufactured takes the half. Of his half, one fifth is regarded as the tax due to the aupuni (Hawaii Department of Survey) & the remaining four fifths is his compensation for the manufacture. These cane cultivators are released from all other demands of every description on the part of the chiefs [Hawaiian Mission Children’s Society Wailuku Station Report 1839 in MacLennan 1997:33]

The modern plantation framework for the Wailuku Sugar Company began in the 1850s by the Protestant missionary Edward Bailey and one of his sons. Their early water-run mill was eventually merged with sugar cultivation performed by Bal and Adams. These pioneer sugar partners later began the Wailuku Sugar Company. In 1862, the partners of the Wailuku Sugar Company grew to include James Robinson & Company, Thomas Cummins, and J. Fuller (Wilcox 1996:122). In 1863, Charles Brewer became a major partner in the operation of the Wailuku Sugar Company. By 1867, the Wailuku Sugar Company had 2,250 acres planted in cane. The Wailuku Sugar Company incorporated in 1875 and began to become profitable. In 1877, the Baileys were bought out (Nellist 1925:70).

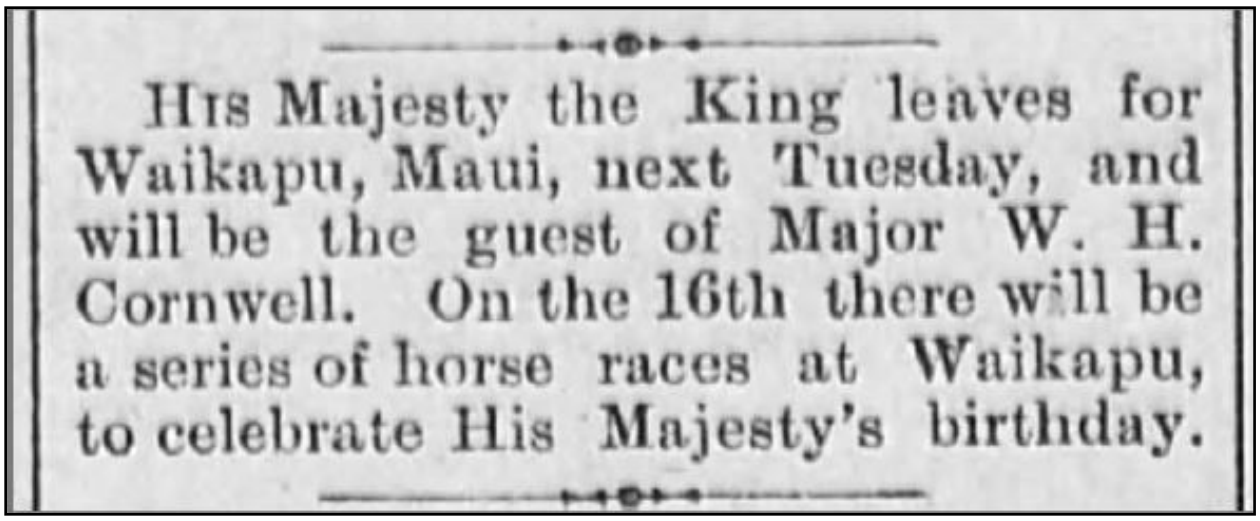

His Majesty the King leaves for Waikapu, Maui, next Tuesday, and will be the guest of Major W. H. Cornwell. On the 16th there will be a series of horse races at Waikapu, to celebrate His Majesty's birthday.

Figure 15. Newspaper announcement for the arrival of Kalākaua's visit to W.H. Cornwell on Maui for the King's birthday (*Evening Bulletin* 1888)

4.3.4 The Waikapu Division of the Wailuku Sugar Company

The Waikapū sugar lands became a part of the Wailuku Sugar Company in 1894. Beginning in 1880, the Waikapū plantation lands began to be merged with those of the Wailuku and Waihe‘e plantations. During the 1880s, F.L. Hoogs was named the head overseer of the Waikapu Division of the Wailuku Sugar Company. In 1887, American sugar growers revolted against the Hawaiian Monarchy and demanded a more liberal Constitution, which was granted, under duress, by Kalākaua. In 1905, a new sugar mill was constructed in Wailuku to accommodate the sugar brought in from the new outlying plantations, including Waikapū (Kaukali and Subica 2010:98).

The economic progress of the Wailuku Sugar Company required the importation of foreign labor. The increase in the labor population at the plantations required larger laborer camps. By the 1890s, a network of plantation housing camps had been established at the Waikapu Division of the Wailuku Sugar Company. These included Hopoi Camp, located at the Hopoi Reservoir, upland of the Waiale Reservoir; Waikapu Camp, located downslope of the Palolo Ditch and the south side Waikapū Ditch, on the Waikapū Stream; Hyashi Camp, located just west of Waikapu Camp, toward the Pu‘u Hele cinder cone; Kimura Camp, located further west from Hyashi Camp; Pu‘u Hele Camp, located at the base of a cinder cone downslope of the Pohakea Gulch, where today the North Kīhei Road meets the Honoapi‘ilani Highway and the Pu‘u Hele Cemetery. In the 1880s, immigrants from South America began to settle in Waikapū. They worked the sugar fields and brought their love of horseracing to the plantation culture of Maui (Kaukali and Subica 2010:98).

The traditional *konohiki* system of water division was evident at the Waikapu Division of the Wailuku Sugar Company. In an 1896 lawsuit (Cornwell v. Wailuku Sugar Company), testimony was entered regarding the destruction of traditional *kuāuna* (embankments of taro patches). This testimony established that, along with the growing of cane in the region, the traditional farming of taro had continued based on the customary rights of landowners under the old Hawaiian tenure. The Wailuku Sugar Company brought the action to stop traditional landowners from diverting irrigation water for raising taro (Hawaii Supreme Court 1896).

4.3.5 Hawaiian Commercial and Sugar in the Central Isthmus

The success of sugar grown in the region resulted in a second large plantation, in Waihe‘e, producing over 757 tons of sugar and 45,000 gallons of molasses in 1865. The Waihe‘e mill manager was Samuel T. Alexander, and the mill’s head foreman was Henry P. Baldwin, both of whom would resign in the late 1860s to establish a small sugar enterprise of their own in upper Pā‘ia (Gilmore 1936).

In 1869, on land located directly west of Pā‘ia, a small *kuleana* of 11.94 acres was purchased by S.T. Alexander and his business partner H.P. Baldwin, both descended from Lāhainā missionary families, who were eager to apply their agricultural experience to their own plantation. This initial land purchase was the beginning of the development of the entire central isthmus for sugar cultivation. In rapid succession, Alexander & Baldwin expanded its operations by purchasing other small *kuleana*, setting up a mill, and attracting more investment capital (Dean 1950).

In 1876, a treaty signed between the Kingdom of Hawai‘i and the United States, the Reciprocity Treaty, opened larger and more lucrative markets for Hawaiian sugar. Plans were immediately drawn up by Alexander & Baldwin to finance a ditch to bring water from the Hāna region of East

Maui to the arid plains of Pā‘ia. The Kingdom of Hawai‘i issued a lease for the construction right-of-way, and in 1879, the successful venture delivered millions of gallons of water to the central isthmus via the Hamakua Ditch (Wilcox 1996).

Competition was supplied by Claus Spreckels who engineered a similar irrigation ditch from Honomanū in East Maui to lands located just inland of Kahului, where the Spreckelsville Mill and plantation camp were built. Spreckels invested three million dollars in the HC&S and competed for sugar lands, wharf and warehouse space, railway lines, and shipping schedules with Alexander & Baldwin (Dorrance and Morgan 2000).

In 1882, Spreckels, following his success in building the Honomanu Ditch linking East Maui water sources with his sugar fields in the central isthmus, further capitalized on that success to engineer the Waihe‘e Ditch (also named the Spreckels Ditch) in West Maui. The 15-mile-long ditch started at the 435-ft elevation of Waihe‘e Stream and carried 60 million gallons of water (per 24-hour day) to the Wai‘ale Reservoir at the 214-ft elevation of Wailuku. Spreckels became the first plantation owner to irrigate his fields with water from both Haleakalā and the West Maui mountains (Wilcox 1996). By 1888, the Spreckels plantation covered 28,000 acres, making it the largest sugar plantation in the world. Financial pressures forced Spreckels to give up control of HC&S to Alexander & Baldwin in 1898 after a long and fierce battle.

In 1899, HC&S determined that cultivating the Pu‘unēnē plains required far more water than the original Hamakua Ditch could provide. The Lowrie Ditch project, completed in 1900, was undertaken to provide an additional source of water to the central Maui plains. The ditch began at the Pāpa‘a‘ea Reservoir, at 1,000 ft elevation, and maintained a 4-ft drop per mile following the ditch’s initial plunge from the Kailua reservoir. Steep mountain gulches were traversed using the force of the constant weight of water flowing in a series of siphons. The Halehaku Gulch, at 250 ft deep, and the Māliko Gulch, at over 350 ft deep, were both crossed by giant siphons fabricated of three-eighths-inch iron and set in place by Japanese laborers (Thrum 1900).

4.4 1900s

In 1912, HC&S began to modernize the existing plantation camps. Between a huge influx of immigrant workers in 1909, and the burning of village areas of Pā‘ia and Kahului to control smallpox in 1910, changes to the camp system were in full swing. The plantation workforce continued to expand until 1917, when the U.S. declared war on Germany, and the accompanying draft seriously depleted the labor pool. By 1919, postwar requirements for sugar had driven the price to an all-time high of $471.40 per ton (Burns 1991). The post-World War I years saw the sugar industry, and companies like HC&S, add electricity to some villages. HC&S completed the Waikapū well (Well 7) in 1926, one of the largest deep wells in the world. The additional capacity of 40 million gallons per day (mgd) provided by this well was instrumental in planning more sugar and industry within Maui’s central plains (Stearns and MacDonald 1942:216).

On 11 November 1929, Inter-Island Airways, Ltd. began flying regularly scheduled flights between the Hawaiian Islands. Amphibious eight-passenger Sikorsky S-38 aircraft landed at Mā‘alaea Bay, taxied up a concrete ramp, and delivered passengers to waiting automobiles for the trip through Waikapū to Wailuku, and points beyond (Saito 2009). By 1936, the airline had purchased three new 16-passenger Sikorsky S-43 aircraft to supplement their four S-38s (Kennedy 1937). With air travel between islands increasing, plans were put underway to build a land-based

air strip at Pu‘unēnē in neighboring Pūlehu Nui Ahupua‘a to the southeast in lieu of the smaller airport located at Mā‘alaea Harbor.

In addition to sugarcane cultivation, much of the lands of Waikapū in the mid-twentieth century were also tied up in pastural endeavors. In 1952, over 7,000 acres of land along the base of the West Maui Mountains, spanning from Waikapū to Ukumehame, were sold at auction in two leases (15- to 21-year lease terms) for $16,582. These land tracts served as hog and cattle pasturage (*Honolulu Star-Bulletin* 1952:5).

4.5 Contemporary Land Use

Throughout the twentieth century, the lands adjacent to the current study area remained under commercial sugarcane cultivation, and the current study area lands remained relatively unchanged until the construction of the Mā‘alaea power plant facilities in the 1970s (Figure 16 through Figure 21). In the latter half of the 1900s, residential tracts were constructed along both the Kuihelani Highway and Honoapi‘ilani Highway corridors that traverse Waikapū. Complementing the residential lots, to a lesser degree, are light industrial parcels, grocery stores, and business developments on the outskirts of the sugar fields of Waikapū.

The present alignment of North Kuihelani Highway (State Route 380) extends along the northwestern boundary of the study area and several small unimproved cane-haul roads extend into the study area. The study area resides in fallow sugarcane fields, with only sporadic buildings associated with the sugarcane operations scattered throughout the tall cane and invasive overgrowth, including dense thickets of *kiawe* and *koa haole*. The sandy sediments characteristic of the area known throughout Waikapū are still evident in the surface soil of the roads surrounding the inactive sugarcane fields.

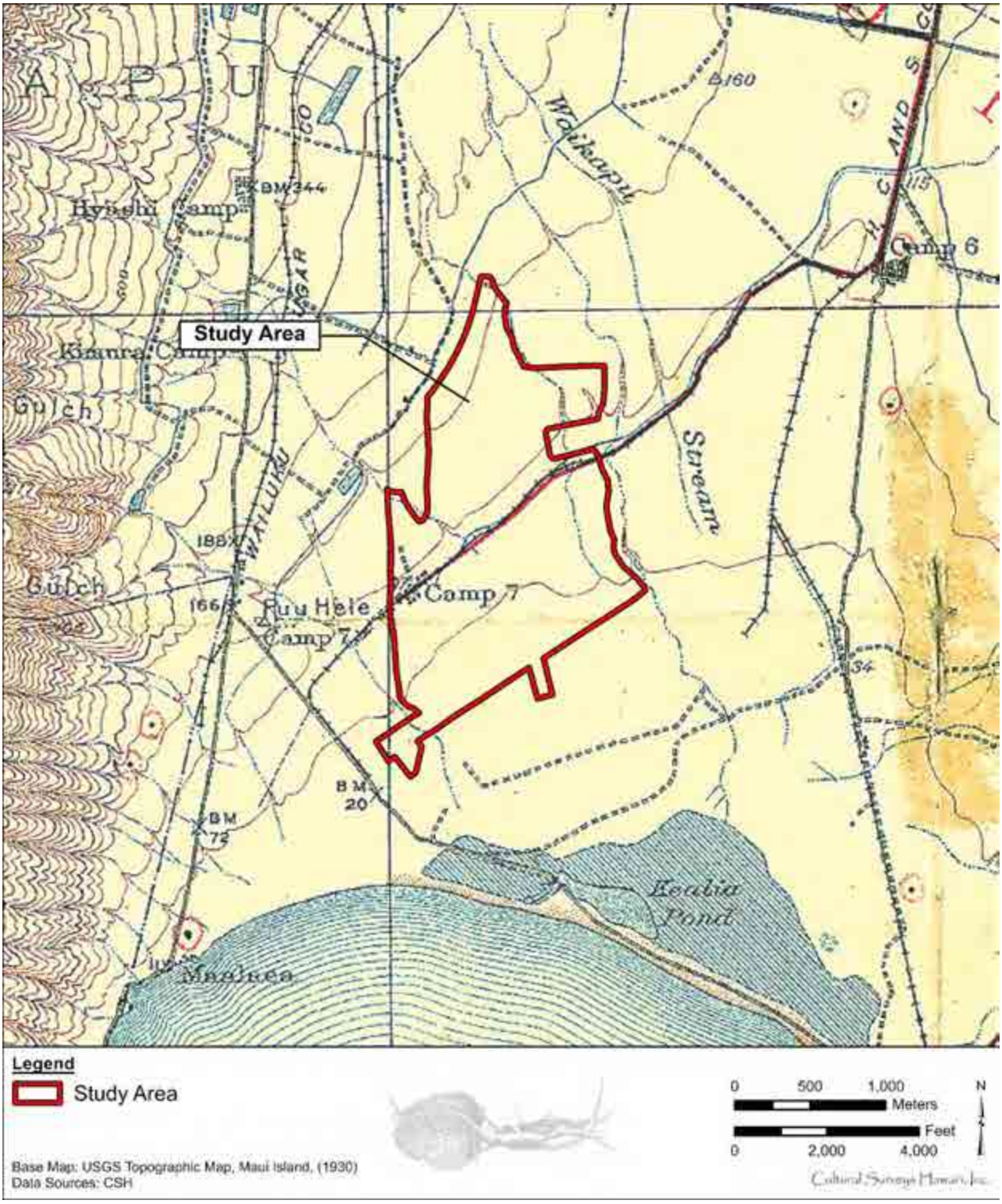


Figure 16. Portion of the 1930 Maui Island USGS topographic quadrangle showing plantation camps and plantation railroads around the study area vicinity

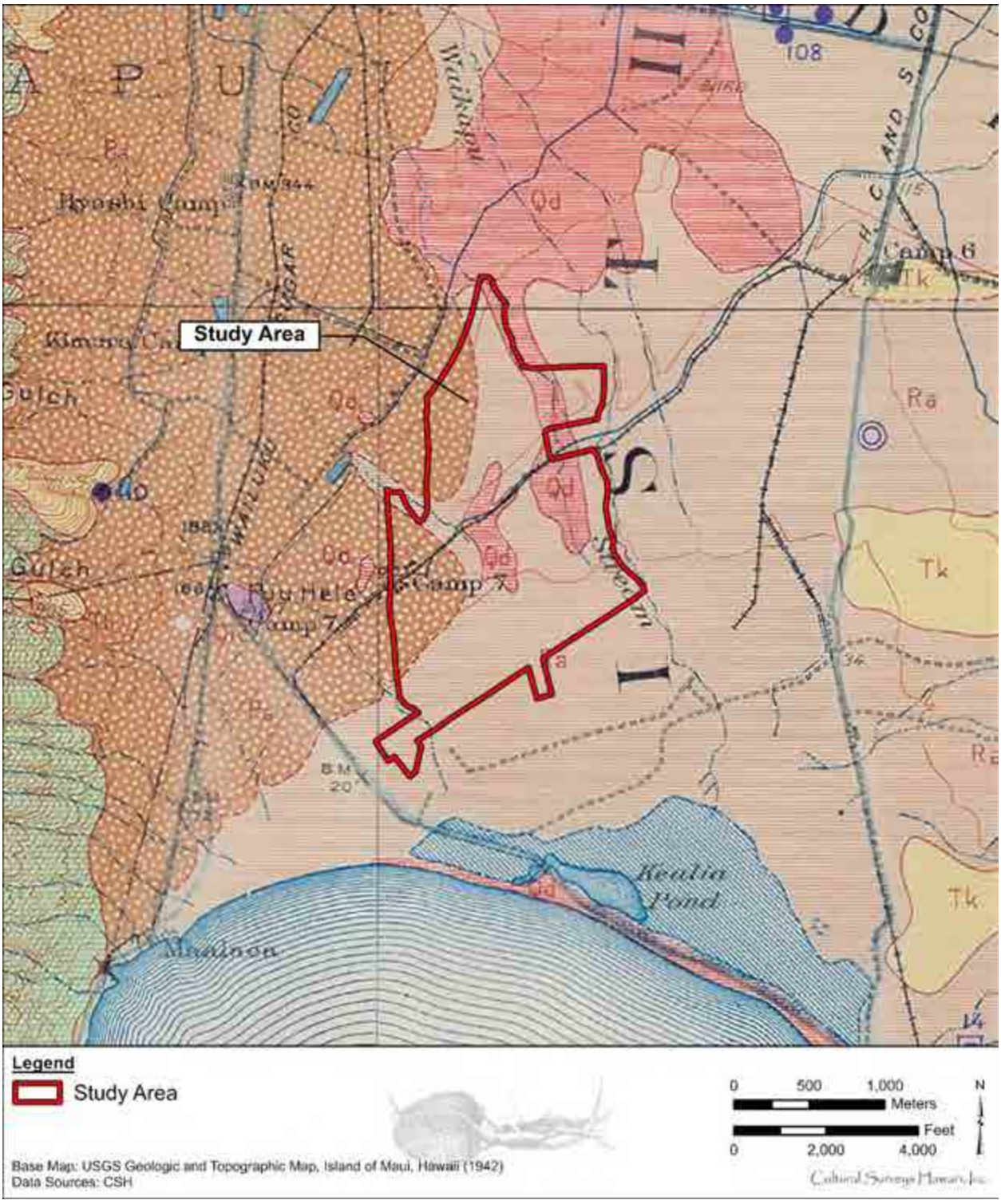


Figure 17. Portion of the 1942 Maui Island USGS map showing calcareous sand dunes (red), unconsolidated deposits of younger alluvium (tan), consolidated earthy deposits of older alluvium (brown) and a Pleistocene great unconformity of Kula basaltic andesites (yellow with Tk)

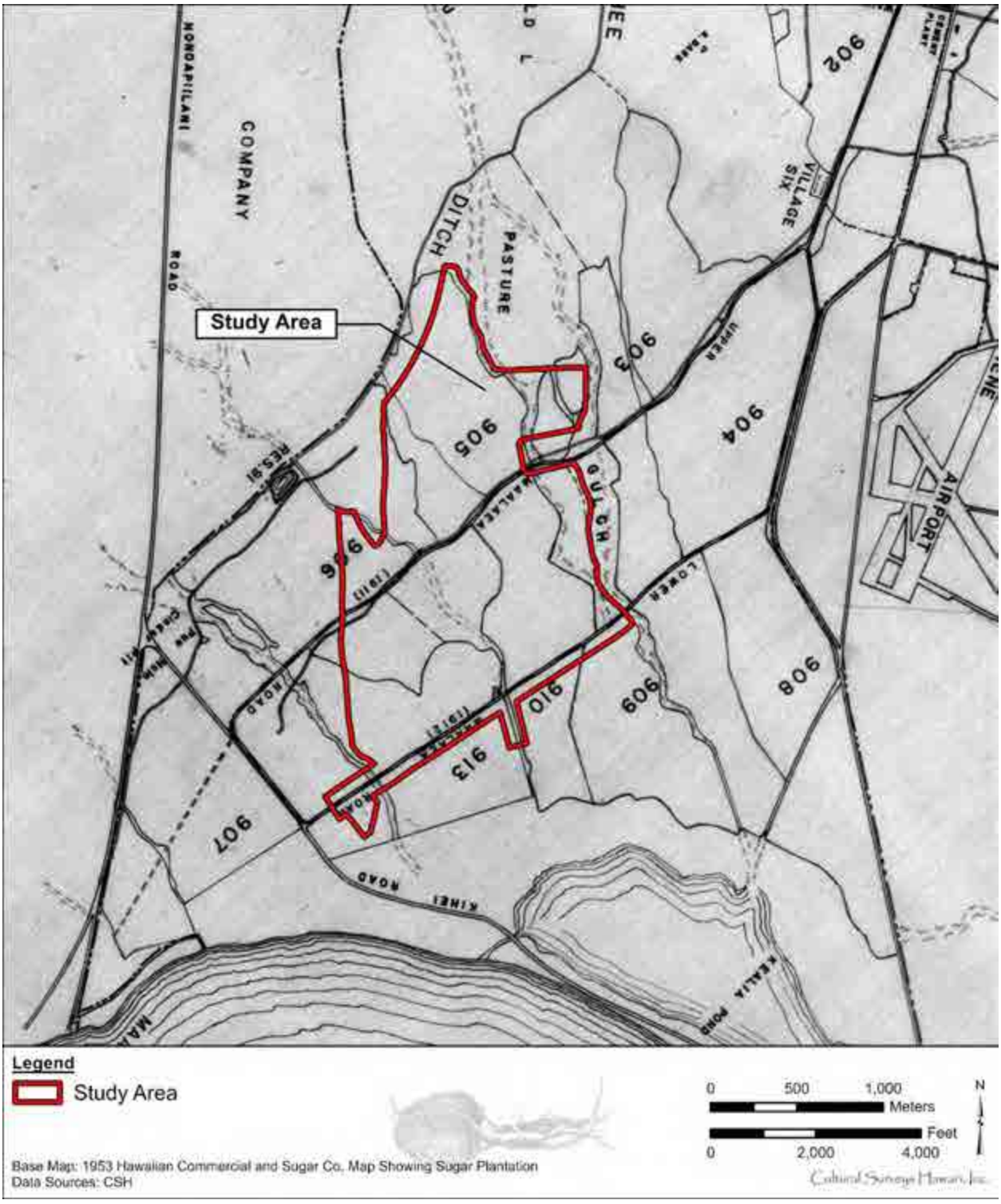


Figure 18. HC&S Company (1953) map showing the sugar plantation fields, Waikapu Pasture, Waikapu Road, and Waihe‘e Ditch

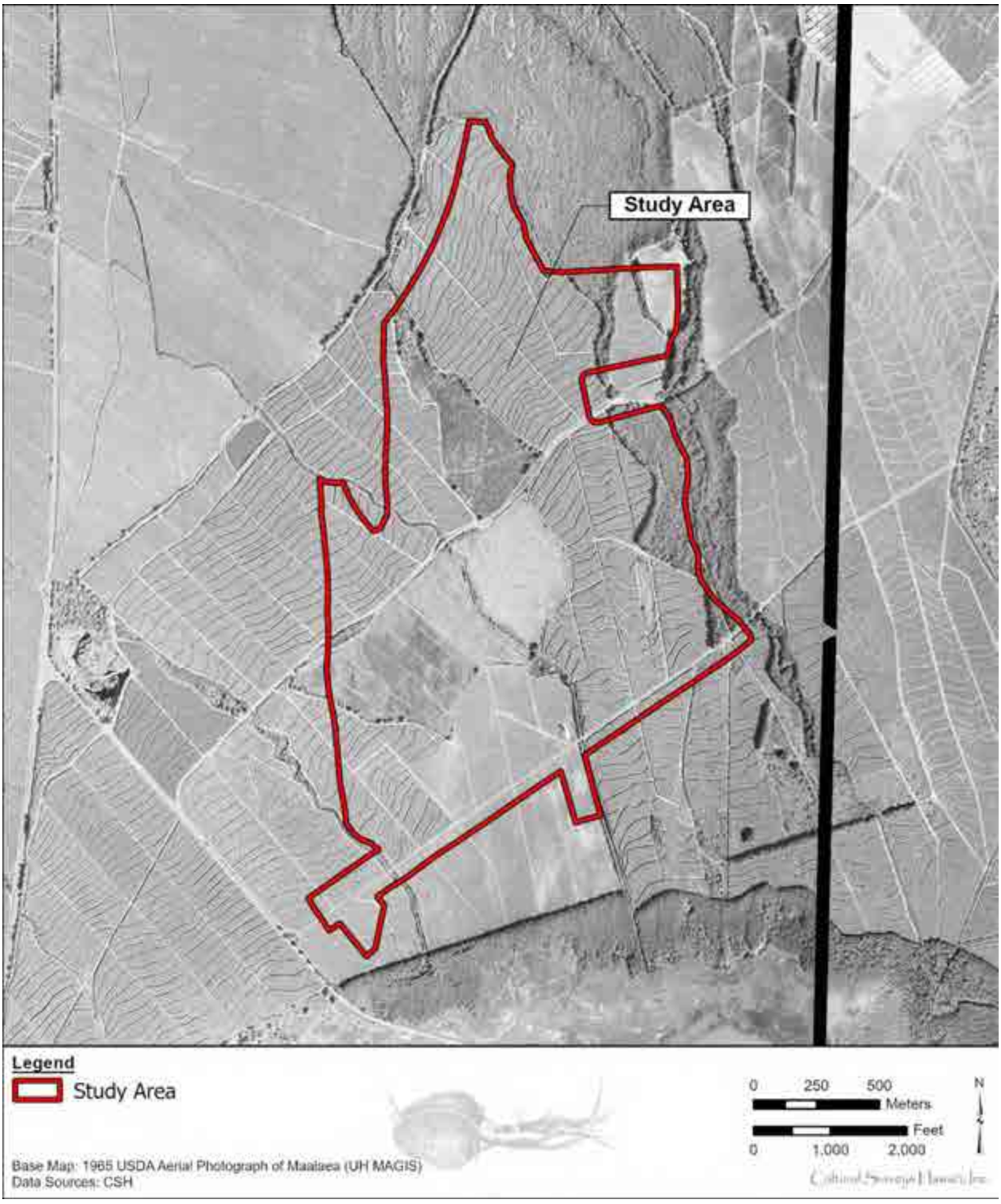


Figure 19. Portion of a USDA (1965) aerial image showing the study area and surrounding development

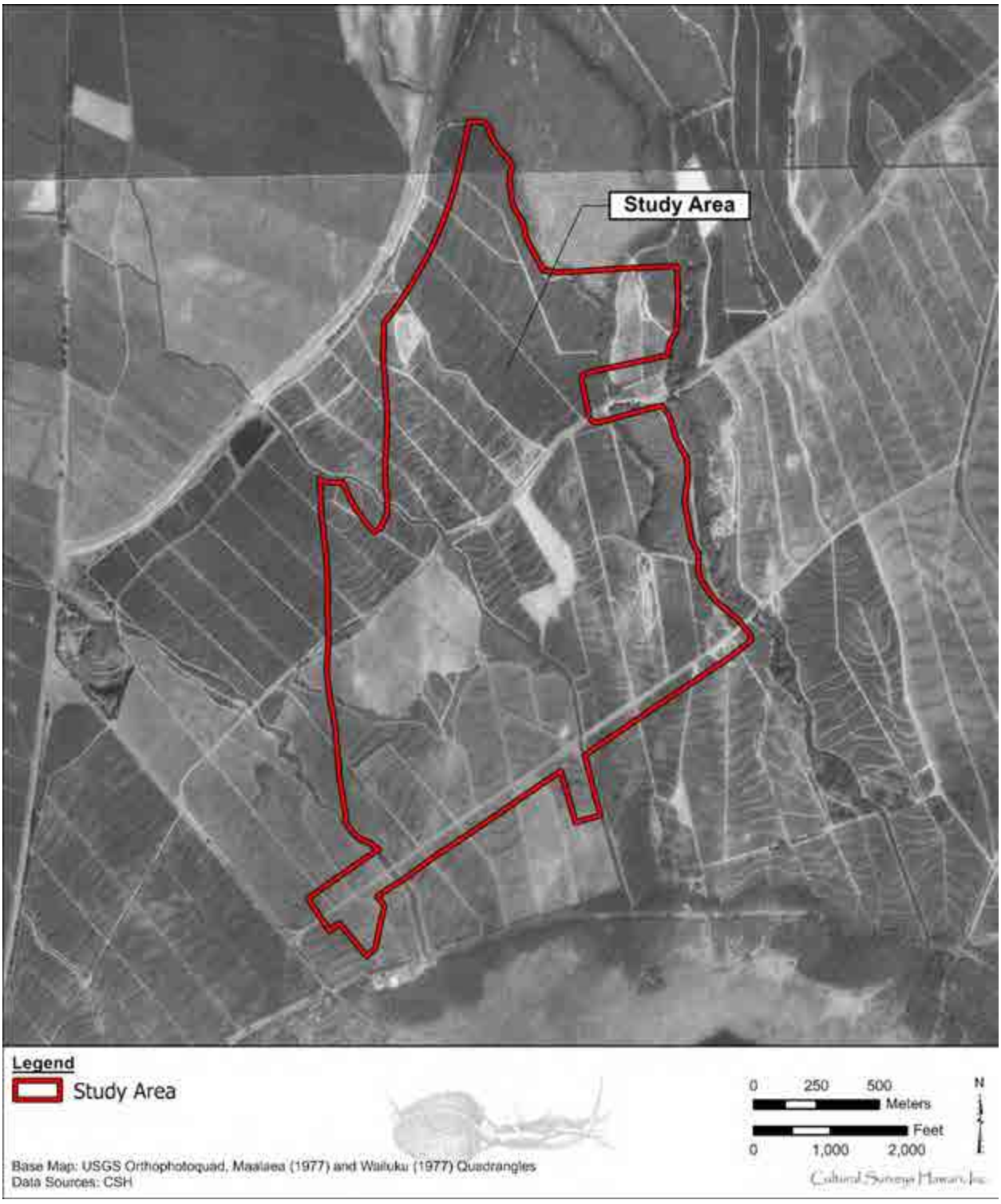


Figure 20. Portions of the 1977 Maalaea and 1977 Wailuku USGS orthophotoquads showing sugar cultivation around the current study area

Figure 21. Portions of the 1992 Puu o Kali, 1996 Maalaea, 1997 Paia, and 1997 Wailuku USGS 7.5-minute topographic quadrangles showing the location of the study area

Section 5 Previous Archaeological Research

5.1 Overview

The earliest archaeological studies on the island of Maui were part of island-wide surveys conducted in the early 1900s (Stokes 1917; Walker 1931). These studies tended to focus on the generation of descriptive lists of large-scale architectural features or traditional ceremonial *heiau* (pre-Chrisitan place of worship) sites. No *heiau* were documented in the immediate vicinity of the current study area.

Between 1931 and 1976, only sporadic archaeological studies were undertaken in the area. Following the passage of the National Historic Preservation Act in 1966 and HRS §6E, which established the historic preservation program in 1976, archaeological studies occurred as a condition of development on a more frequent basis. Previous archaeological studies in the vicinity have included archaeological inventory survey (AIS) investigations (termed “archaeological surveys” pre-2002, before HAR §13-276-5), an archaeological data recovery, archaeological reconnaissance, and archaeological literature review and field inspection (LRFI) surveys, and archaeological monitoring programs (Table 2 and Figure 22). Historic properties identified during previous studies in the vicinity of the study area include clusters of human burials near the Mā‘alaea Small Boat Harbor and in the region to the northwest, in addition to the Naval Air Station (NAS) Pu‘unēnē (State Inventory of Historic Places [SIHP] # 50-50-09-04164), habitation/agricultural complexes, and various historic plantation and ranching features (Figure 23). Note, the SIHP designation refers to the state of Hawai‘i (50), the island code for Maui (50), the topographic quadrangle for Wailuku (04), Maalaea (09), or Puu o Kali (10), and a unique five-digit number.

5.2 Previous Archaeological Studies within and Adjacent to the Study Area

5.2.1 Folk and Hammatt (1991)

The only previous archaeological study conducted within the current study area is an archaeological surface survey of approximately 600 acres of land at Mā‘alaea in Waikapū Ahupua‘a conducted by CSH in October 1990 (Folk and Hammatt 1991). Fieldwork included a survey of the area excluding mature cane fields. Two historic properties were identified within the study area. SIHP # 50-50-09-02708 is a historic cemetery, and SIHP # -02709 is HC&S Plantation Reservoir No. 13 Ditch. SIHP # -02708 includes a minimum of seven burials with tombstones as well as other possible burial locations. The tombstones have Japanese *kanji* inscriptions, and the graves may be associated with the HC&S “Camp Seven,” described as being demolished after World War II (Folk and Hammatt 1991:i). SIHP # -02709 is a large ditch that extends from Pōhākea Gulch to North Kīhei Road within the surveyed area. This portion of the ditch is constructed of mortar and exhibits a U-shaped cross-section with a maximum width of approximately 2.00 m and a maximum depth of approximately 1.25 m. The ditch was no longer active at the time of the survey, and no further work was recommended for the feature within the study area. The study recommended archaeological monitoring for the former area of Camp Seven

and another uncultivated area in the southern portion of the study area. Options for preservation or disinterment of the graves at SIHP # -02708 were presented.

Table 2. Previous archaeological studies in the vicinity of the study area

Reference	Type of Study	Location	Results (SIHP #s 50-50-)
Barrera 1976	Archaeological walk-through survey	Upper Maui Lani area; multiple TMKs	No historic properties identified
Kennedy 1988	Archaeological survey	Maui Central Park; TMK: (2) 3-7-001:002 por.	No historic properties identified, but potential for subsurface cultural material suspected
Haun 1989	AIS	Waikapu Mauka Partners Golf Resort	Identified nine features and complexes (no SIHP #s), including walls, ditches, terraces, mounds, depressions, modified outcrops, possible *heiau* or shrine, enclosures, and L-, C-, and U-shapes
Kennedy 1990	Archaeological reconnaissance survey	Hawaiian Cement Puunene Quarry	No historic properties identified
Rotunno and Cleghorn 1990	Archaeological reconnaissance survey	Horita Homes; TMKs: (2) 3-8-007:002 and 110	Identified two potential historic properties: a sandstone cobble-lined trail (Temp. Site No. 1) and a piled and compacted cobblestone mound (Temp. Site No. 3)
Sinoto 1990a & 1990b	Archaeological surface survey, subsurface assessment, and archaeological monitoring	Maui Lani Sand Borrow Site; TMK: (2) 3-8-007:103	No historic properties identified
Brisbin et al. 1991	Archaeological data recovery	Waikapu Mauka Partners Golf Resort	Designated SIHP #s 04-02019 through -02027 to features/ complexes identified by Haun (1989); returned radiocarbon dates suggest two separate, concurrent occupations from 1450 to 1675 and between 1650 and 1778

Reference	Type of Study	Location	Results (SIHP #s 50-50-)
Donham 1991	Archaeological field inspection	Waikapu Stream	Water channel and terrace wall affected by construction; no SIHP # designation
Folk and Hammatt 1991	AIS	600 acres at Mā‘alaea	Identified two historic properties: SIHP # 09-02708, plantation cemetery, and SIHP # 09-02709, HC&S Plantation Reservoir No. 13 Ditch
Kennedy 1991, 1994	AIS	Waikapu Mauka Partners proposed residential development; TMKs: (2) 3-6-002:002 and 004	Documented seven single features and 11 complexes comprised of 74 (mostly agricultural) features (SIHP #s 04-02753 through -02770); identified intact child burial (Feature B) at SIHP # -02755, a human bone fragment at SIHP # -02756, and an adult burial (Feature E) at SIHP # -02757; returned radiocarbon dates suggest occupation from about 1500 to mid-1600s and again during early 1800s
Kennedy 1992	AIS	Proposed residential project in Waikapu, TMKs: 3-6-002:002 (por.) and 3-6-004:009 (por.)	Identified 18 archaeological complexes (SIHP #s 09-02753 through -02770); dryland agricultural features occurred with highest frequency across study area; features grouped into four broad categories that included boulder slope planting areas, clearing mounds, hillslope terraces, and gully bottom terraces; habitation features and two positively identified human burials, as well as nine possible burials, also identified in and amongst agricultural features
Kennedy and Trimble 1992	AIS	Mā‘alaea Field #175; TMK: (2) 3-8-001:018 por.	No historic properties identified

Reference	Type of Study	Location	Results (SIHP #s 50-50-)
Sinoto and Pantaleo 1992	AIS	Multiple locations; TMKs: (2) 2-5-003-005; (2) 2-7-003, 007-011, 013, 016; (2) 3-8-001, 006, 007, 051, 059, 061, 070, 071	No historic properties identified
Sinoto 1993	Archaeological monitoring	Maui Lani Sand Borrow Site; TMK: (2) 3-8-007:103	No historic properties identified
Athens et al. 1994	Archaeological survey and paleoenvironmental investigation	Mā‘alaea Generating Station at 1000 North Kīhei Rd; TMK: (2) 3-8-005:025 por.	No historic properties identified
Robins et al. 1994	AIS	14.7-mile transmission line from Mā‘alaea Generating Station to Lāhainā	Identified 34 historic properties including canals, cattle walls, other walls, rock shelters, enclosures, a curbstone trail, a mound, a railroad berm, a terrace, an upright stone, and wall-platform; no features in vicinity of current study area
Rotunno-Hazuka, Somer, Clark 1995	Archaeological test excavations	Maui Lani Subdivision and Sand Borrow Site; TMKs: (2) 3-8-007:002 and 110	Determined insignificance for two temporary sites (T-1 and T-3) previously recorded by Rotunno and Cleghorn (1990); identified and determined an additional temporary site (T-4) insignificant; documented at least three additional human burials associated with SIHP # 04-02797
Rotunno-Hazuka, Somer, Flood 1995	Archaeological research, test excavations, and burial investigations	Maui Lani Subdivision; TMKs: (2) 3-8-007:002 and 110	Newly identified ten burial features with a minimum number of individuals (MNI) of 12 associated with SIHP # 04-02797

Reference	Type of Study	Location	Results (SIHP #s 50-50-)
Athens et al. 1996	Archaeological survey and paleoenvironmental investigation	Keālia Pond, National Wildlife Refuge	No historic properties identified
Pantaleo and Sinoto 1996	Archaeological subsurface sampling	Maui Lani Subdivision Phase 1 and 1A parcels; TMKs: (2) 3-8-007:002, 110	Identified four additional burials of SIHP #s 04-04146 and -04147
Hammatt et al. 1996	Archaeological survey addendum	Transmission line access roads from Mā‘alaea Generating Station to Lāhainā	Identified eight historic properties consisting of historic ranching and pre-Contact habitation areas; no features in vicinity of current study area
Burgett and Spear 1997	AIS	Multiple locations; TMKs: (2) 3-8-006:003 and 999; 3-8-004:999; 3-8-005:999; 3-8-008:999	No historic properties identified
Devereux et al. 1997	Archaeological monitoring with limited subsurface testing	Ma‘alaea to Lāhainā Transmission Line	No features identified in vicinity of current study area
Drolet and Sinoto 1998	AIS	35 acres in Pu‘unēnē; TMK: (2) 3-8-008:001 por.	Identified additional components of SIHP # 09-04164, NAS Pu‘unēne
Tomonari-Tuggle et al. 2000	AIS	Former NAS Pu‘unēnē; TMKs: (2) 3-8-008:001, 005, 007, 008, 019, 020, 030, 031, 032, 034–038	Condirmed SIHP # 09-04164, NAS Pu‘unēnē, and identified additional components; identified four historic properties: SIHP # 09-04800, seven sugarcane plantation features; SIHP # 09-04801, two clusters of post-WWII ranching features; SIHP # 09-04802, former locomotive rail bed; SIHP # 09-04803, portions of Haiku Ditch and Reservoir No. 6

Reference	Type of Study	Location	Results (SIHP #s 50-50-)
Sinoto and Titchenal 2003	AIS	Phase VII Residential Project at Maui Lani; TMK: (2) 3-8-007:131 por.	No historic properties identified
Fredericksen and Fredericksen 2004	AIS	Waikapu Affordable Housing Subdivision; TMKs: (2) 3-5-002:001 por. and (2) 3-8-007:101	Documented a previously identified historic property, SIHP # 04-05474, Kama Ditch with associated Reservoir No. 6
Guerriero et al. 2004	AIS	50-acre parcel; TMK: (2) 3-5-002:001 por.	Documented SIHP # 04-05474 Kama Ditch
Rotunno-Hazuka and Pantaleo 2004b	Interim archaeological monitoring	New Sand Hills parcel; TMKs: (2) 3-8-007:121, 136 and 137 por.	No historic properties identified
Rotunno-Hazuka and Pantaleo 2004a	Interim archaeological monitoring	59-acre Hawaiian Cement Sand Mining Operation in Waikapū Ahupua‘a	Identified two burial features within completed Phase B (Fea. 1B and Fea. 2B and 30 additional burial features (Fea. 1A-30A) within ongoing Phase A operations (features not assigned SIHP #s at time of report)
Sinoto et al. 2004	AIS	Industrial Park on Waiko Rd; TMKs: (2) 3-8-007:089 and 102 por.	No historic properties identified
Rotunno-Hazuka and Pantaleo 2005	AIS	Maui Lani Elementary School; TMK: (2) 3-8-007:137	No historic properties identified

Reference	Type of Study	Location	Results (SIHP #s 50-50-)
Wilson and Dega 2005	AIS	215.8-acre parcel in Wailuku and Waikapū; TMKs: (2) 3-5-002 and 003	Documented components of SIHP # 04-05179, Waihe‘e Ditch and SIHP # 04-05493, Waikapū Ditch, identified five new historic properties: SIHP # -05726, an earthen ditch; SIHP # -05727, a large reservoir; SIHP # -05728, 14 erosion control berms; SIHP # -05729, a lesser stone and mortar ditch; and SIHP # -05730, Old Waikapu Rd
Dagan and Hammatt 2006	LRFI	Former Maui Scrap Yard on Waiko Rd; TMK: (2) 3-8-007:105	No historic properties identified
Morawski et al. 2006	Archaeological monitoring	Off-site construction near proposed Kehalani Mauka Subdivision in Wailuku and Waikapū; TMKs: (2) 3-5-002:001 por. and (2) 3-5-001:017 por.	Identified five historic properties: SIHP # 04-05680, human burial; SIHP #s 04-05965 and -05966, isolated and disturbed human remains; SIHP # 04-05963, historic roadbed; SIHP #04-05964, sugarcane flume portion
Fredericksen 2006	Archaeological monitoring	0.5-acre parcel in Waikapu; TMK: (2) 3-8-007:101 por.	No historic properties identified
Hill et al. 2007	LRFI	81.5-acre parcel in Pulehunui, near Mokulele Hwy; TMKs: (2) 3-8-008:007 por. and 008 por.	Confirmed “Facility 100” of SIHP # -09-4164, NAS Pu‘unēnē; no additional historic properties identified
Frey and Fredericksen 2008	AIS	80-acre parcel in Pulehunui, near Maui Veterans Hwy; TMK: (2) 3-8-008:036 por.	Confirmed “Facility 100” of SIHP # 09-04164, NAS Pu‘unēnē; no additional historic properties identified

Reference	Type of Study	Location	Results (SIHP #s 50-50-)
Pestana and Dega 2008	Archaeological monitoring	Consolidated Baseyards on Waiko Rd; TMKs: (2) 3-8-007:089, 143, and 144	Documented SIHP # 04-06226, two human burials
Hill et al. 2008	Archaeological monitoring	10-acre parcel of Pu‘uēnē School, Wailuku Ahupua‘a, Wailuku District, Maui; TMK (2) 3-8-06:008	No historic properties identified
Hill et al. 2009	LRFI	39.267-acre parcel in Pūlehunui; TMK: (2) 3-8-008:001 por	Documented previously identified features of SIHP # 09-04164, NAS Pu‘unēnē, Facility 214 and Facility 343
Madeus et al. 2010	Archaeological monitoring	0.45-acre parcel in Waikapu Industrial Park; TMK: (2) 3-8-094:030	No historic properties identified
Perzinski and Dega 2010	AIS	Proposed Wai‘ale Rd extension and Waiko Rd; TMKs: (2) 3-5-002:014, 018, 888; 3-5-027:021; 3-6-002:003; and 3-8-005:999	Documented SIHP # 04-06668, a historic boulder terrace for either water diversion or a former footbridge footing on southern bank of Waikapū Stream
Tome and Dega 2010	AIS	607 acres of land spanning Wai‘ale, Wailuku, and Waikapū; TMKs: (2) 3-8-005:023 por. and 037; 3-8-007:071, 101, 102, and 104	Confirmed SIHP # 04-01508, a portion of Spreckels/Waihe‘e Ditch, and SIHP # 04-05504, an area where three human burials discovered in 2003; identified SIHP # 04-06578, a buried fire pit/*imu*
Titchenal and Sinoto 2010	Archaeological assessment	8.552 acres at Waiko Rd and Pakana St, TMK: (2) 3-8-07:105	No historic properties identified

Reference	Type of Study	Location	Results (SIHP #s 50-50-)
Lee-Greig et al. 2011	AIS	Approx. 3165 acres located northeast and extending *mauka* from present study area	Identified 90 historic properties (SIHP #s 50-50-10-06693 through -06774), consisting of features associated with sugar plantation, ranching and/or WWII period
Guerriero et al. 2017	AIS	Waikapū Country Town project; TMKs: (2) 3-6-002:003; 3-6-004:003; and 3-6-005:007	Identified four historic properties: SIHP # 04-07881, 18 commercial sugarcane irrigation features; SIHP # 04-07882, remnant L-shaped retaining wall; SIHP # 04-07883 WWII bunker; and SIHP # 04-07884, three historic artifact scatters; also documented a portion of previously identified historic property, SIHP # 04-05197, historic Waihe‘e Ditch
Yucha and Hammatt 2018	LRFI	Mā‘alaea Generating Station at 1000 North Kīhei Rd; TMK: (2) 3-8-005:025 por.	No historic properties identified
Yucha et al. 2021	AIS	AES Kuihelani Solar Plus Storage project on eastern side of Kuihelani Hwy; TMK: (2) 3-8-005:002 por.	Identified components of six new historic properties, two historic water control complexes (SIHP #s 04-08800 and -08804), two water control structures (SIHP #s 04-08801 and -08803), a storage building (SIHP # 04-08802), and a subsurface cultural deposit (SIHP # 04-08805); also documented eight features of SIHP # 04-01508, Spreckels/Waihe‘e Ditch

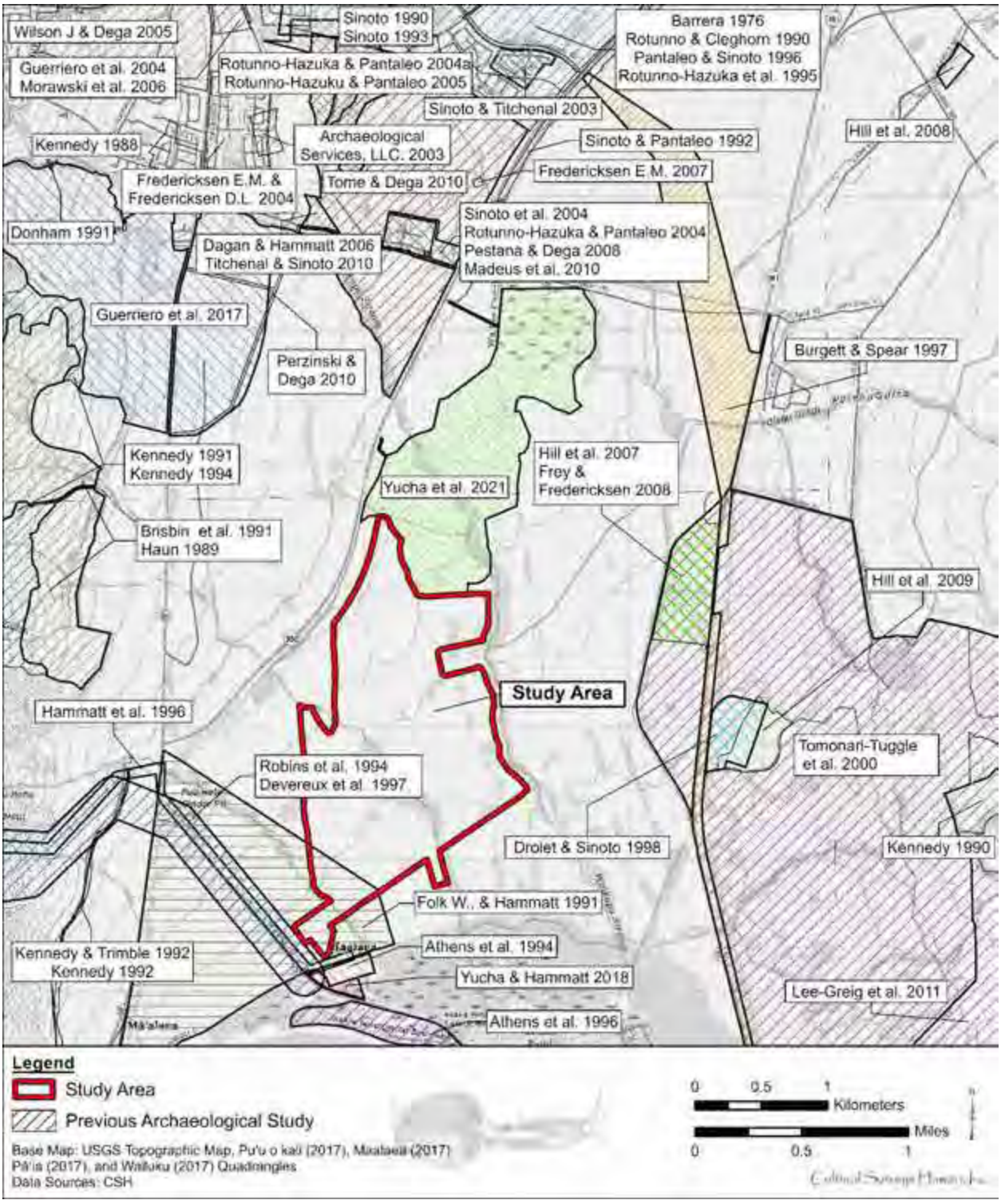


Figure 22. Portions of the 1992 Puu o Kali, 1996 Maalaea, 1997 Paia, and 1997 Wailuku USGS 7.5-minute topographic quadrangles showing the locations of previous archaeological studies in the vicinity of the current study area

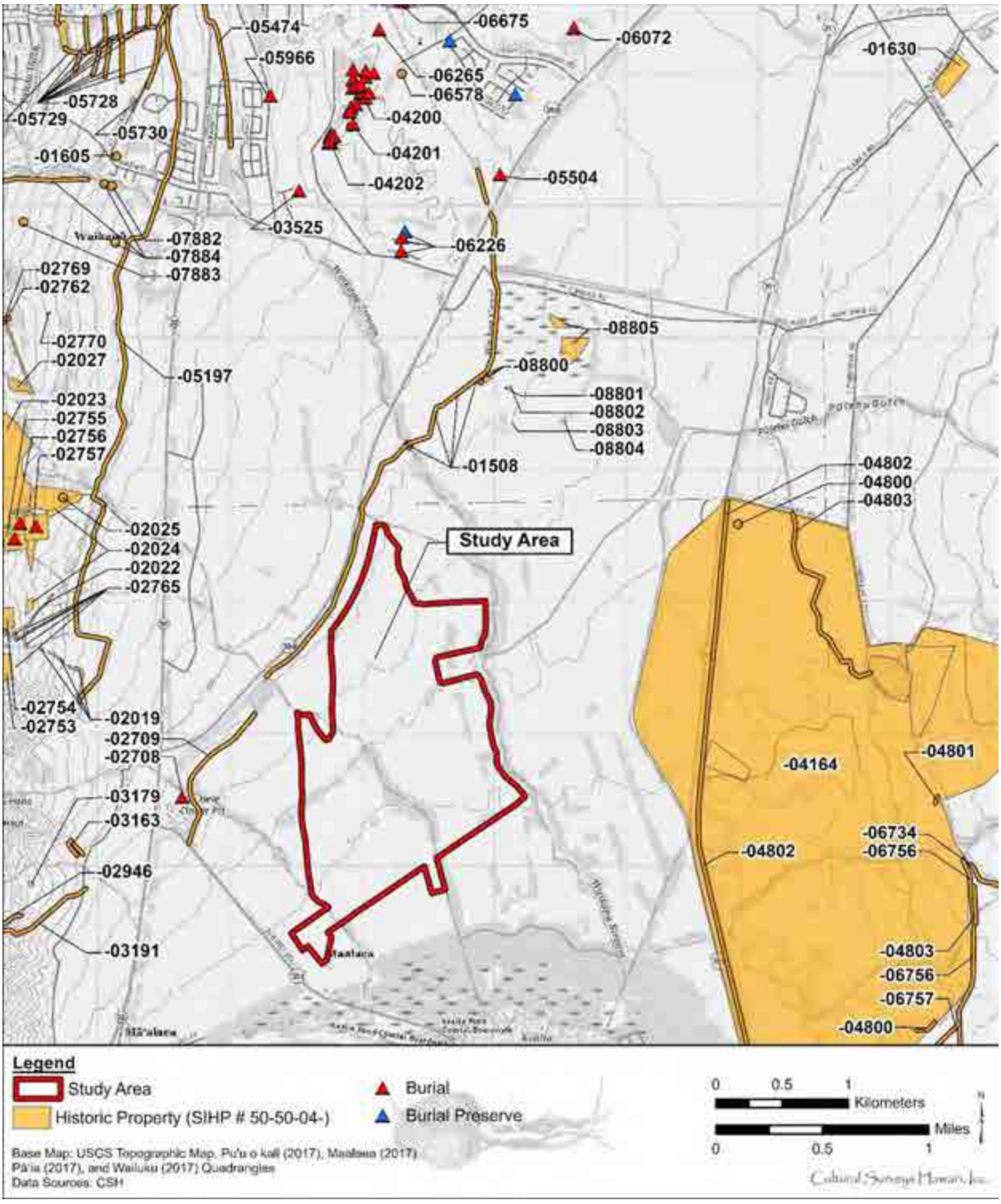


Figure 23. Portions of the 1992 Puu o Kali, 1996 Maalaea, 1997 Paia, and 1997 Wailuku USGS 7.5-minute topographic quadrangles showing the historic properties within the study area vicinity

5.2.2 Devereux et al. (1997); Hammatt et al. (1996); Robins et al. (1994)

Between April and June 1994, CSH completed an archaeological survey of an approximately 14.7-mile proposed 69KV transmission line from the Maui Electric Company Station to Lāhainā (Robins et al. 1994). A total of 34 archaeological sites or site complexes were identified and limited subsurface testing was conducted within two site areas. Site types include canals, cattle walls, other walls, rock shelters, enclosures, a curbstone trail, a mound, a railroad berm, a terrace, an upright stone, and wall-platform. The primary functions of these historic properties were interpreted as relating to agriculture (primarily sugarcane), ranching, and/or temporary habitation. Two historic properties are identified as *heiau*, one as ritual/temporary habitation, and one as permanent habitation/possible burial. No historic properties were identified in the immediate vicinity of the current study area during this study.

From June through September 1996, as an addendum to the Robins et al. (1994) study, CSH conducted fieldwork for an archaeological survey of the access roads leading to pole locations for the Mā‘alaea to Lāhainā Third 69KV Transmission Line Corridor Project (Hammatt et al. 1996). Seven archaeological sites were encountered and subsequently documented in October and November 1996, concurrently with the archaeological monitoring program (Devereux et al. 1997). The access road survey identified a total of seven historic properties, although none are in the vicinity of the current study area. The sites range from historic cattle walls and irrigation features to pre-Contact temporary shelters and a probable fishing shrine (SIHP # 50-50-09-4230). All sites were evaluated as being significant under Criterion “d”, except for the probable fishing (SIHP # 09-4230), which was deemed culturally significant under Criterion “e”. All the sites were to be protected by fencing during the project and preserved in their original condition following completion of the project.

Between August 1996 and January 1997, CSH conducted archaeological monitoring with limited subsurface testing for the MECO Mā‘alaea to Lāhainā Third 69KV Transmission Line Project (Devereux et al. 1997). The project area encompassed a corridor 15.2 miles long and 300 ft wide. The monitoring program included an archaeological survey and subsurface testing, fencing, restoration, and data recovery efforts within various segments of the corridor. The seven historic properties identified by Hammatt et al. (1996) were recorded concurrently with the archaeological monitoring program. Those sites were assessed as historic ranching and pre-Contact habitation areas. One additional historic property was identified as SIHP 50-50-08-04381, consisting of petroglyphs and lithic scatter near Ukumehame Gulch. SIHP #s 50-50-09-04229 (historic water diversion structure), -04230 (pre-Contact religious shrine), and -04231 (pre-Contact temporary habitation enclosure) were within Maalaea quadrangle, however no historic properties were identified in the immediate vicinity of the current study area. Subsurface testing via two hand excavated test units was limited to SIHP # 50-50-08-04381. SHPD consultation and future archaeological mitigation for construction associated ground disturbance was recommended.

5.2.3 Yucha et al. 2021

Between April 2019 and September 2020, CSH conducted an AIS for the AES Kuihelani Solar Plus Storage Project entailing approximately 451.48 acres (182.71 hectares) of former (fallow) commercial agricultural fields on the eastern side of Kuihelani Highway (TMK: [2] 3-8-005:002 por.) (Yucha et al. 2021). The AIS included a 100 percent coverage pedestrian inspection, a GPR

survey of 17 transects, the observation of 25 geotechnical test bores, and a representative subsurface test excavation of 258 backhoe-assisted trenches throughout the project area. Overall, the observed stratigraphy included a mix of aeolian sand, lithified sand, and alluvial loams. Components of seven historic properties were identified, and all the features were associated with commercial sugarcane cultivation. These include six newly identified historic properties, SIHP # 50-50-04-08800 through -08805, as well as documentation of eight features of Spreckels/Waihe‘e Ditch (SIHP # 50-50-04-01508) within the project area. The six newly identified historic properties consist of two historic water control complexes (SIHP #s -08800 and -08804), two water control structures (SIHP #s -08801 and -08803), a storage building (SIHP # -08802), and a subsurface cultural deposit (SIHP # -08805).

Section 6 Previous Cultural Research

6.1 Overview

A review of previous cultural studies has been conducted for the study area. Previous cultural studies (McGerty and Spear 2010, McGerty and Spear 2011, Pellegrino 2014, Spencer and Hammatt 2021, Tanaka et al. 2023) in close proximity to the study area are presented below in Table 3 and shown in Figure 24. Cultural practices and resources identified within Waikapū Ahupua‘a include *lo‘i kalo*, gathering practices for *lā‘au lapa‘au,* freshwater resources, and burial sites.

Table 3.Previous cultural studies in the vicinity of the study area

Reference	Type of Study	Location	Interviewees	Traditional Cultural Practices and Resources
Taua et al. 2010	Cultural impact assessment	Lot 1-A, Kopa‘a Subdivision No.2: TMK: (2) 3-8-007:105	Sandy Bell, Marian Ching, and Zelie Harders	Agricultural practices (taro); Gathering practices (*lā‘au lapa‘au);* Freshwater resources
McGerty and Spear 2010	Cultural impact assessment	Proposed Hauoli Street Drainage Improvements of Approx. 1 Acre, TMKs: (2) 3-8-005:003 and 017 (pors.); 3-8-014:011 and 015 (pors.)	None participated	None
McGerty and Spear 2011	Cultural impact assessment	Wai‘ale Rd extension and Waiko Rd; TMKs: (2) 3-5-002:014, 018, 888; 3-5-027:021; 3-6-002:003; and 3-8-005:999	OHA	None
Engledow 2012	Cultural impact assessment	Milowai Condominium	Lesley Bruce	None

Reference	Type of Study	Location	Interviewees	Traditional Cultural Practices and Resources
Pellegrino 2014	Cultural impact assessment	Waikapū Country Town Development, TMKs: (2) 3-6-05:007 por., 3-6-05-007, 3-6-04:006, 3-6-04:003 por.	Faith Epp and Dawn Mahi, Wally Rogers, Muriel Prager, Dalani Tanahy, Flo Nakama, Ace Miller, Wallette Pellegrino, Keahi Bustamente	Agricultural practices (taro); Gathering practices (*lā‘au lapa‘au);* Freshwater resources
Spencer and Hammatt 2021	Cultural impact assessment	AES Kuihelani Solar Project, TMK: (2) 3-8-005:002 por.	Foster Ampong	Burials practices
Tanaka et al. 2023	Cultural impact assessment	Waiko Road Subdivision Sewer System project, TMKs: (2) 3-5-004:028, 031, and 063; 3-5-010:001, 033, 034, 036, 037, and 038; 3-5-011:001 through 041, 043 through 046, and 048; 3-5-012:001 through 023, 025, 035 through 040, and 043 through 047	Scott Fisher, Kaniloa Kamaunu, Robert Hobdy	Freshwater gathering and uses; Burials practices

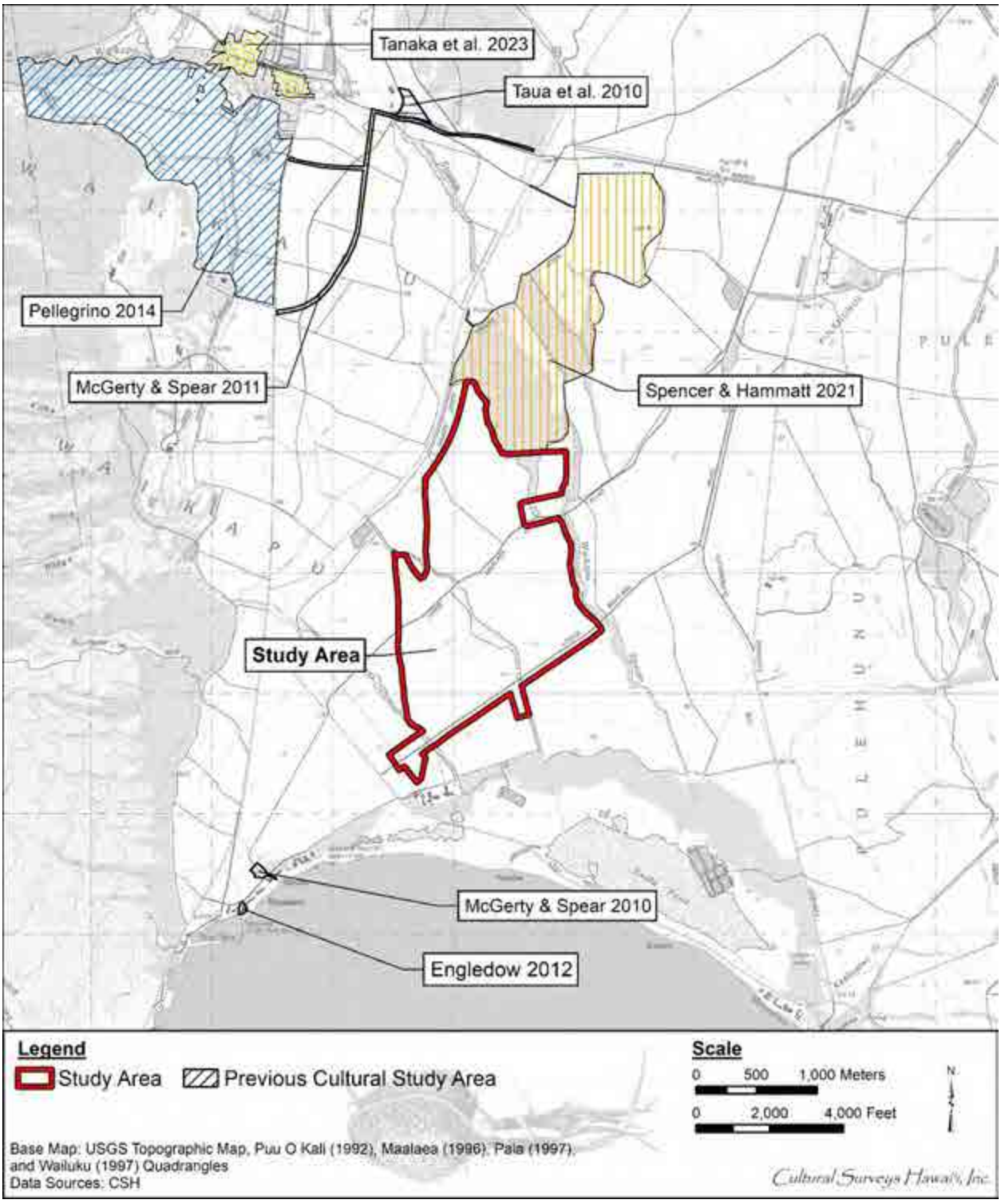


Figure 24. Previous cultural studies within the study area vicinity shown on 1992 Puu O Kai, 1996 Maalaea, 1997 Paia, and 1997 Wailuku USGS topographic quadrangles

6.2 Agricultural Resources

Traditionally, Waikapū was an agriculturally abundant land. The area was known for its extensive *lo‘i* and sustained a large number of inhabitants. Community members interviewed for previous cultural studies discussed the agricultural resources of Waikapū Ahupua‘a in the following paragraphs.

Dr. Scott Fisher (in Tanaka et al. 2023:68) stated Waikapū was a very productive area. He pointed out that Waikapū Stream is part of “Nā Wai ‘Ehā,” or “The Four Waters,” noting that in traditional times, Nā Wai ‘Ehā was the “most culturally productive land on Maui.” He shared that the area is covered by an alluvial fan with rich soil that was good for *kalo* production and pointed out there are still remnants of terraces that formerly spanned the whole area up in the valley.

Robert Hobdy (in Tanaka et al. 2023:68) also mentioned Waikapū was “once part of the of the great Na Wai Eha agricultural system. It was in the southern area centering around Waikapu Stream.” Mr. Hobdy pointed out there were “[a]t least 18 ‘ili (‘ili kalo or ‘ili mo‘o) clustered around Waikapū Stream here and above this project area.” He clarified that, “The term ‘ili kalo describes or connotes wetland grown kalo (taro, *Colocasia esculenta*) in contrast with dryland kalo or other crops. The term ‘ili mo‘o is descriptive of how the water flows from lo‘i (irrigated taro patch) to lo‘i like the thread connecting a string of pearls.” He also noted, “Each ‘ili was composed of several *kuleana* that were all fed by a single *‘auwai* fed by Waikapu Stream. Each ‘ili had a name and each was usually managed by an extended family.”

Dr. Fisher (in Tanaka et al. 2023:68) also mentioned that historically farming in Waikapū consisted of crops such as *‘ulu*, *kalo*, and sugarcane. He recalled hearing that the earliest sugar plantation on Maui was in Waikapū and noted that between the 1850s through the 2000s, Waikapū was a “high productivity sugar area.” Dr. Fisher also shared that while working on his *‘ulu* farm in Waikapū, he encountered evidence of tool production and “old railroad pins.”

6.3 Freshwater Resources

Community members previously interviewed also discussed the freshwater resources of Waikapū. Waikapū Stream is part of the *‘okana* known as “Nā Wai ‘Ehā,” or “The Four Waters.” Informants (Ace Miller Jr. and Scott Fisher) stated that the *muliwai* of Waikapū Stream is Keālia Pond (Pellegrino 2014:87). Scott Fisher also recalled waterworn rocks while working on his farm which indicates the alignment of Waikapū Stream changed over time (Tanaka et al. 2023:68).

Regarding Waikapū Stream resources, informants (Keahi Bustamente, Wallette Pellegrino, Eassie “Ace” Miller Jr., Florence Nakama and Muriel Prager) mentioned catching *‘o‘opu* (goby; *Awaous guamensisi*), *‘opae* (shrimp; *Halocaridina rubra*), *hīhīwai* (snail; *Neritina granosa*), snails, and guppies. Keahi Bustamente mentioned that *‘o‘opu* used to be found in the stream prior to it being drained (Pellegrino 2014:96). According to Florence Nakama, the *‘o‘opu* were too small to eat, around 3-4 inches (Pellegrino 2014:81). Ace Miller Jr. mentioned the stream used to have more holding ponds that were 4 ft deep or more for the *‘opae* to survive (Pellegrino 2014:87).

Keahi Bustamente mentioned the diversions of Waikapū Stream in the following:

> […] I clearly remember the stream diversions and how the stream was always stagnant and had a foul stench below which I believe was from the lack of flow and buildup of organic material from surrounding trees [Pellegrino 2014:96]
>
> […]
>
> I remember all of the diversion in Waikapū, they used to suck the entire stream dry. Never did I see the water flowing mauka to makai. I remember 3 specific diversions, one in the upper regions which I believe is a cement dam which diverts water into Reservoir #1. I know of the Waihe‘e Ditch which is adjacent to the development project [not included within project area, but runs parallel to Honoapi‘ilani Highway] I think and lastly the one by the bridge near the Honoapi‘ilani Highway. Waikapū is a dead stream from my perspective. [Pellegrino 2014:97]

Florence Nakama also mentioned the diversions of Waikapū Stream:

> […] The stream had a side stream on the other side of the park. I don’t know where it was diverted, it used to flow into #5. The main stream used to go to Ma‘alaea, but not the side stream. Especially if it rained, the river would be full. The river always had water. [Pellegrino 2014:81]

Wallette Pellegrino is one of many who are currently farming *lo‘i kalo* and utilizing the north *kuleana ‘auwai* (irrigation ditch) to feed them (Pellegrino 2014:89). Wally Rogers also mentioned, “Their family continue to farm their lands traditionally with lo‘i kalo and other food crops that utilize water directly from the Waikapū Stream via a kuleana ‘auwai” (Pellegrino 2014:58).

Keahi Bustamente mentioned the north *kuleana ‘auwai* as well as the south *kuleana ‘auwai* in the following:

> I clearly remember the north and south kuleana ‘auwai. I remember an old ‘auwai back in the valley on the north side but I don’t know if it has a name. The only reason I believe it is an ancient ‘auwai are because of extensive archaeological sites found around the ditch. [Pellegrino 2014:98]

Ace Miller Jr. mentioned the South Waikapū Kuleana Ditch, which his family utilized on their *kuleana* lands to feed their *lo‘i kalo* (Pellegrino 2014:84). Presently, many Hawaiian families are in the process of returning to Waikapū Ahupua‘a and restoring traditional *lo‘i kalo* and utilizing the *kuleana ‘auwai*.

6.4 Flora and Fauna Resources

Community members interviewed also discussed the plant and animal resources of Waikapū. Dr. Fisher (in Tanaka and Hammatt 2023:68) mentioned *‘auku‘u*, as well as deer live along Waikapū Stream. He also noted the *muliwai* of Waikapū Stream is Keālia Pond which is a habitat for wild birds as well as *olopua*, *‘ōhi‘a (Metrosideros polymorpha)*, ferns, and grasses. He suggested studying Stephanie Pau’s research on the indigenous plants found at Keālia Pond.

Pellegrino (2014:53) mentioned *kama‘āina* of Waikapū continue to practice the “traditional gathering of lā‘au lapa‘au or medicinal plants as well as native plant and tree seeds used for propagation” in Waikapū Valley. Pellegrino (2014:53) noted, “Traditional varieties of kalo and

mai‘a (banana) grow in areas throughout the valley and families still gather them as a food source." *Olonā* (*Touchardia latifolia*) is gathered from Waikapū Valley for making cordage (Pellegrino 2014:53). Keahi Bustamente mentioned native plants like *ko‘oko‘olau (Bidens wiebkei)* and *māmaki* (*Pipturus albidus*) that she would gather for *lā‘au lapa‘au*. These plants grow adjacent to Waikapū Stream and are used to make tea. Ms. Bustamente mentioned *noni* (*Morinda* citrifolia) cannot be found anywhere else in Hawai‘i, but in the upper reaches Waikapū Valley (Pellegrino 2014:98).

Ms. Bustamente shared the following regarding flora resources found in Waikapū Ahupua‘a:

> The dominant dryland forest trees such as koai‘a [*Acacia koaia*], wiliwili [*Erythrina sandwicensis*] and alahe‘e [*Psydrax* odorata] of Waikapū have basically all but disappeared except for the area in which we are protecting as a hui.
>
> […]
>
> Much of the Waikapū watershed is dominated by invasive species which form monotypic stands that inhibit the growth of other species. In steep areas, like the ones inhabited by *Macaranga tanarius*, this leads to erosion, runoff and potentially little groundwater recharge. *Casuarina*, which makes up a large percentage of the alien forest in Waikapū, is known for its inability to allow recharge and for the runoff it creates. Stands of *Casuarina* are also known to have low infiltration and low transpiration rates. We are losing our native forest at an alarming rate, and little of the true endangerment of our watershed is known by those outside the conservation world. In my opinion, we may see a 20-30% loss of remaining native forest in Waikapū to invasive species within my lifetime. As species like *Macaranga, Casuarina*, and others invade and become the forest, groundwater recharge will decline and runoff will increase. I would like to see land cover data and other models be improved and watershed health should be a factor in the calculation of available water for future use. The native forest go hand in hand in regards to the output of our invaluable cultural resource, wai. The name Waikapū alone along with the other three streams in Nā Wai ‘Ehā are clear evidence of the abundance of water the once existed in these ahupua‘a. [Pellegrino 2014:100]

6.5 *Mo‘olelo* and *Wahi Pana*

Informants (Wallette Pellegrino, Keahi Bustamente, Scott Fisher, and Robert Hobdy) have mentioned some *wahi pana* within Waikapū such as Keālia Pond, Mā‘alaea, Pu‘uhele, Loaloa, Wahineomā‘ili, Pilipili, Nohoana, and Kuaiwa. Keahi Bustamente shared that Loaloa is an *‘ili* claimed by Charles Copp and Kupali‘i (Pellegrino 2014:97). Wahineomā‘ili, Pilipili, Nohoana, and Kuaiwa are *‘ili* as well and were mentioned by Robert Hobdy (Tanaka et al. 2023:69).

The name Waikapū literally translates to "Water of the Conch" (Pukui et al. 1974:223). According to *mo‘olelo*, a cave within Waikapū Valley was the home of a supernatural conch shell named Kīhapū. When blown, the shell could be heard throughout the Hawaiian Islands (Beckwith 1970:349; Pukui et al. 1974:223). The shell was eventually stolen by a supernatural dog named Puapualenalena (from Section 3.2.1)

Dr. Fisher (in Tanaka and Hammatt 2023:68–69) discussed how the *ahupua‘a* of Waikapū received its name. He shared two *mo‘olelo* which are both associated with the *pū* or large triton conch shell. The first *mo‘olelo* states that the name Waikapū comes from the sound the wind makes when it blows through Waikapū Valley, which resembles the sound of a *pū* being blown. The second *mo‘olelo* is associated with the battle between the chief of Hawai‘i, Kalani‘ōpu‘u, and his armies and the chief of Maui, Kahekili, and his armies on the plains of Kama‘oma‘o. He stated that Kalani‘ōpu‘u and his armies including the ‘Ālapa and Pi‘ipi‘i landed at Kīheipūko‘a, which is located on the "Kīhei side of Keālia Pond." As the ‘Ālapa and Pi‘ipi‘i crossed through Waikapū on their way to Wailuku, they were surrounded and slaughtered by the forces of Maui and O‘ahu. Dr. Fisher stated the Maui army blew the conch shell to signal their attack on the Hawai‘i army. He noted there were only two survivors from the ‘Ālapa and Pi‘ipi‘i after the battle.

6.6 Burials

Several community members have mentioned the sand dunes or *pu‘u one* that stretches contiguously from the *ahupua‘a* of Waihe‘e, Waiehu, Wailuku, and Waikapū. Waikapū has been the chosen burial grounds of Maui's Native Hawaiian communities for centuries. Foster Ampong (in Spencer and Hammatt 2021:87) noted "numerous and contentious testimonies have been given at the Maui-Lana‘i Island Burial Council meetings, whereupon several members of the community insist these 'burials' are that of fallen warriors of Ka-lani-‘opu‘u's Alapa and Pi‘ipi‘i Forces (Ahulau ka Pi‘ipi‘i Kakanilua) from Hawai‘i Island." Dr. Fisher (in Tanaka and Hammatt 2023:65) also noted cultural descendants of slain warriors from Hawai‘i who were among the ‘Ālapa and Pi‘ipi‘i have been recognized by the MLIBC.

Mr. Ampong (in Spencer and Hammatt 2021:87) strongly believes "these burials being disturbed and *‘iwi* dug out throughout the sand dunes of Maui are likely ancestors of Maui Island **not** the fallen warriors from Hawai‘i Island." The people of Maui would bury their dead in the Pu‘uone sand dune complex. He pointed out that "the fallen warriors from Hawai‘i Island were 'invaders' in every sense of its definition, who came to Maui with specific intent to 'murder' Kahekili and his forces—However, when the battle of Kakanilua was over, it was the warriors from Hawai‘i Island who laid dead on the isthmus and whose remains were left to rot in the sun."

Other informants have mentioned families in the area tending to graves at cemeteries in the area, like the Cornwell cemetery or on the north side of Waikapū Stream. Some burial sites were identified during projects, such as the one located along East Waikō Road, which was mentioned by Kaniloa Kamaunu (Tanaka et al. 2023:69). Keahi Bustamente also mentioned the Rogers-Harders families scattering ashes of their *‘ohana* in Waikapū Valley (Pellegrino 2014:100–101).

Section 7 Community Consultation

7.1 Overview

Throughout the course of this assessment, an effort was made to contact and consult with NHO, agencies, and community members including descendants of the area, in order to identify individuals with cultural expertise and/or knowledge of the *ahupua‘a* of Waikapū. CSH initiated its outreach effort in January 2024 through letters, emails, and/or telephone calls. CSH completed the community consultation in May 2024. CSH reached out to 46 individuals and organizations; seven responded and one *kama‘āina* and/or *kupuna* participated in an in-depth interview. In July 2024 the study area was slightly modified. Participating consultants were notified of the change and given the opportunity to modify their testimony.

7.2 Community Outreach Letter

Letters along with maps and aerial photographs (Appendix A) of the study area were sent via email and U.S. Postal Service (USPS) with the following text:

> *Aloha mai kāua*,
>
> With this letter, Cultural Surveys Hawai‘i (CSH) humbly requests your *mana‘o* and *‘ike* (experience, insights, and perspectives) regarding past and ongoing cultural practices, beliefs, and resources within the Waikapū Ahupua‘a.
>
> Consultation with traditional cultural practitioners, *kūpuna*, *kama‘āina*, and Hawai‘i’s diverse ethnic communities is an important and deeply valued part of our work for proposed projects in Hawai‘i. Your contributions will revitalize and keep alive knowledge of cultural practices, storied places, and life experiences that will remind Hawai‘i’s children of their history for generations to come.
>
> Project Description
>
> At the request of ACE DevCO NC, LLC (AES Clean Energy), CSH is conducting a cultural impact assessment (CIA) and Ka Pa‘akai Analysis for the Kūihelani Solar Phase 2 Project. The proposed project is located on land owned by MP West LLC (d.b.a. Mahi Pono) in Waikapū Ahupua‘a within Pū‘ali Komohana District of the island of Maui (Tax Map Key [TMK] (2) 3-8-005:002 (por.). This project extends south from the footprint of an existing solar plus storage energy project currently under construction (AES Kūihelani Solar Plus Storage). The study area comprises approximately 734 acres (297.039 hectares); the project footprint is expected to occupy approximately 300 acres (121.4 hectares) of the larger study area. The study area is depicted on a portion of the 2017 Maalaea and Wailuku U.S. Geological Survey (USGS) topographic quadrangle (Figure 1) and an aerial photograph (Figure 2).
>
> The project would be owned and operated by AES Clean Energy and its affiliate, Kūihelani Solar Phase 2, LLC, and the power generated by the project would be sold at a fixed rate to Maui Electric Company under a 25-year Power Purchase Agreement (PPA). The project would provide the energy needed for more than

18,000 homes on Maui and would provide nearly 10% of the island's energy needs through clean renewable power, offsetting the use of approximately 4,388,529 barrels of oil over the project lifespan.

The main components of the project include a 40-megawatt (MW) ground-mounted solar photovoltaic (PV) system and a 160 MW-hour battery energy storage system, with related interconnection and ancillary facilities. The solar PV system would include a series of solar arrays, each consisting of panels mounted on a racking system and arranged in evenly spaced rows. The energy storage system would consist of containerized lithium-ion battery units distributed throughout the solar arrays. The solar photovoltaic panels and battery units would are planned to connect via underground electrical wiring to a project substation and Maui Electric switchyard located within the study area. High-voltage overhead loop lines would extend from the substation and switchyard to two points of interconnection (POI) with Maui Electric's island-wide grid located on the MPP-Waena 69kV transmission line and on the MPP-Waiinu 69kV transmission line; both POI are within the study area. The project would be accessed via existing roadways that extend into the property and would utilize a network of existing and new on-site access roads. Temporary construction staging and laydown would occur within the study area.

Purpose of this Study

The purpose of a CIA is to gather information on Hawai‘i's cultural resources, practices, or beliefs that have occurred or still occur within the study area and Waikapū Ahupua‘a. The purpose of a Ka Pa‘akai Analysis outreach is to 1) identify and scope valued cultural, historical, or natural resources in the study area, including the extent to which traditional and customary Native Hawaiian rights are exercised in the study area; 2) identify the extent to which those resources, including traditional and customary Native Hawaiian rights, will be affected or impaired by the proposed action; and 3) identify any feasible action, if any, to be taken to reasonably protect traditional and customary Native Hawaiian rights, if they are found to exist, either currently or possibly in the past. This is accomplished through consultation and background research using previously written documents, studies, and interviews. This information is used to assess potential impacts by the proposed project to the specific identified resources, practices, and beliefs in the study area and throughout Waikapū Ahupua‘a. As a knowledgeable member of the community holding long-term cultural knowledge, your insight, input, and perspective provide a valuable contribution to the assessment of potential effects of this project and an understanding of how to protect these resources and practices.

Insights focused on the following topics in the study area (shown on the attached Figures 1 and 2) are especially helpful and appreciated:

- Your knowledge of traditional cultural practices of the past within the study area and Waikapū Ahupua‘a

- Your specific traditional cultural practice and its connection to the study area and Waikapū Ahupua‘a
- The different natural resources associated with your specific traditional cultural practice
- Legends, stories, or chants associated with your specific traditional cultural practices and their relationships to the study area and Waikapū Ahupua‘a
- Referrals to other *kūpuna*, *kama‘āīna*, and traditional cultural practitioners knowledgeable about the study area and Waikapū Ahupua‘a
- Your comments or thoughts on the potential impacts the proposed project may have on your ongoing traditional cultural practices and natural resources within the study area and Waikapū Ahupua‘a
- Your knowledge of cultural sites and *wahi pana* (storied places) within the study area and Waikapū Ahupua‘a
- Your comments or thoughts on the potential impacts the proposed project may have on cultural sites and *wahi pana* within the study area and Waikapū Ahupua‘a

Consultation Information

Consultation is an important and deeply valued part of the CIA process and the environmental review process. Your contributions will revitalize and keep alive our combined knowledge of past and ongoing cultural practices, historic places, and experiences, reminding our children of their history generation after generation.

With your agreement to participate in this study, your contributions will become part of the comprehensive understanding of traditions of the area and will be part of the public record. The CIA will be available for future access through the State Office of Planning and Sustainable Development (OPSD) Environmental Review Program (ERP) (https://planning.hawaii.gov/erp) and at the State Historic Preservation Division Library (https://dlnr.hawaii.gov/shpd/about/research-resources-library).

As a part of this process, your knowledge may be used to inform future CIAs and other heritage studies of cultural practices and resources that need protection from impacts of proposed future projects. If you engage in consultation, and the *mana‘o* and *‘ike* you provide appears in the study, we would like to recognize your contribution by including your name. If you prefer not to allow your name to be included, your information can be attributed to an anonymous source.

The consultation interview structure and format are flexible. We will accommodate your preference on how to get together: talk story, over the phone, by email correspondence, remotely via Zoom, MS Teams, Google Chat or other remote meeting platforms.

Your knowledge of the resources and potential effect of the project on traditional practices in the study area and Waikapū Ahupua‘a focusing on the topics in the bullet points above can also be submitted in a written statement. CSH will provide return postage for your written statement on request.

CSH is happy to provide a list of topics for discussion, a more structured questionnaire of interview questions, or any other assistance that might be helpful.

7.3 Community Outreach Table

In most cases, two or three attempts were made to contact individuals, organizations, and agencies. Community outreach letters were sent to 46 individuals or groups; seven responded and one *kama‘āina* and/or *kupuna* met with CSH for a more in-depth interview. The results of the community consultation process are presented in Table 4.

Table 4. Summary of community outreach efforts

Name	Affiliation	Notes
Adolpho, Glenn	Waikapu Gardens Homeowners Association	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024 Mr. Adolpho responded on 4 March 2024 and recommended contacting Hōkūao and Wallette Pellegrino. CSH responded same day thanking Mr. Adolpho for his recommendation and will reach out to both Hōkūao and Wallette Pellegrino
Ahia, Jennifer Noelani	Mālama Kakanilua	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Ampong, Foster	*Kama‘āina*	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Apana, Clare	Cultural Practitioner; Mālama Kakanilua; Aha Moku Council Burial Committee	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Apo, Allanette	Paukukalo Hawaiian Homes Community Association	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Biga, Marie	Hawaiian Cultural Practitioner/Leader, Maui Waena Hawaiian Club	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Cameron, Don	*Kama‘āina*	Letter and figures sent via USPS on 31 January 2024

Name	Affiliation	Notes
		Second round letter and figures sent via USPS 6 March 2024
Fisher, Scott	Chief Conservation Officer, HILT; Chief, MLIBC	Letter and figures sent via email on 26 January 2024 Dr. Fisher responded same day wanting to participate CSH responded on 29 January 2024 with availability Dr. Fisher responded same day with availability CSH responded on 30 January 2024 requesting preferred method to do an interview Dr. Fisher responded same day that he prefers Zoom CSH sent Zoom invited for interview on 30 January 2024 Interview via zoom on 31 January 2024 CSH sent interview summary on 16 February 2024 along with answers to questions during interview: *Aloha e Scott,* *Just wanted to update you on the questions you had during our interview on 31 January 2024. Please see below for responses from the client.* *Total amount of acres for both the phase 1 and current phase 2 solar project* *Kuihelani Solar (Kuihelani Phase 1) has a final fenced in solar area of roughly 330 acres. Therefore projects, when fully constructed, is expected to be no more than 630 acres.* *Reason for why the phase 2 solar project is placed right below the phase 1 instead of elsewhere* *Kuihelani Solar Phase 2 is one of five renewable energy projects awarded by HECO under the recent Stage 3 RFP. These projects are located across the island. More details can be found at the HECO Renewable Energy status page https://www.hawaiianelectric.com/clean-energy-hawaii/our-clean-energy-portfolio/renewable-project-status-board* *Project siting is based on multiple criteria including (1) adequate solar resource, (2) availability of land, including enough space and site characteristics suitable for solar energy facilities, (3) proximity to the electrical grid and infrastructure with capacity to accept generation load, and (4) landowner support. Based on these criteria, sites that are suitable for utility-scale solar and energy storage projects are limited. Based on due diligence to date, the proposed site is well suited for a solar and energy project.*

Name	Affiliation	Notes
		Request for a more detailed map of the proposed phase 2 project *Design, engineering, and due diligence is ongoing for this project. We can follow up in a few weeks once more details are available.* Dr. Fisher responded same day: *Mahalo Tehani! I really appreciate you taking the time to answer these questions.* CSH responded on 20 February 2024 CSH sent a follow-up email regarding interview summary review on 8 March 2024: Dr. Fisher responded same day: *Mahalo Tehani! This looks great. Thanks so much for sharing it with me.* CSH responded on 10 March 2024 with authorization form attached CSH sent a link with updated maps of the proposed project on 12 March 2024: *Hey Scott,* *Just heard back from the client and project maps were updated on the following link for this project if you would like to review it. Please let me know if you have any other questions or if you would like to add or change anything in your interview summary.* *Link:* *https://www.aes-hawaii.com/hawaii/project/kuihelani-solar-phase-2* Dr. Fisher responded on the same day: *Mahalo Tehani! I really appreciate it.* CSH notified Dr. Fisher via email on 23 July 2024 that there was a slight change to the study area and provided project maps and his interview summary for review. Dr. Fisher responded same day: *Thanks for letting me know. I don't believe it will affect my project summary.*
Hall, Dana	Hui Alanui o Makena	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Harders, Zelie	*Kama‘āina*	Letter and figures sent via USPS on 31 January 2024 Second round letter and figures sent via USPS 6 March 2024

Name	Affiliation	Notes
Harger, Brad	President, Waikapu Community Association	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Hokoana, Lui	President, Central Maui Hawaiian Civic Club/Chancellor, CEO of UH Maui College	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Holt-Padilla, Hokulani	*Kumu Hula*, Pā‘ū o Hi‘iaka/Cultural Specialist	Letter and figures sent via USPS on 31 January 2024 Second round letter and figures sent via USPS 6 March 2024
Ho‘opi‘i, Michele	Maui Island Burial Council – Wailuku Representative	Letter and Figures sent via USPS on 31 January 2024 Ms. Ho‘opi‘i responded on 9 February 2024 via email and recommended contacting Hōkūao and Wallette Pellegrino CSH responded same day and thanked Ms. Ho‘opi‘i for her recommendations Ms. Ho‘opi‘i responded on 11 February 2024
Kahalehau, Clyde	Aha Moku, Wailuku representative	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Kalanikau, Paula	*Kama‘āina/Kupuna*	Letter and figures sent via USPS on 31 January 2024 Second round letter and figures sent via USPS 6 March 2024
Kalanikau, Vernon	*Kama‘āina*; Honua‘ula Representative, MLIBC	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Kalili, Dre	AHCC, President	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Kamaunu, Johanna	*Kama‘āina*	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Kamaunu, Kaniloa	Aha Moku Council Wailuku Representative; Aha Moku Council Burial Committee	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Kamekona, Carol Lee	Ahahui Kaahumanu - Wailuku	Letter and figures sent via email on 26 January 2024

Name	Affiliation	Notes
		Second round letter and figures sent via email on 1 March 2024
Kapu, Ke‘eaumoku	Chair, Aha Moku o Maui/Koani Foundation (501C3)	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Kapu, Uilani	Treasurer, Na Aikane o Maui	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Kuloloio, Manuel	Makuakāne, Kuloloi‘a Lineage I ke Kai ‘o Kuloloi‘a	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Lake-Farm, Sissy	Executive Director, Maui Museum/ *Kumu Hula*, Nā Hanona Kūlike ‘o Pi‘ilani	Letter and figures sent via USPS on 31 January 2024 Second round letter and figures sent via USPS 6 March 2024
Lu‘uwai, Kalei	*Kama‘āina;* ‘Aha Moku O Maui, Committee Member	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024 Mr. Lu‘uwai responded on 6 March 2024 stating that he did not have anything to contribute to this project CSH responded same day thanking him for his response
Maunupau, Ku‘uleinani	Ka‘ehu, Interim Executive Director	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Nakahashi, Ikaika	Cultural Historian, SHPD	Letter and figures sent via email on 26 January 2024 Mr. Nakahashi responded on 09 February 2024: *Aloha Tehani,* *Mahalo for contacting me regarding the Cultural Impact Assessment for the proposed Kuihelani Solar Project, ahupua‘a of Waikapū, Maui.* *I recommend CSH and the landowner utilize the media (e.x. OHA’s Ka Wai Ola, Maui News, etc.) to solicit additional information for this CIA.* *I recommend your organization and the landowner consult with:* • *Hōkūao Pellegrino* • *Ke‘eaumoku Kapu – ‘Aha Moku o Maui Inc., kapukapuakea@gmail.com* *I recommend your organization and the landowner meet with any native tenants and people who currently live or previously lived in the ahupua‘a listed above on Maui for*

Name	Affiliation	Notes
		information about the cultural resources and cultural practices for this CIA. *Koe nae ke kuleana o na kanaka ma loko = reserving the rights of native tenants.* *Please let me know if I can help with anything else.* *A hui hou* CSH responded on 12 February 2024 thanking him for response and recommendations
Nakanelua, Kyle	Aha Moku Advisory Interim Committee Member, Maui Representative	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024 Mr. Nakanelua responded same day and recommended Hōkūao Pellegrino CSH responded on 4 March 2024 thanking him for his recommendation
Nanoza, Carmela	Hanona, Chair	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Nekaifes, Maraea K.	Nekaifes Ohana	Letter and figures sent via USPS on 31 January 2024 Second round letter and figures sent via USPS 6 March 2024
Oliveira, Roy Kalani	President, Waiehu Kou Phase 3 Association	Letter and figures sent via USPS on 31 January 2024 Second round letter and figures sent via USPS 6 March 2024
Ornellas, Daniel L.	Vice President, Waiehu Kou Phase 3 Association	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Pahia, Bobby	Founder, Hawai‘i Taro Farm LLC	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Pellegrino, Hōkūao	Noho‘ana Farm Owner/Manager; Land Education Specialist for Kamehameha Schools Maui; President, Hui Nā Wai ‘Ehā	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Polido, Travis	Waikapu Community	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024

Name	Affiliation	Notes
	Association Former President	
Pridemore, Jill	Director, Alexander and Baldwin Sugar Museum	Letter and figures sent via USPS on 31 January 2024 Second round letter and figures sent via USPS 6 March 2024
Pundyke, Kawewehi	Wailuku Representative, ‘Aha Moku O Maui ‘Āina Committee	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Purdy, Malia	Hui No Ke Ola Pono, Executive Director	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Raymond, Ki‘ope	Hawaiian Studies Teacher, UH Maui	Letter and figures sent via email on 26 January 2024 Mr. Raymond responded on 27 January 2024 stated that he had no comments for this project CSH responded on 29 January 2024 thanked him for his response
Rogers, Waldemar “Wally” Frank	*Kama‘āina*	Letter and figures sent via USPS on 31 January 2024 Second round letter and figures sent via USPS 6 March 2024
Schattenburg-Raymond, Lisa	Horticulturalist/Former Executive Director, Maui Nui Botanical Gardens	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Sherill, Tamara	Executive Director, Maui Nui Botanical Gardens	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Six, Janet	Principal Investigator, County of Maui	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Smythe, Crystal	Lineal/Cultural Descendant	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Watanabe, Evalina “Noelani”	Maui, Vice-Chair, OHA‘s Native Hawaiian Historic Preservation Council (NHHPC)	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024

7.4 Community Outreach Results

Community outreach letters were sent out to 46 individuals or groups and seven responded. Of the seven that responded, two individuals had no comments and five provided recommendations for CSH to contact for this study. The majority of respondents have recommended the Pellegrino *‘ohana*, Hōkūao and Wallette Pellegrino. CSH has reached out to both individuals, however, we were unable to receive a response for this study. Other individuals and organizations recommended by respondents include Foster Ampong, Michele Ho‘opi‘i, Noelani Ahia, Mālama Kakanilua, and Ke‘eaumoku Kapu. CSH has reached out to those mentioned, however, only Ms. Michele Ho‘opi‘i, the Wailuku representative for the MLIBC, responded and she recommended Hōkūao Pellegrino. Dr. Scott Fisher was the only individual who participated in an in-depth interview with CSH. Please see below for a summary of his interview.

7.5 *Kama‘āina* Interviews

The authors and researchers of this report extend our deep appreciation to everyone who took time to speak and share their *mana‘o* and *‘ike* with CSH, whether in interviews or brief consultations. We request that if these interviews are used in future documents, the words of contributors be reproduced accurately and be in no way altered, and that if large excerpts from interviews are used, report preparers obtain the express written consent of the interviewee/s.

7.5.1 Dr. Scott Fisher

On 31 January 2024, CSH conducted an interview via Zoom with Dr. Scott Fisher regarding the Kūihelani Solar Phase 2 project. Dr. Fisher is the Chair of the MLIBC and has been with the MLIBC for 14 years. He is currently the Director of ‘Āina Stewardship for HILT and has been with the Land Trust for the past 20 years. He has a background in ecological restoration, paleoecology, earth and ocean science, and sustainable agriculture. Additionally, he is a *kama‘āina* of Maui and owns a 4-acre farm in Waikapū, northwest of the current study area between Honoapi‘ilani Highway and Kuihelani Highway, where he primarily grows *‘ulu.* Other crops include coconut (*Cocos nucifera*) and *liliko‘i* (passion fruit; *Passiflora edulis forma flavicarpa*). He grew up in Kula, more specifically, in the *ahupua‘a* of ‘Ōma‘opio.

“Nā Wai ‘Ehā” refers to four streams on Maui: Waikapū, Wailuku, Wai‘ehu, and Waihe‘e. Waikapū Stream borders the eastern boundary of the current study area. Dr. Fisher mentioned that *‘ulu* and *kalo* were traditionally cultivated within Waikapū Ahupua‘a. The area surrounding Waikapū Stream was an important area for *kalo* cultivation and Dr. Fisher stated that “all along this corridor, there would’ve been significant amounts of taro grown.” Various references mention Waikapū Stream being used for *kalo* cultivation. Traditionally, Waikapū Stream has been diverted into *lo‘i kalo* using an *‘auwai* (ditch, water channel). Dr. Fisher stated that at some point the riparian edges of Waikapū Stream primarily consisted of *lo‘i kalo* and within a reasonable distance would have been *‘ulu* and *‘uala.* He further stated that *kalo* would be grown all the way to its *muliwai,* Keālia Pond, which is located just south of the study area.

Waikapū was also known to have groves of *‘ulu* which is one of the reasons Dr. Fisher has an *‘ulu* farm in Waikapū. Dr. Fisher shared that he decided to pursue an *‘ulu* farm because not only was he a fan of *‘ulu,* but he also wanted to do some form of traditional Hawaiian agriculture. He

did mention he would like to eventually pursue *kalo* farming when he can allocate more of his time to farming, however, presently, orchards are more manageable for his busy schedule.

Dr. Fisher pointed out Keālia Pond is a National Wildlife Refuge, making it an ecologically important place. Many endangered and migratory birds inhabit this area, including the endangered Hawaiian Black-necked Stilts (*ae‘o*; *Himantopus mexicanus knudseni*) and Hawaiian Coots (*‘alae ke‘oke‘o*; *Fulica alai*). He shared that he saw Northern Pintails (*koloa māpu*; *Anas acuta*) in Nu‘u, an *ahupua‘a* located in southeast Maui, for the second time ever. As the proposed project is located just northwest of Keālia Pond and Waikapū Stream borders the western boundary of the study area, Dr. Fisher stated the developers need to take into consideration the needs and impacts of the birds in this area.

Regarding the natural environment, Dr. Fisher mentioned the wind of Waikapū, “*ka makani kololio*” or “the wind “*kololio,*” meaning “rumbling wildness.” He further stated that *kololio* describes the “intense, venturi effect that happens when the wind is channeled through the mountains.”

Regarding historical events, Dr. Fisher mentioned the Battle of Kama‘oma‘o that occurred in 1776. Kalani‘ōpu‘u invaded Maui with his warriors from Hawai‘i Island and crossed the central plains where the study area is located. Kalani‘ōpu‘u’s army consisted of two elite warrior units, ‘Ālapa and Pi‘ipi‘i. These two units were slaughtered in this battle by the Maui army, led by Kahekili, whose forces were hiding on top of the sand dunes. Dr. Fisher also mentioned there were a lot more sand dunes where Kalani‘ōpu‘u and his army were traversing. He also stated it’s fairly likely Kalani‘ōpu‘u’s armies may have traversed the land on which the current study area is located, however, it is difficult to know the exact route the Big Island armies took to traverse Central Maui. He did state they came up somewhere behind Keālia Pond.

Regarding soil, Dr. Fisher stated, “there’s shallow colluvial soils overlaying sandy soils.” He further commented, “When we were digging to plant our trees, we kept punching through the colluvium, that sediment that washed down over the last 20,000 years, and hitting pre-Contact sand. You know that’s going to be enticing for people to bury there.” It is well known that sand dunes were popular burial sites. Stephen Desha in *Kamehameha and His Warrior Kekūhaupi‘o*, states that after the two elite warrior units of Kalani‘ōpu‘u were slaughtered, two messengers reported, “[…] Those persons who had been slain and whose bones were laid in the sand dunes of Wailuku and Waikapū were of the chiefly blood of Hawai‘i” (Desha 2000:43). Although Dr. Fisher wasn’t aware of burials specifically in that area, he still recommends archaeological/cultural monitoring any time there is any type of earth movement. He also recommends reaching out to lineal/cultural descendants of the area and the burial council representative of Wailuku Moku, Michele Ho‘opi‘i.

Regarding sugarcane cultivation, Dr. Fisher mentioned the earliest sugarcane plantation on Maui was in Waikapū, known as Waikapu Sugar. Then it became Wailuku Sugar and then HC&S took over. Dr. Fisher also mentioned his father previously worked for HC&S and he oversaw the transition in the early 1980s. He further explained that his father would check to see if the land was suitable for sugarcane by checking the infrastructure or irrigation.

On his farm property, Dr. Fisher has found remnants of what seem to be concrete, possibly from the old mill that used to be in the area. He has also found spikes from the old railroad that was

once utilized to transport harvested sugarcane. He would often come across these spikes when the ground was more exposed at times of drought. Dr. Fisher has also mentioned he found a lithic flake that could possibly be basalt and possible evidence of tool production.

Regarding land use, Dr. Fisher discussed the presence of military activity in Wailuku Moku. The Pu‘unene Naval Air Station is located east of the study area, on the eastern side of Mokulele Highway. He mentioned he once heard there were pits the military mined from and stored explosives. Someone also told him they found some explosives but did not know the exact location where it was found. *The Maui News* (2024) recently published an article (2 February 2024) about unexploded ordnance discovered in a Pu‘unene cane field: “The discovery of unexploded bombs is not uncommon for that area […] [referring to the Pu‘unene Naval Air Station].” According to *The Maui News* (2024), “Suzy Hollinger, director of investor relations at Alexander & Baldwin, acknowledged that ordnance has been found in fields in the past […].”

Dr. Fisher also mentioned the Marine V Amphibious Corps is located within the vicinity of the study area, along N. Kihei Road near the southwest boundary. He stated they were the “depots for their Landing Vehicle Tract (LVT), where they would make the assaults with during the second world war.” He is unsure of any military-related artifacts within the study area specifically, however, it is something to be aware of especially with former military activity in the surrounding area.

Dr. Fisher’s primary concern is that the study area is too large, especially if we’re considering the phase 1 solar project, currently under construction, located just above the current solar study area. He supports renewable energy, especially solar over wind turbines. However, he prefers decentralized renewable energy systems and questioned whether it was possible to instead allocate smaller acreages of land to set up solar in each *ahupua‘a* rather than taking up a massive area of landscape in one spot. He mentioned it’s also an aesthetic concern as it makes the landscape look “ugly.” He further stated that the developers must “take measures to ensure they’re not making another monocrop of solar this time.”

On 23 July 2024, CSH notified Dr. Fisher via email of a slight modification to the study area. The study area was reduced from 734 acres to 729.6 acres. CSH provided project maps and informed Dr. Fisher that “The project, once constructed, is expected to occupy less than 50% of the study area. The project components remain the same.” CSH also included Dr. Fisher’s interview summary for review. Dr. Fisher responded the same day and stated “Thanks for letting me know. I don’t believe it will affect my project summary.”

Section 8 Traditional Cultural Practices

Timothy R. Pauketat succinctly describes the importance of traditions, especially in regard to the active manifestation of one's culture or aspects thereof. According to Pauketat,

> People have always had traditions, practiced traditions, resisted traditions, or created traditions […] Power, plurality, and human agency are all a part of how traditions come about. Traditions do not simply exist without people and their struggles involved every step of the way. [Pauketat 2001:1]

It is understood that traditional practices are developed within the group, in this case, within the Hawaiian culture. These traditions are meant to mark or represent aspects of Hawaiian culture that have been practiced since ancient times. As with most human constructs, traditions are evolving and prone to change, resulting from multiple influences including modernization as well as other cultures. It is well known that within Hawai‘i, a "broader 'local' multicultural perspective exists" (Kawelu 2015:3). While this "local" multicultural mix is deservedly celebrated, it must be noted that it often comes into contact with "traditional Hawaiian culture." This contact among cultures and traditions has undoubtedly resulted in numerous cultural entanglements. These cultural entanglements have prompted questions regarding the legitimacy of newly evolved traditional practices. The influences of "local" culture are well noted throughout this section and understood to represent survival or "the active sense of presence, the continuance of native stories, not a mere reaction, or a survivable name. Native survivance stories are renunciations of dominance, tragedy and victimry" (Vizenor 1999:vii). Acknowledgement of these "local" influences helps to inform nuanced understandings of entanglement and of a "living [Hawaiian] contemporary culture" (Kawelu 2015:3). This section strives to articulate traditional Hawaiian cultural practices practiced within the *ahupua‘a* in ancient times, and the aspects of these traditional practices that continue to be practiced today; however, this section also challenges "tropes of authenticity" (Cipolla 2013) and acknowledges the multicultural influences and entanglements that may "change" or "create" a tradition.

This section integrates information from Sections 1–7 in examining cultural resources and practices identified within or in proximity of the study area in the broader context of the encompassing Waikapū landscape.

8.1 Subsistence and Settlement Patterns

In ancient times, Waikapū was an agriculturally abundant land and was known for its extensive *lo‘i.* The deep valley of Waikapū provided the space to cultivate *kalo* and sustain a large number of inhabitants. During consultation, Dr. Fisher mentioned the riparian edges of Waikapū Stream primarily consisted of *lo‘i kalo* and within a reasonable distance would have been *‘ulu* and *‘uala*.

In previous consultation, Dr. Fisher has shared that the area near Waikapū Stream is covered by an alluvial fan with rich soil that was good for *kalo* production and pointed out there are still remnants of terraces that formerly spanned the whole area up in the valley (Tanaka et al. 2023:68). Another consultant, Mr. Hobdy, shared that there were at least 18 *‘ili* clustered around Waikapū Stream. Each *‘ili* had a name and was usually managed by an extended family. They each consisted of several *kuleana*.

8.2 Freshwater Resources

Waikapū Stream is one of the four streams that make up the Nā Wai ‘Ehā; it borders the eastern boundary of the current study area (Handy et al. 1991:272, 469; Moffat and Fitzpatrick 1995:23). Handy et al. (1991:496) describe Waikapū Stream as land bound, as opposed to emptying into the ocean. Background research and community consultation revealed that *kalo* was grown all along Waikapū Stream. Water was diverted into the *lo‘i* and the overflow would feed onto the dry plains of the central isthmus and Keālia Pond. Traditionally this stream has been diverted into *lo‘i kalo* using an *‘auwai*. Mr. Hobdy shared that the term *‘ili mo‘o* describes how the water flows from one *lo‘i* to the next like a thread (Tanaka et al. 2023:68). Dr. Fisher also recalled waterworn rocks while working on his farm which indicates the alignment of Waikapū Stream changed over time (Tanaka et al. 2023:68). Presently, many Native Hawaiian families are returning to their *kuleana* land in Waikapū Ahupua‘a and restoring old *lo‘i kalo* and *‘auwai*. Keālia Pond is the *muliwai* of Waikapū Stream. It is also a National Wildlife Refuge established in 1922 and an ecologically important nesting, feeding, and resting habitat for endangered Hawaiian waterbirds and migratory birds.

Regarding Waikapū Stream resources, informants (Keahi Bustamente, Wallette Pellegrino, Eassie “Ace” Miller Jr., Florence Nakama and Muriel Prager) mentioned catching *‘o‘opu*, *‘opae*, *hīhīwai,* snails, and guppies. Keahi Bustamente mentioned *‘o‘opu* used to be found in the stream prior to it being drained (Pellegrino 2014:96). According to Florence Nakama, the *‘o‘opu* were too small to eat, around 3-4 inches (Pellegrino 2014:81). Ace Miller Jr. mentioned the stream used to have more holding ponds 4 ft deep or more for the *‘opae* to survive (Pellegrino 2014:87). Dr. Fisher also mentioned flora and fauna found along Waikapū Stream included *‘auku‘u*, deer, wild birds, *olopua*, *‘ōhi‘a*, ferns, and grasses (Tanaka et al. 2023:68).

8.3 Gathering Practices and Plant Resources

Many previous informants have mentioned gathering plants for *lā‘au lapa‘au* in the uplands of Waikapū Valley and along Waikapū Stream. Some plant resources identified by informants in the uplands of Waikapū Valley include *koai‘a, wiliwili, alahe‘e, hala* (*Pandanus tectorius*)*, noni,* guava (*Psidium guajava*), and *mai‘a*. Plant resources that would be found along Waikapū Stream include *ko‘oko‘olau, māmaki, olopua, ‘ōhi‘a*, ferns, and grasses. Ms. Bustamente mentioned using *ko‘oko‘olau* and *māmaki* for tea, which are grown along Waikapū Stream (Pellegrino 2014:98). Dr. Fisher also mentioned *‘aiea* (*Nothocestrum latifolium*), a tree commonly found in dry forested areas.

8.4 Ancient Warfare

Several large battles took place in the general vicinity of Wailuku. Foreign armies would march through the *ahupua‘a* of Waikapū after landing their canoes on the leeward shores of the central isthmus. In one particular battle named *Ahulau ka Pi‘ipi‘i i Kakanilua*, Hawai‘i Island forces under Kalani‘ōpu‘u and Maui forces under Kahekili fought an intense battle on the sand hills south of Wailuku. In this battle, Maui Island prevailed. It can be assumed that the expanse of the central isthmus would have allowed a clear viewing plane for Maui’s home forces to spot invading forces and to plan a successful attack. Dr. Fisher mentioned this battle during consultation and shared that the Hawai‘i Island forces crossed the central plains where the current study area is located.

8.5 Burials

Many informants have mentioned the *pu‘u one* sand dune system located within Waikapū Ahupua‘a as well as other cemeteries and burials located within the study area vicinity. The *pu‘u one* sand dune system was a popular burial ground for Maui’s Native Hawaiian communities in the past and continues to shelter the *iwi.* There is an ongoing debate in the Hawaiian community over whether or not *iwi* found in Waikapū were those of the Hawai‘i Island or Maui warriors. Mr. Ampong believes those buried throughout the sand dunes of Maui are likely ancestors of Maui Island since the Hawai‘i Island warriors were “invaders” whose bones were left to rot in the sun (Spencer and Hammatt 2021:87). However, even the Maui/Lana‘i Island Burial Council has mentioned that some Hawai‘i Island *iwi* were identified over the years in Central Maui. Based on previous archaeological research, no burials were identified within the current study area. Rather, burials were more focused near Mā‘alaea Harbor, toward Waikapū Town, and in the uplands of Waikapū.

Section 9 Ka Pa‘akai Analysis

9.1 Overview

In Ka Pa‘akai vs Land Use Commission, 94 Hawai‘i (2000) the Court held the following analysis must also be conducted:

1. The identity and scope of valued cultural, historical, or natural resources in the study area, including the extent to which traditional and customary native Hawaiian rights are exercised in the study area;
2. The extent to which those resources—including traditional and customary native Hawaiian rights—will be affected or impaired by the proposed action; and
3. The feasible action, if any, to be taken by the LUC to reasonably protect native Hawaiian Rights if they are found to exist.

Based on information gathered from the cultural and historical background, and community consultation for this study, Camp 7, four post-Contact historic properties, and two gulches, Pōhākea and Pale‘a‘ahu, are located within the study area. Waikapū Stream also runs along the eastern edge of the study area. Camp 7 was demolished and removed to make way for the expansion of agricultural fields. Similar to Waikapū Stream, Pōhākea and Pale‘a‘ahu gulches also flow into Keālia Pond and typically only flow during stormwater events. However, Pale‘a‘ahu Gulch terminates in the central portion of the study area. It is important for the developers to design accordingly so that water quality is not impacted by the proposed action. Regarding the four historic properties identified by the companion AIS for this project, archaeological monitoring was recommended during project construction.

At present, there is no documentation or testimony indicating traditional or customary Native Hawaiian rights are currently being exercised “for subsistence, cultural and religious purposes and possessed by *ahupua‘a* tenants who are descendants of native Hawaiians who inhabited the Hawaiian Islands prior to 1778” (Hawai‘i State Constitution, Article XII, Section 7) within the specific study area. While no cultural resources, practices, or beliefs were identified as currently existing within the study area, Waikapū Ahupua‘a maintains a rich cultural history in the exercise of traditional or customary Native Hawaiian rights within the project *ahupua‘a*. The focus of concerns are impacts to the visual aesthetics of the natural landscape and freshwater quality.

9.2 Archaeological Resources

Based on previous archaeological research, one archaeological study was previously conducted within a portion of the current study area (Folk and Hammatt 1991). Two sites, SIHP #s 50-50-09-02708 and -02709, were identified within the Folk and Hammatt (1991) study area, however, they are not located within the current study area. Site -02708 is a historic cemetery and possibly associated with the HC&S “Camp 7,” while site -02709 is HC&S Plantation Reservoir No. 13 Ditch. Archaeological monitoring was recommended for SIHP -02708 and no further work was recommended for SIHP -02709.

A review of historic maps and aerial photographs of the study area also indicated a portion of Camp 7, a historic plantation worker camp owned by HC&S, was located along the western

boundary of the study area. Camp 7 appears on historic maps from 1930 and 1942 (see Figure 16 and Figure 17), however, by 1965, aerial photographs indicate the camp may have been demolished and removed to make way for the expansion of agricultural fields (see Figure 19).

The camp contained domestic occupation buildings, a stable, and a railway line. According to information obtained from multiple informant recollections of the camp,

> There were two sections to Camp Seven. One section was much older and had twenty-four buildings…[that] were white washed and had outside kitchens. The occupants were mostly Filipino bachelors and a few Korean families… The houses of the new section of Camp Seven were built of tongue and grove lumber with shingle roofs. They had kitchens attached and semi-flush toilets. These houses were occupied by Filipino and Japanese families and Filipino bachelors. The camp had a community bath house heated with a diesel boiler…The *luna*'s house [occupied by Mr. Raymond Decambra,] was across from the new camp…The stables and a 10,000 gallon redwood water tank separated the two sections of the camp. Next to [the tank and stables] was the stable keepers house and it was his job to care for the animals and provide security for the stables. The stables [were] used as a community gathering place…There were [also] pig pens along the gulch at the end of the village. [Folk and Hammatt 1991:63-67]

Informants also recall a local graveyard that was used by the occupants of Camp 7:

> There was a graveyard located on a cinder hill near the junction of the road going to Lahaina and the road going to Kihei. The graveyard was for all nationalities—the Portuguese, Catholics, Japanese Buddhist, Filipinos…some people remov[ed] some of the bodies from the graves and [took] them to other graveyards…The cemetery includes at least 7 burials marked with tombstones, 2 possible mound burials and 1 niche burial, with the possibility of unmarked burials. The tombstones are engraved in Kanji and at least one of those interred here was born and died in the plantation's Camp Seven [Folk and Hammatt 1991:i, 67].

The companion AIS conducted by CSH in parallel with this CIA study identified a total of four post-Contact historic properties related to commercial agriculture within the study area. These historic properties included a subsurface cultural deposit of historic artifacts and debris, a historic artifact scatter representing Camp 7, and two remnant agricultural water control structures. Notably, no pre-Contact historic properties or human skeletal remains were identified within the study area. The AIS report, which recommends archaeological monitoring during project construction as mitigation, will be submitted to SHPD for review and acceptance as the next step in the historic preservation review process.

9.3 Burials

Based on previous archaeological research, there are no burials located within the study area, however, there are many in the vicinity of the study area. To the west of the study area, there is a plantation cemetery (SIHP # -09-02708) with seven burials and tombstones with Japanese inscriptions believed to be associated with the nearby Camp 7. The majority of burials (SIHP #s -03525, -04200, -04201, -04202, -05504, -05966, -06072, -06226, -06265, and -066675) are

located north of the study area, while others (SIHP #s -02755 through -02757) are located northwest of the study area in the uplands of Waikapū.

Based on previous consultations, Native Hawaiians traditionally chose the Pu‘uone sand dunes as their burial grounds. The Pu‘uone sand dunes stretch contiguously from the *ahupua‘a* of Waihe‘e, Waiehu, Wailuku, and Waikapū. Other informants have mentioned burials located on the north side of Waikapū Stream, along E. Waiko Road, and in Waikapū Valley. However, the proposed project is not located within the Pu‘uone sand dunes or near the areas mentioned by previous consultants. During consultation for the current proposed project, Dr. Fisher has shared that he is not aware of burials in the study area.

9.4 Faunal Resources

No faunal resources within the study area have been documented. Previous informants have mentioned catching *‘o‘opu*, *‘opae*, *hīhīwai,* snails, and guppies in Waikapū Stream, located along the eastern boundary of the study area; however, *‘o‘opu* and *‘opae* are no longer found in Waikapū Stream as a result of it being drained (Pellegrino 2014:96). Also, previous informants have mentioned *‘auku‘u* and deer live along Waikapū Stream.

Southeast of the study area is Keālia Pond and as mentioned previously, it is a habitat for many endangered and migratory birds. Based on previous consultation and background research, the following birds were mentioned residing at Keālia: *ae‘o*, *‘alae ke‘oke‘o*, *koloa maoli*, *kōlea*, *hunakai*, *‘akeke‘e*, *‘ūlili*, northern pintail, and northern shoveler (USFWS 2021b). Other animals include Blackburn’s Sphinx Moth, *‘ōpe‘ape‘a*, and the endangered *honu‘ea* also nest on the beach adjacent to the refuge (USFWS 2021e).

9.5 Earth Resources

No traditional use of the stones (or soft sediments) within the study area has been documented.

9.6 Plant Resources

The study area is located within undeveloped former agricultural lands utilized for sugarcane cultivation until very recently and are now heavily vegetated with grasses, shrubs, and some trees such as cane grass (*Pennisetum purpureum*) and other unidentified grasses, *kiawe* and *koa haole* (*Leucaena leucocephala*). Waikapū Valley is abundant with the following plant resources that were utilized for *lā‘au lapa‘au: koai‘a, wiliwili, alahe‘e, hala, noni,* guava, and *mai‘a*. Informants have also mentioned the following plant resources found along Waikapū Stream: *ko‘oko‘olau, māmaki, olopua* (Hawai‘i olive; *Nestegis sandwicensis*)*, ‘ōhi‘a*, ferns, and grasses. Dr. Fisher also mentioned *‘aiea*, a tree commonly found in dry forested area.

9.7 Trails

In traditional times, trails were well used for travel within the *ahupua‘a* between *mauka* and *makai* and laterally between *ahupua‘a*. Based on background research and consultation, no trails were identified within the study area. A traditional Hawaiian kerbstone trail remnant (SIHP # -09-03191) is located along a prominent ridge of the West Maui Mountains, west of the study area (see Figure 23). According to Apple (1965), this is a traditional Hawaiian pedestrian trail that was later modified to be used as a horse trail. Robins et al. (1994) stated the “trail diverges from the

Lahaina Pali trail at approximately 800 feet above mean sea level and heads *mauka* […] The Lahaina Pali trail appears to have been constructed over Site 50-50-0 9-3191 trail.”

9.8 *Nā Wahi Pani*

Ke Kula o Kama‘oma‘o, also known as the Plains of Kama‘oma‘o, was a region of sandy plains spanning portions of Wailuku and Waikapū Ahupua‘a. This *wahi pana* was known as a wandering place of the souls, more specifically for the souls of the soldiers killed during the battle named *Ahulau ka Pi‘ipi‘i i Kakanilua* (Battle of Kakanilua), also known as the Battle of Wailuku Common. It was also associated with being the home of owl deities. During consultation, Dr. Fisher stated it’s fairly likely Kalani‘ōpu‘u’s armies may have traversed the land on which the current study area is located, however, it is difficult to know the exact route the Big Island armies took to traverse Central Maui. He did state they came up somewhere behind Keālia Pond, located southeast of the study area.

Previous informants (Mrs. Pellegrino, Ms. Bustamente, Dr. Fisher, and Mr. Hobdy) have mentioned some *wahi pana* within Waikapū such as Keālia Pond, Mā‘alaea, Pu‘u Hele, Loaloa, Wahineomā‘ili, Pilipili, Nohoana, and Kuaiwa. Pu‘u Hele is a cinder cone located to the west of the study area where N. Kihei Road and Honoapi‘ilani Highway meet. Bustamente shared that Loaloa is an *‘ili* claimed by Charles Copp and Kupali‘i (Pellegrino 2014:97). Other *‘ili* mentioned by Robert Hobdy included Wahineomā‘ili, Pilipili, Nohoana, and Kuaiwa (Tanaka et al. 2023:69).

9.9 Valued Cultural, Historical, or Natural Resources in the Study Area

The background research conducted for this study, including cultural and historical data, indicates the vicinity of the study area has a long and rich history of Native Hawaiian use and modification. There is one perennial stream, Waikapū Stream, located along the eastern boundary of the study area and two gulches, Pōhākea and Pale‘a‘ahu, located within the study area. Waikapū Stream is located along the eastern boundary of the study area and Keālia Pond is located southeast of the study area. Waikapū Stream is a valued cultural, historical, and natural resource. Traditionally and historically, the stream was diverted by *kuleana ‘auwai* into *lo‘i kalo*. Previously identified historic properties included historic agricultural terraces and irrigation ditches along Waikapū Stream. Presently, these *kuleana ‘auwai* and *lo‘i kalo* are being restored by Native Hawaiian families who are returning to Waikapū Ahupua‘a and reviving the traditional cultural practice of *kalo* cultivation. Keālia Pond is an ecologically important place where many endangered and migratory birds reside.

A review of historic maps and aerial photographs of the study area also indicated a portion of Camp 7, a historic plantation worker camp, was located along the western boundary in the study area. However, it was demolished to make way for the expansion of agricultural fields. To the west of the study area, near Camp 7, is a plantation cemetery (SIHP # -09-02708) that consists of seven burials and tombstones with Japanese inscriptions. Also, based on the companion AIS for this project, four post-Contact historic properties related to commercial agriculture are located within the study area. These historic properties included a subsurface cultural deposit of historic artifacts and debris, a historic artifact scatter representing Camp 7, and two remnant agricultural water control structures.

9.10 The Extent to which Traditional and Customary Native Hawaiian Resources will be Affected by the Proposed Action

Given the lack of native flora and the prior land history of intensive sugarcane cultivation, military activity, and modern development, it is concluded that the traditional and customary Native Hawaiian resources that may be directly affected by the proposed action are the possible presence of human burials, historic properties, and freshwater resources. Although background and archaeological research has shown there are no burials located within the study area, there are burials, such as the plantation cemetery (SIHP # -09-02708), located within the vicinity of the study area. As this project will include ground disturbances, there is always the possibility and concern of inadvertent discoveries.

Based on a review of historic maps and aerial photographs, a portion of Camp 7 was located within the study area. However, as mentioned previously, Camp 7 was demolished to make way for the expansion of agricultural fields. The companion AIS report identified four post-Contact historic properties within the study area and recommends archaeological monitoring during project construction as mitigation.

Regarding freshwater resources, there are many located both within the study area and its vicinity. Waikapū Stream is located along the eastern boundary of the study area, with its *muliwai,* Keālia Pond, located southwest of the study area. During consultation, Dr. Fisher has expressed an environmental concern with the proposed action potentially impacting the stream’s water quality and in effect impacting the birds that reside at Keālia Pond. However, the proposed action would be designed to avoid any discharge into freshwater resources.

9.11 Feasible Action, if any, to be Taken to Reasonably Protect Native Hawaiian Rights

If indeed the anticipated population growth in Waikapū Ahupua‘a is to continue, then the question is how best to manage it and how to mitigate adverse impact on traditional Hawaiian resources and customary practices, or ideally, to improve traditional Hawaiian resources. As a preliminary action, mitigation would seem to ensure that any development projects do not make matters worse, minimally by ensuring best management practices.

Based on background research, Pōhākea and Pale‘a‘ahu gulches were identified within the study area, however, both are nonperennial. Based on community consultation, the possibility of coming across burials within the study area is low, however, Dr. Fisher recommended archaeological/cultural monitoring during ground disturbance activities. Archaeological monitoring was also recommended by the companion AIS report for the historic properties identified within the study area.

Section 10 Summary and Recommendations

CSH undertook this CIA and Ka Pa‘akai Analysis at the request of Kuihelani Solar Phase 2, LLC. The research broadly covered the *ahupua‘a* of Waikapū.

10.1 Results of Background Research

Background research for this project yielded the following information (presented in approximate chronological order):

1. The study area is located in the Waikapū Ahupua‘a in the Wailuku Moku in the isthmus of Central Maui between the northwest slopes of Haleakalā and the southeast slopes of Mauna Kahālāwai.
2. Waikapū Ahupua‘a is one of the four *ahupua‘a* that make up “Nā Wai ‘Ehā” or “The Four Waters” of Maui; this includes Waihe‘e, Wailuku, Wai‘ehu, and Waikapū.
3. In the tradition of Hawaiian naming practices, the wind associated with Waikapū is called Kololio (Nakuina 1902:68) and the rain specific to this *ahupua‘a* is called Kili‘o‘opu (Akana and Gonzalez 2015:84).
4. The place name “Waikapū,” according to Pukui et al. (1974:223), literally translates to “Water of the Conch.” This is due to a cave within Waikapū Valley that reportedly housed a supernatural conch shell (named Kīhapū, blessed with the breath of Lono) that resided there until it was stolen by a supernatural dog named Puapualenalena.
5. In ancient times, Waikapū and Wailuku were agriculturally abundant lands known for their extensive *lo‘i,* or wetland taro cultivation (Handy et al. 1991:497). Handy et al. (1991:496) describe Waikapū Stream as land bound, as opposed to emptying into the ocean, with the water diverted into *lo‘i* and the overflow dissipating on the dry plains of the central isthmus between West and East Maui feeding the wetland of Keālia.
6. Ke Kula o Kama‘oma‘o, or the Plains of Kama‘oma‘o, is the name given to a region of sandy plains spanning portions of Wailuku and Waikapū Ahupua‘a (Emerson 1993). This area was known by Hawaiians in traditional times as a wandering place of the souls (Beckwith 1970), a place where spirits of the dead waited for a friendly escort, perhaps an *‘aumakua*, to show them the way to eternity.
7. Ahulau ka Pi‘ipi‘i i Kakanilua or The Battle of Waikapū Common entailed the clash of invading Hawai‘i Island forces, headed by Kalani‘ōpu‘u with the Maui forces under Kahekili in 1776. The Big Island army was ambushed at an area close to Waikapū and was destroyed by the army of Kahekili on the plains of Kama‘oma‘o (Hokulani Holt Padilla in Hill et al. 2006).
8. The nineteenth century brought to Maui a multitude of commercial, demographic, social, and religious changes encouraged by the burgeoning foreign influx. In 1819, the first whaling ships arrived in Hawaiian waters and Lāhainā Harbor became a primary port of call for provisioning ships in the Islands. Closely following the arrival of the first whaling ships, the first Protestant missionaries and their families arrived in Lāhainā in 1823 (Bingham 1824).
9. During the Māhele, the lands surrounding Waikapū Commons were sold by the Department of Education in ten parcels, each amounting to more than 1,317 acres, and had Royal Patents issued for the sales in 1854. In 1875 the Board of Education sold at

auction the “Land known as the ahupuaa of Waikapu, saving grants hitherto made within said ahupuaa, or sales by the board of education” to Mr. Henry Cornwell, lands extending out from Waikapū Valley to the northwestern boundary of Pulehunui Ahupua‘a (*Pacific Commercial Advertiser* 1879:5). Cornwell acquired the lands in fee-simple under Royal Patent No. 3152. The study area is situated entirely within this land grant. No *kuleana* awards were recorded near the study area.

10. In 1838, the Waikapū Congregational Church was established as a home-based Christian service. During World War II, Waikapū Congregational Church was turned over to the military and used as a surgical hospital. The Church building was used as a ward with an additional “nurses quarters” built off to the side of the main structure. As sugarcane cultivation began to dominate the region in the early to mid-twentieth century, residential dwellings dwindled, as did the attendees of the Waikapū Congregational Church. As full-time pastors became unnecessary, the church members voted to merge with the Kahului Church, and the Waikapū Congregational Church was abandoned to the sugarcane fields that surround it (Head 1960).
11. Henry Cornwell arrived on Maui from New York and started the Waikapu Sugar Company with James Louzada (his brother-in-law) in 1864. The two partners constructed a steam-powered sugar mill situated on a 17-acre parcel that had been part of Land Grant 2951, land originally purchased by Henry Cornwell and J. Louzada in Waikapū (Wilcox 1996:61).
12. In 1876, Henry Cornwell retired and the remaining plantation lands were sold to the new partners Colonel William H. Cornwell and Colonel G.W. Macfarlane (*Honolulu Advertiser* 1903:8).
13. Most of the Waikapū Commons and across the isthmus was covered with sugarcane by the mid-nineteenth century. Waikapu Sugar Company operated from 1862 to 1894, when it was purchased and incorporated into the holdings of Wailuku Sugar Company (Kaukali and Subica 2010).
14. In 1862, the partners of the Wailuku Sugar Company grew to include James Robinson & Company, Thomas Cummins, and J. Fuller (Wilcox 1996:122). In 1863, Charles Brewer became a major partner in the operation of the Wailuku Sugar Company. By 1867, the Wailuku Sugar Company had 2,250 acres planted in cane. The Wailuku Sugar Company incorporated in 1875 and began to become profitable. In 1877, the Baileys were bought out (Nellist 1925:70).
15. Beginning in 1880, the Waikapū plantation lands began to be merged with those of the Wailuku and Waihe‘e plantations. In 1905, a new sugar mill was constructed in Wailuku to accommodate the sugar brought in from the new outlying plantations, including Waikapū (Kaukali and Subica 2010:98).
16. In 1912, HC&S began to modernize the existing plantation camps. Between a huge influx of immigrant workers in 1909, and the burning of village areas of Pā‘ia and Kahului to control smallpox in 1910, changes to the camp system were in full swing. The plantation workforce continued to expand until 1917, when the U.S. declared war on Germany, and the accompanying draft seriously depleted the labor pool. By 1919, postwar requirements for sugar had driven the price to an all-time high of $471.40 per ton (Burns 1991).

17. Historic properties identified during previous studies in the vicinity of the study area include clusters of human burials near the Mā‘alaea Small Boat Harbor and in the region to the northwest, in addition to the Naval Air Station (NAS) Puunene (SIHP # 50-50-09-04164), habitation/agricultural complexes, and various historic plantation and ranching features.
18. Cultural practices and resources identified in previous cultural studies within Waikapū Ahupua‘a include *lo‘i kalo*, gathering practices for *lā‘au lapa‘au*, freshwater resources, and burial practices.

10.2 Results of Community Consultation

CSH initiated contact with Hawaiian organizations, agencies, and community members as well as cultural and lineal descendants in order to identify individuals with cultural expertise and/or knowledge of the study area and vicinity. Community outreach letters were sent to 46 individuals or groups; seven responded and one of these *kama‘āina* and/or *kūpuna* met with CSH for an in-depth interview. Consultation was received from:

1. Dr. Scott Fisher, Chief Conservation Officer, HILT; Chief, MLIBC; and *kama‘āina*

10.3 Identification of Cultural Practices

Based on the results of community consultation and background research conducted as part of this CIA, CSH has identified the following cultural resources and practices within Waikapū Ahupua‘a:

1. Freshwater resources (Waikapū Stream and Keālia Pond)
2. Agricultural practices (*kalo, ‘ulu,* and *‘uala*)
3. Gathering plant resources for *lā‘au lapa‘au* in the uplands of Waikapū Valley and along Waikapū Stream
4. Burial practices and sites

No ongoing cultural practices were identified within the study area during background research and community consultation. However, the study area is located in the general vicinity of ongoing cultural practices such as *‘ulu* and *kalo* cultivation.

10.4 Identification of Impacts to Cultural Practices

No impacts to ongoing cultural practices were identified within the study area during background research and community consultation for this CIA. Consultation identified a number of concerns related to the environment and the broader community:

1. Visual impact on the natural landscape
    a. Dr. Fisher expressed his concern that the Kūihelani Solar Phase 2 project will negatively impact the aesthetics of the natural landscape. As another solar project, the Kūihelani Solar + Storage project, is located just north of the current project, Dr. Fisher is concerned that adding another solar project within Waikapū Ahupua‘a will result in a new monocrop of solar.
2. Impacts to freshwater resources
    a. Dr. Fisher also expressed his concern in regards to the proposed action potentially impacting the water quality of Waikapū Stream, as it runs along the eastern

boundary of the study area, and Keālia Pond, as it is the *muliwai* (river mouth) of Waikapū Stream, where many endangered and migratory birds reside.

10.5 Mitigation Possibilities Identified During Background Research and Consultation

The results of community consultation, underscored by background research conducted for this CIA, inform the following mitigation possibilities promoting and preserving cultural beliefs, practices, and resources of Native Hawaiians and other ethnic groups:

1. Although the discovery of burials within the study area is unlikely, Dr. Fisher has recommended archaeological/cultural monitoring during any ground disturbance activities.
2. Project construction workers and all other personnel involved in the construction and related activities of the project should be informed of the possibility of inadvertent cultural finds, including human remains. In the event that any potential historic properties are identified during construction activities, all activities should cease and the SHPD should be notified pursuant to HAR §13-280-3. In the event that *iwi kūpuna* (Native Hawaiian skeletal remains) are identified, all earth moving activities in the area should stop, the area should be cordoned off, and the SHPD and Police Department should be notified pursuant to HAR §13-300-40. In addition, in the event of an inadvertent discovery of human remains, the completion of a burial treatment plan, in compliance with HAR §13-300 and HRS §6E-43, is recommended.
3. In the event that *iwi kūpuna* and/or cultural finds are encountered during construction, project proponents should consult with cultural and lineal descendants of the area to develop a reinterment plan and cultural preservation plan for proper cultural protocol, curation, and long-term maintenance.

10.6 *Ka Pa‘akai* Analysis

In Ka Pa‘akai vs Land Use Commission, 94 Hawai‘i (2000) the Court held the following analysis must also be conducted:

1. The identity and scope of valued cultural, historical, or natural resources in the study area, including the extent to which traditional and customary native Hawaiian rights are exercised in the study area;
2. The extent to which those resources—including traditional and customary native Hawaiian rights—will be affected or impaired by the proposed action; and
3. The feasible action, if any, to be taken by the LUC to reasonably protect native Hawaiian Rights if they are found to exist.

Based on information gathered from the cultural and historical background, and community consultation for this study, Camp 7, four post-Contact historic properties, and two gulches, Pōhākea and Pale‘a‘ahu, are located within the study area. Waikapū Stream also runs along the eastern edge of the study area. Camp 7 was demolished and removed to make way for the expansion of agricultural fields. Similar to Waikapū Stream, Pōhākea and Pale‘a‘ahu gulches also flow into Keālia Pond and typically only flow during stormwater events. However, Pale‘a‘ahu

Gulch terminates in the central portion of the study area. It is important for the developers to design accordingly so that water quality is not impacted by the proposed action. Regarding the four historic properties identified by the companion AIS for this project, archaeological monitoring was recommended during project construction.

At present, there is no documentation or testimony indicating traditional or customary Native Hawaiian rights are currently being exercised "for subsistence, cultural and religious purposes and possessed by ahupua‘a tenants who are descendants of native Hawaiians who inhabited the Hawaiian Islands prior to 1778" (Hawai‘i State Constitution, Article XII, Section 7) within the specific study area. While no cultural resources, practices, or beliefs were identified as currently existing within the study area, Waikapū Ahupua‘a maintains a rich cultural history in the exercise of traditional or customary Native Hawaiian rights within the project *ahupua‘a*. The focus of concerns is impacts to the visual aesthetics of the natural landscape and freshwater quality.

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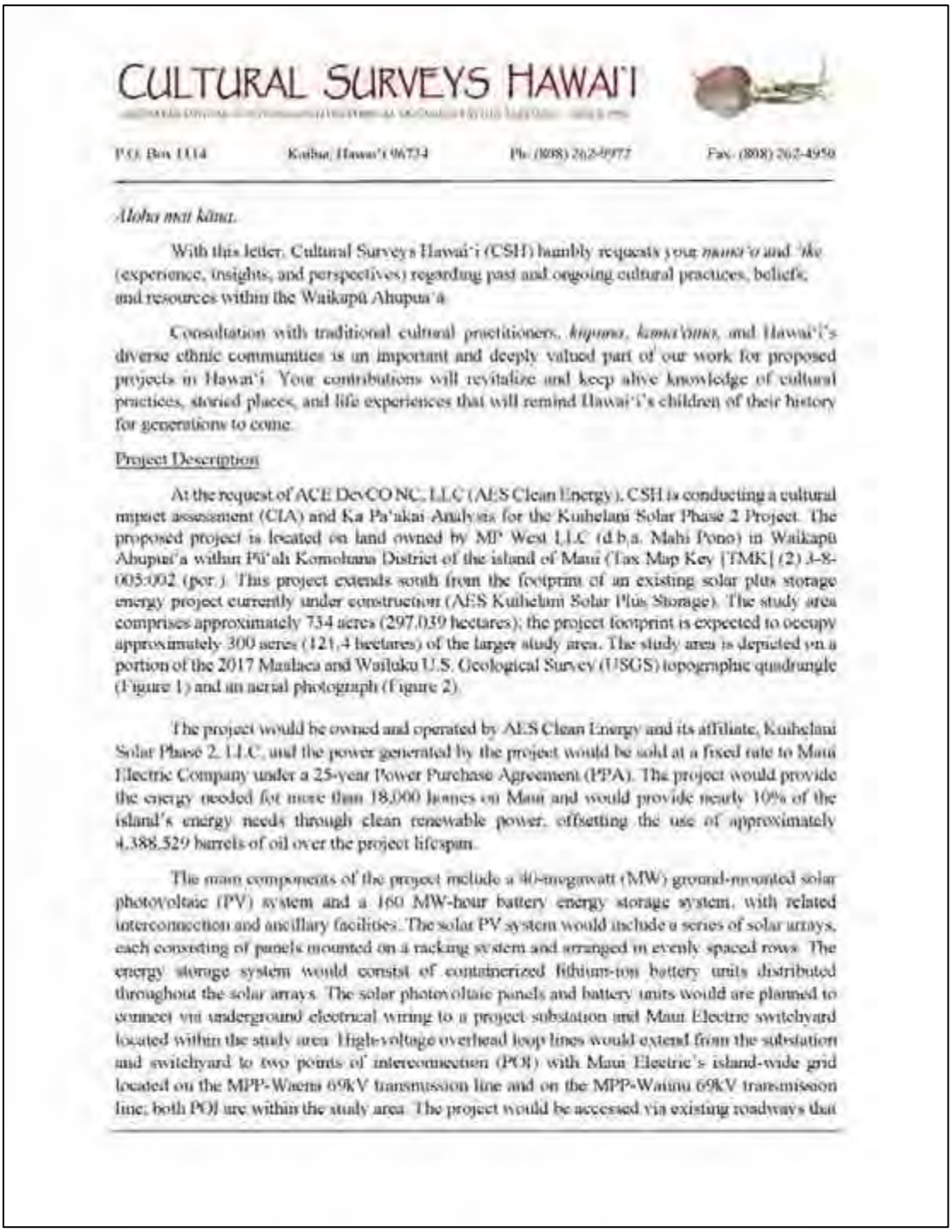
Appendix A Community Outreach Letter



CULTURAL SURVEYS HAWAI'I

P.O. Box 1114 Kailua, Hawai'i 96734 Ph: (808) 262-9972 Fax: (808) 262-4950

Aloha mai kāua.

With this letter, Cultural Surveys Hawai'i (CSH) humbly requests your *mana'o* and *'ike* (experience, insights, and perspectives) regarding past and ongoing cultural practices, beliefs, and resources within the Waikapū Ahupua'a.

Consultation with traditional cultural practitioners, *kupuna*, *kama'aina*, and Hawai'i's diverse ethnic communities is an important and deeply valued part of our work for proposed projects in Hawai'i. Your contributions will revitalize and keep alive knowledge of cultural practices, storied places, and life experiences that will remind Hawai'i's children of their history for generations to come.

Project Description

At the request of ACE DevCO NC, LLC (AES Clean Energy), CSH is conducting a cultural impact assessment (CIA) and Ka Pa'akai Analysis for the Kuihelani Solar Phase 2 Project. The proposed project is located on land owned by MP West LLC (d.b.a. Mahi Pono) in Waikapū Ahupua'a within Pū'ali Komohana District of the island of Maui (Tax Map Key [TMK] (2) 3-8-005:002 (por.). This project extends south from the footprint of an existing solar plus storage energy project currently under construction (AES Kuihelani Solar Plus Storage). The study area comprises approximately 734 acres (297.039 hectares); the project footprint is expected to occupy approximately 300 acres (121.4 hectares) of the larger study area. The study area is depicted on a portion of the 2017 Maalaea and Wailuku U.S. Geological Survey (USGS) topographic quadrangle (Figure 1) and an aerial photograph (Figure 2).

The project would be owned and operated by AES Clean Energy and its affiliate, Kuihelani Solar Phase 2, LLC, and the power generated by the project would be sold at a fixed rate to Maui Electric Company under a 25-year Power Purchase Agreement (PPA). The project would provide the energy needed for more than 18,000 homes on Maui and would provide nearly 10% of the island's energy needs through clean renewable power, offsetting the use of approximately 4,388,529 barrels of oil over the project lifespan.

The main components of the project include a 40-megawatt (MW) ground-mounted solar photovoltaic (PV) system and a 160 MW-hour battery energy storage system, with related interconnection and ancillary facilities. The solar PV system would include a series of solar arrays, each consisting of panels mounted on a racking system and arranged in evenly spaced rows. The energy storage system would consist of containerized lithium-ion battery units distributed throughout the solar arrays. The solar photovoltaic panels and battery units would are planned to connect via underground electrical wiring to a project substation and Maui Electric switchyard located within the study area. High-voltage overhead loop lines would extend from the substation and switchyard to two points of interconnection (POI) with Maui Electric's island-wide grid located on the MPP-Waena 69kV transmission line and on the MPP-Waiinu 69kV transmission line; both POI are within the study area. The project would be accessed via existing roadways that

Figure 25. Community outreach letter, page one

extend into the property and would utilize a network of existing and new on-site access roads. Temporary construction staging and laydown would occur within the study area.

Purpose of this Study

The purpose of a CIA is to gather information on Hawai'i's cultural resources, practices, or beliefs that have occurred or still occur within the study area and Waikapū Ahupua'a. The purpose of a Ka Pa'akai Analysis outreach is to 1) identify and scope valued cultural, historical, or natural resources in the study area, including the extent to which traditional and customary Native Hawaiian rights are exercised in the study area; 2) identify the extent to which those resources, including traditional and customary Native Hawaiian rights, will be affected or impaired by the proposed action; and 3) identify any feasible action, if any, to be taken to reasonably protect traditional and customary Native Hawaiian rights, if they are found to exist, either currently or possibly in the past. This is accomplished through consultation and background research using previously written documents, studies, and interviews. This information is used to assess potential impacts by the proposed project to the specific identified resources, practices, and beliefs in the study area and throughout Waikapū Ahupua'a. As a knowledgeable member of the community holding long-term cultural knowledge, your insight, input, and perspective provide a valuable contribution to the assessment of potential effects of this project and an understanding of how to protect these resources and practices.

Insights focused on the following topics in the study area (shown on the attached Figures 1 and 2) are especially helpful and appreciated:

- Your knowledge of traditional cultural practices of the past within the study area and Waikapū Ahupua'a
- Your specific traditional cultural practice and its connection to the study area and Waikapū Ahupua'a
- The different natural resources associated with your specific traditional cultural practice
- Legends, stories, or chants associated with your specific traditional cultural practices and their relationships to the study area and Waikapū Ahupua'a
- Referrals to other *kūpuna*, *kama'āina*, and traditional cultural practitioners knowledgeable about the study area and Waikapū Ahupua'a
- Your comments or thoughts on the potential impacts the proposed project may have on your ongoing traditional cultural practices and natural resources within the study area and Waikapū Ahupua'a
- Your knowledge of cultural sites and *wahi pana* (storied places) within the study area and Waikapū Ahupua'a
- Your comments or thoughts on the potential impacts the proposed project may have on cultural sites and *wahi pana* within the study area and Waikapū Ahupua'a

Figure 26. Community outreach letter, page two

CULTURAL SURVEYS HAWAI'I

P.O. Box 1114 Kailua, Hawai'i 96734 Ph: (808) 262-9972 Fax: (808) 262-4950

Consultation Information

Consultation is an important and deeply valued part of the CIA process and the environmental review process. Your contributions will revitalize and keep alive our combined knowledge of past and ongoing cultural practices, historic places, and experiences, reminding our children of their history generation after generation.

With your agreement to participate in this study, your contributions will become part of the comprehensive understanding of traditions of the area and will be part of the public record. The CIA will be available for future access through the State Office of Planning and Sustainable Development (OPSD) Environmental Review Program (ERP) (https://planning.hawaii.gov/erp) and at the State Historic Preservation Division Library (https://dlnr.hawaii.gov/shpd/about/research-resources-library).

As a part of this process, your knowledge may be used to inform future CIAs and other heritage studies of cultural practices and resources that need protection from impacts of proposed future projects. If you engage in consultation, and the *mana'o* and *'ike* you provide appears in the study, we would like to recognize your contribution by including your name. If you prefer not to allow your name to be included, your information can be attributed to an anonymous source.

The consultation interview structure and format are flexible. We will accommodate your preference on how to get together: talk story, over the phone, by email correspondence, remotely via Zoom, MS Teams, Google Chat or other remote meeting platforms.

Your knowledge of the resources and potential effect of the project on traditional practices in the project area and Waikapū Ahupua'a focusing on the topics in the bullet points above can also be submitted in a written statement. CSH will provide return postage for your written statement on request.

CSH is happy to provide a list of topics for discussion, a more structured questionnaire of interview questions, or any other assistance that might be helpful.

If you have questions regarding consultation, or are interested in participating in this study, please contact Tehani Baculpo by email at tbaculpo@culturalsurveys.com or phone at (808) 965-6478.

Mahalo nui loa,

Tehani Baculpo

CSH Cultural Researcher

Figure 27. Community outreach letter, page three

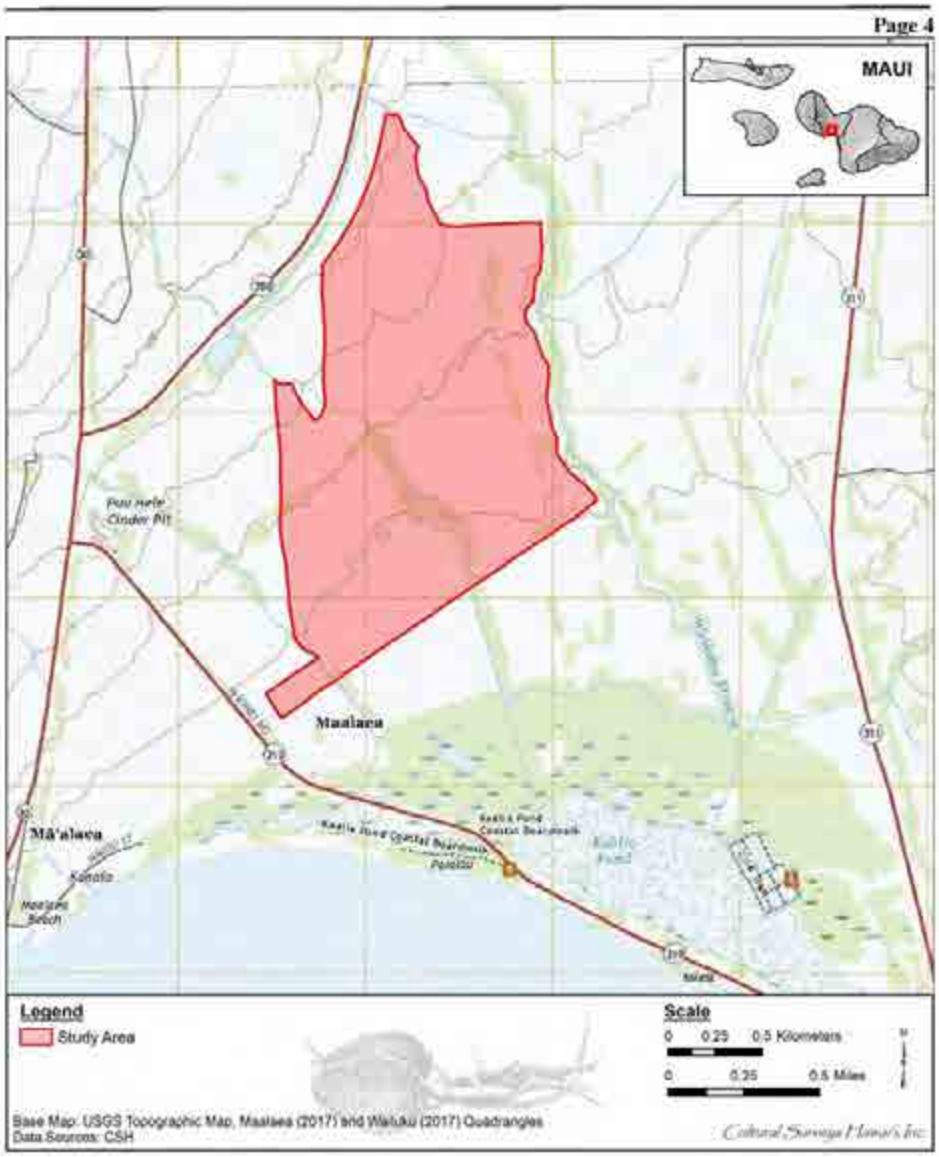


Figure 1. Portion of the 2017 Maalaea and Wailuku USGS topographic quadrangle with the project area delineated

Figure 28. Community outreach letter, page four

WAIKAPU 53 - CIA for the Kuihelani Solar Phase 2 Project

Page 5

Figure 2. 2020 ESRI aerial image superimposed with the boundaries of the project area

Figure 29. Community outreach letter, page five

Appendix M. Economic Impact Assessment Report

Environment and Economics LLC
Saint Augustine, FL 32084
808.366.8323
david@environment-economics.com

ATTN:
Kuihelani Solar Phase 2, LLC
c/o AES Clean Energy Development, LLC
282 Century Place Suite 2000
Louisville, CO 80027

RE: Final Economic Impact Report for Kūihelani Solar Phase 2, July 2025

Environment and Economics, LLC (E&E) was retained by Kuihelani Solar Phase 2, LLC (AES), to analyze economic and fiscal impacts of the proposed Kuihelani Solar Phase 2 project (the Project); the finalized Economic Impact Report was provided to AES in July 2025.

In August 2025, E&E was made aware that the duration of the Project's operations may vary from the 25-year operational term modeled in the Economic Impact Report. E&E understands that the Project's operational duration has not yet been finalized and is ultimately subject to approval by the Public Utility Commission. In the event of a possible 20-year operational term, preliminary examination indicates a reduction in overall totals identified in the report. The reduction in created or sustained jobs would be approximately 6.8%, labor income approximately 3.4%, and total economic output approximately 5.1%. State of Hawai'i and Maui County government revenue reductions, relative to those identified in the report, would be approximately 6.3% for State revenue and 11.4% for County revenue. As pre-development, construction, and decommissioning activities would not be affected by the change in operational term, economic and fiscal impacts associated with those activities are unaffected; the reductions would be spread over the long-term aspects of the Project and would be due solely to the shorter period of analysis.

Sincerely,

David Kiernan
Managing Member

FINAL

Economic Impact Report for Kūihelani Solar Phase 2

July 2025

EXECUTIVE SUMMARY

This Economic Impact Report was conducted to assess the economic impacts that the proposed Kūihelani Solar Phase 2 project would have on the economy of Maui County and the fiscal revenue of the State of Hawai‘i and Maui County governments. Potential economic and fiscal impacts are assessed for various aspects of the project: 1) the pre-development period which is currently underway and is anticipated to have a duration of approximately 4-years, 2) the construction period which has an estimated duration of 14-months, 3) the operations period, which would have a duration of 25-years, 4) annual lease payments that would be made to the landowner to support its existing agricultural operation, 5) community benefits payments made over the operational life of the project, and 6) decommissioning of the project, which is estimated to take place over the course of 1-year. Table ES-1 shows total economic impacts in the short-term (including pre-development and construction), long-term (including operations, community benefits payments, and lease payments), and for decommissioning. Table ES-2 shows total fiscal revenue in the short-term, long-term, and for decommissioning.

Table ES-1. Economic Impacts[1]

Project Phase[2]	Jobs	Labor Income	Economic Output
Short-term[2]	937	$68,937,195	$167,546,703
Long-term [2,3]	527	$15,260,817	$64,723,122
Decommissioning	77	$5,359,510	$19,618,501
Totals	**1,541**	**$89,557,522**	**$251,888,326**

Notes:
[1]Includes direct, indirect, and induced impacts.
[2]Short-term includes pre-development and construction. Long-term includes project operations, community benefits payments, and effects of lease payments to support existing agriculture.
[3] Long-term impacts are shown on a total basis, for the project duration.

Table ES-2. Fiscal Impacts

Project Phase[1]	State of Hawai‘i Government Revenue	Maui County Government Revenue
Short-term[1]	$6,741,535	$2,267,245
Long-term[1,2]	$3,426,994	$4,603,535
Decommissioning	$765,704	$302,659
Totals	**$10,934,233**	**$7,173,439**

Notes:
[1]Short-term includes pre-development and construction. Long-term includes project operations, community benefits payments, and effects of lease payments to support existing agriculture.
[2] Long-term impacts are shown on a total basis, for the project duration.

In addition to these impacts, in compliance with HRS §205-4.5(a)(21), the project will involve partnering with a Maui-based agricultural operator. About 250 acres of project land, with an approximate market lease value of $500,000 per year, will be made available at no cost to the agricultural partner to conduct compatible agricultural activities including lamb grazing and honey production. Early estimates indicate that 5,000 lbs. of lamb and 2,500 lbs. of honey will be produced on project land every year once agricultural operations are fully established. That level of agricultural production would generate nearly $40,000 per year in annual revenue and close to $1,000,000 in revenue over the course of the 25-year partnership.

Economic Impact Report
for Kūihelani Solar Phase 2
TABLE OF CONTENTS

EXECUTIVE SUMMARY **ES-1**
ABBREVIATIONS AND ACRONYMS ..... **iii**
1 INTRODUCTION **1-1**
2 APPROACH TO ANALYSIS **2-1**
2.1 Region of Influence 2-1
2.2 Input Data and Modeling Procedures 2-1
2.3 Economic Result Variables 2-2
2.3.1 Jobs 2-2
2.3.2 Labor Income 2-2
2.3.3 Economic Output 2-2
2.4 Fiscal Result Variables 2-2
2.4.1 State of Hawai‘i Government Revenue 2-3
2.4.2 Maui County Revenue 2-3
3 ECONOMIC BACKGROUND **3-1**
4 ECONOMIC IMPACT RESULTS **4-1**
4.1 Pre-Development 4-1
4.1.1 Jobs 4-1
4.1.2 Labor Income 4-1
4.1.3 Economic Output 4-1
4.2 Construction 4-2
4.2.1 Jobs 4-2
4.2.2 Labor Income 4-2
4.2.3 Economic Output 4-2
4.3 Operations 4-3
4.3.1 Jobs 4-3
4.3.2 Labor Income 4-3
4.3.3 Economic Output 4-3
4.4 Lease Payments to Support Landowner’s Existing Agricultural Operation 4-4
4.4.1 Jobs 4-4
4.4.2 Labor Income 4-4
4.4.3 Economic Output 4-4
4.5 Power Purchase Agreement Community Benefits Package 4-5
4.5.1 Jobs 4-5

4.5.2 Labor Income 4-5
4.5.3 Economic Output 4-5
4.6 Decommissioning 4-6
4.6.1 Jobs 4-6
4.6.2 Labor Income 4-6
4.6.3 Economic Output 4-6
5 FISCAL IMPACT RESULTS 5-1
5.1 Pre-Development 5-1
5.2 Construction 5-2
5.3 Operations 5-3
5.4 Lease Payments to Support Existing Agriculture 5-4
5.5 Power Purchase Agreement Community Benefits Package 5-5
5.6 Decommissioning 5-6
6 REFERENCES 6-1

List of Tables

Table ES-1. Economic Impacts[1] ES-1
Table ES-2. Fiscal Impacts ES-1
Table 3-1. Population Totals and Anuual Growth Rates by Area 3-1
Table 3-2. State of Hawai‘i and Maui County Labor Statistics, 2018-2024 3-2
Table 4-1. Jobs 4-1
Table 4-2. Labor Income (2025 $s) 4-1
Table 4-3. Economic Output (2025 $s) 4-1
Table 4-4. Jobs 4-2
Table 4-5. Labor Income (2025 $s) 4-2
Table 4-6. Economic Output (2025 $s) 4-2
Table 4-7. Jobs, Annual & 25-Year Total 4-3
Table 4-8. Labor Income, Annual & 25-Year Total (2025 $s) 4-3
Table 4-9. Economic Output, Annual & 25-Year Total (2025 $s) 4-3
Table 4-10. Jobs, Annual & 30-Year Total 4-4
Table 4-11. Labor Income, Annual & 30-Year Total (2025 $s) 4-4
Table 4-12. Economic Output, Annual & 30-Year Total (2025 $s) 4-4
Table 4-13. Jobs, Annual & 25-Year Total 4-5
Table 4-14. Labor Income, Annual & 25-Year Total (2025 $s) 4-5
Table 4-15. Economic Output, Annual & 25-Year Total (2025 $s) 4-5

Table 4-16. Jobs 4-6
Table 4-17. Labor Income (2025 $s) 4-6
Table 4-18. Economic Output (2025 $s) 4-6
Table 5-1. State of Hawai‘i Government Revenue (2025 $s) 5-1
Table 5-2. Maui County Government Revenue (2025 $s) 5-1
Table 5-3. State of Hawai‘i Government Revenue (2025 $s) 5-2
Table 5-4. Maui County Government Revenue (2025 $s) 5-2
Table 5-5. State of Hawai‘i Government Revenue, Annual & 25-Year Total (2025 $s) 5-3
Table 5-6. Maui County Government Revenue, Annual & 25-Year Total (2025 $s) 5-3
Table 5-7. State of Hawai‘i Government Revenue, Annual & 30-Year Total (2025 $s) 5-4
Table 5-8. Maui County Government Revenue, Annual & 30-Year Total (2025 $s) 5-4
Table 5-9. State of Hawai‘i Government Revenue, Annual & 25-Year Total (2025 $s) 5-5
Table 5-10. Maui County Government Revenue, Annual & 25-Year Total (2025 $s) 5-5
Table 5-11. State of Hawai‘i Government Revenue (2025 $s) 5-6
Table 5-12. Maui County Government Revenue (2025 $s) 5-6

Abbreviations and Acronyms

Acronym	Definition
%	percent
$s	dollars
AES	AES Distributed Energy
CCD	Census County Division
DBEDT	Department of Business Economic Development & Tourism
EIR	Economic Impact Report
GET	General Excise Tax
IMPLAN	Impact Analysis for Planning
JEDI	Jobs and Economic Development Impacts
NREL	National Renewable Energy Laboratory
ROI	Region of Influence

1 Introduction

Kūihelani Solar Phase 2, LLC (AES) proposes to build Kūihelani Solar Phase 2 - a 40 MWac solar photovoltaic array plus 160 MWh containerized lithium-ion Battery Energy Storage System in central Maui - approximately 3 miles south of Kahului, on a project study area of 729.6 acres of land owned by Mahi Pono. The Project, once constructed, is expected to occupy less than 50 percent of the study area and is proposing to interconnect to Maui Electric Company's grid at the to-be electronically reconfigured MPP-Waiinu 69kV line and the existing MPP-Waena 69kV line approximately 1,600' and 1,500' away from the proposed newly built Hawaiian Electric Company 69kV switchyard. The proposed project would have a 25-year operational life, and then would be decommissioned.

This Economic Impact Report (EIR) was conducted to assess and report on the impacts that the proposed Kūihelani Solar Phase 2 project would have on the Maui County economy where the project would take place. Additionally, fiscal benefits to both the State of Hawai'i and Maui County governments are presented. This EIR assesses impacts for six distinct aspects of the project, over various timeframes; these timeframes are based on planning assumptions and could be subject to change. The six aspects of the project for which analysis is conducted in this EIR are described below:

1. *Pre-development.* This aspect of the project would take place prior to construction and relates to activities such as permitting, technical studies, and civil engineering. The pre-development period would extend approximately 4 years (from early 2023 to March of 2027).
2. *Construction.* This aspect of the project would include preparation of baseline structures, interconnections, and installation of solar panels. The construction period is expected to last approximately 14 months (from April 2027 to June 2028),
3. *Operations*. This aspect of the project would include solar plant operations and maintenance and would take place over a 25-year period (from November 2028 to the end of October 2053),
4. *Lease payments to support an existing agricultural operation*. AES would lease land from Mahi Pono for the project. Lease payments would be made annually during the pre-development, construction, operations, and decommissioning periods. AES would also pay property taxes at the site throughout the project lifespan. Overall, this aspect of the project would cover an approximate 30-year period of analysis for this aspect of the project, predevelopment through completion of decommissioning.
5. *Community benefits payments.* The AES power purchase agreement requires that payments be made to support wellbeing initiatives as identified by the community. These payments would coincide with the operational life of the project (25 years, concurrent with operations).
6. *Decommissioning.* When the operations phase is complete, AES would remove structures and remediate land. This aspect of the project would take approximately one year (2053-2054).

Impacts associated with these aspects of the project are presented in terms of jobs, labor income, economic output, State of Hawai'i government revenue, and Maui County government revenue. Primary input data for the analysis were provided by AES and estimates of impacts were calculated using the Impact Analysis for Planning (IMPLAN) economic model, which was fitted with the most recent available data for Maui County, in conjunction with estimates developed using the National Renewable Energy Laboratory (NREL) Jobs and Economic Development Impacts (JEDI) model.

In addition to the six aspects of the project for which analysis is conducted, in compliance with HRS §205-4.5(a)(21), the project will involve partnering with a Maui-based agricultural operator. About 250 acres of

project land, with an approximate market lease value of $500,000 per year, will be made available at no cost to the agricultural partner to conduct compatible agricultural activities including lamb grazing and honey production. Early estimates indicate that 5,000 lbs. of lamb and 2,500 lbs. of honey will be produced on project land every year once agricultural operations are fully established. That level of agricultural production would generate nearly $40,000 per year in annual revenue and close to $1,000,000 in revenue over the course of the 25-year partnership. Additionally, the agricultural partner will receive payments and other financial support from AES for services that occur in the course of their normal operations; for instance, the agricultural partner will receive compensation as the grazing lamb maintain attractive grass heights around project equipment, and AES is also planning to financially support hiring of an agricultural intern who would work at the project site.

2 Approach to Analysis

2.1 Region of Influence

The Region of Influence (ROI) considered in this EIR is Maui County, which is the location of the proposed project. Fiscal impacts that would accrue to the State of Hawai‘i government are those that would be generated by economic activity that would take place within Maui County. Some economic benefits may spill over into locations outside of the ROI, as workers are likely to spend portions of their income elsewhere, such as Honolulu, Hawai‘i, and Kaua‘i Counties, but these potential spill-over effects would likely be minimal and are not captured in this report.

For the pre-development aspect of the project, impacts should be considered Statewide impacts. While the jobs and expenditures would relate to work being done for the project in Maui County, residents of other islands would likely hold a portion of the direct jobs and occasionally travel back and forth for project related work.

2.2 Input Data and Modeling Procedures

Primary data on project expenditures and employment, with details on the split between local and non-local expenditures, were provided by AES. These data were used in conjunction with the NREL JEDI model to develop inputs for the IMPLAN model. The intent of the JEDI model, for solar projects, is to establish a general profile of investments to show the economic effects that would be expected during the construction and operations of a solar project. Though the NREL conducted extensive research in developing the JEDI model, the model is not designed to provide an exact forecast and does not provide county-level information (NREL, 2025). To prepare more precise and county-specific results, the IMPLAN model, fitted with year 2023 data for Maui County, was utilized for the final step in modeling. The IMPLAN model is an economic input-output modeling application, which develops detailed data sets at various levels of geography on an annual basis (IMPLAN, 2025); it is the current industry standard for economic modeling.

Input data on industry expenditures related to pre-development were provided by AES, along with a description of activities related to pre-development. The local expenditures value was split between multiple IMPLAN sectors – about 40% to the environmental consulting sector, about 50% to the architectural and engineering sector, and another 10% to travel and legal services sectors.

Input data for construction were anchored in AES provided estimates of local construction expenditures. The NREL JEDI model was then used to establish an expenditures vector for that spending. Guided by the NREL JEDI model, total construction expenditures were applied to IMPLAN sectors with approximately 85% applied to the construction of power facilities sector, about 10% applied to wholesale trade sectors, and about 5% applied to retail trade and other services related sectors.

For operations, data on anticipated employment was provided by AES and were input into the Electric Power Generation – Solar sector of the IMPLAN model. IMPLAN calculated overall operations impacts based on anticipated direct employment.

For impacts related to lease payments to support existing agriculture, AES provided information on the anticipated annual lease payments to Mahi Pono. Under the assumption that Mahi Pono would utilize these payments to fund their existing agricultural operation, payments data was input into the IMPLAN model, into multiple agricultural sectors of the IMPLAN model to generate estimates of increased economic activity in the agricultural sector.

For the power purchase agreement community benefits payments, AES provided anticipated annual expenditures. The value of these expenditures was input into the IMPLAN model in the civil and community organizations sector.

For decommissioning, AES provided anticipated expenditures and described the nature of decommissioning activities, which would relate to both the removal of structures and the remediation of land. The value of these expenditures was input into the IMPLAN model in the waste management and remediation sector.

2.3 Economic Result Variables

Economic variables that are presented as results include jobs, labor income, and economic output. Each of these variables consists of a direct, indirect, and induced element. Estimated results for the variables were calculated by the IMPLAN model using the input data described above in Section 2.2. Increases in the result variables are considered beneficial as they tend to be associated with higher living standards.

Direct impacts are associated with the proposed project itself and include workers directly associated with initial project-related expenditures, the incomes earned by those workers, and the economic output generated by these initial project-related expenditures.

Indirect impacts are generated by the businesses that would supply goods and services that would facilitate various aspects of the project. Indirect jobs include jobs at companies that supply goods and services that support direct activities. Indirect jobs extend to include jobs related to the manufacture of products, to the extent that activity may occur in Maui County. Indirect labor income includes the income earned by people working indirect jobs. Indirect economic output includes the total sales volume related to the supply of goods and services net intermediate purchases.

Induced impacts are the result of spending of the wages and salaries of the direct and indirect workers on items such as food, housing, transportation, and medical services. This spending creates induced employment, labor income, and economic output in nearly all sectors of the economy, especially service sectors.

2.3.1 Jobs

Job impacts represent the number of jobs that would be created or sustained within the ROI as a result of the proposed project. The IMPLAN model generates job numbers that include both full-time and part-time jobs including jobs that may be short-term. Short-term jobs may include, for example, construction trades specialists such as carpenters that may only conduct part of the construction work.

2.3.2 Labor Income

Labor income impacts represent the income generated through the jobs that would be created or sustained as a result of the construction, operations, and other related economic activity in the ROI. All labor income estimates were calculated by the IMPLAN model based on either planned expenditures (for construction) or anticipated direct employment (for operations). Results were calculated in 2025 $s.

2.3.3 Economic Output

Economic output equals the total value of production, by industry, in a calendar year. It can also be described as annual revenues plus net change in inventory. Results were calculated in 2025 $s.

2.4 Fiscal Result Variables

Fiscal variables that are presented as results include State of Hawai‘i government revenue and Maui County government revenue. Each of these consists of multiple sources of revenue as described below in Section 2.4.1 and Section 2.4.2. Increases in government revenue are generally considered beneficial as revenue

can be used by governments to fund public services and capital expenditures. Also, when governments spend the revenue that they receive from the project, additional jobs, labor income, and economic output would be generated; however, effects of government expenditures are not captured in this EIR.

2.4.1 State of Hawai‘i Government Revenue

Revenue that would be accrued by the State of Hawai‘i government as a result of construction and operations are presented in four categories: 1) General Excise Tax (GET) and Use Tax, 2) Corporate Profits Tax, 3) Personal Income Tax, and 4) Other. Estimates were calculated by the IMPLAN model based on incomes, spending of incomes, and industry expenditures. Results were calculated in 2025 $s.

2.4.2 Maui County Revenue

Revenue that would be accrued by the Maui County government as a result of construction, operations, and decommissioning of the project are presented in two categories: 1) Property Tax, and 2) Other. Estimates of property tax that would be paid by AES directly on land used for the project (technically a ‘land tax’) were developed by utilizing outputs from the NREL JEDI model, which accounts for project size and scale, as inputs for the IMPLAN model, which calculates estimates of on-site property tax. Other revenue to the Maui County calculated by the IMPLAN model include, but are not limited to, sales tax revenue and revenue from licenses and fees. Results were calculated in 2025 $s.

3 Economic Background

Table 3-1 provides population data for 2010, 2015, 2020, and 2023 for the State of Hawai‘i, Maui County, and each of the Census County Divisions (CCDs) in Maui County, along with average annual growth rates from 2010 to 2020 and 2020 to 2023. As of 2023, the population for the State of Hawai‘i was about 1.45 million, with 164,632 of that population residing in Maui County (about 11.4% of the State population). The Kihei CCD, where the proposed project would occur, had a 2023 population of 25,405, making up about 15.4% of the Maui County population.

Population growth rates countywide, and through many Maui CCDs were lower from 2020 to 2023 than they were from 2010 to 2020. The Kihei CCD grew at an average annual rate of 1.1% from 2010-2020 exceeding the State and County rates, however from 2015 to 2023 the Kihei CCD declined. From 2020 to 20223, the Kihei CCD population declined at an average annual rate of -0.1% compared to a 0.6% statewide increase and a -0.4% decline for Maui County.

Table 3-1. Population Totals and Anuual Growth Rates by Area

	2010	2015	2020	2023	Average Annual Growth Rate 2010-2020	Average Annual Growth Rate 2020-2023
State of Hawai‘i	1,333,591	1,406,299	1,420,074	1,445,635	0.6%	0.6%
Maui County	150,711	160,863	166,657	164,632	1.1%	-0.4%
East Molokai	4,903	6,300	4,117	5,168	-1.6%	8.5%
Haiku-Pauwela	9,552	9,854	10,802	11,263	1.3%	1.4%
Hana	2,351	1,841	1,388	1,307	-4.1%	-1.9%
Kahului	24,712	28,476	29,993	27,068	2.1%	-3.3%
Kihei	23,066	24,801	25,492	25,405	1.1%	-0.1%
Kula	12,135	13,212	12,988	13,546	0.7%	1.4%
Lahaina	20,121	21,996	23,117	21,766	1.5%	-1.9%
Lanai	3,335	3,539	2,888	3,333	-1.3%	5.1%
Makawao-Paia	20,729	20,372	20,655	21,349	0.0%	1.1%
Spreckelsville	280	457	229	290	-1.8%	8.9%
Wahihee-Waikapu	5,201	7,568	7,837	8,364	5.1%	2.2%
Wailuku	21,865	21,626	24,771	22,849	1.3%	-2.6%
West Molokai	2,641	2,821	2,380	2,924	-1.0%	7.6%

Source: U.S. Census, 2010, 2015, 2020, 2023

Table 3-2 provides labor statistics for the State of Hawai‘i and Maui County for the years 2018 to 2024. The labor statistics include the size of the labor force, the total number of employed individuals, the total number of unemployed individuals, and the unemployment rate. Unemployment rates for both the State and Maui County were generally very low from 2018 to 2019 but surged in 2020 due to business closures and travel restrictions forced by the COVID-19 pandemic. The Maui County unemployment rate declined from 2020 to 2022 but began to rise again in 2023 due to the effects of wildfires. In recent months the unemployment rate was showing improvement (2.9% in April of 2025 and 3.0% in May of 2025 compared to 4.1% and 3.9% in the same months of 2024).

Table 3-2. State of Hawai‘i and Maui County Labor Statistics, 2018-2024

	2018	2019	2020	2021	2022	2023	2024
State of Hawai‘i							
Labor force	692,457	686,066	665,964	670,193	672,727	676,355	680,307
Employment	675,849	668,769	588,159	630,151	650,672	656,336	660,079
Unemployment	16,608	17,297	77,805	40,042	22,055	20,019	20,228
Unemployment rate	2.4%	2.5%	11.7%	6.0%	3.3%	3.0%	3.0%
Maui County							
Labor force	90,337	89,697	85,169	87,321	87,268	86,842	82,976
Employment	88,220	87,505	69,977	80,630	84,237	83,025	79,406
Unemployment	2,117	2,192	15,192	6,691	3,031	3,817	3,569
Unemployment rate	2.3%	2.4%	17.8%	7.7%	3.5%	4.4%	4.3%

Source: U.S. Bureau of Labor Statistics, 2025

4 Economic Impact Results

4.1 Pre-Development

4.1.1 Jobs

Table 4-1 shows that over the 4-year pre-development period there would be an estimated total of 65 jobs generated or sustained from Kūihelani Solar Phase 2 pre-development – 43 of the jobs would be direct, 13 indirect, and 10 induced.

Table 4-1. Jobs

	Total
Direct	43
Indirect	13
Induced	10
Total	**65**

Note: Some totals may not appear to sum from their parts due to rounding.

4.1.2 Labor Income

Table 4-2 shows that over the 4-year pre-development period there would be an estimated total of $3.4 million in labor income generated or sustained from Kūihelani Solar Phase 2 pre-development – $2.1 million would be direct, $0.72 million indirect, and $0.58 million induced.

Table 4-2. Labor Income (2025 $s)

	Total
Direct	$2,082,384
Indirect	$722,588
Induced	$575,458
Total	**$3,380,429**

Note: Some totals may not appear to sum from their parts due to rounding.

4.1.3 Economic Output

Table 4-3 shows that over the 4-year pre-development period there would be an estimated total of $9.5 million in economic output generated or sustained from Kūihelani Solar Phase 2 pre-development – $5.6 million would be direct, $2.1 million indirect, and $1.8 million induced.

Table 4-3. Economic Output (2025 $s)

	Total
Direct	$5,554,711
Indirect	$2,060,814
Induced	$1,841,687
Total	**$9,457,213**

Note: Some totals may not appear to sum from their parts due to rounding.

4.2 Construction

4.2.1 Jobs

Table 4-4 shows that over the 14-month construction period there would be an estimated total of 872 jobs generated or sustained from Kūihelani Solar Phase 2 construction – 615 of the jobs would be direct, 71 indirect, and 187 induced.

Table 4-4. Jobs

	Total
Direct	615
Indirect	71
Induced	187
Total	**872**

Note: Some totals may not appear to sum from their parts due to rounding.

4.2.2 Labor Income

Table 4-5 shows that over the 14-month construction period there would be an estimated total of $65.6 million in labor income generated or sustained from Kūihelani Solar Phase 2 construction – $50.2 million would be direct, $4.3 million indirect, and $11.1 million induced.

Table 4-5. Labor Income (2025 $s)

	Total
Direct	$50,154,777
Indirect	$4,295,014
Induced	$11,106,976
Total	**$65,556,766**

Note: Some totals may not appear to sum from their parts due to rounding.

4.2.3 Economic Output

Table 4-6 shows that over the 14-month construction period, there would be an estimated total of $158.1 million in economic output generated or sustained from Kūihelani Solar Phase 2 construction – $106.8 million would be direct, $15.7 million indirect, and $35.5 million induced.

Table 4-6. Economic Output (2025 $s)

	Total
Direct	$106,821,725
Indirect	$15,723,084
Induced	$35,544,681
Total	**$158,089,490**

Note: Some totals may not appear to sum from their parts due to rounding.

4.3 Operations

4.3.1 Jobs

Table 4-7 shows that there would be an estimated total of 4 jobs generated or sustained from Kūihelani Solar Phase 2 operations annually, for a 25-year period – 2 of the jobs would be direct, 1 indirect, and 1 induced. Over the course of the 25 years, there would be an estimated overall total of 104 jobs.

Table 4-7. Jobs, Annual & 25-Year Total

	Annual	Total
Direct	2	53
Indirect	1	24
Induced	1	27
Total	**4**	**104**

Notes Some totals may not appear to sum from their parts due to rounding.

4.3.2 Labor Income

Table 4-8 shows that there would be a total increase of $0.38 million in labor income generated or sustained from Kūihelani Solar Phase 2 operations annually, for a 25-year period – $0.26 million of the labor income would be direct, $57,187 indirect, and another $64,880 induced. Over the course of the 25 years, there would be an estimated overall total of $9.5 million in labor income generated or sustained.

Table 4-8. Labor Income, Annual & 25-Year Total (2025 $s)

	Annual	Total
Direct	$259,244	$6,481,089
Indirect	$57,187	$1,429,669
Induced	$64,880	$1,621,990
Total	**$381,310**	**$9,532,747**

Note: Some totals may not appear to sum from their parts due to rounding.

4.3.3 Economic Output

Table 4-9 shows that there would be a total increase of $1.6 million in economic output generated or sustained from Kūihelani Solar Phase 2 operations annually, for a 25-year period – $1.2 million of the economic output would be direct, $0.17 million indirect, and another $0.21 million induced. Over the course of the 25 years, there would be an estimated overall total of $39.0 million in economic output generated or sustained.

Table 4-9. Economic Output, Annual & 25-Year Total (2025 $s)

	Annual	Total
Direct	$1,179,281	$29,482,022
Indirect	$171,348	$4,283,702
Induced	$207,601	$5,190,037
Total	**$1,558,230**	**$38,955,760**

Note: Some totals may not appear to sum from their parts due to rounding.

4.4 Lease Payments to Support Landowner's Existing Agricultural Operation

4.4.1 Jobs

Table 4-10 shows that there would be an estimated total of 13 jobs generated or sustained from Kūihelani Solar Phase 2 lease payments to support existing agriculture annually, for approximately 30 years – 12 of the jobs would be direct, 1 indirect, and less than 1 induced. Over the course of the 30 years, there would be an estimated overall total of 396 jobs.

Table 4-10. Jobs, Annual & 30-Year Total

	Annual	Total
Direct	12	356
Indirect	1	29
Induced	0	11
Total	**13**	**396**

Note: Some totals may not appear to sum from their parts due to rounding.

4.4.2 Labor Income

Table 4-11 shows that there would be a total increase of $132,250 in labor income generated or sustained from Kūihelani Solar Phase 2 lease payments to support existing agriculture annually, for approximately 30 years – $79,072 of the labor income would be direct, $32,002 indirect, and another $21,176 induced. Over the course of the 30 years, there would be an estimated overall total of $4.0 million in labor income generated or sustained.

Table 4-11. Labor Income, Annual & 30-Year Total (2025 $s)

	Annual	Total
Direct	$79,072	$2,372,155
Indirect	$32,002	$960,061
Induced	$21,176	$635,274
Total	**$132,250**	**$3,967,490**

Note: Some totals may not appear to sum from their parts due to rounding.

4.4.3 Economic Output

Table 4-12 shows that there would be a total increase of $0.7 million in economic output generated or sustained from Kūihelani Solar Phase 2 lease payments to support existing agriculture annually, for approximately 30 years – about $0.6 million of the economic output would be direct, $65,186 indirect, and approximately $67,648 induced. Over the course of the 30 years, there would be an estimated overall total of $21.4 million in economic output generated or sustained.

Table 4-12. Economic Output, Annual & 30-Year Total (2025 $s)

	Annual	Total
Direct	$571,989	$17,159,670
Indirect	$65,186	$1,955,570
Induced	$67,648	$2,029,436
Total	**$704,823**	**$21,144,676**

Note: Some totals may not appear to sum from their parts due to rounding.

4.5 Power Purchase Agreement Community Benefits Package

4.5.1 Jobs

Table 4-13 shows that there would be an estimated total of slightly more than 1 job generated or sustained from Kūihelani Solar Phase 2 community benefit payments annually, for approximately 25 years. Over the course of the 25 years, there would be an estimated overall total of 27 jobs.

Table 4-13. Jobs, Annual & 25-Year Total

	Annual	Total
Direct	1	18
Indirect	0	5
Induced	0	5
Total	**1**	**27**

Notes: Some totals may not appear to sum from their parts due to rounding.

4.5.2 Labor Income

Table 4-14 shows that there would be a total increase of $70,423 in labor income generated or sustained from Kūihelani Solar Phase 2 community benefit payments annually, for approximately 25 years – $49,328 of the labor income would be direct, $9,375 indirect, and another $11,721 induced. Over the course of the 25 years, there would be an estimated overall total of $1.8 million in labor income generated or sustained.

Table 4-14. Labor Income, Annual & 25-Year Total (2025 $s)

	Annual	Total
Direct	$49,328	$1,233,200
Indirect	$9,375	$234,368
Induced	$11,721	$293,013
Total	**$70,423**	**$1,760,580**

Note: Some totals may not appear to sum from their parts due to rounding.

4.5.3 Economic Output

Table 4-15 shows that there would be a total increase of $184,907 in economic output generated or sustained from Kūihelani Solar Phase 2 community benefit payments annually, for approximately 25 years – about $120,000 of the economic output would be direct, about $27,404 indirect, and approximately $37,503 induced. Over the course of the 25 years, there would be an estimated overall total of $4.6 million in economic output.

Table 4-15. Economic Output, Annual & 25-Year Total (2025 $s)

	Annual	Total
Direct	$120,000	$3,000,000
Indirect	$27,404	$685,106
Induced	$37,503	$937,581
Total	**$184,907**	**$4,622,686**

Note: Some totals may not appear to sum from their parts due to rounding.

4.6 Decommissioning

4.6.1 Jobs

Table 4-16 shows that over the 1-year decommissioning period there would be an estimated total of 77 jobs generated or sustained from decommissioning of Kūihelani Solar Phase 2 – 40 of the jobs would be direct, 22 indirect, and 15 induced.

Table 4-16. Jobs

	Total
Direct	40
Indirect	22
Induced	15
Total	**77**

Notes: Some totals may not appear to sum from their parts due to rounding.

4.6.2 Labor Income

Table 4-17 shows that over the 1-year decommissioning period there would be a total increase of $5.4 million in labor income generated or sustained from decommissioning of Kūihelani Solar Phase 2 – $3.1 of the labor income would be direct, $1.3 million indirect, and another $0.90 million induced.

Table 4-17. Labor Income (2025 $s)

	Total
Direct	$3,111,732
Indirect	$1,346,806
Induced	$900,972
Total	**$5,359,510**

Note: Some totals may not appear to sum from their parts due to rounding.

4.6.3 Economic Output

Table 4-18 shows that over the 1-year decommissioning period there would be a total increase of $19.6 million in economic output generated or sustained from decommissioning of Kūihelani Solar Phase 2 – $12.5 million of the economic output would be direct, $4.2 million indirect, and another $2.9 million induced.

Table 4-18. Economic Output (2025 $s)

	Total
Direct	$12,500,000
Indirect	$4,235,323
Induced	$2,883,178
Total	**$19,618,501**

Note: Some totals may not appear to sum from their parts due to rounding.

5 Fiscal Impact Results

5.1 Pre-Development

Table 5-1 shows that over the 4-year pre-development period there would be a total of approximately $378,378 in State of Hawai‘i government revenue generated or sustained from Kūihelani Solar Phase 2 pre-development. The majority of this revenue ($245,497) would be generated through GET.

Table 5-1. State of Hawai‘i Government Revenue (2025 $s)

Tax Category	Total
GET & Use	$245,497
Corporate Profit	$10,814
Personal Income	$109,679
Other	$12,388
Total	**$378,378**

Note: Some totals may not appear to sum from their parts due to rounding.

Table 5-2 shows that over the 4-year pre-development period there would be a total of approximately $139,105 in Maui County government revenue generated or sustained from Kūihelani Solar Phase 2 pre-development. The majority of this revenue ($118,147) would be generated through property taxes.

Table 5-2. Maui County Government Revenue (2025 $s)

Tax Category	Total
Property	$118,147
Other	$20,957
Total	**$139,105**

Note: Some totals may not appear to sum from their parts due to rounding.

5.2 Construction

Table 5-3 shows that over the 14-month construction period there would be a total of approximately $6.4 million in State of Hawai‘i government revenue generated or sustained from Kūihelani Solar Phase 2 project construction. The majority of this revenue ($3.7 million) would be generated through GET.

Table 5-3. State of Hawai‘i Government Revenue (2025 $s)

Tax Category	Total
GET & Use	$3,722,644
Corporate Profit	$340,899
Personal Income	$2,096,179
Other	$203,434
Total	**$6,363,157**

Note: Some totals may not appear to sum from their parts due to rounding.

Table 5-4 shows that over the 14-month construction period there would be a total of approximately $2.1 million in Maui County government revenue generated or sustained from Kūihelani Solar Phase 2 project construction. The majority of this revenue ($1.8 million) would be generated through property taxes.

Table 5-4. Maui County Government Revenue (2025 $s)

Tax Category	Total
Property	$1,791,550
Other	$336,589
Total	**$2,128,140**

Note: Some totals may not appear to sum from their parts due to rounding.

5.3 Operations

Table 5-5 shows that there would be a total of approximately $102,781 in State of Hawai‘i government revenue generated or sustained from Kūihelani Solar Phase 2 project operations, annually for 25-years. The majority of this revenue ($84,408) would be generated through GET. Over the course of the 25 years, there would be an estimated overall total of $2.6 million in State of Hawai‘i government revenue.

Table 5-5. State of Hawai‘i Government Revenue, Annual & 25-Year Total (2025 $s)

	Annual	Total
GET & Use	$84,408	$2,110,198
Corporate Profit	$3,012	$75,311
Personal Income	$11,957	$298,921
Other	$3,404	$85,090
Total	**$102,781**	**$2,569,520**

Note: Some totals may not appear to sum from their parts due to rounding.

Table 5-6 shows that there would be a total of approximately $170,728 in Maui County government revenue generated or sustained from Kūihelani Solar Phase 2 project operations, annually for 25 years. The majority of this revenue ($163,621) would be generated through property taxes. Over the course of the 25 years, there would be an estimated overall total of $4.3 million in Maui County government revenue.

Table 5-6. Maui County Government Revenue, Annual & 25-Year Total (2025 $s)

	Annual	Total
Property[1]	$163,621	$4,090,536
Other	$7,106	$177,658
Total[2]	**$170,728**	**$4,268,194**

Notes: [1]Includes estimated annual on-site property tax payments of approximately $156,000.
[2]Some totals may not appear to sum from their parts due to rounding.

5.4 Lease Payments to Support Existing Agriculture

Table 5-7 shows that there would be a total of $27,860 in State of Hawai‘i government revenue generated or sustained from Kūihelani Solar Phase 2 project lease payments to support existing agriculture, annually for 30 years. The majority of this revenue ($20,232) would be generated through GET. Over the course of the 30 years, there would be an estimated overall total of $0.70 million in State of Hawai‘i government revenue.

Table 5-7. State of Hawai‘i Government Revenue, Annual & 30-Year Total (2025 $s)

	Annual	Total
GET & Use	$20,232	$505,791
Corporate Profit	$4,040	$101,008
Personal Income	$2,725	$68,118
Other	$864	$21,590
Total	**$27,860**	**$696,506**

Note: Some totals may not appear to sum from their parts due to rounding.

Table 5-8 shows that there would be a total of $11,279 in Maui County government revenue generated or sustained from Kūihelani Solar Phase 2 project lease payments to support existing agriculture, annually for 30 years. The majority of this revenue ($9,737) would be generated through property taxes. Over the course of the 30 years, there would be an estimated overall total of $0.28 million in Maui County government revenue.

Table 5-8. Maui County Government Revenue, Annual & 30-Year Total (2025 $s)

	Annual	Total
Property	$9,737	$243,416
Other	$1,542	$38,548
Total	**$11,279**	**$281,964**

Note: Some totals may not appear to sum from their parts due to rounding.

5.5 Power Purchase Agreement Community Benefits Package

Table 5-9 shows that there would be a total of $6,439 in State of Hawai‘i government revenue generated or sustained from Kūihelani Solar Phase 2 community benefit payments, annually for 25 years. The majority of this revenue ($3,725) would be generated through GET. Over the course of the 25 years, there would be an estimated overall total of $0.16 million in State of Hawai‘i government revenue.

Table 5-9. State of Hawai‘i Government Revenue, Annual & 25-Year Total (2025 $s)

	Annual	Total
GET & Use	$3,725	$93,131
Corporate Profit	$345	$8,631
Personal Income	$2,160	$54,007
Other	$208	$5,200
Total	**$6,439**	**$160,968**

Note: Some totals may not appear to sum from their parts due to rounding.

Table 5-10 shows that there would be a total of $2,135 in Maui County government revenue generated or sustained from Kūihelani Solar Phase 2 community benefit payments, annually for 25 years. The majority of this revenue ($2,135) would be generated through property taxes. Over the course of the 25 years, there would be an estimated overall total of $53,377 in Maui County government revenue.

Table 5-10. Maui County Government Revenue, Annual & 25-Year Total (2025 $s)

	Annual	Total
Property	$1,793	$44,820
Other	$342	$8,557
Total	**$2,135**	**$53,377**

Note: Some totals may not appear to sum from their parts due to rounding.

5.6 Decommissioning

Table 5-11 shows that over the 1-year decommissioning period there would be a total of approximately $0.77 million in State of Hawai‘i government revenue generated or sustained from Kūihelani Solar Phase 2 project decommissioning. The majority of this revenue ($0.54 million) would be generated through GET.

Table 5-11. State of Hawai‘i Government Revenue (2025 $s)

Tax Category	Total
GET & Use	$539,041
Corporate Profit	$33,048
Personal Income	$168,730
Other	$24,885
Total	**$765,704**

Note: Some totals may not appear to sum from their parts due to rounding.

Table 5-12 shows that over the 1-year decommissioning period there would be a total of approximately $0.30 million in Maui County government revenue generated or sustained from Kūihelani Solar Phase 2 project decommissioning. The majority of this revenue ($0.26 million) would be generated through property taxes.

Table 5-12. Maui County Government Revenue (2025 $s)

Tax Category	Total
Property	$259,417
Other	$43,242
Total[2]	**$302,659**

Note: Some totals may not appear to sum from their parts due to rounding.

6 References

The IMPLAN Group. 2025. Company website. Available online at: https://www.implan.com/

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U.S. Census Bureau. 2010. American Community Survey 5-year estimates for 2010. Available online at: https://data.census.gov/cedsci/advanced

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U.S. Census Bureau. 2023.American Community Survey 5-year estimates for 2023. Available online at: https://data.census.gov/cedsci/advanced

U.S. Bureau of Labor Statistics. 2025. Local Area Unemployment Statistics for the State of Hawai‘i and Maui County. Available online at: https://www.bls.gov/lau/

Appendix N. Wetland Delineation Report and Jurisdictional Determination

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, HONOLULU DISTRICT
FORT SHAFTER, HAWAII 96858-5440

January 29, 2025

SUBJECT: Approved Jurisdictional Determination, Kūihelani Solar Phase 2, LLC. Kūihelani Solar Phase 2 Project, Kihei, Island of Maui, Hawaii, Department of the Army File No. POH-2024-00108

Michael Jenkins
Kuihelani Solar Phase 2, LLC
282 Century Pl. #2000
Louisville, CO 80027

Dear Mr. Jenkins:

The Honolulu District, U.S. Army Corps of Engineers (Corps), Regulatory Branch has received your request for a jurisdictional determination and clarification whether a Department of the Army (DA) permit is required for the Kūihelani Solar Phase 2 Project located approximately 2.75 miles north west of The City of Kihei, Island of Maui, Hawaii (20.818064º, -156.488145º) and consists of the 730 acre parcel as depicted in the review area map (Enclosure 1) which is the proposed project area for the development of the Kūihelani Solar Phase 2 Project. Your request has been assigned DA file number POH-2024-00108. Please reference this number in all future correspondence with our office relating to this action.

Based on our review of the information you provided and the enclosed approved jurisdictional determination (AJD) (Enclosure 2), dated January 16, 2025, the Kūihelani Solar Phase 2 Project site does not contain waters of the U.S., including wetlands or navigable waters of the U.S., as defined by 33 CFR Parts 328 and 329, respectively. Therefore, a DA permit under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act of 1899 is not required. The basis for our jurisdictional determination is on the enclosed AJD Form.

While a DA permit is not required for your proposed project, you are responsible for obtaining all other applicable Federal, state, or local authorizations required by law.

Thank you for your cooperation with the Honolulu District Regulatory Program. If you have any questions related to this determination, please contact me at 808.835.4309 or via e-mail at joshua.h.moffi@uace.army. You are encouraged to provide comments on your experience with the Honolulu District Regulatory Branch by accessing our web-based customer survey form at http://corpsmapu.usace.army.mil/cm_apex/f?p=regulatory_survey. For additional

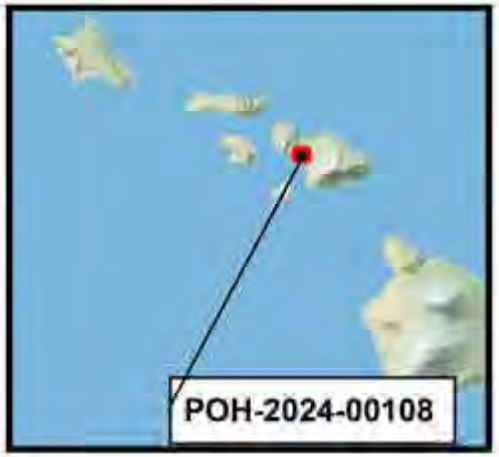
information about our Regulatory Program, please visit our web site at http://www.poh.usace.army.mil/Missions/Regulatory.aspx.

Sincerely,

Joshua Moffi
Project Manager, Regulatory Branch

Enclosure
Enclosure 1 – Review Area Map
Enclosure 2 – AJD

POH-2024-00108, Kuihelani Solar Phase 2
Approved Jurisdictional Determination



Legend

Review Area

Streams

N

0 0.175 0.35 0.7 Miles

POH-2024-00108, Pōhākea Gulch, Paleʻaʻahu Gulch

Notes:
For planning purposes only.

Date: January 16, 2025

Figure: 1 of 1

US ARMY CORPS OF ENGINEERS (USACE)
REGULATORY PROGRAM
APPROVED JURISDICTIONAL DETERMINATION FORM (INTERIM)
2023 RULE

OMB Control Number: 0710-0024
Expiration Date: 09/30/2023

AGENCY DISCLOSURE NOTICE

The public reporting burden for this collection of information, 0710-0024, is estimated to average 4 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or burden reduction suggestions to the Department of Defense, Washington Headquarters Services, at whs.mc-alex.esd.mbx.dd-dod-information-collections@mail.mil. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

I. ADMINISTRATIVE INFORMATION

Completion Date of Approved Jurisdictional Determination (AJD): 1/29/2025
ORM Project Name: Kuihelani Phase 2 Solar
ORM Identification Number: POH-2024-00108
☐ Other sites (e.g., offsite mitigation sites, disposal sites or other review areas, etc.) are associated with this action and are recorded on a different jurisdictional determination (JD) form(s).
Associated JD Names and Numbers: N/A
Review Area Location: State/Territory: Island of Maui, Hawaii City: Kihei
County/Parish/Borough: Maui
Center Coordinates of Review Area: Latitude: 20.818064°N, Longitude: 156.488145°W
Limits of review area: See Attached Map

II. SUMMARY[2]

Check all that apply. At least one box from the following list MUST be selected. Complete the corresponding tables in Section III., summarize data sources in Section IV., and attach completed Appendices A and/or B when specified.
☐ The review area is comprised entirely of dry land (i.e., there are no waters such as streams, rivers, wetlands, lakes, ponds, tidal waters, ditches, and the like in the entire review area). Rationale: Provide Rationale for Dry Land Determination
☐ There are "navigable waters of the United States" within Rivers and Harbors Act jurisdiction within the review area (complete the table in Section III.A.).
☐ There are "waters of the United States" within Clean Water Act jurisdiction within the review area (complete appropriate tables in Section III.B. and complete and attach appendices as appropriate).
☒ Potentially jurisdictional waters and/or features were assessed within the review area and determined to be non-jurisdictional (complete appropriate tables in Section III.C. and complete and attach appendices as appropriate).

[1] The final rule "Revised Definition of 'Waters of the United States'" (2023 Rule) was published in the *Federal Register* on 18 January 2023 and the effective date is 20 March 2023. See https://www.federalregister.gov/documents/2023/01/18/2022-28595/revised-definition-of-waters-of-the-united-states.
[2] Map(s)/figure(s) or descriptions of the review area and any jurisdictional waters are attached to the AJD provided to the requestor.

III. FINDINGS IN THE REVIEW AREA

A. Jurisdictional under the Rivers and Harbors Act of 1899[3] (Section 10)[4]

Section 10 Waters			
Section 10 water name	Section 10 size in review area		Type of Section 10 water
N/A	N/A	N/A	N/A.
Rationale for determination: N/A			

B. Jurisdictional under the Clean Water Act

Paragraph (a)(1) waters:[5] Waters which are: (i) Currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide (Traditional Navigable Waters); (ii) The territorial seas; or (iii) Interstate waters, including interstate wetlands			
(a)(1) water name	(a)(1) size in review area		Type of paragraph (a)(1) water
N/A	N/A	N/A	N/A.
Rationale for determination: N/A			

Paragraph (a)(2) waters: Impoundments of waters otherwise defined as waters of the United States under this definition, other than impoundments of waters identified under paragraph (a)(5)			
(a)(2) water name	(a)(2) size in review area		Type of paragraph (a)(2) water
N/A	N/A	N/A	N/A.
Rationale for determination: N/A			

[3] If the navigable water of the United States is not subject to the ebb and flow of the tide and not included on the district's list of Rivers and Harbors Act (RHA) Section 10 navigable waters of the United States list do NOT use this form to make a report of findings to support a determination that the water is a navigable water of the United States. The district must follow the procedure outlined in 33 CFR part 329.14 to make a determination that water is a navigable water of the United States subject to Section 10 of the Rivers and Harbors Act.

[4] USACE has authority under both Section 9 and Section 10 of the Rivers and Harbors Act of 1899 but for convenience, in this AJD form, jurisdiction under RHA will be referred to as Section 10.

[5] A stand-alone TNW determination for a water that is not subject to Section 9 or 10 of RHA is completed independently of a request for an AJD. A stand-alone TNW determination is conducted for a specific segment of river or stream or other type of waterbody, such as a lake, where upstream or downstream limits or lake borders are established. A stand-alone TNW determination should be completed following applicable guidance and should NOT be documented on the AJD Form.

US ARMY CORPS OF ENGINEERS (USACE)
REGULATORY PROGRAM
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2023 RULE

Paragraph (a)(3) waters: Tributaries of waters identified in paragraph (a)(1) or (2): (i) That are relatively permanent, standing or continuously flowing bodies of water; or (ii) That either alone or in combination with similarly situated waters in the region, significantly affect the chemical, physical, or biological integrity of waters identified in paragraph (a)(1)			
(a)(3) water name	(a)(3) size in review area		Type of paragraph (a)(3) water
N/A	N/A	N/A	N/A.
Rationale for determination: N/A			

Paragraph (a)(4) waters: Wetlands adjacent to the following waters: (i) Waters identified in paragraph (a)(1); or (ii) Relatively permanent, standing or continuously flowing bodies of water identified in paragraph (a)(2) or (a)(3)(i) and with a continuous surface connection to those waters; or (iii) Waters identified in paragraph (a)(2) or (3) when the wetlands either alone or in combination with similarly situated waters in the region, significantly affect the chemical, physical, or biological integrity of waters identified in paragraph (a)(1)			
(a)(4) water name	(a)(4) size in review area		Adjacency criteria
N/A	N/A	N/A	N/A
Type of paragraph (a)(4) water	N/A		
Rationale for determination: N/A			

Paragraph (a)(5) waters: Intrastate lakes and ponds, streams, or wetlands not identified in paragraphs (a)(1) through (4): (i) That are relatively permanent, standing or continuously flowing bodies of water with a continuous surface connection to the waters identified in paragraph (a)(1) or (a)(3)(i); or (ii) That either alone or in combination with similarly situated waters in the region, significantly affect the chemical, physical, or biological integrity of waters identified in paragraph (a)(1).[6]			
(a)(5) water name	(a)(5) size in review area		Type of paragraph (a)(5) water
N/A	N/A.	N/A	N/A
Rationale for determination: N/A			

[6] In implementing the significant nexus standard, the agencies generally intend to analyze waters under paragraph (a)(5) individually to determine if they significantly affect the chemical, physical, or biological integrity of a paragraph (a)(1) water.

C. Waters or features that are not jurisdictional under the Clean Water Act

Waters analyzed under paragraph (a)(3)(ii), (a)(4)(iii), or (a)(5)(ii) and determined non-jurisdictional: Tributaries of waters identified in paragraph (a)(1) or (2); and/or wetlands adjacent to waters identified in paragraph (a)(2) or (3); and/or intrastate lakes and ponds, streams, or wetlands not identified as (a)(1) through (4) waters; that either alone or in combination with similarly situated waters in the region, do not significantly affect the chemical, physical, or biological integrity of waters identified in paragraph (a)(1).			
Water name	Water size in review area		Type of water for which significant nexus was not met:
Pōhākea Gulch Pale‘a‘ahu Gulch Feature 1	2,140 5,100 985	Linear feet	N/A
Rationale for determination: N/A Pōhākea Gulch and Pale‘a‘ahu Gulch are ephemeral streams according to the data collected for the Pōhākea Watershed Plan. Feature 1 at 20.8111030, -156.496064 is believed to be an irrigation or drainage ditch, which no longer has connectivity to any other stream or aquatic feature.			

(b)(1) – (b)(8) Excluded Features[7]			
Excluded feature name	Excluded feature size in review area		Exclusion[8]
N/A	N/A	N/A	N/A
Rationale for determination: N/A			

IV. SUPPORTING INFORMATION

A. Paragraph (a)(1) water that is outside the review area:

a. Provide the name of the paragraph (a)(1) water: The closest (a)(1) water is Maalaea Bay on the Pacific Ocean which is located about 585 yards directly south of the most southerly point of the review area.
b. Type of paragraph (a)(1) water: (a)(1)(ii) Territorial Seas.
c. Provide the rationale for jurisdiction of the paragraph (a)(1) water: Maalaea Bay is subject to the ebb and flow of the tide.

B. Significant nexus analyses

[7] Transient features on the landscape that are difficult to document due to their non-permanent nature, such as rills and gullies, may not be specifically identified on the AJD form unless a requestor specifically asks a USACE district to do so. USACE districts may, in case-by-case instances, elect to document any such feature on a case-by-case basis, such as when the feature is relevant to analysis of the jurisdictional status of another water.

[8] Note the full text of the exclusions for (b)(1)-(6) and (b)(8) are included in the dropdown list, while the text for the (b)(7) exclusion is truncated due to space limitations. The full text of the (b)(7) exclusion is as follows: (b)(7) Waterfilled depressions created in dry land incidental to construction activity and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of waters of the United States

☐ Appendix A is attached and includes the significant nexus analysis for any waters in the review area that were evaluated under paragraph (a)(3)(ii) and/or paragraph (a)(4)(iii).
☐ Appendix B is attached and includes the significant nexus analyses for any waters in the review area that were evaluated under paragraph (a)(5)(ii).
☒ There are no waters in the review area that require evaluation under the significant nexus standard. Therefore, neither Appendix A nor Appendix B are included with this form

C. Data, models, and other relevant methods Select/enter all resources that were used to support this determination and include data/maps and/or references/citations in the administrative record, as appropriate.

☐ Aquatic resources delineation submitted by, or on behalf of, the requestor: Title(s) and Date(s)
The aquatic resources delineation submitted by or on behalf of the requestor is sufficient for purposes of this AJD Select
Rationale: N/A or Describe why Information is Partially or Wholly Insufficient for Purposes of this AJD
☐ Aquatic resources delineation prepared by the USACE: Title(s) and Date(s)
☐ Wetland field data sheets prepared by the USACE: Title(s) and Date(s)
☐ OHWM data sheets prepared by the USACE: Title(s) and Date(s)
☐ USACE site visit: Date(s) of site visit(s): Date(s) of Site Visit(s), Title(s) and Date(s) of Site Visit Summary Document(s)
☐ Previous Jurisdictional Determinations (AJDs or PJDs) addressing the same (or portions of the same) review area: ORM Number(s) and Date(s)
☒ Photographs: Provided by the applicant as part of their ADJ package.
☐ Aerial Imagery: Google Earth, Digital Globe, June 13, 2024.
☐ LiDAR: Source(s), Title(s) and Date(s)
☐ USDA NRCS Soil Survey: Title(s) and Date(s)
☐ USFWS NWI maps: Title(s) and Date(s)
☐ USGS topographic maps: Title(s) and Date(s)
☐ USGS NHD data/maps: Title(s) and Date(s)
☐ USGS Dynamic Surface Water Extent: Title(s) and Date(s)
☐ Section 10 navigability resource used: Title(s) and Date(s)

Other data sources or models used to aid in this determination:

Data source or model (Select)	Name, date, and other relevant information
USGS Sources	N/A
USEPA Sources	N/A
USDA Sources[9]	N/A
NOAA Sources	N/A
USACE Sources	N/A
Other state/local data (specify)	Pōhākea Watershed Plan Final Report. January 25, 2023, Maui County, Hawaii.
Other Sources	N/A

[9] Including Certified Wetland Determination from the NRCS.

D. Additional comments to support AJD: N/A

Kūihelani Solar Phase 2 Project

Waters of the United States Delineation Report

(POH-2024-00108)

Prepared for:

Kuihelani Solar Phase 2, LLC

Revised August 2024

TETRA TECH

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WATERS OF THE U.S. DELINEATION SUMMARY

Project Name	Kūihelani Solar Phase 2 Project (POH-2024-00108)
Study Area Location	Kīhei-Mākena District, Maui Island, Hawai'i 20.818061°, -156.488145° Tax Map Key (TMK) parcel (2) 3-8-005:002-0003 (por.)
Applicant	Kuihelani Solar Phase 2, LLC
Landowner	MP West LLC (d.b.a Mahi Pono)
Survey Dates	July 25 and 26, 2023; July 12, 2024
Project Staff	Tiffany Bovino Agostini, Senior Biologist Lara Reynolds, Biologist

Kuihelani Solar Phase 2, LLC (Kuihelani Solar Phase 2) is proposing the Kūihelani Solar Phase 2 Project (Project) in the Kīhei-Mākena District on the Island of Maui. The Project involves construction and operation of a 40-megawatt (MW) ground-mounted solar photovoltaic system coupled with a 160 MW-hour (MWh) battery energy storage system, a substation and switchyard, and related interconnection and ancillary facilities. To allow for responsible siting and avoidance of any sensitive features that may be identified, the Study Area for the Project was defined to encompass roughly 730 acres of land (tax map key [TMK] parcel (2) 3-8-005:002-0003[por.]), owned by MP West LLC (d.b.a Mahi Pono). Once constructed, the Project is expected to occupy less than 50 percent of the Study Area. Access for construction and operation of the Project would be via one or more existing roads that run into the Study Area, which include those extending from North Kīhei Road (South 8th and 9th Streets), Maui Veterans Highway, and Kūihelani Highway (through the existing AES Kūihelani Solar + Storage Project site). New service roads would be constructed for internal access within the Study Area.

Kuihelani Solar Phase 2 contracted Tetra Tech, Inc. (Tetra Tech) to conduct a delineation of potential Waters of the United States (WOTUS) regulated by the Clean Water Act within the Study Area. This report summarizes the findings of the WOTUS delineation and assessment conducted in the Study Area on July 25- 26, 2023 and July 12, 2024. It also includes observations during supplementary site visits in September and November 2023. Tetra Tech also delineated potential WOTUS immediately adjacent to the Study Area to inform Project planning efforts and ensure avoidance of impacts. Kuihelani Solar Phase 2 is requesting an approved jurisdictional determination (AJD) for the Study Area, as well as the features delineated adjacent to the Study Area.

The National Hydrography Dataset (NHD), National Wetland Inventory (NWI), and Hawai'i Division of Aquatic Resources (DAR) identify two gulches/streams within the Study Area: Pōhākea Gulch crosses the southwestern portion of the Study Area and Pale'a'ahu Gulch intersects the central portion of the Study Area. Waikapū Stream is outside of the Study Area, but runs along the eastern

boundary of the Study Area. A tributary to Waikapū Stream is mapped crossing the access road that extends from Kūihelani Highway (through the under-construction AES Kūihelani Solar + Storage Project site). An unnamed ditch (referred to as Roadside Ditch) and Waiheʻe Ditch are mapped by NWI and NHD along portions of the access road that extends from Maui Veterans Highway to the Study Area.

Tetra Tech delineated the ordinary high water mark (OHWM) of Pōhākea Gulch and Paleʻaʻahu Gulch within the Study Area. Tetra Tech also delineated the OHWM of Waikapū Stream, Waikapū Tributary, and an unnamed ditch (i.e., Roadside Ditch) adjacent to the Study Area. Based on the current regulatory regime (January 2023 Rule and conforming rule), Pōhākea Gulch and Paleʻaʻahu Gulch are not likely considered jurisdictional in the Study Area because these tributaries do not meet the relatively permanent standard and only flow for short periods in response to precipitation. Waikapū Stream would likely be considered a WOTUS because its flow to a Traditional Navigable Water is continuous during certain times of the year; however, the Study Area has been defined to avoid Waikapū Stream and no improvements to the existing road crossings are planned. Roadside Ditch would be excluded from jurisdiction because it was excavated wholly in and draining only dry land and does not carry a relatively permanent flow of water. Other features proximate to the existing access roads oustide of the Study Area were not delineated because no improvements or other work within these features is anticipated. No wetlands were observed or delineated in the Study Area. The conclusions within this report are subject to confirmation by the U.S. Army Corps of Engineers.

Table of Contents

1.0 Introduction 1
1.1 Regulatory Setting 1
1.2 Project Description 2
2.0 Description of Study Area 3
2.1 Climate 3
2.2 Topography and Soils 4
2.3 Surface Waters 4
2.4 Flora and Fauna 5
3.0 Methodology 6
3.1 Streams 7
3.2 Ditches 7
3.3 Wetlands 7
4.0 Results 7
4.1 Non-Wetland Waters 8
4.1.1 Pōhākea Gulch 8
4.1.2 Feature 1 8
4.1.3 Paleʻaʻahu Gulch 9
4.1.4 Waikapū Stream 9
4.1.5 Waikapū Tributary 10
4.1.6 Roadside Ditch 10
4.2 Wetlands 10
5.0 Assessment 11
5.1 Pōhākea Gulch 11
5.2 Feature 1 11
5.3 Paleʻaʻahu Gulch 11
5.4 Waikapū Stream 12
5.5 Waikapū Tributary 12
5.6 Roadside Ditch 12
6.0 Conclusions 12
7.0 Literature Cited 13

List of Tables

Table 1. Monthly Rainfall at Waikapū Country Club Gage Prior to the Survey....3
Table 2. Potential Waters of the U.S. Delineated in the Study Area....8

List of Figures

Figure 1. Study Area and Vicinity
Figure 2. Soil Types in the Study Area
Figure 3. Water Resources Identified by the NWI, NHD, and DAR Datasets
Figure 4. Delineated OHWM of Pōhākea Gulch, Feature 1, and Paleʻaʻahu Gulch
Figure 5. Delineated OHWM of Waikapū Stream and Waikapū Tributary
Figure 6. Delineated Roadside Ditch Adjacent to the Study Area

List of Appendices

Appendix A. Figures
Appendix B. Representative Photographs

Acronyms and Abbreviations

CFR	Code of Federal Regulations
CWA	Clean Water Act
DAR	State of Hawai‘i Department of Aquatic Resources
EPA	U.S. Environmental Protection Agency
FAC	Facultative
FACU	Facultative Upland
ha	hectare
km	kilometer
m	meter
mm	millimeter
MW	megawatt
NHD	National Hydrography Dataset
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
OHWM	ordinary high water mark
Project	Kūihelani Solar Phase 2 Project
RHA	Rivers and Harbors Act
Tetra Tech	Tetra Tech, Inc.
TMK	Tax Map Key
TNW	Traditional Navigable Waters
UPL	Upland
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WOTUS	Waters of the United States

1.0 Introduction

Kuihelani Solar Phase 2, LLC (Kuihelani Solar Phase 2), a subsidiary of AES Clean Energy (AES), is proposing the Kūihelani Solar Phase 2 Project (Project), a utility-scale solar energy facility to be located northwest of Kīhei in Central Maui. The Project involves construction and operation of a 40-megawatt (MW) ground-mounted solar photovoltaic system coupled with a 160-MW-hour (MWh) battery energy storage system, a substation and switchyard, and related interconnection and ancillary facilities (see Section 1.2). The Study Area for the Project includes 729.6 acres (295 hectares [ha]) of land owned by MP West LLC (d.b.a Mahi Pono) within a portion of tax map key (2) 3-8-005:002-0003. Existing data show that there are several surface water features within or directly adjacent to the Study Area that may be considered Waters of the U.S. (WOTUS) and therefore jurisdictional by the U.S. Army Corps of Engineers (USACE) under the Clean Water Act (CWA); these features include Pōhākea Gulch, Paleʻaʻahu Gulch, Waikapū Stream, Waikapū Tributary, and an unnamed ditch.

Kuihelani Solar Phase 2 contracted Tetra Tech, Inc. (Tetra Tech) to perform a delineation of potential WOTUS in the Study Area (Figure 1). Tetra Tech also delineated potential WOTUS immediately adjacent to the Study Area to inform Project planning and ensure avoidance of impacts. This report describes the extent and location of potential WOTUS delineated within the Study Area and immediate vicinity by Tetra Tech on July 25 and 26, 2023 and July 12, 2024. Supplemental observations were made during site visits on July 10 – 13, 2023, September 11-15, 2023, and November 2-3, 2023. Kuihelani Solar Phase 2 is requesting an approved jurisdictional determination (AJD) for the Study Area, as well as the features delineated immediately adjacent to the Study Area.

1.1 Regulatory Setting

USACE derives its regulatory authority over WOTUS from two federal laws: (1) Section 404 of the Clean Water Act (CWA) of 1972, and (2) Section 10 of the Rivers and Harbors Act (RHA) of 1899. Under Section 404 of the CWA, dredged and fill material may not be discharged into jurisdictional WOTUS without a permit. Section 10 of the RHA of 1899 prevents unauthorized obstruction or alteration of navigable WOTUS. Navigable waters are defined as “subject to the ebb and flow of the tide and/or presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce” (33 Code of Federal Regulations [CFR] 322.2(a)).

A "Revised Definition of 'Waters of the United States’" rule was published in the Federal Register on January 18, 2023 (Department of Army and EPA 2023a; January 2023 Rule), and the rule became effective on March 20, 2023. However, in August 2023, the U.S. Environmental Protection Agency (EPA) and USACE issued a final rule to amend the 2023 Rule to conform to the WOTUS definition consistent with the U.S. Supreme Court’s May 25, 2023 decision in the case of *Sackett v. Environmental Protection Agency*. The conforming rule became effective on September 8, 2023. Notably, the confirming rule removed the significant nexus standard and revised the definition of

adjacent to mean "having a continuous surface connection" (Department of Army and EPA 2023). The Honolulu District is currently interpreting WOTUS under the January 2023 Rule, as amended by the conforming rule (EPA 2023).

Categories of jurisdictional waters under the current WOTUS definition include: 1.) traditional navigable waters (TNW), territorial seas, and interstate waters (also known as (a)(1) waters); 2.) impoundments of WOTUS; 3.) tributaries of TNW, territorial seas, and interstate waters that are relatively permanent, standing or continuously flowing bodies of water; 4.) certain adjacent wetlands; and 5.) certain additional waters. The current definition excludes certain features from jurisdiction including "ditches excavated wholly in and draining only dry land, and that do not carry a relatively permanent flow of water", and "swales and erosional features (e.g., gullies, small washes) characterized by low volume, infrequent, or short duration flow" (Department of Army and EPA 2023, EPA 2023).

In parallel with the federal CWA, Maui County has adopted Wetlands Ordinance 5421 to protect and restore the County's wetland resources, including wetlands, ponds, and perennial and non-perennial streams (Maui County 2022). The final wetland overlay map (Maui County 2024) depicts features the County will consider when implementing the ordinance.

1.2 Project Description

The Project involves construction and operation of a 40-MW mounted solar photovoltaic system coupled with a 160-MWh battery energy storage system, a substation and switchyard, and related interconnection and ancillary facilities. In total, the Project is expected to occupy no more than 50 percent of the Study Area. The solar photovoltaic system would consist of modules mounted on a racking system arranged in evenly spaced rows; the racking system would include single-axis trackers which would rotate the modules along a fixed horizontal axis, from eat to west, as the sun moves across the sky. The energy storage system would consist of containerized lithium-ion battery units distributed throughout the solar arrays. The solar photovoltaic panels and battery units would connect with the Project substation via a network of medium-voltage electrical collector lines, installed either above ground and/or in underground electrical conduit. From the Project substation, the Project would interconnect with Maui Electric Company's island-wide electrical grid via a proposed Maui Electric Company switchyard with loop lines extending to the existing Mā'alaea Power Plant-Waena and Mā'alaea Power Plant-Waiinu 69kV transmission lines.

Access for construction and operation of the Project would be via one or more existing roads that connect with the Study Area, which include those extending from North Kīhei Road (South 8th and 9th Streets), Maui Veterans Highway, and Kūihelani Highway (through the existing AES Kūihelani Solar + Storage Project site). New service roads would be constructed for internal access within the Study Area.

2.0 Description of Study Area

As shown in Figure 1, the Study Area is located in south-central Maui approximately 2 miles (3.2 kilometers [km]) northwest of Kīhei. It encompasses roughly 730 acres (295 ha) within tax map key (TMK) parcel (2) 3-8-005:002-0003 [por.]. Access to the Study Area is via one or more existing roads extending from North Kīhei Road (South 8th and 9th Streets), Maui Veterans Highway, and Kūihelani Highway.

The Study Area consists of fallow agricultural fields that were previously used for sugar cane (*Saccharum officinarum*) cultivation as part of the Hawaiian Commercial & Sugar Company (HC&S) plantation. The site is currently unoccupied, although there are remnant features of the former agricultural operation, including irrigation equipment and overhead electrical transmission lines. The existing AES Kūihelani Solar + Storage Project is located to the north of the Study Area; the remainder of the Study Area (to the east, south, and west) is surrounded by agricultural land. Kūihelani Highway is located to the west-northwest, Maui Veterans Highway is located to the east, Keālia Pond National Wildlife Refuge (NWR) is located to the south, and North Kīhei Road is located to the southwest.

2.1 Climate

The climate in the Study Area is characterized as arid and sunny (Price et al. 2012). According to the Online Rainfall Atlas of Hawai'i (Giambelluca et al. 2013), the area receives a mean annual rainfall of approximately 13 inches (330 millimeters [mm]). Rainfall is typically highest from December through January and lowest from June through July (Giambelluca et al. 2013).

The closest functioning National Weather Service (NWS) rainfall gage to the Study Area is at Waikapū Country Club, located 1.5 miles (2.4 km) northwest of the Study Area near Hoʻopiʻilani Highway. The monthly rainfall totals recorded at the gage in 2023 and 2024 between April and July (i.e., prior to when the surveys were conducted) are shown in Table 1. The year-to-date total for this gage through the end of July 2023 and July 2024 was approximately 82 percent and 88 percent of average, respectively. This suggests relatively dry conditions during the surveys. Moderate drought conditions were reported on the central plains of Maui during the survey period (NWS 2023b, 2024b).

Table 1. Monthly Rainfall at Nearby Waikapū Country Club Gage Prior to the Surveys

Month	Rainfall Total; Percentage of Average	
	2023	2024
April	2.62 inches; 136%	1.70 inches; 88%
May	0.95 inches; 64%	0.39 inches; 26%
June	0.06 inches; 15%	0.06 inches; 15%
July	0.34 inches; 85%	0.51 inches; 128%

Source: NWS 2023a, 2024a

2.2 Topography and Soils

The Study Area is relatively flat, with elevations ranging from roughly 50 to 180 feet (15 to 55 meters [m]) above mean sea level, gradually sloping in a southeasterly direction (Figure 2). The topography varies where gulch/stream corridors intersect the Study Area (see Section 2.3). The gulches/streams are generally oriented from north to south through the Study Area.

The Natural Resources Conservation Service (NRCS) identifies 9 soil types in the Study Area and immediate vicinity (Figure 2; NRCS 2023a). The majority of the Study Area is underlain by Jaucas Sand, 0 to 15 percent slopes. Assorted Pūlehu series soil types (silt loam, cobbly silt loam, clay loam, and cobbly clay loam) also cover large areas of the Study Area, with a small portion comprised of Puʻuone sand, 7 to 30 percent slopes. Jaucus sand consists of excessively and somewhat excessively drained soils with low runoff. The Pūlehu soils series is characterized as having moderate permeability and subject to flooding in low areas. Puʻuone sand consists of soil on sandhills in the vicinity of the ocean, comprised of an upper surface layer of rapidly permeable calcareous sand underlain by a cemented sand layer. Runoff is slow and potential erosion by wind is considered moderate to severe (NRCS 2023a).

The NRCS National List of Hydric Soils (NRCS 2023b) for Maui Island includes seven hydric soils for the island. The soil units mapped by NRCS in the Study Area and immediate vicinity are not listed as hydric soils (NRCS 2023a, NRCS 2023b).

2.3 Surface Waters

The Study Area is situated within the Waikapū and Pōhākea watersheds (Parham et al. 2008). Streams, ditches, and other water features identified by the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) data (USFWS 2023), the U.S. Geological Survey (USGS) topographic and National Hydrography Dataset (NHD; USGS 2023), and the State of Hawaiʻi Division of Aquatic Resources (DAR) dataset (DAR 2008) are shown in Figure 3. These datasets identify two gulches/streams within the Study Area; Pōhākea Gulch crosses the southwestern portion of the Study Area and the South 8th Street access road, and Paleʻaʻahu Gulch intersects the central portion of the Study Area. Pōhākea Gulch is defined as an intermittent and non-perennial stream by NHD and DAR, respectively, and as a Palustrine, Forested, Seasonally Flooded Wetland (PFO3C) or Riverine, Intermittent, Seasonal Flooded (R4SBC) by NWI. Paleʻaʻahu Gulch is identified as an intermittent and non-perennial stream by NHD and DAR, respectively, and as Riverine, Intermittent, Seasonally Flooded (R4SBC) by NWI. According to NHD, Pōhākea Gulch and Paleʻaʻahu Gulch connect to Keālia Pond (USGS 2023), which is usually separated from Māʻalaea Bay by coastal dunes.

Waikapū Stream is outside of the Study Area but runs along the eastern boundary of the Study Area (Figure 3). Waikapū Stream is defined as intermittent and perennial by NHD and DAR, respectively, and as a Freshwater Forested/Shrub Wetland (PFO3C) by NWI. A tributary of Waikapū Stream is mapped just north of the Study Area and crosses the access road extending from Kūihelani Highway; this tributary is defined as intermittent by NHD, perennial by DAR, and as Riverine,

Intermittent, Seasonally Flooded (R4SBC) by NWI. Flows from Waikapū Stream occasionally reach Keālia Pond (Maui County 2018).

In addition to these gulches and streams, several features are also mapped along portions of the existing access roads that connect to the Study Area (Figure 3). An unnamed ditch (defined as Riverine, Unconsolidated Bottom, Permanently Flooded, Excavated (R3UBHx) by NWI) begins at Waikapū Stream and continues northeast along the access road running from the Study Area to Maui Veterans Highway. In addition, sections of Waiheʻe Ditch are identified along the northern portion of the Maui Veterans Highway access road and the access road from Kūihelani Highway (USGS 2023). NWI (USFWS 2023a) classifies Waiheʻe Ditch as Riverine, Unknown Perennial, Unconsolidated Bottom, Semipermanently Flooded, Excavated (R5UBFx).

2.4 Flora and Fauna

Tetra Tech conducted a general biological survey of the Study Area on July 10 – 13, 2023 and July 12, 2024. Follow-up surveys for the endangered Blackburn's sphinx moth (*Manduca blackburnii*) and it's host plants were conducted in September 2023, November 2023, and July 2024. In general, the biological resources in the Study Area have been modified by historic agricultural uses, the introduction of invasive species, and a recent wildfire in 2018 (Tetra Tech 2023). However, two federally and state-listed species have been recorded in the Study Area—the Blackburn's sphinx moth and the Hawaiian goose/nēnē (*Branta sandvicensis*). Several other listed animal species that weren't seen but may occasionally occur in or fly through the Study Area include the Hawaiian stilt/ aeʻo (*Himantopus mexicanus knudseni*), Hawaiian coot/ ʻalae keʻokeʻo (*Fulica alai*), Hawaiian petrel/ ʻuaʻu (*Pterodroma sandwichensis*), Newell's shearwater/ ʻaʻo (*Puffinus newelli),* band-rumped storm-petrel/ ʻakēʻakē (*Hydrobates castro*), and the Hawaiian hoary bat/ ʻōpeʻapeʻa (*Lasiurus semotus*).

Two main vegetation types occur in the Study Area: Buffelgrass Grassland and Kiawe/ Koa Haole Forest. The Kiawe/ Koa Haole Forest occurs in the southwestern portions of the Study Area and along the corridors of Pōhākea Gulch, Paleʻaʻahu Gulch, Waikapū Stream, and Waikapū Tributary. This vegetation type is dominated by kiawe (*Neltuma pallida* – FACU) and koa haole (*Leucaena leucocephala* subsp. *leucocephala* – UPL) trees, with moderately dense to open cover. Various non-native species are scattered in this vegetation type including klu (*Acacia farnesiana* – UPL), castor bean (*Ricinus communis* – FACU), small crown flower (*Calotropis procera* – UPL), sourbush (*Pluchea carolinensis* – FAC), and *Macaranga tanarius* (UPL). The understory is comprised of predominately buffelgrass (*Cenchrus ciliaris* – FACU) within which are scattered patches of Guinea grass (*Megathyrsus maximus* – FAC), hairy abutilon (*Abutilon grandifolium* – UPL), and golden-crown beard (*Verbesina encelioides* – FACU). Where the Kiawe/ Koa Haole Forest occurs along the banks of Waikapū Stream, tall java plum (*Syzygium cumini* - FAC) trees are present. Tree tobacco (*Nicotiana glauca* – UPL) is also present as scattered individuals. Understory vegetation along the stream corridors varies from open to dense, and where dense is dominated by thick stands of Guinea grass intermixed with sugar cane (*Saccharum officinarum* – FACU) and buffelgrass.

The vegetation in the remainder of the Study Area is characterized by Buffelgrass Grassland. This vegetation type is dominated by swaths of buffelgrass along with the following scattered plant

species: lion's ear (*Leonotis nepetifolia* – FACU), golden crown-beard, Cuban jute (*Sida rhombifolia* – FACU), smooth rattlepod (*Crotolaria pallida* – FAC), fireweed (*Senecio madagascariensis* – FACU), swollen finger grass (*Chloris barbata* – FACU), common sandbur (*Cenchrus echinatus* – FACU), and Bermuda grass (*Cynodon dactylon* – FACU). Small crown flower shrubs are scattered throughout the grassland, and widely dispersed individuals of kiawe and koa haole are also present. The natives ʻuhaloa (*Waltheria indica* – FACU) and ʻilima (*Sida fallax* – UPL), are also present.

The majority of the wildlife recorded in the Study Area are non-native to the Hawaiian Islands. The most common bird species recorded during the survey were African silverbill (*Euodice cantans*), scaly-breasted munia (*Lonchura punctulata*), and zebra dove (*Geopelia striata*). Besides the listed Hawaiian goose and listed Blackburn's sphinx moth, only three other native wildlife species were recorded—black-crowned night heron/ aukuʻu (*Nycticorax nycticorax*), globe skimmer (*Pantala flavescens*), and green darner (*Anax junis*) (Tetra Tech 2023).

3.0 Methodology

Before the survey, Tetra Tech reviewed aerial imagery, topographic maps, and water resource datasets to inform the field delineation of WOTUS potentially in the Study Area. This included NWI data (USFWS 2023), NHD data (USGS 2023), DAR streams data (DAR 2008), and ditch information (CWRM 2019). The State of Hawaiʻi Atlas of Hawaiian Watersheds & Their Aquatic Resources (Parham et al. 2008), NRCS Soil Survey Geographic Database dataset (NRCS 2023a), USGS Scientific Investigations Reports (Oki et al. 2010), and previous water reports (MEC and Central Maui SWCD 2023) were also reviewed.

Tetra Tech delineated potential WOTUS on July 25 - 26, 2023, and July 12, 2024.[1] During the field survey, Tetra Tech specifically focused on locations where existing data and aerial imagery show potential WOTUS within and immediately adjacent to the Study Area. Other features proximate to the existing access roads outside the Study Area were not delineated because no improvements or other work within these features is anticipated. The geographic coordinates of the ordinary high water mark (OHWM) and other features were collected in the field with an iPad mini with ArcGIS Field Maps and a Geode GPS receiver. Data were collected to sub-meter accuracy. The linear length and acreage of these features were calculated by projecting these point and line data files in a geographic information system (GIS). In addition to the delineations in July 2023 and 2024, supplemental observations of flow regime for Pōhākea Gulch and Paleʻaʻahu Gulch were made during site visits on July 10 – 13, 2023, September 11-15, 2023, and November 2-3, 2023.

For this Project, Tetra Tech also assessed the potential federal jurisdiction for each feature based on the current regulatory regime (see Section 1.1); however, USACE will ultimately determine jurisdiction.

[1] The field effort on July 12, 2024 was to confirm the delineation results based on a slight modification in the Study Area boundary.

3.1 Streams

During the field survey, stream boundaries were delineated by recording the location of the OHWM as defined in the USACE Regulatory Guidance Letter 05-05 (USACE 2005), Rapanos Guidance (EPA and USACE 2008), and the interim national OHWM manual (David et al. 2022) (EPA and USACE 2008). Indicators of OHWM can be physical or vegetative, and include, but are not limited, to the following: benches, shelving, drift lines, natural lines impressed on the bank, changes in the character of soil, transitions in vegetation type and density, destruction of terrestrial vegetation (matted-down vegetation), sediment deposition, presence of litter and debris, presence of wrack lines, bed and banks, multiple observed flow events, scour, sediment sorting, and water staining (USACE 2005; EPA and USACE 2008; Lichvar and McColley 2008; Mersel and Lichvar 2014; David et al. 2022).

3.2 Ditches

The location and condition of any ditches or related infrastructure (e.g., culverts) within or adjacent to the Study Area were recorded during the survey.

3.3 Wetlands

The 1987 Corps of Engineers Wetlands Delineation Manual (USACE 1987), as amended, outlines the technical guidelines and methods for identifying and delineating wetlands potentially subject to Section 404 of the CWA. This manual is supplemented by the 2012 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Hawai'i and Pacific Islands Region (USACE 2012).

Based on these documents, jurisdictional wetlands are identified using the following three criteria: hydrophytic vegetation, hydric soils, and wetland hydrology. All three criteria must be present for an area to be considered a wetland, unless problematic natural processes or atypical recent human disturbance has resulted in the absence of positive wetland indicators.

During the survey, Tetra Tech scanned the Study Area for surface wetland hydrology indicators and hydrophytic vegetation based on the National Wetland Plant List (USACE 2020); however, no sampling points were taken in the Study Area because no wetlands have previously been identified in the Study Area, and no potential wetlands were observed in the Study Area.

4.0 Results

Tetra Tech delineated six potential WOTUS within and adjacent to the Study Area (Table 2). Of the potential WOTUS, only Waikapū Stream had surface water present during the survey. No wetlands were observed or delineated in the Study Area. A brief summary of each feature delineated within or adjacent to the Study Area is provided below. Photographs are provided in Appendix B.

Table 2. Potential Waters of the U.S. Delineated in the Study Area

Feature Name	NWI Classification Codes[1]	NHD Classification	Approximate Length Delineated (Feet)
Pōhākea Gulch	PFO3C / R4SBC	Intermittent Stream	1,370
Feature 1	N/A	N/A	985
Paleʻaʻahu Gulch	R4SBC	Intermittent Stream	5,700
Waikapū Stream	PFO3C	Intermittent Stream	5,545
Waikapū Tributary	R4SBC	Intermittent Stream	738
Roadside Ditch	R3UBHx	Canal/Ditch	7,730

Note 1: PFO3C = Palustrine, Forested, Seasonally Flooded; R4SBC = Riverine, Streambed, Seasonally Flooded; R3UBHx = Riverine, Unconsolidated Bottom, Permanently Flooded, Excavated; R5UBFx = Riverine, Unknown Perennial, Unconsolidated Bottom, Permanently Flooded, Excavated.

4.1 Non-Wetland Waters

4.1.1 Pōhākea Gulch

Pōhākea Gulch begins in the West Maui Mountains at roughly 4,000 feet (122 m) elevation. It continues southeast crossing Honoapiʻilani Highway via a culvert system and then turns southeast toward the agricultural fields. Pōhākea Gulch crosses the 8th Street access road and then passes through the Study Area near the existing 9th Street access road. South of the Study Area, Pōhākea Gulch continues makai and runs along the eastern edge of the Maui Electric Company Māʻalaea Power Plant. Although Tetra Tech did not investigate Pōhākea Gulch south of the Study Area, according to the NHD (USGS 2023) and the Pōhākea Watershed Plan (MEC and Central Maui SWCD 2023), Pōhākea Gulch connects to Keālia Pond which occasionally discharges to Māʻalaea Bay.

Tetra Tech delineated approximately 1,370 linear feet (418 m) of Pōhākea Gulch within and adjacent to the Study Area. The location of the delineated OHWM of Pōhākea Gulch is shown in Figure 4. The OHWM was delineated based on a change in slope that corresponds with a change in vegetation. In some sections of the gulch, the banks have a sharp break in slope. Guinea grass is dense above the OHWM while vegetation is nearly absent on the slopes and below the OHWM. Koa haole trees are present at and above the OHWM, but not within the channel. Although no surface water was observed during the surveys or supplemental observations, evidence of previous high flow events was observed. Drift or wrack (accumulation of woody debris and other material deposited by flow events) was found at several locations where it collected behind obstructions. Photos 1-3 show the conditions observed at Pōhākea Gulch during the survey.

4.1.2 Feature 1

Feature 1 is not identified by NWI, NHD, or DAR data, but is noticeable as distinct from the surrounding area on aerial imagery. Although this feature is not included in the current ditch

dataset (CWRM 2019), it aligns with previously published ditch spatial data (DAR 2004), and therefore might be a remnant of a former ditch.

Tetra Tech mapped roughly 985 feet (300 m) of Feature 1 within and adjacent to the Study Area. Feature 1 lacks a defined channel and indicators of an OHWM. Although it is within a topographic depression, there is no distinct channel, change in vegetation or substrate/sediment (Photos 4-5), or evidence of recent water flow (e.g., wrack, mud cracks). Litter and organic debris are scattered within the depression, but based on the debris orientation are not associated with any previous water flow event. Feature 1 ends in a broad plain with uniform topography and does not connect to any gulches or streams (Figure 4; Photo 6).

4.1.3 Paleʻaʻahu Gulch

Paleʻaʻahu Gulch begins at roughly 3,000 feet (914 m) elevation in the West Maui Mountains. It converges with several tributaries before crossing Kūihelani Highway and then intersects with the Study Area roughly 2,230 feet (680 m) from the highway. Paleʻaʻahu Gulch crosses the 8th and 9th Street access roads within the Study Area (Photo 8). Although Tetra Tech did not investigate Paleʻaʻahu Gulch south of the Study Area, according to the NHD (USGS 2023) and the Pōhākea Watershed Plan (MEC and Central Maui SWCD 2023), Paleʻaʻahu Gulch connects to Keālia Pond which occasionally discharges to Māʻalaea Bay.

Tetra Tech delineated 5,700 linear feet (1,737 m) of Paleʻaʻahu Gulch within and adjacent to the Study Area (Figure 4). The OHWM was delineated based on a change in slope that corresponds with a change in vegetation. In general, the channel banks were steep with Guinea grass and koa haole trees at and above the OHWM, and vegetation was generally absent within the channel (Photos 8, 13). In several sections, there was a narrow channel within the larger depression that had a distinct break in slope, as well as grass cover between the OHWM and the upper break in slope (Photo 9). Portions of Paleʻaʻahu Gulch have vertical banks and unnaturally straight sections (Photo 11) suggesting the natural alignment may have been previously modified. Although no surface water was observed during the surveys or supplement observations, evidence of water flow and a defined OHWM was observed throughout most of the delineated feature (Photo 12).

4.1.4 Waikapū Stream

Waikapū Stream is part of the four streams collectively known as Nā Wai ʻEhā (Waikapū, Wailuku, Waiehu, and Waiheʻe streams), which drain the eastern part of West Maui. The headwaters of Waikapū Stream originate in the West Maui Mountains. The stream crosses Honoapiʻilani Highway, then turns southeast crossing Kūihelani Highway. Waikapū Stream runs along the eastern boundary of the Study Area and eventually connects to Keālia Pond.

Tetra Tech delineated 5,545 linear feet (1,690 m) of Waikapū Stream adjacent to the Study Area (Figure 5). As stated above, Waikapū Stream is not within the Study Area but was delineated to confirm the OHWM is outside of the Study Area boundaries. Flowing surface water was observed in the stream on all survey dates. The OHWM was delineated based on a change in slope and the

presence of woody, upland vegetation (e.g., java plum) at and above the OHWM, with vegetation absent in the channel. Photos 14-16 show the conditions observed at Waikapū Stream during the survey.

4.1.5 Waikapū Tributary

NWI, NHD, and DAR data show a tributary of Waikapū Stream beginning just mauka of Kūihelani Highway and passing immediately north of the Study Area before continuing east to join with Waikapū Stream at roughly 120 feet (36 m) elevation (Figure 3). Tetra Tech first delineated and assessed this feature in 2019 for the recently constructed Kūihelani Solar + Storage Project. Although some indicators of the OHWM were present immediately adjacent to Kūihelani Highway in 2019, there was no evidence that there is a tributary connecting to Waikapū Stream (Tetra Tech 2019). USACE concurred with Tetra Tech's assessment of the lateral, jurisdictional limits of Waikapū Tributary in 2019 (POH-2019-00101).

In July 2023, Tetra Tech delineated 738 feet (225 m) of Waikapū Tributary, which is to the north of the Study Area (Figure 5). The location of the feature was delineated based on topography in order to confirm Project avoidance. No surface water was observed during the survey, and no evidence of recent water flow was seen. Although there is a berm along the southwestern side of the feature, there is no distinct channel and the area is uniformly vegetated with Guinea grass, lion's ear, and other non-hydrophytic plants (Photo 17-18). The feature ends in a broad flat plain with uniform topography and does not connect to any gulches or streams (Photo 19).

4.1.6 Roadside Ditch

The unnamed concrete ditch referred to as Roadside Ditch was constructed for agriculture and sugarcane cultivation. It begins at Waikapū Stream just outside of the Study Area, runs along the access road that connects to Maui Veterans Highway. This ditch was delineated to confirm it is outside of the Study Area boundaries.

Tetra Tech delineated 7,730 linear feet (2,356 m) of Roadside Ditch adjacent to the Maui Veterans Highway access road (Figure 6). No water was observed in the Roadside Ditch during the survey. The ditch was largely overgrown with dry vegetation, mostly buffelgrass, and does not appear to actively carry water (Photos 20-22). Portions of the ditch have degraded, and its condition indicates Roadside Ditch currently does not divert water from Waikapū Stream or connect to other streams east of the Study Area.

4.2 Wetlands

No wetlands were identified or delineated within the Study Area.

5.0 Assessment

Under the current regulatory regime (January 2023 Rule and confirming rule), the USACE takes jurisdiction over certain tributaries, including tributaries of TNW, the territorial seas, or interstate waters that are relatively permanent, standing or continuously flowing bodies of water. A tributary can be a river, stream, or ditch that eventually flows into a TNW, the territorial seas, or an interstate water. Swales, gullies, and erosional features "characterized by low volume, infrequent, or short duration flow" are not considered tributaries. Jurisdictional tributaries must have flowing or standing water year-round or continuously during certain times of the year, not only for a short duration in direct response to precipitation (Department of Army and EPA 2023).

Ditches can be considered tributaries and therefore jurisdictional if they flow directly or indirectly to TNWs and the territorial seas, meet the relatively permanent standard, and are not excluded from jurisdiction. Under the January 2023 Rule, ditches are excluded if they were excavated wholly in and draining only dry lands and do not carry a relatively permanent flow of water (Department of Army and EPA 2023).

5.1 Pōhākea Gulch

Data on the current duration and frequency of water flow in Pōhākea Gulch could not be found; however, according to the Pōhākea Watershed Plan, although heavy flows do occur within Pōhākea Gulch, it "typically only flows during stormwater events" (MEC and Central Maui SWCD 2023). This conclusion is supported by Tetra Tech's observations in the field. No surface water or flowing water were observed during surveys in July, September, or November. Although dry conditions were present on Maui during July and September, flowing and standing water was observed in nearby Waikapū Stream. Pōhākea Gulch has episodic flow events and does not appear to have continuous flow for extended periods of time. Therefore, it is likely that Pōhākea Gulch would not be considered a WOTUS under the current regulatory regime.

5.2 Feature 1

Feature 1 does not have an OHWM or defined channel, or connect to a downstream water. No surface water or evidence of recent flowing or standing water was observed. Based on observations in the field, Feature 1 is either a remnant of a former ditch system or an erosional feature. Therefore, Feature 1 would be excluded from jurisdiction under the current regulatory regime.

5.3 Paleʻaʻahu Gulch

It is unknown how often water flows within Paleʻaʻahu Gulch; however, according to the Pōhākea Watershed Plan, the gulch is ephemeral, conveying flow only during storm events (MEC and Central Maui SWCD 2023). This conclusion is supported by Tetra Tech's observations in the field. No surface water or flowing water was observed during surveys in July, September, or November. Paleʻaʻahu Gulch does not appear to have continuous flow for extended periods of time. Although

water may occasionally flow through Paleʻaʻahu Gulch to Keālia Pond during heavy rain events, the water is not relatively permanent (year-round or continuously during certain times of year). Therefore, it is likely that Paleʻaʻahu Gulch would not be considered a WOTUS under the conforming rule.

5.4 Waikapū Stream

Historically, Waikapū Stream was perennial throughout the entire system, with continuous flow present throughout the year (Maciolek 1971); however, the stream has been diverted for agricultural use for decades. Recent changes to the amount of water diverted have increased the amount and duration of flow in Waikapū Stream compared to historical conditions, with more flow reaching downstream Keālia Pond (Maui County 2018). While Waikapū Stream does flow continuously during certain times of the year, it does not flow year-round to Keālia Pond, especially during drought conditions, as recently noted when unusual pink-looking water was observed at Keālia Pond (McAvoy 2023). Keālia Pond also does not have a continuous surface connection to the nearby Pacific Ocean; the outlet channel from the bridge to the ocean is generally blocked by sand and outflows to the ocean occur occasionally in the winter when water levels are high in the pond (USFWS 2011). However, Keālia Pond may be a WOTUS because it is occasionally subject to the ebb and flow of the tide (USFWS 2011). Therefore, because Waikapū Stream contributes flow for extended periods to Keālia Pond (more than just in direct response to rain events), Waikapū Stream may be considered a WOTUS under the current definition.

5.5 Waikapū Tributary

Waikapū Tributary does not have an OHWM or defined channel, or connect to a downstream water. No surface water or evidence of recent flowing or standing water was observed adjacent to the Study Area during the survey. Based on observations in the field, and consistent with USACE's previous determination (POH-2019-00101), this feature would be excluded from jurisdiction under the current regulatory regime.

5.6 Roadside Ditch

Ditches "excavated wholly in and draining only dry land, and that do not carry a relatively permanent flow of water" are excluded from CWA jurisdiction under the January 2023 Rule (Department of Army and EPA 2023). Thus, Roadside Ditch adjacent to the access road from Maui Veterans Highway would be excluded from jurisdiction given it does not carry a relatively permanent flow of water (i.e., no flowing or standing water year-round or continuously during certain times of the year).

6.0 Conclusions

Tetra Tech delineated six non-wetland potential WOTUS within and adjacent to the Study Area. Tetra Tech delineated the OHWM of Pōhākea Gulch and Paleʻaʻahu Gulch within the Study Area.

Although no surface water was observed in either Pōhākea Gulch or Pale‘a‘ahu Gulch, both gulches had a defined channel and OHWM with evidence of previous flow events. However, based on Tetra Tech’s observations in the field and a review of available information, both Pōhākea Gulch and Pale‘a‘ahu Gulch do not appear to have continuous flow to an (a)(1) water for extended periods of time; thus, these gulches are not likely to be considered WOTUS under the current regulatory regime.

Tetra Tech also delineated the OHWM of Waikapū Stream and Waikapū Tributary immediately adjacent to the Study Area. The delineation of Waikapū Stream confirmed that the OHWM is situated outside the Study Area. Because flowing surface water was observed in Waikapū Stream on all survey dates and it contributes flow continuously during certain times of year to Keālia Pond, Waikapū Stream may be considered a WOTUS under the current regulations. Nonetheless, Waikapū Stream is located outside the Study Area and the existing road crossings are not expected to require improvements.

Waikapū Tributary and Feature 1 were mapped based on topographic relief; however, these features are not expected to be jurisdictional because they are not tributaries of (a)(1) waters that have relatively permanent, standing or continuously flowing water. The Roadside Ditch along the access road connecting to Maui Veterans Highway would be excluded from jurisdiction as it does not carry a relatively permanent flow of water.

These conclusions are subject to confirmation by the USACE Honolulu District. Should the USACE determine that features within the Study Area are jurisdictional, impacts to jurisdictional waters will be avoided wherever practicable. If impacts cannot be avoided and the Project requires placement of dredged or fill materials into a jurisdictional WOTUS, a USACE permit (likely a Nationwide Permit) would be required. If a USACE permit is required, additional permits from other agencies may also be required (e.g., Water Quality Certification from Department of Health Clean Water Branch) before commencing any work. In addition, compliance with the Maui County Wetlands Ordinance 5421 should also be considered.

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Appendix A. Figures

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Kūihelani Solar Phase 2 Project

Figure 1
Study Area and Vicinity

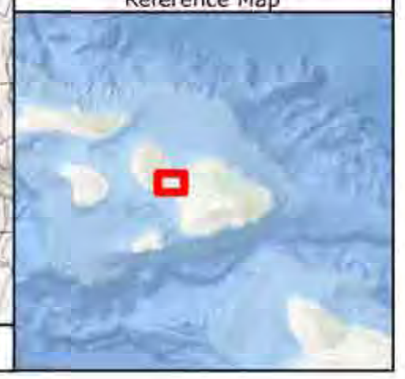
MAUI COUNTY, HAWAI'I

- Study Area
- Existing AES Kūihelani Solar Plus Storage Project
- Access Routes
- Major Road
- Secondary Road

aes Hawai'i

TETRA TECH

Reference Map



Kahului
Waikapu
Kūihelani Highway
Maui Veterans Highway
Honoapiilani Highway
Mā'alaea
North Kihei Road
WEST MAUI FOREST RESERVE
PULEHUNUI

1:40,000 WGS 1984 UTM Zone 4N

0 0.5 1 2 Miles

NOT FOR CONSTRUCTION

\\oas709gis51\CES\Projects\PDX\AES_Distributed_Energy\Kuihelani_Solar_Phase2\Maps\WOTUS_20231219\AESDE_Kuihelani_Phase2_WOTUS_20240814.aprx

Kūihelani Solar Phase 2 Project

Figure 2
Soil Types in the Study Area

MAUI COUNTY, HAWAI'I

Study Area
Access Routes
Major Road
Secondary Road
100-ft Contour

NRCS Soil Type

- JaC - Jaucas sand, 0 to 15 percent slopes, MLRA 163
- PZUE - Puuone sand, 7 to 30 percent slopes
- PpA - Pulehu silt loam, 0 to 3 percent slopes
- PpB - Pulehu silt loam, 3 to 7 percent slopes
- PrA - Pulehu cobbly silt loam, 0 to 3 percent slopes
- PrB - Pulehu cobbly silt loam, 3 to 7 percent slopes
- PsA - Pulehu clay loam, 0 to 3 percent slopes , MLRA 163
- PtA - Pulehu cobbly clay loam, 0 to 3 percent slopes
- PtB - Pulehu cobbly clay loam, 3 to 7 percent slopes

aes Hawai'i

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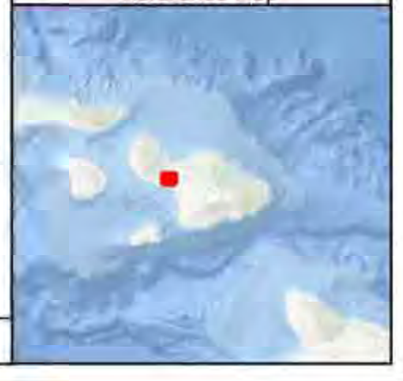
Reference Map



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0 0.5 1 Miles

NOT FOR CONSTRUCTION

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Kūihelani Solar Phase 2 Project

Figure 3
Water Resources Identified by NWI, NHD, and DAR Datasets

MAUI COUNTY, HAWAI'I

Kūihelani Highway
Waiohee Ditch
Maui Veterans Highway
Waiohee Ditch
Honoapiilani Highway
North Kihei Road

- Study Area
- Access Routes
- Major Road
- Secondary Road

National Hydrography Dataset

- Canal/Ditch
- Intermittent Stream
- Underground Pipeline
- Perennial Stream
- Waterbody

Division of Aquatic Resources

- Non-Perennial Stream

National Wetlands Inventory Wetland Type

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine

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TETRA TECH

Reference Map

1:30,000

WGS 1984 UTM Zone 4N

0 0.5 1 2 Miles

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Kūihelani Solar Phase 2 Project

Figure 4
Delineated OHWM of Pōhākea Gulch, Feature 1, and Paleʻaʻahu Gulch

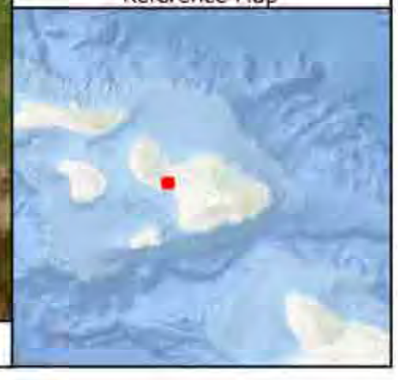
MAUI COUNTY, HAWAIʻI

Study Area
Access Routes
Major Road
Feature Location
Delineated OHWM

aes Hawai'i

TETRA TECH

Reference Map



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0 250 500 1,000 1,500 2,000 Feet

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Kūihelani Solar Phase 2 Project

Figure 5
Delineated OHWM of Waikapū Stream and Waikapū Tributary

MAUI COUNTY, HAWAI'I

Waikapū Tributary

Kuihelani Highway

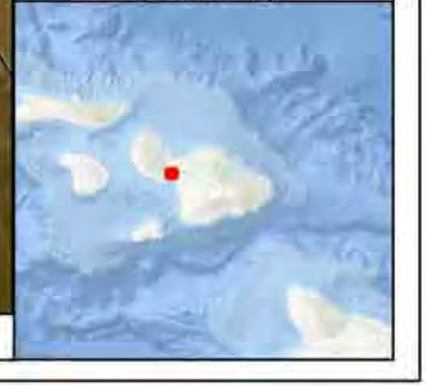
Waikapū Stream

- Study Area
- Access Routes
- Major Road
- Secondary Road
- Delineated OHWM

aes Hawai'i

TETRA TECH

Reference Map



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WGS 1984 UTM Zone 4N

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Kūihelani Solar Phase 2 Project

Figure 6
Delineated Roadside Ditch Adjacent to the Study Area

MAUI COUNTY, HAWAI'I

- Study Area
- Access Routes
- Major Road
- Secondary Road
- Delineated Ditch
- Delineated OHWM

aes Hawai'i

TETRA TECH

Reference Map

1:10,000 WGS 1984 UTM Zone 4N

0 250 500 1,000 1,500 2,000 Feet

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Appendix B. Representative Photographs

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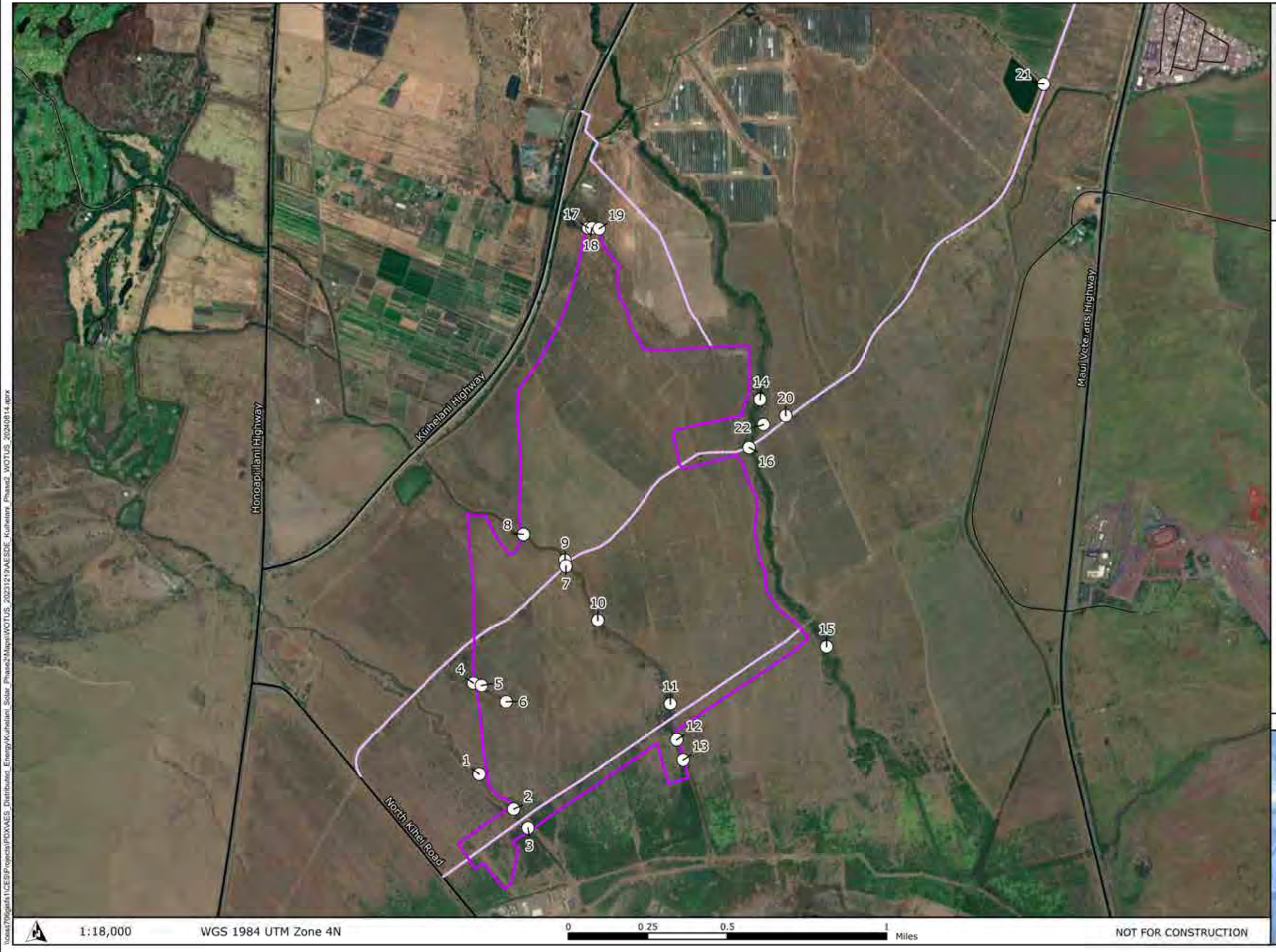
Kūihelani Solar Phase 2 Project

Appendix B
Waters of the U.S. Photo Log

MAUI COUNTY, HI



Study Area
Access Roads
Major Road
Secondary Road
Photo Location

aes Hawai'i

TETRA TECH

Reference Map

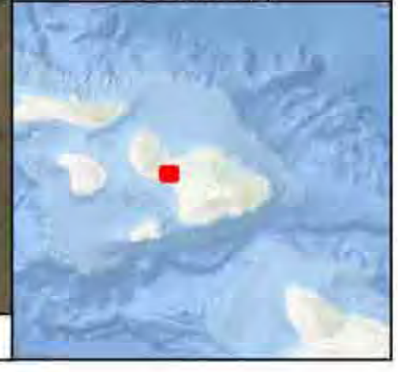


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Photo 1. Pōhākea Gulch looking downstream from left bank showing steep banks and difference in vegetation inside and outside channel. Date: 07/25/2023.

Photo 2. Pōhākea Gulch showing steep, unvegetated channel banks and lack of vegetation within the channel compared to vegetation above the OHWM. Date: 07/25/2023.

Photo 3. Wrack within Pōhākea Gulch showing evidence of previous flow events. Date: 07/25/2023.

Photo 4. Feature 1 showing depression but no defined channel. Date: 07/25/2023.

Photo 5. Feature 1 showing no defined channel or OHWM. Date: 07/25/2023.

Photo 6. Broad, flat plain just makai of Feature 1. Date: 07/25/2023.

Photo 7. Paleʻaʻahu Gulch looking upstream from South 8th Street road crossing showing no surface water. Date: 07/11/2023.

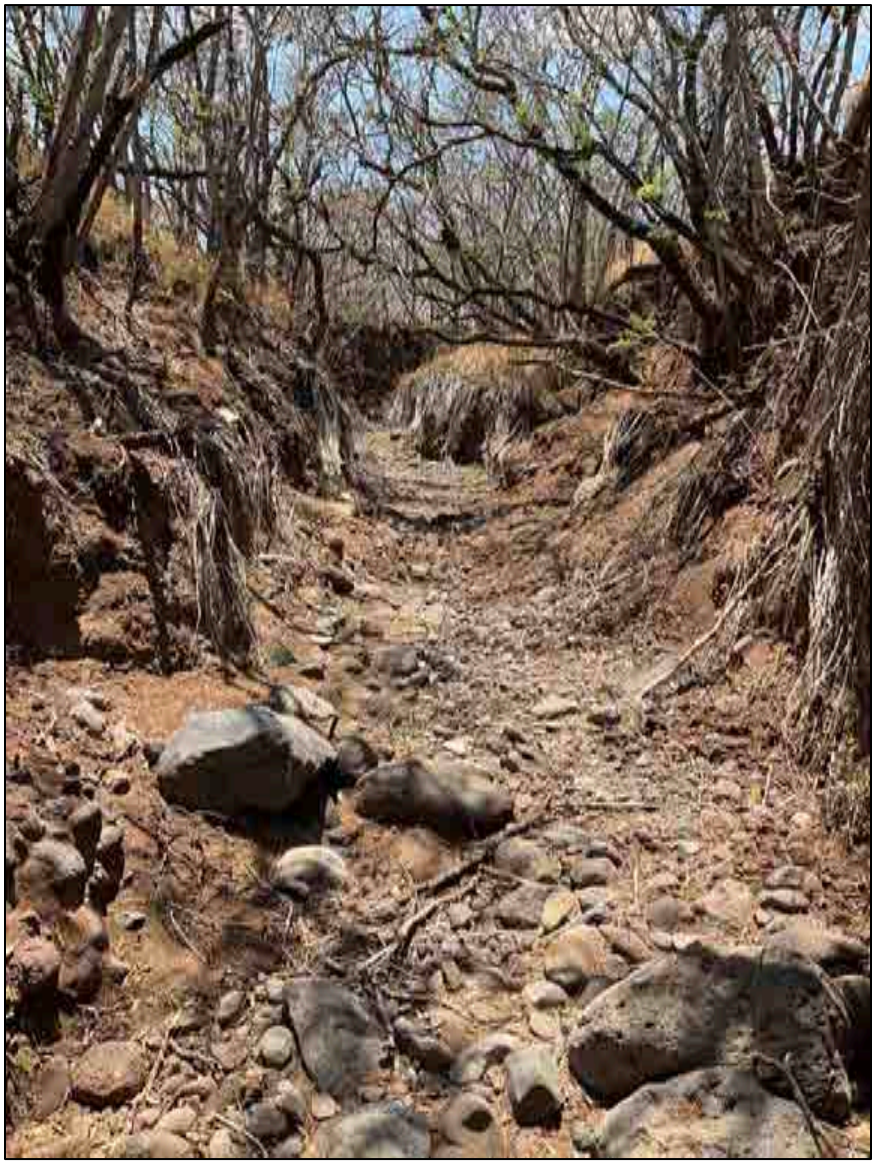

Photo 8. Paleʻaʻahu Gulch showing steep banks and trees at and above the OHWM. Date: 07/25/2023.

Photo 9. Paleʻaʻahu Gulch showing narrow channel with distinct break in slope and vegetation transition located below the upper break/shelf. Date: 07/25/2023.

Photo 10. Paleʻaʻahu Gulch showing typical section with break in slope and vegetation transition above and below OHWM. Date: 07/25/2023.

Photo 11. Paleʻaʻahu Gulch showing straight course at lower extent of the Study Area. Date: 07/25/2023.

Photo 12. Paleʻaʻahu Gulch looking upstream showing evidence of previous water flow with debris collected and pushed in direction of water flow. Date: 07/25/2023.

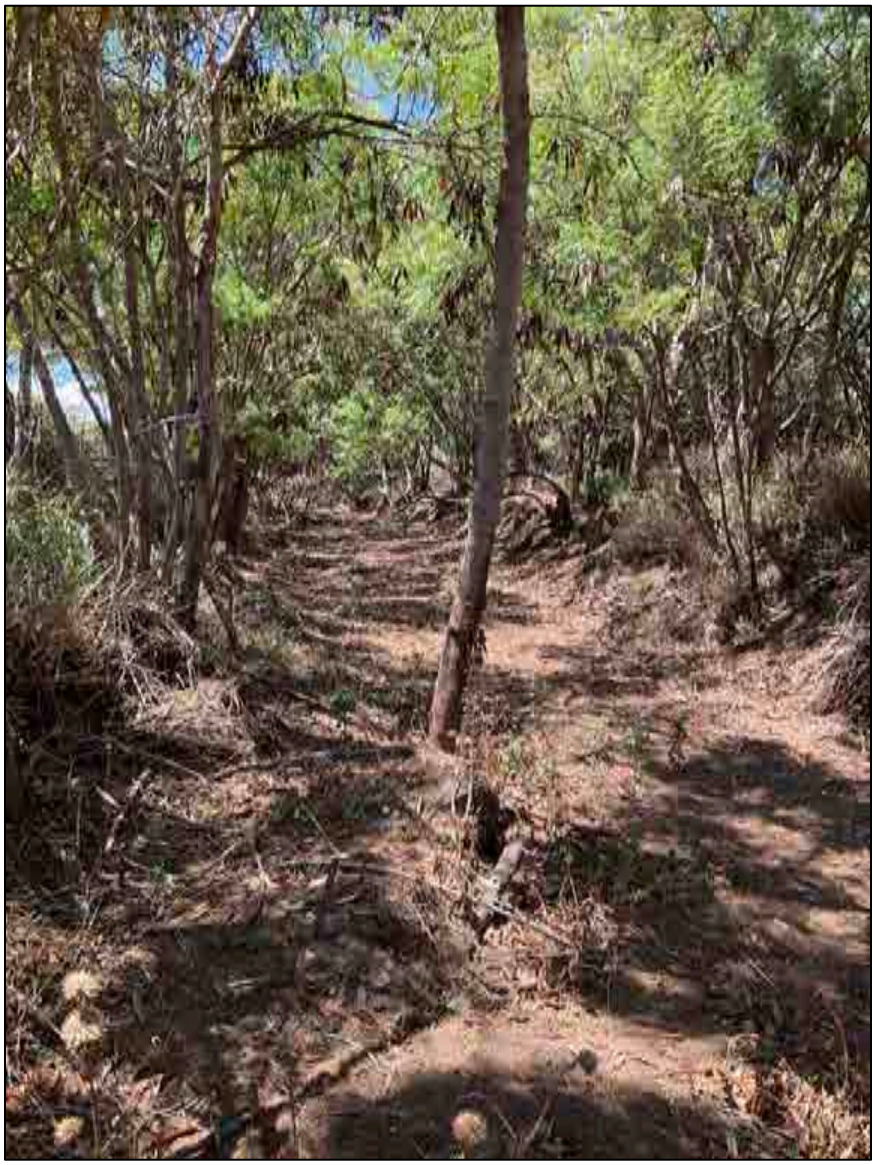

Photo 13. Paleʻaʻahu Gulch in the lower reach of the Study Area showing koa haole trees at and above the OHWM, and vegetation generally absent within the channel. Date: 07/12/2024.

Photo 14. Waikapū Stream showing flowing water and OHWM at tree line. Date: 07/26/2023.

Photo 15. Typical conditions at Waikapū Stream showing flowing surface water. Date: 07/26/2023.

Photo 16. Waikapū Stream at South 8th Street showing surface water and eroded concrete on ford. Date: 07/26/2023.

Photo 17. Waikapū Tributary looking upstream showing overgrown non-hydrophytic vegetation and lack of channel. Date: 07/26/2023.

Photo 18. Waikapū Tributary looking downstream showing no OHWM. Date: 07/26/2023.

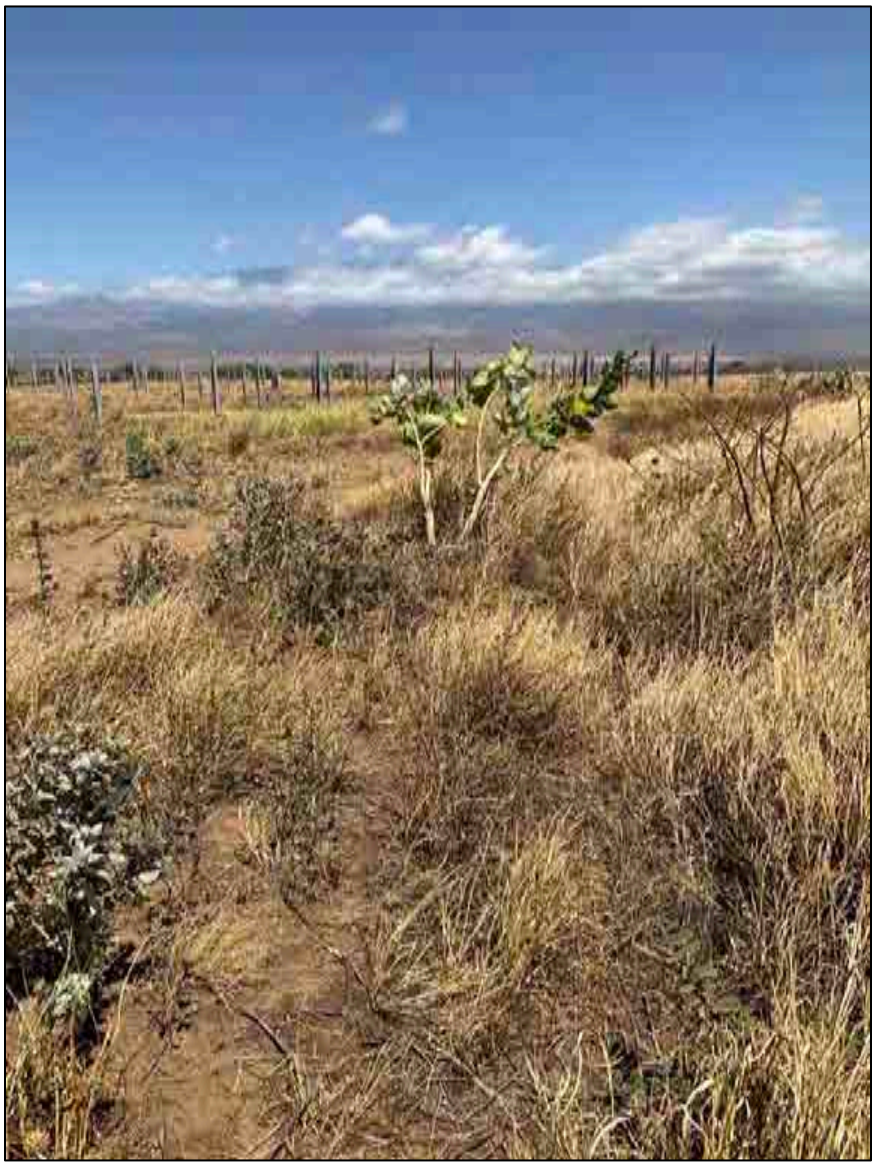

Photo 19. Looking southeast of delineated Waikapū Tributary showing flat plain with no channel or evidence of water flow. Date: 07/26/2023.

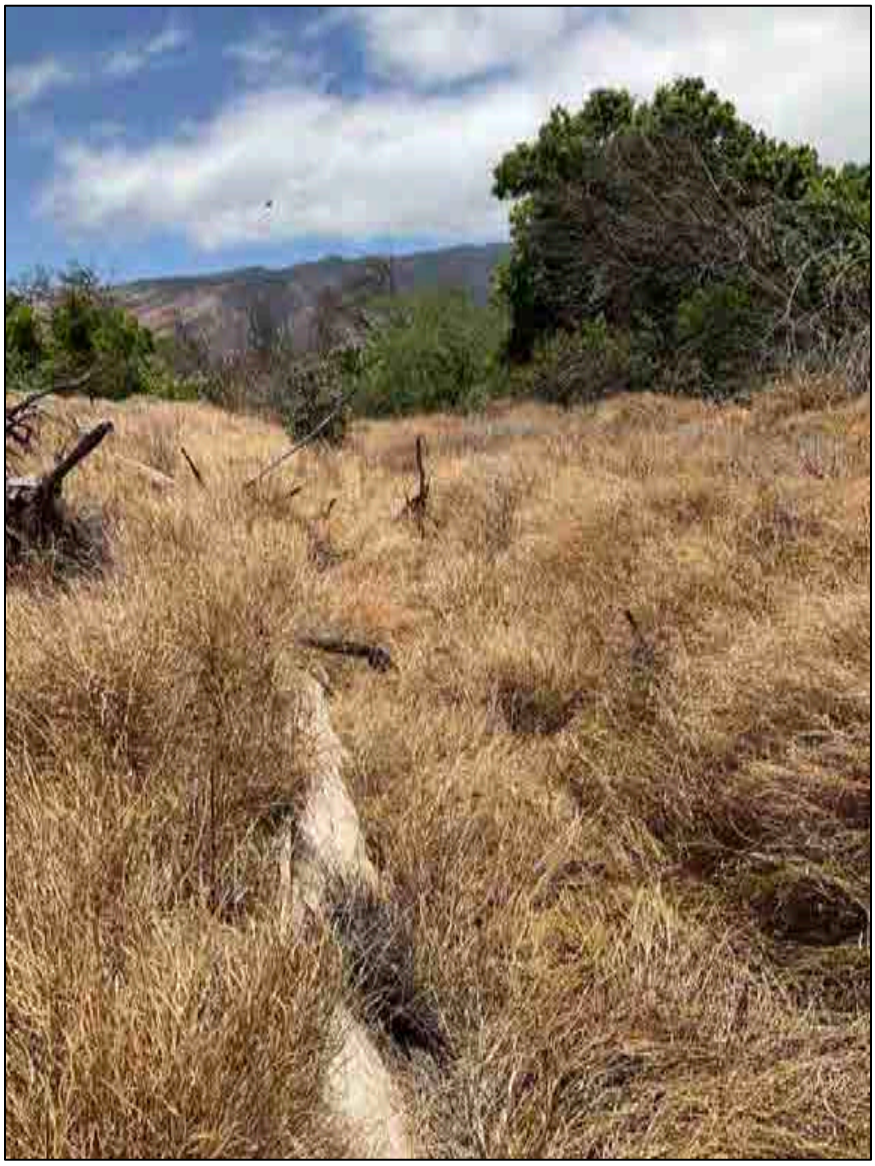

Photo 20. Roadside Ditch looking toward Waikapū Stream showing the ditch overgrown with dry vegetation and no water. Date: 07/26/2023.

Photo 21. Non-functional Roadside Ditch along South 8th Street from Maui Veterans Highway. Date: 07/26/2023.

Photo 22. Roadside Ditch along South 8th Street from Maui Veterans Highway showing no surface water and overgrown grass. Date: 07/26/2023.

Appendix O. Visual Impact Assessment Report

Kūihelani Solar Phase 2 Project

Visual Impact Assessment Report

Prepared for:

Kūihelani Solar Phase 2, LLC

July 2025

TETRA TECH

complex world | CLEAR SOLUTIONS™

Table of Contents

1.0 Introduction 1
2.0 Project Description 1
3.0 Affected Environment 2
4.0 County Scenic Resource Goals and Objectives 3
5.0 Visual Assessment Methods 5
5.1 Visual Impact Criteria 5
5.2 Viewshed and Viewpoints 5
5.3 Methodology for Photo Simulations 7
6.0 Potential Visual Impact Analysis 7
7.0 Conclusion 13
8.0 References 15

List of Figures

Figure 1. Project Location
Figure 2. Project Site Plan
Figure 3. Surrounding Land Uses
Figure 4. Viewpiont Location Map

List of Appendices

Appendix A. Photo Log and Photo Simulations

1.0 Introduction

Kūihelani Solar Phase 2, LLC, a subsidiary of AES Clean Energy Development, LLC (AES) is proposing the Kūihelani Solar Phase 2 Project (Project) on the island of Maui. The Project involves construction and operation of a solar photovoltaic and battery energy storage system, as well as an electrical substation, switchyard and related interconnection equipment, and other ancillary facilities approximately 3 miles south of Kahului in Central Maui. The Project site encompasses 476.303 acres of land within tax map key (TMK) (2) 3-8-005:002-0003, which is owned by MP West LLC (d.b.a Mahi Pono). The Project location is shown in Figure 1.

The Project site is within the State of Hawai'i's agricultural land use district and the County of Maui's agricultural zoning district. Pursuant to Hawai'i Revised Statutes (HRS) Chapter 205 and Maui County Code (MCC) Section 19.30A.060(A)(12), the Project requires both a County Special Use Permit (CSUP) and State Special Use Permit (SSP). To support the CSUP/SSP application, Tetra Tech conducted a visual impact assessment to characterize the potential visual impacts associated with the Project. The results of this assessment are presented herein.

2.0 Project Description

The Project involves construction and operation of an approximately 40 megawatt (MW) ground-mounted solar photovoltaic system coupled with a 160 MW-hour (MWh) battery energy storage system, as well as a Project substation, switchyard and associated interconnection lines, and other ancillary facilities (Figure 2). The solar photovoltaic system would consist of a series of modules mounted on a racking system arranged in evenly-spaced rows; the racking system would include single-axis trackers which would rotate the modules along a fixed horizontal axis, from east to west, as the sun moves across the sky. The battery energy storage system would consist of containerized lithium-ion battery units and associated inverters installed on concrete pads distributed throughout the solar arrays. The solar arrays and battery energy storage system would connect with a Project substation via a network of medium-voltage electrical collector lines, installed primarily underground with some short overhead spans where trenching is restricted by existing utilities or onsite gulches. A Maui Electric Company (Maui Electric) switchyard would be constructed adjacent to the Project substation to facilitate the transfer of electricity from the Project to Maui Electric's island-wide grid. Two high-voltage interconnection lines (each configured as a parallel loop) would connect the switchyard to existing Maui Electric overhead transmission lines which traverse the Project site. A perimeter fence would enclose the solar arrays and battery energy storage system, Project substation, and switchyard; the fenced area is expected to occupy approximately 250 acres. The Project would be accessed via a combination of existing privately-owned roads that extend to the Project site from Maui Veterans Highway, Kūihelani Highway, and North Kīhei Road. Within the Project site, a series of internal access routes would be installed to accommodate construction vehicles and to allow ongoing access for operations and maintenance. Temporary construction staging and laydown would occur within the Project site. The Project would be owned and operated by AES, with use of the Project site secured through a long-term lease from Mahi Pono. At the end of the Project's useful life, the Project equipment would be decommissioned, and the Project site would be returned to substantially the same condition as existed prior to Project development.

3.0 Affected Environment

The Project site is 476.303 acres in size and occupies the southern portion of TMK (2)3-8-005:002-0003. In total, this parcel comprises approximately 3,898 acres, spanning between Kūihelani Highway and Maui Veterans Highway on Maui's central isthmus. The central isthmus is a relatively narrow plain that stretches from the northwest slopes of Haleakalā to the southeast slopes of Mauna Kahālāwai (West Maui Mountains). The topography within the Project site is relatively flat, with a gentle slope increasing towards the northwest. The elevation of the site ranges from approximately 30 feet above mean sea level (amsl) along the southern edge to approximately 150 feet amsl along the northwestern edge. On average, the Project site has a slope of less than 5 percent.

The Project would be located approximately 3 miles south of Kahului in Central Maui on land that is privately owned by Mahi Pono (acquired from Alexander & Baldwin, Inc.). This land was formerly part of the Hawaiian Commercial & Sugar Company (HC&S) plantation and was used for sugarcane cultivation for more than 100 years until Alexander & Baldwin ceased commercial operations in 2016, then subsequently sold to Mahi Pono. Presently, the Project site consists of fallow fields and plantation roads, as well as irrigation equipment and other remnant features of the former plantation. In addition, two 69kV overhead transmission lines, owned and operated by Maui Electric, span the southern and western portions of the Project site; these lines are supported by a series of wooden utility poles, generally ranging in height up to approximately 60 feet.

As shown in Figure 3, the Project site is generally surrounded by former HC&S plantation lands. Most of these surrounding agricultural fields are fallow, except for the fields east of the Project site which have been planted with citrus trees (Mahi Pono 2025). Other surrounding land uses in the immediate vicinity include AES' existing Kūihelani Solar + Storage Project, a 60 MW solar photovoltaic and 240 MWh battery energy storage facility located to the north, and Maui Electric's Māʻalaea Power Plant to the south. Further south, beyond the Māʻalaea Power Plant, is the Keālia Pond National Wildlife Refuge, a protected wetland complex, located approximately 0.3 miles from the southern boundary of the Project site. Waikapū Stream, which flows south toward Keālia Pond, is located approximately 650 feet east of the Project site.

Kūihelani Highway is approximately 0.2 miles to the west, Maui Veterans Highway is approximately 0.8 miles to the east, and North Kīhei Road is approximately 0.2 miles to the southwest of the Project site. Land uses beyond Kūihelani Highway to the west include various fallow fields and farmlands in active cultivation, as well as County of Maui baseyard facilities. To the east beyond Maui Veterans Highway, approximately 1.1 miles from the Project site, are Army National Guard facilities and Maui Raceway Park. Māʻalaea Harbor is located approximately 1.2 miles southwest of the Project site, along with various surrounding commercial and tourist accommodations. Planned future uses in the Project vicinity include the Waikapū Country Town, which would be located approximately 1.1 miles to the north (beyond Kūihelani Highway); this 500-acre development would include residential units, retail/commercial uses, a school, park and open space, as well as an agricultural preserve. Other possible future developments in this region include several state projects in the Pūlehunui area, located east of the Project site along Maui Veterans Highway; these projects include industrial, commercial, and agricultural homestead developments on Department of Hawaiian Homelands (DHHL) lands, an industrial and business park on Department of Land and Natural Resources (DLNR) lands, as well as a public safety complex on Department of Accounting and General Services (DAGS) lands (DHHL 2024).

Given the land use history, the overall character of this region is relatively rural with increasing built components associated with surrounding urban and industrial developments. These elements contribute to the visual setting, with the natural landscape as a backdrop. In particular, the visual setting of this region is dominated by views of Haleakalā to the east, Mauna Kahālāwai (West Maui Mountains) to the west, and Keālia Pond and the Pacific Ocean to the south. Based on topography, the Project site is potentially visible from surrounding areas extending a few miles to the south and west (up to and including the slopes of the Mauna Kahālāwai) with more distant viewpoints in other directions (up to and including the western slopes of Haleakalā and the surrounding Pacific Ocean).

4.0 County Scenic Resource Goals and Objectives

The Maui Island Plan (Maui County, 2012) is the county's blueprint for implementing the General Plan and is intended to guide land use development in the county. Chapter 2 of the Maui Island Plan specifically addresses scenic resources and establishes goals, objectives, and policies to protect the county's identified scenic resources. Maui County establishes the following goal in the plan:

> *Goal 2.5: Maui will continue to be a beautiful island steeped in coastal, mountain, open space, and historically significant views that are preserved to enrich the residents' quality of life, attract visitors, provide a connection to the past, and promote a sense of place.*

To implement this goal, the plan establishes the following three objectives and associated policies:

> *2.5.1 A greater level of protection for scenic resources*
>
> > *2.5.1.a Protect views to include, but not be limited to, Haleakalā, 'Iao Valley, the Mauna Kahālāwai (West Maui Mountains), Pu'u Ō'la'i, Kaho'olawe, Molokini, Moloka'i, and Lāna'i, Mauna Kea, Mauna Loa, sea stacks, the Pacific Ocean, and significant water features, ridgelines, and landforms.*
> >
> > *2.5.1.b. Identify, preserve, and provide ongoing management of important scenic vistas and open space resources, including mauka-to-makai and makai-to-mauka view planes.*
> >
> > *2.5.1.c. Protect "night sky" resources by encouraging the implementation of ambient light ordinances and encouraging conversion of all sources that create excessive light pollution, affecting our ability to view the stars.*
> >
> > *2.5.1.d. Protect ridgelines from development where practicable to facilitate the protection of public views.*
> >
> > *2.5.1.e. Protect scenic resources along Maui's scenic roadway corridors.*
>
> *2.5.2: Reduce impacts of development projects and public-utility improvements on scenic resources.*
>
> > *2.5.2.a Enforce the policies and guidelines of the SMA regarding the protection of views.*
> >
> > *2.5.2.b Require any new subdivision of land, development, or redevelopment adjacent to a "high" or "exceptional" scenic corridor to submit an impact assessment of the project's*

scenic impacts; this assessment shall use the avoidance, minimization, and mitigation steps respectively, with an emphasis on avoidance.

2.5.2.c Require appropriate building setbacks and limits on wall heights to protect views along scenic corridors.

2.5.2.d Encourage the State of Hawai`i Board of Land and Natural Resources to deny any development within the State Conservation District that interferes with a scenic landscape or disrupts important open space resources.

2.5.2.e Require Urban Design and Review Board (UDRB) review and approval of utility poles, facilities, and other visible infrastructure improvements along scenic corridors.

2.5.2.f Ensure little or no effect on scenic resources from utility improvements, primarily power poles.

2.5.2.g Protect scenic vistas from intrusion by power poles.

2.5.3: Greater protection of and access to scenic vistas, access points, and scenic lookout points.

2.5.3.a Protect, enhance, and acquire access to Maui's scenic vistas and resources.

The general focus of the Maui Island Plan's objectives and policies is the protection of mauka-to-makai and makai-to-mauka view planes and protection of views of significant geographic features and landforms such as Haleakalā, Mauna Kahālāwai (West Maui Mountains), and offshore islands – especially as these views/view planes relate to public views from scenic roadways, parks, and other public access points.

As an implementing action to the Maui Island Plan, Maui County conducted a Scenic Resources Inventory and Mapping Project in 2006 (Chris Hart & Partners 2006) to identify and map the islands' scenic roadway corridors. In the vicinity of the Project site, Honoapi'ilani Highway was designated as a "high" and "medium" value scenic corridor, 'Iao Valley Road was designated as an "exceptional" value scenic corridor, Hana Highway and Haleakalā Highway were designated as "high" value scenic corridors, and North Kīhei Road was designated as a "medium " value scenic corridor on the Cultural Resources Overlay/Scenic Corridor Protection Map for the Central and West Maui area (Maui County 2009). Based on the orientation of the roadway relative to the surrounding topography and vegetation, the Project site is not visible from 'Iao Valley Road. Based on topography only, views of the Project site are potentially visible from Honoapi'ilani Highway, Haleakalā Highway, and North Kīhei Road. Actual views depend on the existing visual elements in the viewshed and any screening effects of intervening vegetation and/or physical structures.

The Cultural Resources Overlay/Scenic Corridor Protection Map was utilized as part of the Maui Island Plan formulation process. However, neither the Scenic Resources Inventory and Mapping Project, nor the Cultural Resources Overlay/Scenic Corridor Protection Map were included in the final Maui Island Plan, which was formally adopted by the Maui County Council in December 2012.

Based on the above information, this visual assessment considers the following views and view planes based on scenic resources identified by the county and potential visibility of the Project:

- Views from designated scenic roadway corridors that may have views of the Project, including Honoapi‘ilani Highway and North Kīhei Road; and
- Mauka-to-makai and makai-to-mauka view planes from public access points that may have views of the Project.

5.0 Visual Assessment Methods

5.1 Visual Impact Criteria

Visual impacts are generally defined in terms of a project’s physical characteristics and potential visibility, as well as the extent to which the project’s presence would change the perceived visual character and quality of the environment in which it would be located. As Maui County does not have a visual assessment guide or formal visual resource management system, Tetra Tech followed the contrast rating system used by the U.S. Bureau of Land Management (BLM) to objectively measure potential changes to the visual environment.[1] The BLM’s contrast rating system is commonly used by federal agencies to assess potential visual resource impacts from proposed projects.

Potential visual impacts were characterized by determining the level of visual contrast introduced by the Project based on comparing existing conditions and photo simulations. Visual contrast is a means to evaluate the level of modification to existing landscape features. Existing landscape is defined by the visual characteristics (form, line, color, and texture) associated with the landform (including water), vegetation, and existing development. The level of visual contrast introduced by a project can be measured by changes in the visual characteristics that would occur as a result of project implementation. The greater the difference between the character elements found within the existing landscape and with a proposed project, the more apparent the level of visual contrast. The following general criteria[2] were used when evaluating the degree of contrast:

- *None* – The element contrast is not visible or perceived.
- *Weak* – The element contrast can be seen but does not attract attention.
- *Moderate* – The element contrast begins to attract attention and begins to dominate the characteristic landscape.
- *Strong* – The element contrast demands attention, would not be overlooked, and is dominant in the landscape.

5.2 Viewshed and Viewpoints

A viewshed is generally defined as the area that is visible from an observer’s viewpoint and includes the screening effects of intervening vegetation, terrain, and/or structural features. In order to initially determine the geographic extent of potential views of the Project, a viewshed analysis was conducted to identify potential Project visibility based on topography. This analysis assumed “bare earth” conditions, not accounting for screening by intervening structures, vegetation, or other features. As previously noted, based on topography alone, views of the Project site from the surrounding area are potentially

[1] See BLM Visual Resource Management System (BLM 1986).

[2] These criteria are based on the BLM Visual Resource Management (VRM) system, a process using the concept of “contrast” to objectively measure potential changes to the landscape features.

available within a few miles to the west and greater distances to the east. Within these areas, the degree of visibility would depend on distance and view angle. Greater view angles from elevations higher than the Project site allow for views from greater distances. However, as the distance increases, Project components (i.e. solar arrays, battery containers, substation equipment) would blend into the surrounding agricultural land use and the natural vegetation patterns. In general, it is anticipated that contrast would generally be stronger from viewpoints within approximately one mile of the Project site and would weaken as texture and color become muted and less detailed with distance.

Distance is only one of the factors that determine visibility of a site from a viewpoint. Vegetation, structures, and other intervening features can obscure views that might otherwise be available at a certain distance. A detailed visual assessment considers intervening structures, vegetation, and terrain from selected viewpoints to assess where Project components may be potentially visible and noticeable to the casual observer. The "casual observer" is considered an observer who is not actively looking or searching for the Project components, but who is engaged in activities at locations with potential views of the Project, such as walking or driving along a roadway. If the Project components are not noticeable to the casual observer, then visual impacts can be considered minor to negligible.

The visual assessment conducted for the Project included the collection of photographs from selected viewpoints to capture existing views, a qualitative assessment of whether the view may or may not have an unobstructed view (taking into account terrain, existing vegetation, and structures – such as residential or commercial buildings), and where appropriate, the creation of photo-realistic simulations (see Section 5.3 for more information on photo simulation methodology). Viewpoints were selected from publicly accessible locations (e.g., roadways, public right of ways, etc.), representing various types of casual observers (i.e. drivers, residents, park patrons) within the potential viewshed areas. The potential visibility of the Project was then assessed from each viewpoint based on the simulations.

The following viewpoints were identified for detailed visual assessment and creation of photo simulations. These viewpoints (Figure 4), represent public viewsheds including views from two roadways, Honoapiʻilani Highway and North Kīhei Road, which are designated as scenic corridors on the Cultural Resources Overlay/Scenic Corridor Protection Map for the West and Central Maui area (Maui County 2009):

- Viewpoint 1: Maʻalahi Street
- Viewpoint 2: Honoapiʻilani Highway near Waikapū
- Viewpoint 3: Kūihelani Highway near Honoapiʻilani Highway
- Viewpoint 4: Māʻalaea Road
- Viewpoint 5: Keālia Coastal Boardwalk
- Viewpoint 6: North Kīhei Road (Keālia Pond National Wildlife Refuge)
- Viewpoint 7: North Kīhei Road (9th Street)
- Viewpoint 8: Kūihelani Highway
- Viewpoint 9: Maui Veterans Highway (South End of Mehameha Loop)
- Viewpoint 10: Maui Veterans Highway (North End of Mehameha Loop)
- Viewpoint 11: Waiohuli Community Center

5.3 Methodology for Photo Simulations

To obtain photographs for the simulations, a site visit was conducted for each of the selected viewpoint locations. Documentation at each viewpoint location generally included recording global positioning system (GPS) coordinates, taking a series of photographs to capture the existing views, and field notes (e.g., date/time photographs were taken, weather, direction of photograph). In addition, at each viewpoint location, GPS coordinates were recorded for "control points," which are objects such as buildings or light poles that appear within the series of photographs taken.

To create the photo simulations, the location data captured by the GPS device was transferred to geographic information system (GIS) software that combined data of the preliminary layout of Project components to produce a reference map. This map was then exported at true scale and imported into 3D modeling software to create a scaled 3D model of the Project equipment, including the proposed solar modules, battery storage containers, and substation/switchyard in spatially accurate locations and elevations. The Project equipment and associated dimensions were identified based on the current level of design, with the maximum solar module height assumed to be 11 feet above the ground surface (at full tilt). The views from the existing photographs were then matched in the 3D model using virtual cameras with the same focal length and field of view as the digital camera used to take the photographs. Date- and time-specific lighting was added to the 3D model, and renderings from the virtual cameras were created. These renderings were blended into the existing conditions photographs in digital photograph editing software. The resulting simulations were used to determine the level of visual contrast between the existing landscape and the expected landscape once the proposed Project is constructed. The simulations are contained in Attachment A.

6.0 Potential Visual Impact Analysis

The visual impact analysis is based on the Project layout shown in Figure 2. Given the existing topography, the majority of the Project site, including the areas associated with the solar modules and internal access routes, would require minimal grading. As such, the Project is not expected to significantly alter the existing topography, thereby avoiding visual impacts associated with landform changes.

During construction and operation, where visible and noticeable, the Project may introduce visual contrast with the introduction of Project facilities and equipment (e.g., solar modules, battery containers, electrical substation, switchyard, etc.), which could potentially create visual effects within the surrounding areas for the casual observer. If the Project components would not be visible or perceived, then no visual impact would occur. If the Project components would introduce contrast to but not attract the attention of casual observer, the contrast is considered weak, and the visual impacts could be considered minor to negligible. If the visual contrast that would be introduced by the Project begins to attract attention and begins to dominate the view, the contrast is considered moderate, and the impact could be considered moderate. If the Project components would introduce contrast that demands attention, would not be overlooked, and would dominate in the view, the contrast is considered strong, and the impact could be considered substantial.

The potential visual impacts anticipated as a result of construction and operation of the Project at each of the viewpoint locations are discussed below. The photo simulations developed for each viewpoint are included in Appendix A.

Ma‘alahi Street (Viewpoint 1)

The Project is located approximately 3.2 miles southeast of this viewpoint. This viewpoint is located at Ma‘alahi Street, approximately 100 feet north of the intersection of Ma‘alahi Street and Kulaiwi Drive and approximately 850 feet higher in elevation than the Project site. This viewpoint looks southeast and reflects the views of drivers traveling east on Ma‘alahi Street and from adjacent residences where views would not be blocked by structures or vegetation. Sloping terrain with residences are visible in the foreground,[3] relatively flat terrain with agricultural and urban development in the middleground, and the steep terrain of Haleakalā in the background.[4]

The existing landscape setting is characterized by man-made features in the foreground and with irregular, organic forms of vegetation visible throughout the viewshed. Vegetation in the foreground includes medium to tall trees and shrubs; dominant colors are light and dark green and brown with pops of bright red colors. Vegetation in the middleground is dominated by fallow agricultural fields with generally short vegetation, and light and dark green and brown coloring. Vegetation in the background appears as shades of green and brown patches on Haleakalā. Linear, horizontal, and vertical lines associated with the structural features of the residential buildings and palm trees are prominent in the foreground. Additional geometric shapes associated with agricultural and urban development are apparent in the middleground. Dominant colors for the structures (residential buildings and roadway) are shades of white, brown, and gray.

The Project would introduce gray color, regular and uniform geometric shapes, and horizontal lines into the landscape setting. As shown on the visual simulation, it would appear as a dark patch within existing agricultural land; however, from this distance, the Project is barely noticeable and seamlessly blends in with the existing surroundings. The Project would not attract attention by the casual observer and views of Haleakalā would not be blocked by the Project components. As the contrast is anticipated to be weak to none, the visual impacts are considered negligible.

Honoapi‘ilani Highway near Waikapū (Viewpoint 2)

This viewpoint is located on Honoapi‘ilani Highway, approximately 2 miles northwest of the Project site. This section of Honoapi‘ilani Highway has been designated as a scenic roadway corridor with “medium” value (Maui County 2009). The photograph was taken from the east side of the road, looking southeast. The proposed Waikapū Country Town Development would be located on the east and west side of the highway near this location. Fallow agriculture is visible across the viewshed with Haleakalā in the distance.

The existing landscape setting is characterized by relatively flat terrain in the foreground and middleground to the steeper terrain of Haleakalā in the background. Irregular, organic forms of vegetation are visible throughout the viewshed. Vegetation in the foreground includes dry brush and fallow agricultural vegetation with dominant colors in shades of brown. Vegetation in the middleground includes trees, shrubs, and short, fallow agricultural vegetation; dominant colors are brown and dark green. Vegetation in the background appears as light and dark brown patches on Haleakalā.

Solar arrays from the Project would barely be visible from this location due to distance and obstruction by existing vegetation in the foreground and middleground. Also, given the low profile of the Project

[3] Foreground and middleground describes area 0 to 5 miles from the viewpoint.

[4] Background describes area beyond 5 miles and up to 15 miles away from the viewpoint.

components, the Project would not block views of Haleakalā within the existing viewshed. The Project would have weak to no visual contrast and would not attract the attention of the casual observer; therefore, there the visual impact from Viewpoint 2 would be negligible.

Kūihelani Highway near Honoapiʻilani Highway (Viewpoint 3)

This viewpoint is located on Kūihelani Highway, approximately 0.7 miles west of the Project site. The photograph was taken from the east side of the road, looking east. The proposed Waikapū Country Town Agricultural Preserve will be located on the west side of the highway near this location. This viewpoint reflects the views of drivers traveling on Kūihelani Highway and from the southern end of the proposed Waikapū County Town Agricultural Preserve. Fallow agricultural fields are visible in the foreground/middleground and Haleakalā is visible in the background.

The existing landscape setting is characterized by relatively flat agricultural land stretching across the view with steeper terrain rising in the background. Irregular, organic forms of vegetation including medium-sized trees, shrubs, and short, fallow agricultural vegetation are visible in the foreground, with dominant colors including brown and green. Vegetation in the middleground includes short, fallow agricultural vegetation; dominant colors are brown and green. Vegetation in the background appears as brown and dark green patches on Haleakalā.

The Project would introduce shades of dark gray and blue color, geometric shapes, and horizontal lines into the landscape setting. The colors, regular geometric forms and horizontal lines associated with the solar arrays and associated infrastructure would result in a visual contrast with the irregular, organic forms, and colors of the existing vegetation. There would be mostly unobstructed views towards the Project at this location. However, given the low profile of the Project components, the Project would not block views of Haleakalā within in the existing viewshed. At this distance, the gray and blue colors of the Project would blend with the existing dark greens and brown colors of the landscape setting. The Project would attract the attention of the casual observer creating moderate to weak visual contrast but would still appear as a subordinate feature in the landscape. The Project would result in moderate to minor visual impact from Viewpoint 3.

Māʻalaea Road (Viewpoint 4)

This viewpoint is located near Māʻalaea Harbor, approximately 1.4 miles southwest of the Project site. The photograph was taken from the east side of Māʻalaea Road, looking northeast. This viewpoint reflects the views of the casual observer from Māʻalaea Harbor and drivers along both Māʻalaea Road and the nearby Honoapiʻilani Highway. The nearby section of Honoapiʻilani Highway was designated as a scenic roadway corridor with “high” value (Maui County 2009). A grassy berm located along the edge of Māʻalaea Road is visibly dominant across the foreground. Trees and shrubs are situated beyond the grassy berm in the middleground. The lower portion of Haleakalā is shown in the background.

The existing landscape setting is characterized by strong linear lines from the existing hardscape and associated structures. The sidewalk and roadway are prominent across the bottom view, and vertical utility poles with horizontal lines create a strong presence on top of the vegetated berm as they protrude above the horizon. The roadway, sidewalk, and utility poles and lines include colors of gray, yellow, red, brown, and black. The vegetation has dominant colors of light and dark green. The Project would not be visible to a casual observer from this location because the views would be screened by the existing grassy berm; therefore, there would be no visual contrast at this location. There would be no visual impact from Viewpoint 4.

Keālia Coastal Boardwalk (Viewpoint 5)

This viewpoint is located on Keālia Coastal Boardwalk, approximately 0.8 mile south of the Project site. The photograph was taken on the bridge section of the boardwalk, looking north through Keālia Pond National Wildlife Refuge with North Kīhei Road in the middleground. This viewpoint reflects the views of people walking and sightseeing along the trail. Lowland wetland with relatively flat terrain and an outlet from Keālia Pond is visible in the foreground/middleground and steeper terrain of Mauna Kahālāwai is visible in the background.

The existing landscape setting is characterized by irregular, organic forms of vegetation intertwined with flat water, visible throughout the viewshed. Vegetation in the foreground and middleground includes small trees and low growing plants of shrubs and grasses, with dominant colors including shades green and brown. Vegetation in the background appears as shades of green and brown patches.

Project components, including proposed vertical utility poles would be introduced into the midground view, however, these features would generally be screened by existing vegetation or blend into the existing surroundings. The small scale of the new structures would not attract attention by the casual observer and views of Kealia Pond, Mauna Kahālāwai would not be blocked by the Project components. As the contrast is anticipated to be weak to none, the visual impacts are considered negligible at Viewpoint 5.

North Kīhei Road and Keālia Pond National Wildlife Refuge (Viewpoint 6)

This viewpoint is located on North Kīhei Road, approximately 2 miles southeast of the Project site. North Kīhei Road was designated as a “medium” value scenic roadway corridor (Maui County 2009). This viewpoint looks northwest and reflects the views of drivers traveling on North Kīhei Rd and people visiting the beach and Keālia Pond National Wildlife Refuge or staying in nearby accommodations. The photograph was taken from the north side of the road, looking northwest across Keālia Pond National Wildlife Refuge. Relatively flat terrain associated with Keālia Pond is visible in the foreground, with Mā‘alaea Bay and agricultural fields in the middleground. In the background is the steeper terrain of Mauna Kahālāwai.

The existing landscape setting is characterized by irregular, organic forms of vegetation. Vegetation in the foreground includes tall trees along the road, shrubs and grasses in and around the pond, and a cluster of trees in the distance; dominant colors are shades of brown and green. Vegetation in the background appears as shades of brown and green patches on Mauna Kahālāwai. This view also shows strong vertical elements in the form of a wire fence and the Keālia Pond sign, in colors of light brown and orange.

The Project would introduce dark gray patches from the solar arrays in the middleground, but most of the Project would be screened by terrain and existing vegetation. Due to distance, the solar arrays would be visible at a small scale and the colors would blend into the surrounding areas; therefore, the Project would likely not be visible to a casual observer from this location. The visual contrast would be weak to none and the visual impact from Viewpoint 6 would be negligible.

North Kīhei Road and 9th Street (Viewpoint 7)

This viewpoint is located at intersection of North Kīhei Road and 9th Street, looking northeast, approximately 0.5 miles southwest of the Project site. North Kīhei Road was designated as a “medium” value scenic roadway corridor (Maui County 2009). This viewpoint reflects the views of travelers traveling on N Kīhei Rd. Trees, shrubs, and grasses are visible in the foreground and fallow agricultural

fields with trees and shrubs visible in the middleground. The trees in the middleground block any further views towards the background.

The existing landscape setting is characterized by relatively flat terrain with irregular, organic forms of vegetation and the perpendicular layout of the roadway. Also prominent within this view are shades of gray, green, and brown, visible throughout the viewshed. This view also shows strong vertical structures from existing transmission poles and street signs. Horizontal lines are also visible from transmission lines and the gate structure.

The terrain and existing vegetation would screen most of the Project components except for transmission poles and lines required to interconnect the Project with Maui Electric's existing electrical grid. Views of the proposed transmission poles would be mostly unobstructed as they protrude above the existing vegetation into the sky space and have visibility to the casual observer. However, the proposed transmission poles are narrow in size and would blend in with the existing vertical structures. Additionally, the poles would only be seen briefly as viewers drive by, contributing to a weak visual contrast. The visual impact from Viewpoint 7 would be considered minor.

Kūihelani Highway (Viewpoint 8)

This viewpoint is located along Kūihelani Highway, approximately 0.4 mile north of the Project site. The photograph was taken from southbound Kūihelani Highway, looking southeast. This viewpoint reflects the views of drivers traveling on Kūihelani Highway and other nearby areas. Flat roadway with trees and shrubs are visible in the foreground. Due to elevation, the middleground is barely visible, but includes relatively flat agricultural land. The steep terrain of Haleakalā is visible in the background.

The existing landscape setting is characterized by irregular, organic forms of vegetation protruding above the wide, flat roadway in the foreground. Dominant colors in shades of brown and green are visible throughout the view. This view shows strong horizontal elements from existing roadway and striping. Vertical lines are also visible from a few existing utility poles. Dominant colors of these features are gray.

The terrain and existing vegetation in the foreground would screen the Project. The Project would not create any visual contrast at this location because it would not be visible to the casual observer. There would be no visual impact from Viewpoint 8.

Maui Veterans Highway near South End of Mehameha Loop (Viewpoint 9)

This viewpoint is located along southbound Maui Veterans Highway near the southern entrance to Mehameha Loop, approximately 1 mile east of the Project site. This viewpoint looks west and reflects the views of drivers traveling on Maui Veterans Highway as well as people visiting Maui Raceway Park. Flat agricultural land with scattered shrubs are visible in the foreground and continue into the distance with scattered trees. The road curves through the center of the view with a gate on the left side, roadway signs in the center, and a building structure on the right side of the view. The steep terrain of Mauna Kahālāwai is visible in the background with wind turbines lined across the ridgeline.

The existing landscape setting is characterized by irregular, organic forms of vegetation with dominant colors in shades of brown and green visible throughout the view. Horizontal and angled lines are associated with the gate and vertical lines are associated with the wind turbines, sign poles and building. Mauna Kahālāwai is the most prominent natural feature in this view.

The Project would introduce dark gray blue forms low in the horizon of the middleground, visually broken up by existing vegetation. Most of the Project would be screened by terrain and existing vegetation so the Project would create weak visual contrast at this location. The casual observer would have low visibility of the Project and the visual impact at Viewpoint 9 would be minor.

Maui Veterans Highway at North End of Mehameha Loop (Viewpoint 10)

This viewpoint is located along Maui Veterans Highway, approximately 1.5 miles northeast of the Project site. The photograph was taken at the intersection of Maui Veterans Highway and Mehameha Loop, looking southwest across the central isthmus toward Mauna Kahālāwai. This viewpoint reflects the views of drivers traveling along Maui Veterans Highway. Fallow agricultural land and flat terrain is visible in the foreground and middleground, and the steep terrain of Mauna Kahālāwai in the background with wind turbines faintly visible across the ridgeline. There is also some development in the foreground, including utility infrastructure and various buildings.

The existing landscape setting is characterized by irregular, organic forms of vegetation throughout the viewshed. Vegetation in the foreground and middleground includes clumps of short grasses and scatterings of short trees and shrubs; dominant colors are tan and green. Vegetation along the slopes of Mauna Kahālāwai in the background appears as shades of brown patches. The linear, horizontal, and vertical lines associated with the structural features of the brown colored utility poles, a small red farm building, white signage for the Maui Humane Society, and the gray colored roadway (Mehameha Loop) are prominent from this viewpoint. Structures from the white and gray colored agricultural and urban development and rigid lines of the wind turbines are barely visible in the background.

The Project would introduce a gray mass into the landscape setting, but Project components would not block views of Mauna Kahālāwai within the existing viewshed. Although the Project has visibility at this location, it would be small in scale and due to distance and terrain, it would not likely be noticable to the casual observer. The visual contrast would be weak to none and the visual impact at Viewpoint 10 would be minor to negligible.

Waiohuli Community Center (Viewpoint 11)

This viewpoint is located at the Waiohuli Community Center, looking northwest. The Project is located approximately 9.8 miles northwest of this viewpoint. This viewpoint reflects the views from the Waiohuli Community Center and general views from the slopes of Haleakalā, where not blocked by terrain, vegetation, or structures. Undeveloped rolling terrain is visible in the foreground, the Pacific Ocean and relatively flat terrain with agricultural lands in the middleground, and the steep terrain of Mauna Kahālāwai in the background with the mountainside marked by visible wind energy infrastructure.

The existing landscape setting is characterized by irregular, organic forms of vegetation including short grasses in clumps and stands of short trees and shrubs in the foreground; dominant colors are light and dark green and brown. Vegetation in the middleground is dominated by agricultural fields of generally short vegetation, with green and brown colorings. Vegetation along the slopes of Mauna Kahālāwai in the background appears as mostly shades of brown patches. The blue of the ocean is visible in the middleground. White and gray colored geometric shapes associated with the structural features of agricultural and urban development near the coast are barely visible from this viewpoint but the white vertical lines of the wind turbines contrast noticeably with the brown shades of the mountain.

Solar arrays from the Project would introduce gray patches into the background landscape setting. However, as shown in the simulation, the Project would barely be visible and is unlikely to attract the attention of the casual observer from this location due to distance. Furthermore, Project components would not block views of Mauna Kahālāwai given the low profile. Project components would blend with the existing land use patterns and would be a subordinate feature in the landscape setting. The visual contrast is anticipated to be weak to none from Viewpoint 11; therefore the visual impacts are considered minor to negligible.

7.0 Conclusion

During construction and operation, where visible and noticeable, the Project may introduce contrast and have the potential to create visual effects within the surrounding areas for the casual observer. Based on a viewshed assessment (which considers terrain, but not existing vegetation or structures that may obstruct the view), the Project site is potentially visible from surrounding areas extending a few miles to the west (up to and including the slopes of Mauna Kahālāwai) with more distant viewpoints in the other directions (up to and including the western slopes of Haleakalā and the surrounding Pacific Ocean). Within these areas, the degree of visibility would depend on distance, view angle and the extent to which the Project components blend into the surrounding visual environment. Greater view angles from higher elevations would allow for views of the Project site from greater distances. However, with increasing distance, Project components (i.e. solar arrays, battery containers, substation and interconnection equipment) would blend into the surrounding agricultural land use and the native vegetation patterns, resulting in less contrast. In general, it is anticipated that contrast would generally be stronger from viewpoints within approximately one mile of the Project site and would weaken as texture and color become muted and less detailed with distance. Project visibility may be further limited by existing vegetation, structures, and other intervening features.

The visual impact analysis, which considered the viewsheds from a variety of publicly accessible locations surrounding the Project site (e.g., roadways and public right of ways), indicates that the Project would either be completely screened or have limited visibility from many nearby viewpoints due to the relatively flat topography and surrounding vegetation (e.g., see Viewpoints 4, 7, and 8). In areas where there is insufficient screening by existing vegetation, such as along certain sections of Kūihelani Highway, the Project would introduce weak to moderate visual contrast to the landscape setting (e.g., see Viewpoint 3). However, Project components would appear as a sub-dominant feature within the landscape setting. Travelers along scenic-roadway corridors (e.g., see Viewpoints 2, 4, 6, and 7) and other nearby roadways would only be parallel to the Project for a limited time and their focus would be on the road ahead and mountains in the distance, such that any visual impact in these locations would be minor to negligible and short-term and transient in nature. Areas with a greater view angle from higher elevations have a greater potential for views of the Project; however, visibility of Project components would diminish with distance. For example, from certain viewpoints in Wailuku Heights, the Project would introduce weak contrast to the landscape setting resulting in minor visual impacts (e.g., see Viewpoint 1). Although the Project would also be visible from similar elevations to the east, the Project components would barely be noticeable to the casual observer due to distance of the Project, resulting in negligible visual impacts (e.g., see Viewpoint 11).

In conclusion, it is anticipated that views of the Project would vary from completely screened to partially screened to unobstructed. Portions of the Project that would be visible would appear as a sub-dominant to co-dominant feature in the landscape setting and would be viewed in the context of surrounding features including roadways, utility infrastructure, and agricultural operations. Given the relatively low profile of the solar photovoltaic modules, the Project would not block views of the ocean, Mauna Kahālāwai (West Maui Mountains), or Haleakalā from any of the viewpoints. After decommissioning, the Project site would be returned to substantially the same condition as existed prior to Project development. Considering these factors, the Project is expected to have minimal or negligible impact on Maui County's scenic and visual resources.

8.0 References

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Figures

1:60,000 WGS 1984 UTM Zone 4N 0 0.5 1 2 Miles NOT FOR CONSTRUCTION

Kūihelani Solar Phase 2 Project

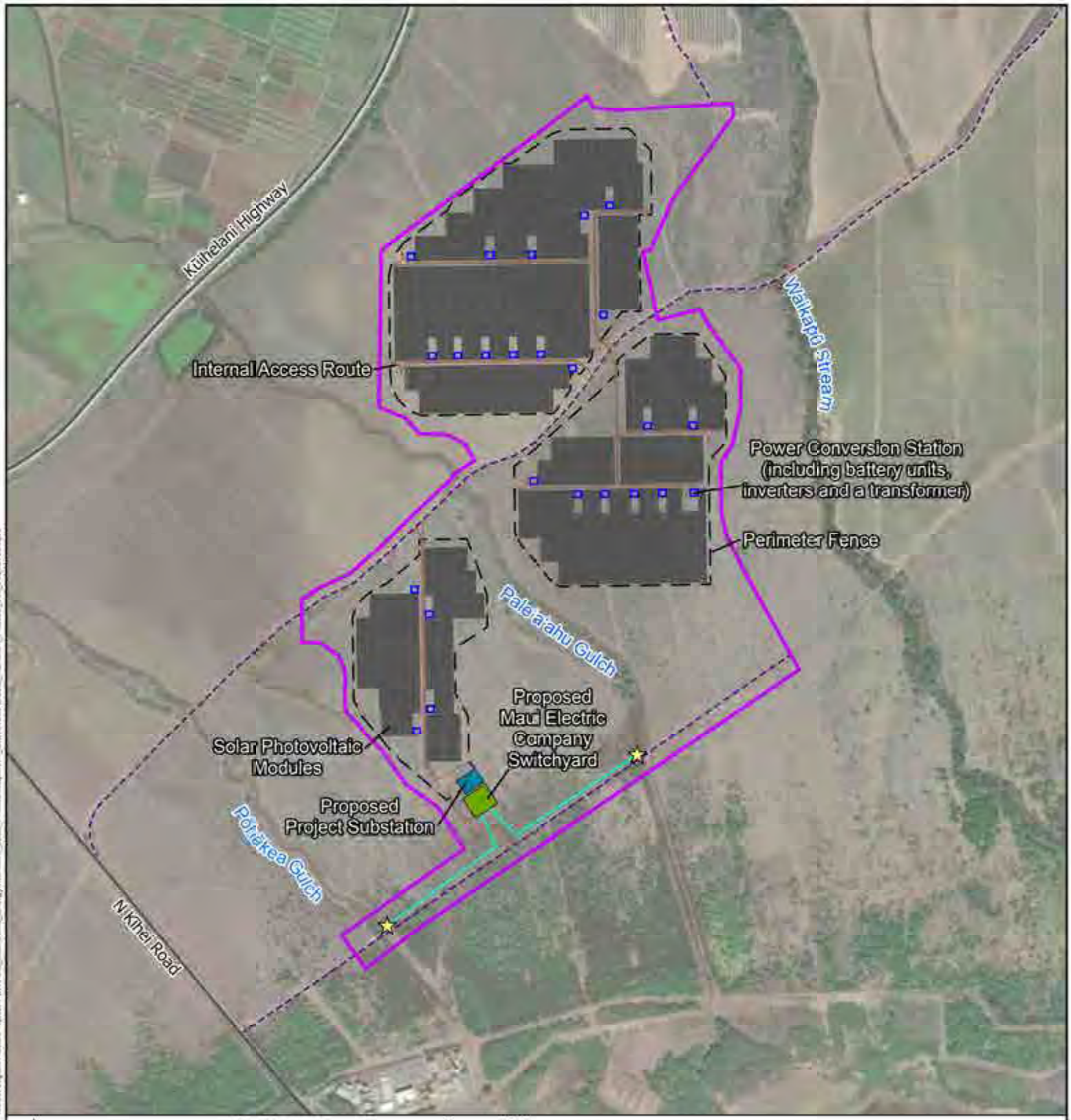
Figure 1
Project Location

MAUI COUNTY, HAWAI'I

- Project Site
- Existing AES Kūihelani Solar Plus Storage Project
- Major Road
- Secondary Road

Reference Map

TETRA TECH aes Hawai'i



1:15,000 WGS 1984 UTM Zone 4N 0 0.13 0.25 0.5 Miles NOT FOR CONSTRUCTION

Kūihelani Solar Phase 2 Project

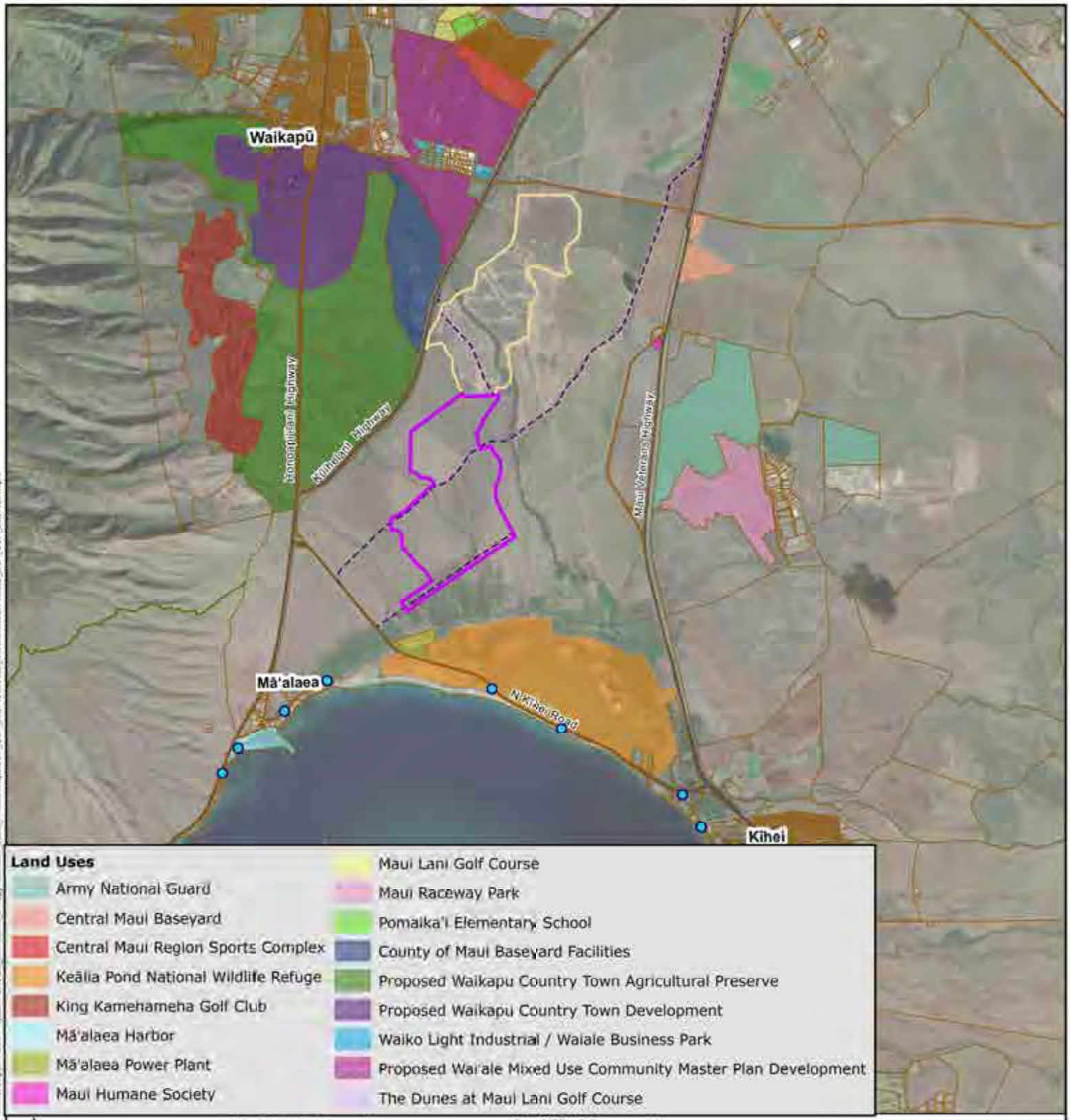
Figure 2
Project Site Plan

MAUI COUNTY, HAWAI'I

- Project Site
- Proposed Project Substation
- Proposed Maui Electric Company Switchyard
- Proposed Point of Interconnection
- Proposed Interconnection Route
- Solar Photovoltaic Modules
- Power Conversion Station
- Perimeter Fence
- Existing Access Route
- Internal Access Route
- Major Road

TETRA TECH aes Hawai'i

Reference Map



Kūihelani Solar Phase 2 Project

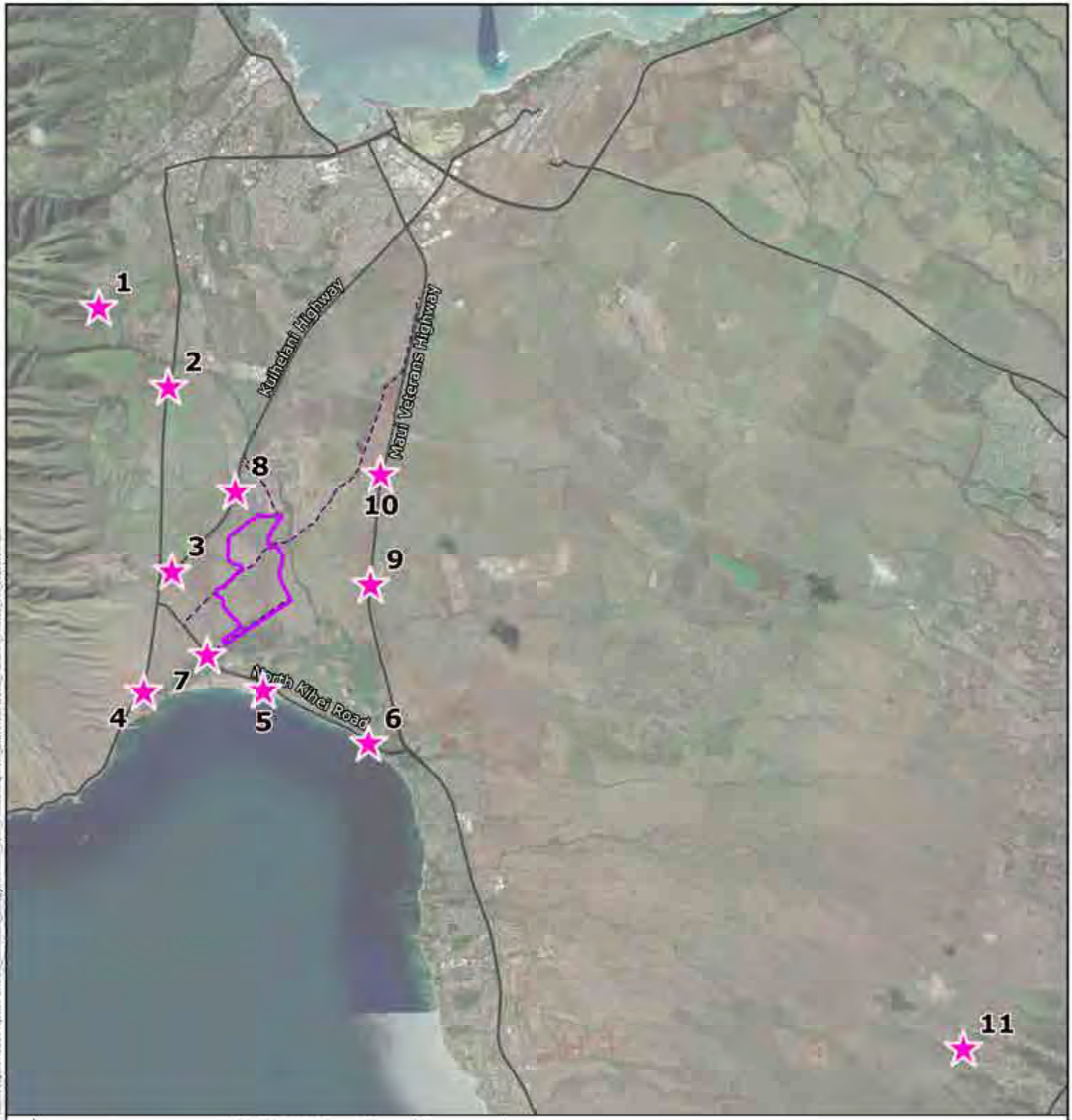
Figure 3
Surrounding Land Uses

MAUI COUNTY, HAWAI'I

- Project Site
- Existing AES Kūihelani Solar Plus Storage Project
- TMK Boundary
- Existing Access Route
- Major Road
- Maui County Shoreline Access Locations
- Nā Ala Hele Trails and Access

Reference Map

TETRA TECH aes Hawai'i



1:100,000 WGS 1984 UTM Zone 4N 0 1 2 4 Miles NOT FOR CONSTRUCTION

Kūihelani Solar Phase 2 Project

Figure 4
Location of Viewpoints

MAUI COUNTY, HAWAI'I

Study Area
Existing Access Route
Major Road
Key Observation Points

Reference Map

TETRA TECH aes Hawai'i

APPENDIX A
PHOTO LOG AND PHOTO SIMULATIONS

Existing Conditions

Simulated Conditions

Kūihelani Solar Phase 2 Project

VISUAL SIMULATIONS
30% Design

Viewpoint 1

Ma‘alahi Street

VICINITY MAP

Photograph Information

1 - Ma‘alahi Street
Time of photograph: 12:30 p.m.
Date of photograph: 11/20/2023
Weather condition: Partly Cloudy
Viewing direction: Southeast
Latitude: 20.863246° N
Longitude: -156.517474° W

Existing Conditions

Simulated Conditions

Kūihelani Solar Phase 2 Project

VISUAL SIMULATIONS
30% Design

Viewpoint 2

Honoapi‘ilani Highway near Waikapū

VICINITY MAP

Photograph Information

2 - Honoapi‘ilani Highway near Waikapū

Time of photograph: 1:00 p.m.
Date of photograph: 11/20/2023
Weather condition: Partly Cloudy
Viewing direction: East-southeast
Latitude: 20.84899° N
Longitude: -156.504806° W

Existing Conditions

Simulated Conditions

Kūihelani Solar Phase 2 Project

VISUAL SIMULATIONS
30% Design

Viewpoint 3

Kūihelani Highway near Honoapi‘ilani Highway

VICINITY MAP

Photograph Information

3 - Kūihelani Hwy
Time of photograph: 1:10 p.m.
Date of photograph: 11/20/2023
Weather condition: Partly Cloudy
Viewing direction: East-southeast
Latitude: 20.817343° N
Longitude:-156.504602° W

Existing Conditions

Simulated Conditions

Views of the Project Area, shown overlaid in green, are obstructed by foreground terrain and vegetation.

Kūihelani Solar Phase 2 Project

VISUAL SIMULATIONS
30% Design

Viewpoint 4

Mā‘alaea Road

VICINITY MAP

Photograph Information

4 - Mā‘alaea Road
Time of photograph: 12:00 p.m.
Date of photograph: 02/23/2024
Weather condition: Partly Cloudy
Viewing direction: Northeast
Latitude: 20.796502° N
Longitude: -156.510418° W

Existing Conditions

Simulated Conditions

Kūihelani Solar Phase 2 Project

VISUAL SIMULATIONS
30% Design

Viewpoint 5

Keālia
Coastal Boardwalk

VICINITY MAP

Photograph Information

5 - Keālia Coastal Boardwalk
Time of photograph: 12:50 p.m.
Date of photograph: 02/23/2024
Weather condition: Partly Cloudy
Viewing direction: North-northeast
Latitude: 20.796214° N
Longitude: -156.487986° W

Existing Conditions

Simulated Conditions

Kūihelani Solar Phase 2 Project

VISUAL SIMULATIONS
30% Design

Viewpoint 6

North Kīhei Road
near Keālia Pond
National Wildlife Refuge

VICINITY MAP

Photograph Information

6 - North Kīhei Road
Time of photograph: 2:00 p.m.
Date of photograph: 11/20/2023
Weather condition: Partly Cloudy
Viewing direction: North
Latitude: 20.787193° N
Longitude: -156.469102° W

Existing Conditions

Simulated Conditions

Kūihelani Solar Phase 2 Project

VISUAL SIMULATIONS
30% Design

Viewpoint 7

North Kīhei Road
at 9th Street

VICINITY MAP

Photograph Information

7 - North Kīhei Road
Time of photograph: 1:25 p.m.
Date of photograph: 02/23/2024
Weather condition: Partly Cloudy
Viewing direction: Northeast
Latitude: 20.802601° N
Longitude: -156.498494° W

Existing Conditions

Simulated Conditions

Views of the Project PV Arrays, Substation and Switchyard, shown overlaid in green, are obstructed by foreground terrain and vegetation.

Kūihelani Solar Phase 2 Project

VISUAL SIMULATIONS
30% Design

Viewpoint 7

North Kīhei Road
at 9th Street

VICINITY MAP

Photograph Information

7 - North Kīhei Road
Time of photograph: 1:25 p.m.
Date of photograph: 02/23/2024
Weather condition: Partly Cloudy
Viewing direction: Northeast
Latitude: 20.802601° N
Longitude: -156.498494° W

Existing Conditions

Simulated Conditions

Views of the Project Area, shown overlaid in green, are obstructed by foreground terrain and vegetation.

Kūihelani Solar Phase 2 Project

VISUAL SIMULATIONS
30% Design

Viewpoint 8

Kūihelani Highway

VICINITY MAP

Photograph Information

8 - Kūihelani Highway
Time of photograph: 11:00 a.m.
Date of photograph: 02/23/2024
Weather condition: Partly Cloudy
Viewing direction: Southeast
Latitude: 20.829668° N
Longitude: -156.493364° W

Existing Conditions

Simulated Conditions

Kūihelani Solar Phase 2 Project

VISUAL SIMULATIONS
30% Design

Viewpoint 9

Maui Veterans Highway (South End of Mehameha Loop)

VICINITY MAP

Photograph Information

9 - Maui Veterans Hwy
Time of photograph: 2:40 p.m.
Date of photograph: 11/20/2023
Weather condition: Partly Cloudy
Viewing direction: West
Latitude: 20.814519° N
Longitude: -156.468175° W

Existing Conditions

Simulated Conditions

Kūihelani Solar Phase 2 Project

VISUAL SIMULATIONS
30% Design

Viewpoint 10

Maui Veterans Highway (North End of Mehameha Loop)

VICINITY MAP

Photograph Information

10 - Maui Veterans Hwy
Time of photograph: 11:50 p.m.
Date of photograph: 11/20/2023
Weather condition: Partly Cloudy
Viewing direction: West
Latitude: 20.833564° N
Longitude: -156.465993° W

Existing Conditions

Simulated Conditions

Kūihelani Solar Phase 2 Project

VISUAL SIMULATIONS
30% Design

Viewpoint 11

Waiohuli
Community Center

VICINITY MAP

Photograph Information

11 - Waiohuli Community Center
Time of photograph: 11:15 a.m.
Date of photograph: 11/20/2023
Weather condition: Partly Cloudy
Viewing direction: Northwest
Latitude: 20.732253° N
Longitude: -156.360228° W

Appendix P. Glare Study and FAA No Effect Determination

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2025-AWP-12603-OE

Issued Date: 08/19/2025

AES KUIHELANI SOLAR, LLC
NICK MOLINARI
282 Century Place
#2000
Louisville, CO 80027

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure: Solar Panel Kuihelani II
County, State: Maui, Hawaii

Collected Point(s):

Label	Latitude	Longitude	SE	DET AGL	AMSL
pt-1	20-49-32.78N	156-29-12.22W	117 Ft	15 Ft	132 Ft
pt-2	20-48-50.47N	156-29-04.96W	55 Ft	15 Ft	70 Ft
pt-3	20-48-33.74N	156-29-31.23W	34 Ft	15 Ft	49 Ft
pt-4	20-48-40.28N	156-29-42.80W	63 Ft	15 Ft	78 Ft
pt-5	20-48-54.53N	156-29-35.50W	85 Ft	15 Ft	100 Ft
pt-6	20-49-21.84N	156-29-39.28W	144 Ft	15 Ft	159 Ft

In accordance with the provisions of 49 U.S.C., Section 44718 and as applicable Title 10 of the Code of Federal Regulations, part 183a, this aeronautical study was sent to the Military Aviation and Installation Assurance Clearinghouse established by the Secretary of Defense for review. The results of that review resulted in a finding of no risk to national security.

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 M Change 1.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, will void this determination. Any future construction or alteration, including increase to heights,

power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

If construction or alteration is dismantled or destroyed, you must submit notice to the FAA within 5 days after the construction or alteration is dismantled or destroyed.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

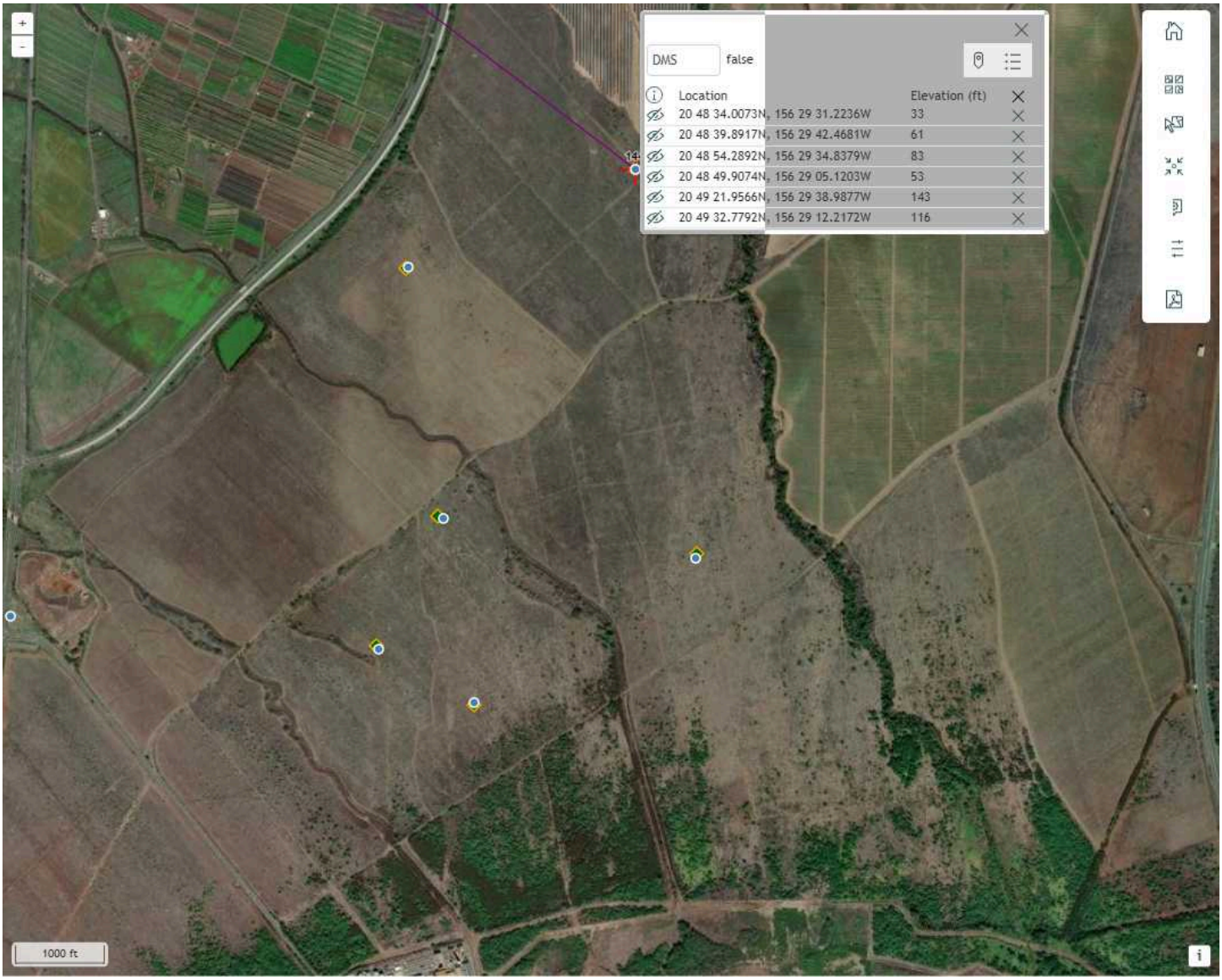
This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at 1-817-222-5915, or Rodney.H-CTR.Love@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2025-AWP-12603-OE.

Signature Control No: 671538446-674358968 (DNE)
rodney.h-ctr.love@faa.gov
Technician

Attachment(s)
Map(s)

Verified Map for ASN 2025-AWP-12603-OE



TETRA TECH

Glare Analysis for the Proposed Kūihelani Solar Phase 2 Project; Wailuku District, Maui, Hawai'i

To:	Kuihelani Solar Phase 2, LLC
From:	Tetra Tech
Date:	July 17, 2025

At the request Kuihelani Solar Phase 2, LLC, a subsidiary of AES Clean Energy Development, LLC (AES), Tetra Tech, Inc. (Tetra Tech) conducted a glare analysis for the proposed Kūihelani Solar Phase 2 Project (Project), located approximately 3 miles south of Kahului in the Wailuku District of Maui County, Hawai'i. The Project consists of a 40 megawatt (MW) ground-mounted solar photovoltaic system coupled with a 160 MW-hour (MWh) battery energy storage system, as well as a Project substation, switchyard and interconnection lines, and other ancillary facilities. The Project site consists of fallow agricultural fields that were previously used for sugar cane cultivation as part of the former Hawaiian Commercial & Sugar Company (HC&S) plantation. AES' recently constructed Kūihelani Solar + Storage Project is located to the north and Maui Electric Company's Ma'alaea Power Plant is located to the south of the Project site; other surrounding areas are comprised of agricultural land, portions of which are being cultivated by Mahi Pono. Nearby roads include Kūihelani Highway to the west-northwest, Maui Veterans Highway to the east, and North Kīhei Road to the southwest.

This memorandum summarizes the results of an analysis of glare that may result from operation of the proposed solar photovoltaic facility. Included with this memo are figures showing the Project location and glare receptors considered in the analysis (Attachment A) and the glare modeling analysis reports (Attachment B).

GLARE ANALYSIS METHOD

With growing numbers of solar energy systems being proposed and installed throughout the United States, the potential impact of glint (a momentary flash of bright light) and glare (a continuous source of bright light) from solar photovoltaic modules has come under scrutiny by aviation authorities. The Federal Aviation Administration (FAA) issued an Interim Policy (78 FR 63276) on October 23, 2013, describing methods for obtaining FAA review and approval of proposed solar arrays on airport property. These methods involve the use of the Sandia Laboratories Solar Glare Hazard Analysis Tool (SGHAT), a modeling/compliance analysis tool licensed for public use within the ForgeSolar GlareGauge cloud software application. Although not required for a proposed solar installation located offsite of an airport property (and for which notice is filed with FAA pursuant to 14 CFR Part 77.9), analysis of potential glare hazard using SGHAT is generally considered to be an industry best practice for solar facilities.

Sandia Laboratories describes the SGHAT technology as follows:

> *Sandia developed SGHAT v. 4.0, a web-based tool and methodology to evaluate potential glint/glare associated with solar energy installations. The validated tool provides a quantified assessment of when and where glare will occur, as well as information about potential ocular impacts. The calculations and methods are based on analyses, test data, a database of different photovoltaic module surfaces (e.g., anti-reflective coating, texturing), and models developed over several years at Sandia. The results are presented in a simple easy-to-interpret plot that specifies when glare will occur throughout the year, with color indicating the potential ocular hazard (Ho and Cims 2017).*

Based on the predicted retinal irradiance (intensity) and subtended angle (size/distance) of the glare source to receptor, SGHAT categorizes potential glare where it is predicted to occur by the model in accordance with three tiers of severity (ocular hazards) represented by different colors in the model output:

- "Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
- "Yellow" glare is glare with potential to cause an after-image when observed prior to a typical blink response time.
- "Red" glare is glare with potential to cause permanent eye damage (retinal burn).

Tetra Tech used SGHAT to conduct three separate glare analyses to evaluate the potential glare from the Project, as follows: (1) 26 observation points (OP) at nearby locations selected to represent lines of sight from neighboring properties; (2) proximal segments of nearby roads (Haleakalā Highway, Honoapi'ilani Highway, Kūihelani Highway, Maui Veterans Highway, and North Kīhei Road); and 3) the final approach paths and air traffic control tower (ATCT) for the Kahului Airport (OGG). Analysis 1 and 2 differ in the heights assumed for the OP and vehicular routes; Analysis 1 represents the point of view from an average first floor residential/commercial structure and typical commuter car, while Analysis 2 represents the point of view from an average second floor residential/commercial structure and typical semi-tractor-trailer truck. Analysis 3 modeled the four two-mile final approach flight paths and ATCT associated with OGG airport. For all three analyses, the Project was defined as three separate solar photovoltaic arrays, which are segmented polygons generally representative of the proposed Project layout. The modeled solar photovoltaic arrays are shown in Figure 1; the OPs, roadway segments, the final approach runways and ATCT are shown in Figure 2 (Attachment A).

The panel orientation, location, and specifications used in the analysis are based on the Project design as provided by AES. The solar photovoltaic arrays consist of a single-axis tracker system with a maximum tracking angle tilt of ±60 degrees (including backtracking with a resting angle of 5 degrees) and a panel height of 8 feet above ground surface (centroid height) with applicable panel specifications. The panels to

be used are smooth glass surface material with an anti-reflection coating (ARC), which is noted in the glare analysis. The input features used in the analyses are summarized in Table 1 and Table 2.

Table 1. Glare Analyses Input Features

Analysis No.	Racking Type	Module Orientation[1]	Tracking Maximum[2] (degrees)	Resting Angle[3] (degrees)	Module Height[4] (feet)	OP Height[5] (feet)	Route Height[6] (feet)	ATCT	Flight Paths
1	Tracking	East-facing	±60	5	8	6	5	-	-
2	Tracking	East-facing	±60	5	8	16	9	-	-
3	Tracking	East-facing	±50	5	8	-	-	1	4

1. PV Array Areas modeled as single axis tracking modules from east-facing in the morning hours to west-facing in the evening hours.
2. The module tilt varies through the day as they track the sun, the maximum tracking angle tilt is ±60 degrees east/west.
3. Resting angle is to angle of rotation of panels when sun is outside tracking range and is used to model backtracking. Panels will revert to the position described by this rotation angle at all times when the sun is outside the rotation range defined by the tracking maximum.
4. Average module centroid height above ground surface.
5. Height of observation point receptor: 6 feet represents an average first floor residential/commercial point of view and 16 feet represents an average second floor residential/commercial point of view.
6. Height of vehicular route receptor: 5 feet represents typical commuter car height and 9 feet represents typical semi-tractor-trailer truck views.

Table 2. Analysis 3 Input Features

Flight Path/ ATCT Name	Associated Airport	True Direction (degrees)	Threshold Crossing Height (feet)	Glide Path[1] (degrees)	Height Above Ground[2] (feet)
OGG RWY 02	Kahului Airport (OGG)	35	77	3	-
OGG RWY 05	Kahului Airport (OGG)	65	40	3	-
OGG RWY 20	Kahului Airport (OGG)	215	76	3	-
OGG RWY 23	Kahului Airport (OGG)	245	50	3	-
OGG ATCT	Kahului Airport (OGG)	-	-	-	100

1. Angle of descent along final approach flight path.
2. Unable to be confirmed based on public information. A conservative height of 100 feet was used based on aerial photography and Google Street views.

The FAA Notice Criteria Tool (NCT) determines whether a proposed structure is in proximity to a jurisdictional air navigation facility and if formal submission under 14 CFR Part 77.9 (Safe, Efficient Use, and Preservation of the Navigable Airspace) is needed. The NCT was utilized to determine whether notice must be filed and if there are any airports or federally obligated two-mile final approach paths within the vicinity of the Project. The NCT identified the OGG airport but determined that the Project does not exceed notice criteria. However, given that the OGG airport is in relatively close proximity to the Project, it is recommended that the Project file with the FAA Obstruction Evaluation/Airport Airspace Analysis (OE/AAA) to confirm no hazard to military routes or equipment.

GLARE ANALYSIS RESULTS

Using SGHAT, three analyses were run to model predicted glare at the identified receptors and routes at varying heights as well as the final approach paths or ATCT for the OGG Airport, as described above. The model did not predict glare at any of the receptors or routes. There is no glare predicted for the OGG Airport.

SUMMARY

The proposed solar photovoltaic facility for the Kūihelani Solar Phase 2 Project was modeled using SGHAT to evaluate the extent of predicted glare that may be experienced at nearby observation points, vehicle routes, and the OGG airport. Three analyses were performed which represented the point of view from an average first floor residential/commercial structure and typical commuter car (six feet and five feet respectively), an average second floor residential/commercial structure and typical semi-tractor-trailer truck (sixteen feet and nine feet respectively), and the 2-mile final approach paths and ATCT for the nearby OGG airport. The model results indicate that there would be no predicted glare impacts to any of the receptors, vehicle routes, or nearby flight paths or ATCT for the OGG airport.

The GlareGauge model does not account for varying ambient conditions (i.e., cloudy days, precipitation), atmospheric attenuation, screening due to existing topography beyond the defined array layouts, or existing vegetation or structures (including fences or walls), nor does the tool allow proposed landscaping to be included. As such, the model results are considered to be conservative.

REFERENCES

Federal Aviation Administration. CFR Title 14 Part 77.9 Notice of Proposed Construction or Alteration Requiring Notice. 2010.

Ho, Clifford L. and Sims, Cianan. "Solar Glare Hazard Analysis Tool v. 4.0." , Jan. 2017.Interim Policy, FAA Review of Solar Energy System Projects on Federally Obligated Airports. 78 FR 63276. October 23, 2013.

Sandia Solar Glare Hazard Analysis Tool, GlareGauge hosted by ForgeSolar. Accessed online https://www.forgesolar.com/

Attachment A. Figures

Legend

Project Layout (PV Array Areas)

*Locations are approximate

Approximate Scale:

0 0.25 0.5 1 Miles

TETRA TECH

Figure 1
PV Array Areas

Kūihelani Solar Phase 2 Project
Maui, Hawai'i

TETRA TECH

Figure 2
Glare Analysis Receptors

Kūihelani Solar Phase 2 Project
Maui, Hawai'i

Attachment B. Glare Analysis Reports

FORGESOLAR GLARE ANALYSIS

Project: **Kuihelani II**
Site configuration: **Analysis 1- 1st Story 07142025**

Client: AES

Created 17 Jul, 2025
Updated 17 Jul, 2025
Time-step 1 minute
Timezone offset UTC-10
Minimum sun altitude 0.0 deg
DNI peaks at 1,000.0 W/m^2
Category 10 MW to 100 MW
Site ID 155193.20238

Ocular transmission coefficient 0.5
Pupil diameter 0.002 m
Eye focal length 0.017 m
Sun subtended angle 9.3 mrad
PV analysis methodology V2

Summary of Results No glare predicted

PV Array	Tilt	Orient	Annual Green Glare		Annual Yellow Glare		Energy
	°	°	min	hr	min	hr	kWh
PV array 1	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 2	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 3	SA tracking	SA tracking	0	0.0	0	0.0	-

Total glare received by each receptor; may include duplicate times of glare from multiple reflective surfaces.

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Haleakala Hwy	0	0.0	0	0.0
Honoapiilani Hwy	0	0.0	0	0.0
Kuihelani Hwy	0	0.0	0	0.0
Maui Veterans Hwy	0	0.0	0	0.0
N Kihei Rd	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 15	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 18	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 21	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 23	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0

Component Data

PV Arrays

Name: PV array 1
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 5.0°
Ground Coverage Ratio: 0.4
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	20.813354	-156.495083	78.56	8.00	86.56
2	20.813968	-156.494675	79.57	8.00	87.57
3	20.813945	-156.493137	72.19	8.00	80.19
4	20.815164	-156.493154	78.23	8.00	86.23
5	20.815140	-156.491960	69.26	8.00	77.26
6	20.814565	-156.491762	65.07	8.00	73.07
7	20.813927	-156.491527	62.45	8.00	70.45
8	20.813324	-156.491543	57.61	8.00	65.61
9	20.813308	-156.492392	63.80	8.00	71.80
10	20.810838	-156.492467	40.57	8.00	48.57
11	20.810821	-156.492244	37.91	8.00	45.91
12	20.809627	-156.492269	35.24	8.00	43.24
13	20.809619	-156.493143	39.87	8.00	47.87
14	20.810289	-156.493568	43.24	8.00	51.24
15	20.810286	-156.494414	53.26	8.00	61.26
16	20.810891	-156.494461	57.54	8.00	65.54
17	20.811539	-156.494481	61.64	8.00	69.64
18	20.811548	-156.495047	65.81	8.00	73.81

Name: PV array 2
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 5.0°
Ground Coverage Ratio: 0.4
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	20.816716	-156.490482	76.04	8.00	84.04
2	20.817382	-156.489962	76.75	8.00	84.75
3	20.817952	-156.489586	76.79	8.00	84.79
4	20.817958	-156.487476	70.27	8.00	78.27
5	20.819974	-156.487507	83.15	8.00	91.15
6	20.820570	-156.486784	78.17	8.00	86.17
7	20.820552	-156.485586	76.75	8.00	84.75
8	20.819984	-156.485126	75.40	8.00	83.40
9	20.819352	-156.484790	71.58	8.00	79.58
10	20.818175	-156.484822	65.72	8.00	73.72
11	20.816582	-156.485322	57.28	8.00	65.28
12	20.814122	-156.485351	47.02	8.00	55.02
13	20.814173	-156.489415	58.78	8.00	66.78
14	20.815426	-156.490433	66.01	8.00	74.01

Name: PV array 3
Axis tracking: Single-axis rotation
Backtracking: Shade
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 5.0°
Ground Coverage Ratio: 0.4
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

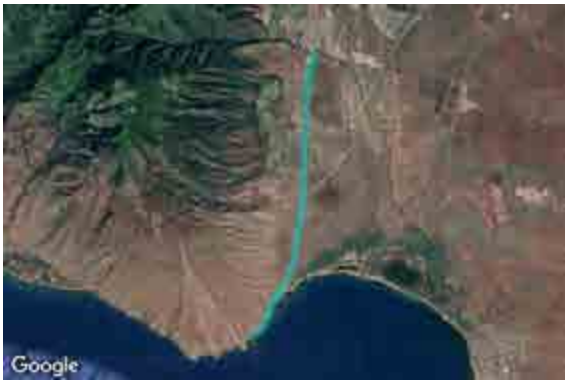
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	20.822391	-156.493845	138.13	8.00	146.13
2	20.819932	-156.493792	115.75	8.00	123.75
3	20.819263	-156.493550	108.01	8.00	116.01
4	20.818651	-156.493175	100.83	8.00	108.83
5	20.818676	-156.489543	80.14	8.00	88.14
6	20.820025	-156.488537	88.06	8.00	96.06
7	20.821273	-156.487258	91.89	8.00	99.89
8	20.823823	-156.486930	106.46	8.00	114.46
9	20.825119	-156.486941	108.25	8.00	116.25
10	20.825751	-156.487118	110.05	8.00	118.05
11	20.825826	-156.489538	133.43	8.00	141.43
12	20.824497	-156.491555	146.58	8.00	154.58
13	20.823210	-156.493248	139.74	8.00	147.74

Route Receptors

Name: Haleakala Hwy
Path type: Two-way
Azimuthal view angle: 50.0°
Downward view angle: 90.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	20.848403	-156.346451	1162.24	5.00	1167.24
2	20.849345	-156.349326	1073.91	5.00	1078.91
3	20.850528	-156.352802	1012.36	5.00	1017.36
4	20.851751	-156.355513	960.09	5.00	965.09
5	20.856606	-156.363216	814.41	5.00	819.41
6	20.863134	-156.372063	637.61	5.00	642.61
7	20.865273	-156.375811	555.78	5.00	560.78
8	20.867118	-156.380339	483.61	5.00	488.61
9	20.872442	-156.394969	316.95	5.00	321.95
10	20.873405	-156.397136	287.52	5.00	292.52
11	20.874854	-156.399375	238.59	5.00	243.59
12	20.878635	-156.403752	180.88	5.00	185.88
13	20.879717	-156.405168	167.91	5.00	172.91
14	20.880680	-156.407185	152.28	5.00	157.28
15	20.881181	-156.409031	135.28	5.00	140.28
16	20.881863	-156.413546	108.50	5.00	113.50
17	20.885841	-156.425320	91.86	5.00	96.86
18	20.886013	-156.426340	89.00	5.00	94.00

Name: Honoapiilani Hwy
Path type: Two-way
Azimuthal view angle: 50.0°
Downward view angle: 90.0°

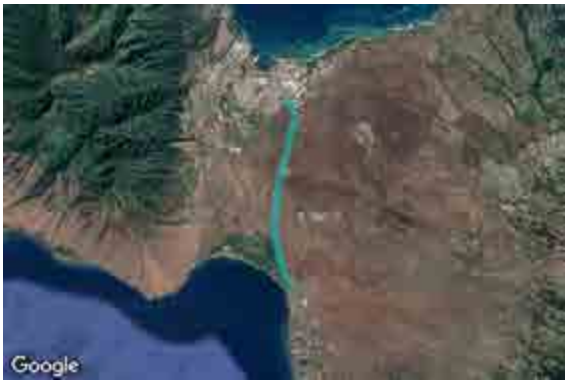


Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	20.781379	-156.520402	67.11	5.00	72.11
2	20.781948	-156.519359	69.02	5.00	74.02
3	20.782686	-156.518447	58.30	5.00	63.30
4	20.783626	-156.517685	48.54	5.00	53.54
5	20.784665	-156.517149	18.87	5.00	23.87
6	20.786321	-156.516424	44.88	5.00	49.88
7	20.790800	-156.514384	19.70	5.00	24.70
8	20.795599	-156.511442	39.03	5.00	44.03
9	20.798276	-156.510118	59.04	5.00	64.04
10	20.800965	-156.509254	78.09	5.00	83.09
11	20.806261	-156.508287	116.62	5.00	121.62
12	20.811624	-156.507416	159.15	5.00	164.15
13	20.816842	-156.506814	185.66	5.00	190.66
14	20.818093	-156.506736	203.30	5.00	208.30
15	20.820822	-156.506741	240.21	5.00	245.21
16	20.829357	-156.506423	291.38	5.00	296.38
17	20.834135	-156.506310	318.18	5.00	323.18
18	20.842994	-156.505774	352.11	5.00	357.11
19	20.847215	-156.505406	355.69	5.00	360.69
20	20.850213	-156.504491	377.21	5.00	382.21
21	20.853181	-156.503762	404.44	5.00	409.44

Name: Kuihelani Hwy
Path type: Two-way
Azimuthal view angle: 50.0°
Downward view angle: 90.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	20.816725	-156.506778	184.57	5.00	189.57
2	20.817121	-156.505152	177.27	5.00	182.27
3	20.817933	-156.503655	173.21	5.00	178.21
4	20.818294	-156.503087	173.82	5.00	178.82
5	20.819824	-156.501601	174.67	5.00	179.67
6	20.821947	-156.499428	168.11	5.00	173.11
7	20.824330	-156.496645	171.99	5.00	176.99
8	20.825374	-156.495598	173.34	5.00	178.34
9	20.827116	-156.494308	180.36	5.00	185.36
10	20.828366	-156.493619	179.63	5.00	184.63
11	20.829704	-156.493082	180.24	5.00	185.24
12	20.830775	-156.492786	181.09	5.00	186.09
13	20.833285	-156.492165	175.53	5.00	180.53
14	20.836801	-156.491226	186.76	5.00	191.76
15	20.846848	-156.485931	200.17	5.00	205.17
16	20.855501	-156.481090	169.67	5.00	174.67
17	20.859010	-156.478558	142.17	5.00	147.17
18	20.863036	-156.474677	117.98	5.00	122.98
19	20.872468	-156.464695	65.55	5.00	70.55
20	20.876398	-156.460275	42.60	5.00	47.60

Name: Maui Veterans Hwy
Path type: Two-way
Azimuthal view angle: 50.0°
Downward view angle: 90.0°



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	20.782226	-156.458110	24.67	5.00	29.67
2	20.783510	-156.459279	22.42	5.00	27.42
3	20.784563	-156.460309	17.61	5.00	22.61
4	20.785817	-156.461790	16.58	5.00	21.58
5	20.787051	-156.462691	16.22	5.00	21.22
6	20.787791	-156.462920	16.16	5.00	21.16
7	20.799519	-156.465786	19.49	5.00	24.49
8	20.808108	-156.467833	30.90	5.00	35.90
9	20.810134	-156.468187	30.21	5.00	35.21
10	20.812407	-156.468187	32.81	5.00	37.81
11	20.816335	-156.467712	47.41	5.00	52.41
12	20.822943	-156.466911	82.35	5.00	87.35
13	20.833520	-156.465679	107.79	5.00	112.79
14	20.840806	-156.463907	114.83	5.00	119.83
15	20.851411	-156.461140	101.75	5.00	106.75
16	20.864680	-156.457634	75.55	5.00	80.55
17	20.867066	-156.456990	71.13	5.00	76.13
18	20.868670	-156.456969	65.51	5.00	70.51
19	20.870238	-156.457248	61.67	5.00	66.67
20	20.872324	-156.458171	52.60	5.00	57.60
21	20.874389	-156.459480	42.83	5.00	47.83
22	20.876313	-156.460488	43.64	5.00	48.64

Name: N Kihei Rd
Path type: Two-way
Azimuthal view angle: 50.0°
Downward view angle: 90.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	20.785682	-156.462057	15.63	5.00	20.63
2	20.785326	-156.462669	9.94	5.00	14.94
3	20.785005	-156.464106	3.31	5.00	8.31
4	20.785020	-156.465045	3.28	5.00	8.28
5	20.785211	-156.465956	3.28	5.00	8.28
6	20.785808	-156.467099	3.28	5.00	8.28
7	20.787679	-156.470125	3.28	5.00	8.28
8	20.788926	-156.471847	3.28	5.00	8.28
9	20.789517	-156.472787	3.28	5.00	8.28
10	20.790148	-156.474224	3.28	5.00	8.28
11	20.791031	-156.476251	3.28	5.00	8.28
12	20.792746	-156.480025	3.28	5.00	8.28
13	20.794562	-156.483574	3.28	5.00	8.28
14	20.794939	-156.484261	3.28	5.00	8.28
15	20.795796	-156.485334	2.86	5.00	7.86
16	20.796505	-156.486017	3.27	5.00	8.27
17	20.797026	-156.486671	2.80	5.00	7.80
18	20.797337	-156.487229	3.28	5.00	8.28
19	20.797765	-156.488530	3.28	5.00	8.28
20	20.799468	-156.494640	3.28	5.00	8.28
21	20.799741	-156.495498	6.56	5.00	11.56
22	20.800277	-156.496308	9.68	5.00	14.68
23	20.800988	-156.497061	13.01	5.00	18.01
24	20.807626	-156.502778	76.98	5.00	81.98
25	20.811065	-156.505717	144.85	5.00	149.85
26	20.811351	-156.506109	157.00	5.00	162.00
27	20.811571	-156.507391	157.48	5.00	162.48

Discrete Observation Point Receptors

Name	ID	Latitude (°)	Longitude (°)	Elevation (ft)	Height (ft)
OP 1	1	20.863239	-156.517312	918.98	6.00
OP 2	2	20.858238	-156.501837	382.97	6.00
OP 3	3	20.796317	-156.488303	3.28	6.00
OP 4	4	20.759849	-156.330063	2724.18	6.00
OP 5	5	20.731472	-156.359377	2139.77	6.00
OP 6	6	20.781511	-156.461292	9.25	6.00
OP 7	7	20.786196	-156.468236	3.28	6.00
OP 8	8	20.793937	-156.508241	3.29	6.00
OP 9	9	20.815869	-156.466474	53.96	6.00
OP 10	10	20.866857	-156.474369	101.36	6.00
OP 11	11	20.865915	-156.479161	117.74	6.00
OP 12	12	20.859404	-156.481350	148.92	6.00
OP 13	13	20.827150	-156.356897	1093.25	6.00
OP 14	14	20.798894	-156.370433	1119.89	6.00
OP 15	15	20.840678	-156.518780	764.66	6.00
OP 16	16	20.833601	-156.515031	551.95	6.00
OP 17	17	20.786476	-156.515786	21.80	6.00
OP 18	18	20.869698	-156.468164	78.59	6.00
OP 19	19	20.863202	-156.517468	929.48	6.00
OP 20	20	20.849232	-156.504858	364.70	6.00
OP 21	21	20.817195	-156.504739	174.15	6.00
OP 22	22	20.786846	-156.468958	3.28	6.00
OP 23	23	20.802584	-156.498452	25.35	6.00
OP 24	24	20.829648	-156.493331	183.50	6.00
OP 25	25	20.833506	-156.465969	105.35	6.00
OP 26	26	20.814385	-156.468137	39.37	6.00

Glare Analysis Results

Summary of Results No glare predicted

PV Array	Tilt	Orient	Annual Green Glare		Annual Yellow Glare		Energy
	°	°	min	hr	min	hr	kWh
PV array 1	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 2	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 3	SA tracking	SA tracking	0	0.0	0	0.0	-

Total glare received by each receptor; may include duplicate times of glare from multiple reflective surfaces.

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Haleakala Hwy	0	0.0	0	0.0
Honoapiilani Hwy	0	0.0	0	0.0
Kuihelani Hwy	0	0.0	0	0.0
Maui Veterans Hwy	0	0.0	0	0.0
N Kihei Rd	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 15	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 18	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 21	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 23	0	0.0	0	0.0

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0

PV: PV array 1 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Haleakala Hwy	0	0.0	0	0.0
Honoapiilani Hwy	0	0.0	0	0.0
Kuihelani Hwy	0	0.0	0	0.0
Maui Veterans Hwy	0	0.0	0	0.0
N Kihei Rd	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 15	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 18	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 21	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 23	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0

PV array 1 and Route: Haleakala Hwy

No glare found

PV array 1 and Route: Honoapiilani Hwy

No glare found

PV array 1 and Route: Kuihelani Hwy

No glare found

PV array 1 and Route: Maui Veterans Hwy

No glare found

PV array 1 and Route: N Kihei Rd

No glare found

PV array 1 and OP 1

No glare found

PV array 1 and OP 2

No glare found

PV array 1 and OP 3

No glare found

PV array 1 and OP 4

No glare found

PV array 1 and OP 5

No glare found

PV array 1 and OP 6

No glare found

PV array 1 and OP 7

No glare found

PV array 1 and OP 8

No glare found

PV array 1 and OP 9

No glare found

PV array 1 and OP 10

No glare found

PV array 1 and OP 11

No glare found

PV array 1 and OP 12

No glare found

PV array 1 and OP 13

No glare found

PV array 1 and OP 14

No glare found

PV array 1 and OP 15

No glare found

PV array 1 and OP 16

No glare found

PV array 1 and OP 17

No glare found

PV array 1 and OP 18

No glare found

PV array 1 and OP 19

No glare found

PV array 1 and OP 20

No glare found

PV array 1 and OP 21

No glare found

PV array 1 and OP 22

No glare found

PV array 1 and OP 23

No glare found

PV array 1 and OP 24

No glare found

PV array 1 and OP 25

No glare found

PV array 1 and OP 26

No glare found

PV: PV array 2 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Haleakala Hwy	0	0.0	0	0.0
Honoapiilani Hwy	0	0.0	0	0.0
Kuihelani Hwy	0	0.0	0	0.0
Maui Veterans Hwy	0	0.0	0	0.0
N Kihei Rd	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 15	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 18	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 21	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 23	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0

PV array 2 and Route: Haleakala Hwy

No glare found

PV array 2 and Route: Honoapiilani Hwy

No glare found

PV array 2 and Route: Kuihelani Hwy

No glare found

PV array 2 and Route: Maui Veterans Hwy

No glare found

PV array 2 and Route: N Kihei Rd

No glare found

PV array 2 and OP 1

No glare found

PV array 2 and OP 2

No glare found

PV array 2 and OP 3

No glare found

PV array 2 and OP 4

No glare found

PV array 2 and OP 5

No glare found

PV array 2 and OP 6

No glare found

PV array 2 and OP 7

No glare found

PV array 2 and OP 8

No glare found

PV array 2 and OP 9

No glare found

PV array 2 and OP 10

No glare found

PV array 2 and OP 11

No glare found

PV array 2 and OP 12

No glare found

PV array 2 and OP 13

No glare found

PV array 2 and OP 14

No glare found

PV array 2 and OP 15

No glare found

PV array 2 and OP 16

No glare found

PV array 2 and OP 17

No glare found

PV array 2 and OP 18

No glare found

PV array 2 and OP 19

No glare found

PV array 2 and OP 20

No glare found

PV array 2 and OP 21

No glare found

PV array 2 and OP 22

No glare found

PV array 2 and OP 23

No glare found

PV array 2 and OP 24

No glare found

PV array 2 and OP 25

No glare found

PV array 2 and OP 26

No glare found

PV: PV array 3 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Haleakala Hwy	0	0.0	0	0.0
Honoapiilani Hwy	0	0.0	0	0.0
Kuihelani Hwy	0	0.0	0	0.0
Maui Veterans Hwy	0	0.0	0	0.0
N Kihei Rd	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 15	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 18	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 21	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 23	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0

PV array 3 and Route: Haleakala Hwy

No glare found

PV array 3 and Route: Honoapiilani Hwy

No glare found

PV array 3 and Route: Kuihelani Hwy

No glare found

PV array 3 and Route: Maui Veterans Hwy

No glare found

PV array 3 and Route: N Kihei Rd

No glare found

PV array 3 and OP 1

No glare found

PV array 3 and OP 2

No glare found

PV array 3 and OP 3

No glare found

PV array 3 and OP 4

No glare found

PV array 3 and OP 5

No glare found

PV array 3 and OP 6

No glare found

PV array 3 and OP 7

No glare found

PV array 3 and OP 8

No glare found

PV array 3 and OP 9

No glare found

PV array 3 and OP 10

No glare found

PV array 3 and OP 11

No glare found

PV array 3 and OP 12

No glare found

PV array 3 and OP 13

No glare found

PV array 3 and OP 14

No glare found

PV array 3 and OP 15

No glare found

PV array 3 and OP 16

No glare found

PV array 3 and OP 17

No glare found

PV array 3 and OP 18

No glare found

PV array 3 and OP 19

No glare found

PV array 3 and OP 20

No glare found

PV array 3 and OP 21

No glare found

PV array 3 and OP 22

No glare found

PV array 3 and OP 23

No glare found

PV array 3 and OP 24

No glare found

PV array 3 and OP 25

No glare found

PV array 3 and OP 26

No glare found

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
The algorithm does not rigorously represent the detailed geometry of a system; detailed features such as gaps between modules, variable height of the PV array, and support structures may impact actual glare results. However, we have validated our models against several systems, including a PV array causing glare to the air-traffic control tower at Manchester-Boston Regional Airport and several sites in Albuquerque, and the tool accurately predicted the occurrence and intensity of glare at different times and days of the year.
Several V1 calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare. This primarily affects V1 analyses of path receptors.
Random number computations are utilized by various steps of the annual hazard analysis algorithm. Predicted minutes of glare can vary between runs as a result. This limitation primarily affects analyses of Observation Point receptors, including ATCTs. Note that the SGHAT/ ForgeSolar methodology has always relied on an analytical, qualitative approach to accurately determine the overall hazard (i.e. green vs. yellow) of expected glare on an annual basis.
The analysis does not automatically consider obstacles (either man-made or natural) between the observation points and the prescribed solar installation that may obstruct observed glare, such as trees, hills, buildings, etc.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
The variable direct normal irradiance (DNI) feature (if selected) scales the user-prescribed peak DNI using a typical clear-day irradiance profile. This profile has a lower DNI in the mornings and evenings and a maximum at solar noon. The scaling uses a clear-day irradiance profile based on a normalized time relative to sunrise, solar noon, and sunset, which are prescribed by a sun-position algorithm and the latitude and longitude obtained from Google maps. The actual DNI on any given day can be affected by cloud cover, atmospheric attenuation, and other environmental factors.
The ocular hazard predicted by the tool depends on a number of environmental, optical, and human factors, which can be uncertain. We provide input fields and typical ranges of values for these factors so that the user can vary these parameters to see if they have an impact on the results. The speed of SGHAT allows expedited sensitivity and parametric analyses.
The system output calculation is a DNI-based approximation that assumes clear, sunny skies year-round. It should not be used in place of more rigorous modeling methods.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Refer to the Help page at **www.forgesolar.com/help/** for assumptions and limitations not listed here.

Default glare analysis parameters and observer eye characteristics (for reference only):

- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

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FORGESOLAR GLARE ANALYSIS

Project: **Kuihelani II**
Site configuration: **Analysis 2- 2nd Story 07142025**

Client: AES

Created 17 Jul, 2025
Updated 17 Jul, 2025
Time-step 1 minute
Timezone offset UTC-10
Minimum sun altitude 0.0 deg
DNI peaks at 1,000.0 W/m^2
Category 10 MW to 100 MW
Site ID 155194.20238

Ocular transmission coefficient 0.5
Pupil diameter 0.002 m
Eye focal length 0.017 m
Sun subtended angle 9.3 mrad
PV analysis methodology V2

Summary of Results No glare predicted

PV Array	Tilt	Orient	Annual Green Glare		Annual Yellow Glare		Energy
	°	°	min	hr	min	hr	kWh
PV array 1	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 2	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 3	SA tracking	SA tracking	0	0.0	0	0.0	-

Total glare received by each receptor; may include duplicate times of glare from multiple reflective surfaces.

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Haleakala Hwy	0	0.0	0	0.0
Honoapiilani Hwy	0	0.0	0	0.0
Kuihelani Hwy	0	0.0	0	0.0
Maui Veterans Hwy	0	0.0	0	0.0
N Kihei Rd	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 15	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 18	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 21	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 23	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0

Component Data

PV Arrays

Name: PV array 1
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 5.0°
Ground Coverage Ratio: 0.4
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	20.813354	-156.495083	78.56	8.00	86.56
2	20.813968	-156.494675	79.57	8.00	87.57
3	20.813945	-156.493137	72.19	8.00	80.19
4	20.815164	-156.493154	78.23	8.00	86.23
5	20.815140	-156.491960	69.26	8.00	77.26
6	20.814565	-156.491762	65.07	8.00	73.07
7	20.813927	-156.491527	62.45	8.00	70.45
8	20.813324	-156.491543	57.61	8.00	65.61
9	20.813308	-156.492392	63.80	8.00	71.80
10	20.810838	-156.492467	40.57	8.00	48.57
11	20.810821	-156.492244	37.91	8.00	45.91
12	20.809627	-156.492269	35.24	8.00	43.24
13	20.809619	-156.493143	39.87	8.00	47.87
14	20.810289	-156.493568	43.24	8.00	51.24
15	20.810286	-156.494414	53.26	8.00	61.26
16	20.810891	-156.494461	57.54	8.00	65.54
17	20.811539	-156.494481	61.64	8.00	69.64
18	20.811548	-156.495047	65.81	8.00	73.81

Name: PV array 2
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 5.0°
Ground Coverage Ratio: 0.4
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	20.816716	-156.490482	76.04	8.00	84.04
2	20.817382	-156.489962	76.75	8.00	84.75
3	20.817952	-156.489586	76.79	8.00	84.79
4	20.817958	-156.487476	70.27	8.00	78.27
5	20.819974	-156.487507	83.15	8.00	91.15
6	20.820570	-156.486784	78.17	8.00	86.17
7	20.820552	-156.485586	76.75	8.00	84.75
8	20.819984	-156.485126	75.40	8.00	83.40
9	20.819352	-156.484790	71.58	8.00	79.58
10	20.818175	-156.484822	65.72	8.00	73.72
11	20.816582	-156.485322	57.28	8.00	65.28
12	20.814122	-156.485351	47.02	8.00	55.02
13	20.814173	-156.489415	58.78	8.00	66.78
14	20.815426	-156.490433	66.01	8.00	74.01

Name: PV array 3
Axis tracking: Single-axis rotation
Backtracking: Shade
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 5.0°
Ground Coverage Ratio: 0.4
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

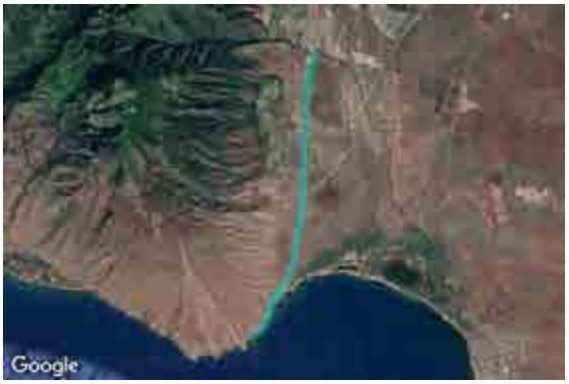
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	20.822391	-156.493845	138.13	8.00	146.13
2	20.819932	-156.493792	115.75	8.00	123.75
3	20.819263	-156.493550	108.01	8.00	116.01
4	20.818651	-156.493175	100.83	8.00	108.83
5	20.818676	-156.489543	80.14	8.00	88.14
6	20.820025	-156.488537	88.06	8.00	96.06
7	20.821273	-156.487258	91.89	8.00	99.89
8	20.823823	-156.486930	106.46	8.00	114.46
9	20.825119	-156.486941	108.25	8.00	116.25
10	20.825751	-156.487118	110.05	8.00	118.05
11	20.825826	-156.489538	133.43	8.00	141.43
12	20.824497	-156.491555	146.58	8.00	154.58
13	20.823210	-156.493248	139.74	8.00	147.74

Route Receptors

Name: Haleakala Hwy
Path type: Two-way
Azimuthal view angle: 50.0°
Downward view angle: 90.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	20.848403	-156.346451	1162.24	9.00	1171.24
2	20.849345	-156.349326	1073.91	9.00	1082.91
3	20.850528	-156.352802	1012.36	9.00	1021.36
4	20.851751	-156.355513	960.09	9.00	969.09
5	20.856606	-156.363216	814.41	9.00	823.41
6	20.863134	-156.372063	637.61	9.00	646.61
7	20.865273	-156.375811	555.78	9.00	564.78
8	20.867118	-156.380339	483.61	9.00	492.61
9	20.872442	-156.394969	316.95	9.00	325.95
10	20.873405	-156.397136	287.52	9.00	296.52
11	20.874854	-156.399375	238.59	9.00	247.59
12	20.878635	-156.403752	180.88	9.00	189.88
13	20.879717	-156.405168	167.91	9.00	176.91
14	20.880680	-156.407185	152.28	9.00	161.28
15	20.881181	-156.409031	135.28	9.00	144.28
16	20.881863	-156.413546	108.50	9.00	117.50
17	20.885841	-156.425320	91.86	9.00	100.86
18	20.886013	-156.426340	89.00	9.00	98.00

Name: Honoapiilani Hwy
Path type: Two-way
Azimuthal view angle: 50.0°
Downward view angle: 90.0°

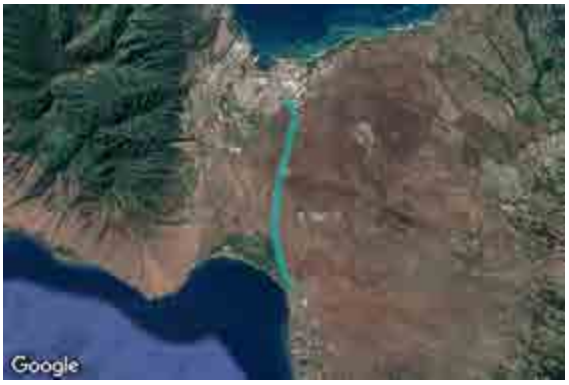


Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	20.781379	-156.520402	67.11	9.00	76.11
2	20.781948	-156.519359	69.02	9.00	78.02
3	20.782686	-156.518447	58.30	9.00	67.30
4	20.783626	-156.517685	48.54	9.00	57.54
5	20.784665	-156.517149	18.87	9.00	27.87
6	20.786321	-156.516424	44.88	9.00	53.88
7	20.790800	-156.514384	19.70	9.00	28.70
8	20.795599	-156.511442	39.03	9.00	48.03
9	20.798276	-156.510118	59.04	9.00	68.04
10	20.800965	-156.509254	78.09	9.00	87.09
11	20.806261	-156.508287	116.62	9.00	125.62
12	20.811624	-156.507416	159.15	9.00	168.15
13	20.816842	-156.506814	185.66	9.00	194.66
14	20.818093	-156.506736	203.30	9.00	212.30
15	20.820822	-156.506741	240.21	9.00	249.21
16	20.829357	-156.506423	291.38	9.00	300.38
17	20.834135	-156.506310	318.18	9.00	327.18
18	20.842994	-156.505774	352.11	9.00	361.11
19	20.847215	-156.505406	355.69	9.00	364.69
20	20.850213	-156.504491	377.21	9.00	386.21
21	20.853181	-156.503762	404.44	9.00	413.44

Name: Kuihelani Hwy
Path type: Two-way
Azimuthal view angle: 50.0°
Downward view angle: 90.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	20.816725	-156.506778	184.57	9.00	193.57
2	20.817121	-156.505152	177.27	9.00	186.27
3	20.817933	-156.503655	173.21	9.00	182.21
4	20.818294	-156.503087	173.82	9.00	182.82
5	20.819824	-156.501601	174.67	9.00	183.67
6	20.821947	-156.499428	168.11	9.00	177.11
7	20.824330	-156.496645	171.99	9.00	180.99
8	20.825374	-156.495598	173.34	9.00	182.34
9	20.827116	-156.494308	180.36	9.00	189.36
10	20.828366	-156.493619	179.63	9.00	188.63
11	20.829704	-156.493082	180.24	9.00	189.24
12	20.830775	-156.492786	181.09	9.00	190.09
13	20.833285	-156.492165	175.53	9.00	184.53
14	20.836801	-156.491226	186.76	9.00	195.76
15	20.846848	-156.485931	200.17	9.00	209.17
16	20.855501	-156.481090	169.67	9.00	178.67
17	20.859010	-156.478558	142.17	9.00	151.17
18	20.863036	-156.474677	117.98	9.00	126.98
19	20.872468	-156.464695	65.55	9.00	74.55
20	20.876398	-156.460275	42.60	9.00	51.60

Name: Maui Veterans Hwy
Path type: Two-way
Azimuthal view angle: 50.0°
Downward view angle: 90.0°



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	20.782226	-156.458110	24.67	9.00	33.67
2	20.783510	-156.459279	22.42	9.00	31.42
3	20.784563	-156.460309	17.61	9.00	26.61
4	20.785817	-156.461790	16.58	9.00	25.58
5	20.787051	-156.462691	16.22	9.00	25.22
6	20.787791	-156.462920	16.16	9.00	25.16
7	20.799519	-156.465786	19.49	9.00	28.49
8	20.808108	-156.467833	30.90	9.00	39.90
9	20.810134	-156.468187	30.21	9.00	39.21
10	20.812407	-156.468187	32.81	9.00	41.81
11	20.816335	-156.467712	47.41	9.00	56.41
12	20.822943	-156.466911	82.35	9.00	91.35
13	20.833520	-156.465679	107.79	9.00	116.79
14	20.840806	-156.463907	114.83	9.00	123.83
15	20.851411	-156.461140	101.75	9.00	110.75
16	20.864680	-156.457634	75.55	9.00	84.55
17	20.867066	-156.456990	71.13	9.00	80.13
18	20.868670	-156.456969	65.51	9.00	74.51
19	20.870238	-156.457248	61.67	9.00	70.67
20	20.872324	-156.458171	52.60	9.00	61.60
21	20.874389	-156.459480	42.83	9.00	51.83
22	20.876313	-156.460488	43.64	9.00	52.64

Name: N Kihei Rd
Path type: Two-way
Azimuthal view angle: 50.0°
Downward view angle: 90.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	20.785682	-156.462057	15.63	9.00	24.63
2	20.785326	-156.462669	9.94	9.00	18.94
3	20.785005	-156.464106	3.31	9.00	12.31
4	20.785020	-156.465045	3.28	9.00	12.28
5	20.785211	-156.465956	3.28	9.00	12.28
6	20.785808	-156.467099	3.28	9.00	12.28
7	20.787679	-156.470125	3.28	9.00	12.28
8	20.788926	-156.471847	3.28	9.00	12.28
9	20.789517	-156.472787	3.28	9.00	12.28
10	20.790148	-156.474224	3.28	9.00	12.28
11	20.791031	-156.476251	3.28	9.00	12.28
12	20.792746	-156.480025	3.28	9.00	12.28
13	20.794562	-156.483574	3.28	9.00	12.28
14	20.794939	-156.484261	3.28	9.00	12.28
15	20.795796	-156.485334	2.86	9.00	11.86
16	20.796505	-156.486017	3.27	9.00	12.27
17	20.797026	-156.486671	2.80	9.00	11.80
18	20.797337	-156.487229	3.28	9.00	12.28
19	20.797765	-156.488530	3.28	9.00	12.28
20	20.799468	-156.494640	3.28	9.00	12.28
21	20.799741	-156.495498	6.56	9.00	15.56
22	20.800277	-156.496308	9.68	9.00	18.68
23	20.800988	-156.497061	13.01	9.00	22.01
24	20.807626	-156.502778	76.98	9.00	85.98
25	20.811065	-156.505717	144.85	9.00	153.85
26	20.811351	-156.506109	157.00	9.00	166.00
27	20.811571	-156.507391	157.48	9.00	166.48

Discrete Observation Point Receptors

Name	ID	Latitude (°)	Longitude (°)	Elevation (ft)	Height (ft)
OP 1	1	20.863239	-156.517312	918.98	16.00
OP 2	2	20.858238	-156.501837	382.97	16.00
OP 3	3	20.796317	-156.488303	3.28	16.00
OP 4	4	20.759849	-156.330063	2724.18	16.00
OP 5	5	20.731472	-156.359377	2139.77	16.00
OP 6	6	20.781511	-156.461292	9.25	16.00
OP 7	7	20.786196	-156.468236	3.28	16.00
OP 8	8	20.793937	-156.508241	3.29	16.00
OP 9	9	20.815869	-156.466474	53.96	16.00
OP 10	10	20.866857	-156.474369	101.36	16.00
OP 11	11	20.865915	-156.479161	117.74	16.00
OP 12	12	20.859404	-156.481350	148.92	16.00
OP 13	13	20.827150	-156.356897	1093.25	16.00
OP 14	14	20.798894	-156.370433	1119.89	16.00
OP 15	15	20.840678	-156.518780	764.66	16.00
OP 16	16	20.833601	-156.515031	551.95	16.00
OP 17	17	20.786476	-156.515786	21.80	16.00
OP 18	18	20.869698	-156.468164	78.59	16.00
OP 19	19	20.863202	-156.517468	929.48	16.00
OP 20	20	20.849232	-156.504858	364.70	16.00
OP 21	21	20.817195	-156.504739	174.15	16.00
OP 22	22	20.786846	-156.468958	3.28	16.00
OP 23	23	20.802584	-156.498452	25.35	16.00
OP 24	24	20.829648	-156.493331	183.50	16.00
OP 25	25	20.833506	-156.465969	105.35	16.00
OP 26	26	20.814385	-156.468137	39.37	16.00

Glare Analysis Results

Summary of Results No glare predicted

PV Array	Tilt	Orient	Annual Green Glare		Annual Yellow Glare		Energy
	°	°	min	hr	min	hr	kWh
PV array 1	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 2	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 3	SA tracking	SA tracking	0	0.0	0	0.0	-

Total glare received by each receptor; may include duplicate times of glare from multiple reflective surfaces.

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Haleakala Hwy	0	0.0	0	0.0
Honoapiilani Hwy	0	0.0	0	0.0
Kuihelani Hwy	0	0.0	0	0.0
Maui Veterans Hwy	0	0.0	0	0.0
N Kihei Rd	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 15	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 18	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 21	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 23	0	0.0	0	0.0

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0

PV: PV array 1 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Haleakala Hwy	0	0.0	0	0.0
Honoapiilani Hwy	0	0.0	0	0.0
Kuihelani Hwy	0	0.0	0	0.0
Maui Veterans Hwy	0	0.0	0	0.0
N Kihei Rd	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 15	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 18	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 21	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 23	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0

PV array 1 and Route: Haleakala Hwy

No glare found

PV array 1 and Route: Honoapiilani Hwy

No glare found

PV array 1 and Route: Kuihelani Hwy

No glare found

PV array 1 and Route: Maui Veterans Hwy

No glare found

PV array 1 and Route: N Kihei Rd

No glare found

PV array 1 and OP 1

No glare found

PV array 1 and OP 2

No glare found

PV array 1 and OP 3

No glare found

PV array 1 and OP 4

No glare found

PV array 1 and OP 5

No glare found

PV array 1 and OP 6

No glare found

PV array 1 and OP 7

No glare found

PV array 1 and OP 8

No glare found

PV array 1 and OP 9

No glare found

PV array 1 and OP 10

No glare found

PV array 1 and OP 11

No glare found

PV array 1 and OP 12

No glare found

PV array 1 and OP 13

No glare found

PV array 1 and OP 14

No glare found

PV array 1 and OP 15

No glare found

PV array 1 and OP 16

No glare found

PV array 1 and OP 17

No glare found

PV array 1 and OP 18

No glare found

PV array 1 and OP 19

No glare found

PV array 1 and OP 20

No glare found

PV array 1 and OP 21

No glare found

PV array 1 and OP 22

No glare found

PV array 1 and OP 23

No glare found

PV array 1 and OP 24

No glare found

PV array 1 and OP 25

No glare found

PV array 1 and OP 26

No glare found

PV: PV array 2 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Haleakala Hwy	0	0.0	0	0.0
Honoapiilani Hwy	0	0.0	0	0.0
Kuihelani Hwy	0	0.0	0	0.0
Maui Veterans Hwy	0	0.0	0	0.0
N Kihei Rd	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 15	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 18	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 21	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 23	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0

PV array 2 and Route: Haleakala Hwy

No glare found

PV array 2 and Route: Honoapiilani Hwy

No glare found

PV array 2 and Route: Kuihelani Hwy

No glare found

PV array 2 and Route: Maui Veterans Hwy

No glare found

PV array 2 and Route: N Kihei Rd

No glare found

PV array 2 and OP 1

No glare found

PV array 2 and OP 2

No glare found

PV array 2 and OP 3

No glare found

PV array 2 and OP 4

No glare found

PV array 2 and OP 5

No glare found

PV array 2 and OP 6

No glare found

PV array 2 and OP 7

No glare found

PV array 2 and OP 8

No glare found

PV array 2 and OP 9

No glare found

PV array 2 and OP 10

No glare found

PV array 2 and OP 11

No glare found

PV array 2 and OP 12

No glare found

PV array 2 and OP 13

No glare found

PV array 2 and OP 14

No glare found

PV array 2 and OP 15

No glare found

PV array 2 and OP 16

No glare found

PV array 2 and OP 17

No glare found

PV array 2 and OP 18

No glare found

PV array 2 and OP 19

No glare found

PV array 2 and OP 20

No glare found

PV array 2 and OP 21

No glare found

PV array 2 and OP 22

No glare found

PV array 2 and OP 23

No glare found

PV array 2 and OP 24

No glare found

PV array 2 and OP 25

No glare found

PV array 2 and OP 26

No glare found

PV: PV array 3 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Haleakala Hwy	0	0.0	0	0.0
Honoapiilani Hwy	0	0.0	0	0.0
Kuihelani Hwy	0	0.0	0	0.0
Maui Veterans Hwy	0	0.0	0	0.0
N Kihei Rd	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 15	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 18	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 21	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 23	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0

PV array 3 and Route: Haleakala Hwy

No glare found

PV array 3 and Route: Honoapiilani Hwy

No glare found

PV array 3 and Route: Kuihelani Hwy

No glare found

PV array 3 and Route: Maui Veterans Hwy

No glare found

PV array 3 and Route: N Kihei Rd

No glare found

PV array 3 and OP 1

No glare found

PV array 3 and OP 2

No glare found

PV array 3 and OP 3

No glare found

PV array 3 and OP 4

No glare found

PV array 3 and OP 5

No glare found

PV array 3 and OP 6

No glare found

PV array 3 and OP 7

No glare found

PV array 3 and OP 8

No glare found

PV array 3 and OP 9

No glare found

PV array 3 and OP 10

No glare found

PV array 3 and OP 11

No glare found

PV array 3 and OP 12

No glare found

PV array 3 and OP 13

No glare found

PV array 3 and OP 14

No glare found

PV array 3 and OP 15

No glare found

PV array 3 and OP 16

No glare found

PV array 3 and OP 17

No glare found

PV array 3 and OP 18

No glare found

PV array 3 and OP 19

No glare found

PV array 3 and OP 20

No glare found

PV array 3 and OP 21

No glare found

PV array 3 and OP 22

No glare found

PV array 3 and OP 23

No glare found

PV array 3 and OP 24

No glare found

PV array 3 and OP 25

No glare found

PV array 3 and OP 26

No glare found

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
The algorithm does not rigorously represent the detailed geometry of a system; detailed features such as gaps between modules, variable height of the PV array, and support structures may impact actual glare results. However, we have validated our models against several systems, including a PV array causing glare to the air-traffic control tower at Manchester-Boston Regional Airport and several sites in Albuquerque, and the tool accurately predicted the occurrence and intensity of glare at different times and days of the year.
Several V1 calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare. This primarily affects V1 analyses of path receptors.
Random number computations are utilized by various steps of the annual hazard analysis algorithm. Predicted minutes of glare can vary between runs as a result. This limitation primarily affects analyses of Observation Point receptors, including ATCTs. Note that the SGHAT/ ForgeSolar methodology has always relied on an analytical, qualitative approach to accurately determine the overall hazard (i.e. green vs. yellow) of expected glare on an annual basis.
The analysis does not automatically consider obstacles (either man-made or natural) between the observation points and the prescribed solar installation that may obstruct observed glare, such as trees, hills, buildings, etc.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
The variable direct normal irradiance (DNI) feature (if selected) scales the user-prescribed peak DNI using a typical clear-day irradiance profile. This profile has a lower DNI in the mornings and evenings and a maximum at solar noon. The scaling uses a clear-day irradiance profile based on a normalized time relative to sunrise, solar noon, and sunset, which are prescribed by a sun-position algorithm and the latitude and longitude obtained from Google maps. The actual DNI on any given day can be affected by cloud cover, atmospheric attenuation, and other environmental factors.
The ocular hazard predicted by the tool depends on a number of environmental, optical, and human factors, which can be uncertain. We provide input fields and typical ranges of values for these factors so that the user can vary these parameters to see if they have an impact on the results. The speed of SGHAT allows expedited sensitivity and parametric analyses.
The system output calculation is a DNI-based approximation that assumes clear, sunny skies year-round. It should not be used in place of more rigorous modeling methods.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Refer to the Help page at **www.forgesolar.com/help/** for assumptions and limitations not listed here.

Default glare analysis parameters and observer eye characteristics (for reference only):

- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

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FORGESOLAR GLARE ANALYSIS

Project: **Kuihelani II**
Site configuration: **Analysis 3- FAA Receptors 07142025**

Client: AES

Created 17 Jul, 2025
Updated 17 Jul, 2025
Time-step 1 minute
Timezone offset UTC-10
Minimum sun altitude 0.0 deg
DNI peaks at 1,000.0 W/m^2
Category 10 MW to 100 MW
Site ID 155195.20238

Ocular transmission coefficient 0.5
Pupil diameter 0.002 m
Eye focal length 0.017 m
Sun subtended angle 9.3 mrad
PV analysis methodology V2

Summary of Results No glare predicted

PV Array	Tilt	Orient	Annual Green Glare		Annual Yellow Glare		Energy
	°	°	min	hr	min	hr	kWh
PV array 1	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 2	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 3	SA tracking	SA tracking	0	0.0	0	0.0	-

Total glare received by each receptor; may include duplicate times of glare from multiple reflective surfaces.

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
OGG RWY 02	0	0.0	0	0.0
OGG RWY 05	0	0.0	0	0.0
OGG RWY 20	0	0.0	0	0.0
OGG RWY 23	0	0.0	0	0.0
1-ATCT	0	0.0	0	0.0

Component Data

PV Arrays

Name: PV array 1
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 5.0°
Ground Coverage Ratio: 0.4
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	20.813354	-156.495083	78.56	8.00	86.56
2	20.813968	-156.494675	79.57	8.00	87.57
3	20.813945	-156.493137	72.19	8.00	80.19
4	20.815164	-156.493154	78.23	8.00	86.23
5	20.815140	-156.491960	69.26	8.00	77.26
6	20.814565	-156.491762	65.07	8.00	73.07
7	20.813927	-156.491527	62.45	8.00	70.45
8	20.813324	-156.491543	57.61	8.00	65.61
9	20.813308	-156.492392	63.80	8.00	71.80
10	20.810838	-156.492467	40.57	8.00	48.57
11	20.810821	-156.492244	37.91	8.00	45.91
12	20.809627	-156.492269	35.24	8.00	43.24
13	20.809619	-156.493143	39.87	8.00	47.87
14	20.810289	-156.493568	43.24	8.00	51.24
15	20.810286	-156.494414	53.26	8.00	61.26
16	20.810891	-156.494461	57.54	8.00	65.54
17	20.811539	-156.494481	61.64	8.00	69.64
18	20.811548	-156.495047	65.81	8.00	73.81

Name: PV array 2
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 5.0°
Ground Coverage Ratio: 0.4
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	20.816716	-156.490482	76.04	8.00	84.04
2	20.817382	-156.489962	76.75	8.00	84.75
3	20.817952	-156.489586	76.79	8.00	84.79
4	20.817958	-156.487476	70.27	8.00	78.27
5	20.819974	-156.487507	83.15	8.00	91.15
6	20.820570	-156.486784	78.17	8.00	86.17
7	20.820552	-156.485586	76.75	8.00	84.75
8	20.819984	-156.485126	75.40	8.00	83.40
9	20.819352	-156.484790	71.58	8.00	79.58
10	20.818175	-156.484822	65.72	8.00	73.72
11	20.816582	-156.485322	57.28	8.00	65.28
12	20.814122	-156.485351	47.02	8.00	55.02
13	20.814173	-156.489415	58.78	8.00	66.78
14	20.815426	-156.490433	66.01	8.00	74.01

Name: PV array 3
Axis tracking: Single-axis rotation
Backtracking: Shade
Tracking axis orientation: 180.0°
Max tracking angle: 60.0°
Resting angle: 5.0°
Ground Coverage Ratio: 0.4
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	20.822391	-156.493845	138.13	8.00	146.13
2	20.819932	-156.493792	115.75	8.00	123.75
3	20.819263	-156.493550	108.01	8.00	116.01
4	20.818651	-156.493175	100.83	8.00	108.83
5	20.818676	-156.489543	80.14	8.00	88.14
6	20.820025	-156.488537	88.06	8.00	96.06
7	20.821273	-156.487258	91.89	8.00	99.89
8	20.823823	-156.486930	106.46	8.00	114.46
9	20.825119	-156.486941	108.25	8.00	116.25
10	20.825751	-156.487118	110.05	8.00	118.05
11	20.825826	-156.489538	133.43	8.00	141.43
12	20.824497	-156.491555	146.58	8.00	154.58
13	20.823210	-156.493248	139.74	8.00	147.74

Flight Path Receptors

Name: OGG RWY 02
Description:
Threshold height: 77 ft
Direction: 35.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	20.889518	-156.436025	49.32	77.00	126.32
Two-mile	20.865834	-156.453796	80.18	599.57	679.75

Name: OGG RWY 05
Description:
Threshold height: 40 ft
Direction: 65.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	20.898212	-156.436661	31.25	40.00	71.25
Two-mile	20.885993	-156.464743	3.28	621.39	624.67

Name: OGG RWY 20
Description:
Threshold height: 76 ft
Direction: 215.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	20.904532	-156.424839	9.84	76.00	85.84
Two-mile	20.928216	-156.407066	-70.49	709.76	639.27

Name: OGG RWY 23
Description:
Threshold height: 50 ft
Direction: 245.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	20.903608	-156.424289	13.44	50.00	63.44
Two-mile	20.915827	-156.396206	-5.16	622.03	616.87

Discrete Observation Point Receptors

Name	ID	Latitude (°)	Longitude (°)	Elevation (ft)	Height (ft)
1-ATCT	1	20.897218	-156.426021	47.48	100.00

Map image of 1-ATCT

Glare Analysis Results

Summary of Results No glare predicted

PV Array	Tilt	Orient	Annual Green Glare		Annual Yellow Glare		Energy
	°	°	min	hr	min	hr	kWh
PV array 1	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 2	SA tracking	SA tracking	0	0.0	0	0.0	-
PV array 3	SA tracking	SA tracking	0	0.0	0	0.0	-

Total glare received by each receptor; may include duplicate times of glare from multiple reflective surfaces.

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
OGG RWY 02	0	0.0	0	0.0
OGG RWY 05	0	0.0	0	0.0
OGG RWY 20	0	0.0	0	0.0
OGG RWY 23	0	0.0	0	0.0
1-ATCT	0	0.0	0	0.0

PV: PV array 1 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
OGG RWY 02	0	0.0	0	0.0
OGG RWY 05	0	0.0	0	0.0
OGG RWY 20	0	0.0	0	0.0
OGG RWY 23	0	0.0	0	0.0
1-ATCT	0	0.0	0	0.0

PV array 1 and FP: OGG RWY 02

No glare found

PV array 1 and FP: OGG RWY 05

No glare found

PV array 1 and FP: OGG RWY 20

No glare found

PV array 1 and FP: OGG RWY 23

No glare found

PV array 1 and 1-ATCT

No glare found

PV: PV array 2 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
OGG RWY 02	0	0.0	0	0.0
OGG RWY 05	0	0.0	0	0.0
OGG RWY 20	0	0.0	0	0.0
OGG RWY 23	0	0.0	0	0.0
1-ATCT	0	0.0	0	0.0

PV array 2 and FP: OGG RWY 02

No glare found

PV array 2 and FP: OGG RWY 05

No glare found

PV array 2 and FP: OGG RWY 20

No glare found

PV array 2 and FP: OGG RWY 23

No glare found

PV array 2 and 1-ATCT

No glare found

PV: PV array 3 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
OGG RWY 02	0	0.0	0	0.0
OGG RWY 05	0	0.0	0	0.0
OGG RWY 20	0	0.0	0	0.0
OGG RWY 23	0	0.0	0	0.0
1-ATCT	0	0.0	0	0.0

PV array 3 and FP: OGG RWY 02

No glare found

PV array 3 and FP: OGG RWY 05

No glare found

PV array 3 and FP: OGG RWY 20

No glare found

PV array 3 and FP: OGG RWY 23

No glare found

PV array 3 and 1-ATCT

No glare found

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
The algorithm does not rigorously represent the detailed geometry of a system; detailed features such as gaps between modules, variable height of the PV array, and support structures may impact actual glare results. However, we have validated our models against several systems, including a PV array causing glare to the air-traffic control tower at Manchester-Boston Regional Airport and several sites in Albuquerque, and the tool accurately predicted the occurrence and intensity of glare at different times and days of the year.
Several V1 calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare. This primarily affects V1 analyses of path receptors.
Random number computations are utilized by various steps of the annual hazard analysis algorithm. Predicted minutes of glare can vary between runs as a result. This limitation primarily affects analyses of Observation Point receptors, including ATCTs. Note that the SGHAT/ ForgeSolar methodology has always relied on an analytical, qualitative approach to accurately determine the overall hazard (i.e. green vs. yellow) of expected glare on an annual basis.
The analysis does not automatically consider obstacles (either man-made or natural) between the observation points and the prescribed solar installation that may obstruct observed glare, such as trees, hills, buildings, etc.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
The variable direct normal irradiance (DNI) feature (if selected) scales the user-prescribed peak DNI using a typical clear-day irradiance profile. This profile has a lower DNI in the mornings and evenings and a maximum at solar noon. The scaling uses a clear-day irradiance profile based on a normalized time relative to sunrise, solar noon, and sunset, which are prescribed by a sun-position algorithm and the latitude and longitude obtained from Google maps. The actual DNI on any given day can be affected by cloud cover, atmospheric attenuation, and other environmental factors.
The ocular hazard predicted by the tool depends on a number of environmental, optical, and human factors, which can be uncertain. We provide input fields and typical ranges of values for these factors so that the user can vary these parameters to see if they have an impact on the results. The speed of SGHAT allows expedited sensitivity and parametric analyses.
The system output calculation is a DNI-based approximation that assumes clear, sunny skies year-round. It should not be used in place of more rigorous modeling methods.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Refer to the Help page at **www.forgesolar.com/help/** for assumptions and limitations not listed here.

Default glare analysis parameters and observer eye characteristics (for reference only):

- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

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Appendix Q. Biological Resource Survey Report and Agency Correspondence

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:
2023-0132372

September 6, 2024

Michael Jenkins
AES Hawai‘i
282 Century Pl. #2000
Louisville, CO 80027

Subject: 2023-0132372 Technical Assistance for the Proposed AES Kūihelani Solar Phase 2 Project, Maui

Dear Michael Jenkins,

This letter is in response to your August 26, 2024, request for our review and technical assistance on the August 2024 Kūihelani Solar Phase 2 Project Biological Resources Survey Report (August 2024 Report) for your project in Kīhei, Maui. Thank you for including the Avoidance and Minimization Measures recommended by the U.S. Fish and Wildlife Service (Service) (Attachment A) in the Conclusions and Recommendations section of your Report. We reviewed your Report and other supplemental information provided in our May and August 2024 emails, your November 2023 Report, phone calls, and the updated biological summary information you provided on August 26, 2024. We provide the following comments for incorporation into your project. 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.

Thank you for considering the following listed species and our recommended avoidance and minimization methods referenced in your November 2023 and August 2024 Report:

- ‘Ōpe‘ape‘a or Hawaiian hoary bat (*Lasiurus cinereus semotus*)
- Nēnē or Hawaiian goose (*Branta sandvicensis*)
- Hawaiian waterbirds, including ae‘o or Hawaiian stilt (*Himantopus mexicanus knudseni*) and ‘alae ke‘oke‘o or Hawaiian coot (*Fulica alai*)
- Blackburn’s sphinx moth (*Manduca blackburni*)

- 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*), and ‘ua‘u or Hawaiian petrel (*Pterodroma sandwichensis*)

Project Description

Kūihelani Solar Phase 2 LLC, a subsidiary of AES Clean Energy (AES), LLC (AES Hawai‘i) is proposing the Kūihelani Solar Phase 2 Project (Project). The Project proposes to construct and operate a 40-megawatt (MW) solar photovoltaic system coupled with a 160-MW-hour battery storage system, an electrical substation, and related interconnection and ancillary facilities. The solar arrays and battery energy storage system would connect with the Project substation via a network of medium-voltage electrical lines, installed either above ground or in underground electrical conduit. Lines would also connect the Project substation to the existing Mā‘alaea Power Plant (MPP)-Waiinu and MPP-Waena 69kV transmission lines. The Project is expected to occupy no more than approximately 300-acres of the 730-acre study area evaluated in the August 2024 Report. The area is fallow sugarcane land that is now predominantly covered by buffelgrass (*Cenchrus ciliaris*), kiawe (*Neltuma pallida*), and koa haole (*Leucaena leucocephala* subsp. *leucocephala*). The area burned in a 2018 wildfire.

Figure 1. Kūihelani Solar Phase 2 Project. The 730-acre study area is shown in pink outline. The approximately 300-acre proposed Project will be sited within the 730-acre study area.

Recommended Avoidance and Minimization Measures for ESA Species

- Page 3 of your letter dated August 26, 2024, says "The project intends to avoid all impacts to state and federally listed species." The Service recommends incorporating the following items into the Project design, construction, operation, and maintenance:
  - all recommendations provided in the August 2024 Report;
  - the Service's Avoidance and Minimization Measures for federally-listed Wildlife Species (Attachment A),
  - Invasive Species Biosecurity Protocols as appropriate (Attachment B), and
  - Best Management Practices for Work In or Around Aquatic Environment (Attachment C)

- The Project Description (August 2024 Report Section 1.1) indicates several sets of powerlines will be associated with the operation of the project and tie-in with the electrical grid. Powerlines, guywires, and construction cranes pose a collision risk to Hawaiian seabirds and Hawaiian waterbirds. Minimizing exposure of the lines above vegetation height and vertical profile is recommended. In the absence of vegetation cover, we strongly recommend placing the powerlines in underground conduit whenever possible to reduce the risk of collision.

- Section 2.3 of the Report indicates the presence of gulches and streams within the study area. The Service recommends incorporating Best Management Practices for Work In or Around Aquatic Environment (Attachment C) into project planning to avoid or minimize impacts to fish and wildlife resources should construction activities occur near streams or gulches. Should construction activities occur near aquatic resources, we request you further consult with us.

- Section 4.1 of the Report indicates 'ilima (*Sida fallax*) is present in low numbers in the 730-acre study area. 'Ilima and other native plant species, provide nectar, pollen, or nesting resources for several species of listed yellow-faced bees (*Hylaeus* spp.) (Attachment A). Yellow-faced bees are not known from the 730-acre study area and it is unlikely the existing habitat supports nesting or provides sufficient foraging resources for listed yellow-faced bee species.

- Section 4.2.3 states no Blackburn's sphinx moth eggs or larvae were observed within the study area during the surveys in July 2023, September 2023, May 2024, or July 2024. However, two Blackburn's sphinx moth eggs and three larvae were observed on tree tobacco (*Nicotiana glauca*) in November 2023. Blackburn's sphinx moth larvae feed on non-native tree tobacco (*Nicotiana glauca*) and native 'aiea (*Nothocestrum* spp.). To pupate, the larvae burrow into the soil and can remain in a state of torpor for a year or more before emerging from the soil. Soil disturbance can result in death of the pupae.

  The August 2024 Report states the majority of the tree tobacco was removed from the study area in accordance with the avoidance and minimization measures provided by the Service in September 2023. In order for the project to continue to avoid risks to Blackburn's sphinx moth, a biologist familiar with the species should survey for Blackburn's sphinx moth and its larval host plants prior to any construction or ground disturbing 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. Please note that this is only guidance for timing; changes in weather may influence activity of Blackburn's sphinx moth.
- Surveys should include searches for adults, eggs, larvae, and signs of larval feeding (chewed stems, frass, or leaf damage).
    - *If moths, eggs, or larvae are found* during the survey, the location of the plants should be mapped and not disturbed. Please contact the Service for additional guidance, if necessary. Once the eggs and larvae are no longer present, the upper portions of the plant may be removed. However, a 33-foot (radius) disturbance-free buffer should be maintained around the once occupied plants for a minimum of 3 months or until a heavy rainfall event occurs to prevent inadvertent mortality of Blackburn's sphinx moth pupae that may be present in the soil. After this period, the plant roots can be removed and the soil disturbed.
    - *If no eggs or larvae are found* within a 33-foot radius of the tree tobacco plant, remove the tree tobacco plant(s). Cut stems can be treated with an herbicide to prevent regrowth.
- Continuous removal of tree tobacco before it reaches 3 feet in height is encouraged to avoid laying of Blackburn's sphinx moth eggs on existing tree tobacco. Maintaining the planned construction and/or ground disturbance areas devoid of tree tobacco greater than 3 feet, reduces the risks of destroying future pupae to discountable.

The Service also requests the Project consider impacts to avian species protected under the Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 U.S.C. § 703–712) and implement avoidance and minimization measures. A list of birds protected under the MBTA implementing regulations is provided at 50 CFR § 10.13. The MBTA, prohibits the taking, killing or possessing of migratory birds. The list of migratory bird species protected under MBTA includes any species that is native to the United States or U.S. territories and is included in the four international treaties. A native migratory bird species is one that is present because of natural biological or ecological processes. Unless permitted by regulations, the MBTA makes it unlawful to pursue, hunt, take, capture, kill, possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carry or receive any migratory bird, part, nest, egg or product. Currently the MBTA provides no process for authorizing incidental take of MBTA protected birds.

Avoidance and minimization measures for ESA species are likely to benefit other MBTA species (not listed under the ESA). Similarly, measures to offset impacts to Covered Species (via compensatory mitigation) are likely to have beneficial effects to MBTA species. We encourage you to include a list of MBTA species that are expected to benefit from the Project's avoidance and minimization measures and other conservation actions. We also recommend you identify MBTA-listed birds not covered by ESA that could be affected by activities but are not benefited by ESA-motivated mitigation measures. For this project, primary MBTA concerns would be regarding pueo or Hawaiian short-eared owl (*Asio flammeus sandwichensis*), Wedge-tailed shearwater (*Ardenna pacifica*), and migratory shorebirds. Where gaps exist, we recommend you

develop targeted beneficial practices to protect MBTA species and incorporate them into the project description.

Recommended Avoidance and Minimization Measures for MBTA species:

Pueo

Pueo (Hawaiian Short-eared owl, *Asio flammeus sandwichensis*) are endemic to the Hawaiian Islands and not federally listed, but there are suspected population declines and they are considered a Bird of Conservation Concern. Pueo are known to breed on all the main Hawaiian Islands across a wide variety of habitat types. Pueo have been documented nesting in non-native habitat, including buffelgrass-dominated grassland, and using kiawe forest edge for roosting and hunting. Pueo have a long potential breeding season, with nests being found from November – July. Pueo nest on the ground, generally in spots of taller, denser vegetation than the surrounding area, and the time from first egg laid to last chick fledged is approximately 2 months. At approximately 10-12 days old, pueo chicks will disperse from the nest on foot, up to 200 meters away from the nest site, but remain flightless and dependent on their parents for another 26-36 days.

We recommend that pueo surveys and sweeps of the grassland areas are conducted before any vegetation clearing or ground-based disturbances occur, in order to locate potential pueo nests so nest disturbance can be avoided. Surveys should encapsulate the crepuscular period (i.e. dawn and dusk) as pueo tend to be more active during this time, and thus are more likely to be detected. If an active pueo nest is found, we recommend implementing a 200-meter radius buffer zone around the nest for the entire duration that the nest is active to avoid impacts to breeding adults and chicks.

ʻUaʻu kani

ʻUaʻu kani (Wedge-tailed shearwaters, *Ardenna pacifica*) do not breed in the vicinity of the project area, but may transit through the area. As with other native Hawaiian seabirds, ʻuaʻu kani may also collide with powerlines, guywires, and associated construction cranes. ʻUaʻu kani are also vulnerable to light attraction and disorientation and are often found as “fallout” birds, where they are grounded and need assistance again to take off on their own. We recommend minimizing the exposure of powerlines above vegetation height or placing them in an underground conduit system, when possible, to reduce the risk of collision. We also recommend minimal nighttime lighting to avoid seabird light attraction and implementing seabird-friendly lighting measures such as shielding to prevent light trespass and longer wavelength, (warmer color), low-intensity lighting.

Migratory shorebirds

There are several migratory shorebird species that use nearby wetland habitats and may transit through the project area to reach suitable habitat. These species include Pacific golden-plover (*Pluvalis fulva*), ruddy turnstone (*Arenaria interpres*), wandering tattler (*Tringa incana*), and sanderling (*Calidris alba*). The biological survey period (July 10-13, 2023) coincided with the

period of time that most migratory shorebirds are absent from the Hawaiian Islands, and thus their presence in the project area may not have been accounted for. We recommend additional surveys be conducted during the period of time that migratory shorebirds are present in the Hawaiian Islands (August to April) to better understand if these species transit through the project area and may be impacted by project activities. As acknowledged in the August 2024 Report, shorebirds have been documented to collide with photovoltaic arrays, although the exact mechanism for why they collide with these structures is still uncertain. We recommend documenting and reporting impacts to any avian species, including migratory shorebirds, to better inform our understanding of avian interactions with solar projects.

The above avoidance and minimization measures for MBTA species are voluntary. However, if the Project's monitoring strategies include the handling or collection of avian carcasses, a Federal MBTA Special Purpose – Utility (SPUT) permit is required to conduct this otherwise prohibited activity.

Regulatory Pathways

Under section 7 of the ESA, it is the Federal agency's (or their non-federal designee) responsibility to make the determination of whether or not the proposed project "may affect" federally listed species or designated critical habitat. A "may affect, not likely to adversely affect" determination is appropriate when effects to federally listed species are expected to be discountable (i.e., unlikely to occur), insignificant (minimal in size), or completely beneficial. This conclusion requires written concurrence from the Service. If a "may affect, likely to adversely affect" determination is made, then the Federal agency must initiate formal consultation with the Service. Projects that are determined to have "no effect" on federally listed species and/or critical habitat do not require additional coordination or consultation.

Implementing the avoidance, minimization, or conservation measures for the species that may occur in your project area will normally enable you to make a "may affect, not likely to adversely affect" determination for your project. If it is determined that the proposed project may affect federally listed species, we recommend you contact our office early in the planning process so that we may assist you with the ESA compliance. If the proposed project is funded, authorized, or permitted by a Federal agency, then that agency should consult with us pursuant to section 7(a)(2) of the ESA. If no Federal agency is involved with the proposed project, the applicant should apply for an incidental take permit under section 10(a)(1)(B) of the ESA. A section 10 permit application must include a habitat conservation plan that identifies the effects of the action on listed species and their habitats and defines measures to minimize and mitigate those adverse effects.

Should the Project be able to provide a conservation benefit to listed species through the creation of foraging or nesting resources to listed species nesting on the Project site, we encourage you to consider developing a conservation benefit agreement and applying for a 10(a)(1)(A) Enhancement of Survival Permit. Please contact us if you are interested. More information can be found here https://www.fws.gov/apps/service/conservation-benefit-agreement.

Thank you for participating in the protection of federally listed species. If you have any questions, please contact Diane Sether, Ph.D., at diane_sether@fws.gov or by telephone at 808-210-4919 or pifwo_admin@fws.gov. If you have any questions regarding MBTA concerns, please contact Olivia Wang at olivia_wang@fws.gov or 808-272-1715. When referring to this project, please include this reference number: 2023-0132372.

Sincerely,

Chelsie Javar-Salas
Acting Island Team Manager, Maui Nui and Hawai‘i Island
Pacific Islands Fish and Wildlife Office

Attachments: A: Service Avoidance and Minimization Measures (Animals)
B: General Service Biosecurity Protocols
C: BMPs For Work In or Around Aquatic Environment

Attachment A: Animals – U.S. Fish and Wildlife Service Avoidance and Minimization Measures

FINAL Avoidance and Minimization Measures (AMMs)
Final revised May 2023

ESA Listed Species

Endangered ʻōpeʻapeʻa (Hawaiian hoary bat, *Lasiurus cinereus semotus*): The Hawaiian hoary bat roosts in woody vegetation across all islands and will leave their young unattended in trees and shrubs when they forage. If trees or shrubs 15 feet or taller are cleared during the pupping season, June 1 through September 15, there is a risk that young bats could inadvertently be harmed or killed, since they are too young to fly or move away from disturbance. 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.

Endangered ʻuaʻu (Hawaiian petrel, *Pterodroma sandwichensis*), Threatened ʻaʻo, (Newell's shearwater, *Puffinus newelli*), and Endangered Hawaiʻi Distinct Population Segment of the ʻakēʻakē (band-rumped storm-petrel, *Hydrobates 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.

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, guy-wires and other cables, minimize exposure above vegetation height and vertical profile.

We recommend further coordination with our office to address specific project details and potential seabird interactions.

Threatened nēnē (Hawaiian goose, *Branta (Nesochen) sandvicensis*): Nēnē are found on the islands of Hawai‘i, Maui, Moloka‘i, and Kaua‘i. 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 nēnē we recommend you incorporate the following measures into your project description:

- Do not approach, feed, or disturb nēnē.
- If nēnē are observed loafing or foraging within the project area during the breeding season (September through April), have a biologist familiar with nēnē 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 nēnē 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.

Endangered Hawaiian waterbirds (ae‘o, Hawaiian stilt, *Himantopus mexicanus knudseni* and ‘alae ke‘oke‘o, Hawaiian coot, *Fulica alai*: Hawaiian waterbirds are currently found in a variety of wetland habitats including freshwater marshes and ponds, coastal estuaries and ponds, artificial reservoirs, kalo or taro (*Colocasia esculenta*) lo‘i or patches, irrigation ditches, sewage treatment 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.

Based on the project details provided, your project may result in the creation of standing water or open water that could attract Hawaiian waterbirds to the project site. 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 measures into your project description:

- In areas where waterbirds 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.
- If water resources are located within or adjacent to the project site, incorporate applicable best management practices regarding work in aquatic environments into the project design (See Attachment C: BMPs For Work In or Around Aquatic Environment).
- 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.

Endangered Blackburn's sphinx moth (*Manduca blackburni*):
The adult Blackburn's sphinx moth feeds on nectar from native plants, including beach morning glory (*Ipomoea pes-caprae*), ʻilieʻe (*Plumbago zeylanica*), maiapilo (*Capparis sandwichiana*), and others. Blackburn's sphinx moth larvae feed on non-native tree tobacco (*Nicotiana glauca*) and native ʻaiea (*Nothocestrum* spp.). To pupate, the larvae burrow into the soil and can remain in a state of torpor for a year or more before emerging from the soil. Soil disturbance can result in death of the pupae.

We offer the following survey recommendations to assess whether the Blackburn's sphinx moth occurs within the project area:

- A biologist familiar with the species should 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, please contact the Service for additional guidance to avoid impacts to this species.

If no Blackburn's sphinx moth, 'aiea, or tree tobacco are found during surveys, it is imperative that measures 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. We therefore recommend that you:

- 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.
    - Monitoring for tree tobacco can be completed by any staff, such as groundskeeper or regular maintenance crew, provided with picture placards of tree tobacco at different life stages.

Attachment B: General U.S. Fish and Wildlife Service Biosecurity Protocols

PIFWO Invasive Species Biosecurity Protocols
(Updated February 2022)

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 (Invasive Species Biosecurity Protocol). Additionally, your project occurs in a geographic area and/or involves activities that risk spreading the following specific invasive species little fire ant (*Wasmannia auropunctata*). Therefore, we recommend including additional protocols specific to those invasive species (Species-Specific Biosecurity Protocol for Little Fire Ant (LFA). 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:

- Maui – https://mauiinvasive.org/

Species-Specific Biosecurity Protocol

Little Fire Ant (LFA)

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.

Attachment C: (BMPs) For Work In or Around Aquatic Environment

U.S. Fish and Wildlife Service
Recommended Standard Best Management Practices (BMPs)

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, 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 prevent attraction and introduction of non-native 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.

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

DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET, ROOM 325
HONOLULU, HAWAII 96813

DAWN N.S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

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FIRST DEPUTY

CIARA W.K. KAHAHANE
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LAND
STATE PARKS

February 3, 2025

Tiffany Bovino Agostini
Senior Biologist/ Project Manager TetraTech
737 Bishop Street, Suite 2000
Honolulu, HI 96813
Attn: Tiffany.Agostini@tetratech.com

Dear Ms. Agostini,

The Department of Land and Natural Resources, Division of Forestry and Wildlife (DOFAW) has received your Biological Resources Survey Report for the Kūihelani Solar Phase 2 Project in the Wailuku District of Maui. A Kūihelani Solar Phase 2 LLC, a subsidiary of AES Clean Energy (AES), is proposing the Kūihelani Solar Phase 2 Project (Project). The project would involve the construction and operation of a 40-MW ground-mounted solar photovoltaic system coupled with a 160-MW-hour (MWh) battery energy storage system, as well as an electrical substation related interconnection and ancillary facilities. The study area for the project encompasses roughly 729.6 acres within the TMK parcel: (2) 3-8-005:002-0003[por.], which is owned by MP West LLC (d.b.a Mahi Pono). From the project substation, the project would interconnect with Maui Electric Company's island-wide electrical grid via a proposed Maui Electric Company switchyard with loop lines extending to the existing MPP-Waiinu and MPP-Waena 69kV transmission lines.

DOFAW concurs with the measures included in the biological survey intended to avoid construction and operational impacts to State-listed species including the ʻōpeʻapeʻa or Hawaiian Hoary bat (*Lasiurus cinereus semotus*), aeʻo or Hawaiian Stilt (*Himantopus mexicanus knudseni*), ʻalae keʻokeʻo or Hawaiian Coot (*Fulica alai*), nēnē or Hawaiian Goose (*Branta sandvicensis*), State listed Blackburn's Sphinx Moth (*Manduca blackburni*) or BSM, and seabirds. For illustrations and guidance related to seabird-friendly light styles that also protect the dark, starry skies of Hawaiʻi please visit https://dlnr.hawaii.gov/wildlife/files/2016/03/DOC439.pdf. We also appreciate the measures outlined to minimize the movement of plant and soil material to prevent the spread of invasive species and for the use of native plant species. DOFAW provides the following additional comments regarding the potential for the proposed work to affect

listed species in the vicinity of the project area.

The endemic pueo or Hawaiian Short-Eared Owl (*Asio flammeus sandwichensis*) could potentially nest in the project area. We amend our previous recommendations and instead ask that you perform vantage point observational surveys three times within a week leading up to the construction, approximately 70 to 75 minutes before sunset, finishing at civil twilight. Please utilize the Pueo Project Survey Protocol (Price and Cotín 2018) and adjust the vantage points to stay within the project boundary and prioritize project areas with potential vegetation clearing and ground disturbance. We recommend you follow the protocol to record detection start time, detection end time, detection type, owl behavior classification, owl vocalization description, distance from observer, direction from observer, habitat where owl is observed, and description of courtship behavior. If any breeding displays are observed, please contact DOFAW at (808) 927-1850 for further recommendations on how to proceed. We also concur that vegetation clearing and grading should occur as soon as possible following pueo surveys and should be completed within 14 days of surveys.

Studies on the mainland have linked solar power facilities with mortality of a variety of avian species, including waterbirds and raptors. Minimization activities should include predator control and/or fencing; reduced lighting, particularly during seabird fallout season; markers or reflectors on wires; and measures to reduce the attractiveness of solar panels to birds[1].

We recommend that Best Management Practices are employed during and after construction to contain any soils and sediment with the purpose of preventing damage to near-shore waters and marine ecosystems.

We appreciate your efforts to work with our office for the conservation of our native species. 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 Kinsley McEachern, Protected Species Habitat Conservation Planning Associate via email at Laurinda.k.mceachern.researcher@hawaii.gov.

Sincerely,

JASON D. OMICK
Wildlife Program Manager

[1]Penniman, J. F., & Duffy, D. C. (2021). *Best Management Practices to Protect Endangered and Native Birds at Solar Installations in Hawai'i*. https://scholarspace.manoa.hawaii.edu/server/api/core/bitstreams/c54ff4ba-d40f-4cd9-bdf6-624bdc48b283/content

Kūihelani Solar Phase 2 Project

Biological Resources Survey Report

Prepared for:
Kuihelani Solar Phase 2, LLC

Revised August 2024

TETRA TECH

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Table of Contents

1.0 Introduction 1
1.1 Project Description 1
2.0 Description of the Study Area 1
2.1 Climate 2
2.2 Topography and Soils 3
2.3 Surface Waters 3
2.4 Listed Species and Critical Habitat 4
3.0 Methods 4
3.1 Plants 4
3.2 Wildlife 5
3.2.1 Birds 5
3.2.2 Mammals 5
3.2.3 Invertebrates 5
4.0 Results and Discussion 6
4.1 Plants 6
4.2 Wildlife 7
4.2.1 Birds 7
4.2.2 Mammals 9
4.2.3 Invertebrates 10
5.0 Conclusions and Recommendations 11
5.1 Plants 11
5.2 Wildlife 12
5.2.1 Nēnē 12
5.2.1 Listed Seabirds 13
5.2.2 Waterbirds 13
5.2.4 Hawaiian Hoary Bat 13
5.2.5 Blackburn Sphinx Moth 14
6.0 References 15

List of Tables

Table 1. Monthly Rainfall at Nearby Waikapū Country Club Gage Prior to the Surveys.....2
Table 2. Bird Species Recorded in the Study Area and Immediate Vicinity 7
Table 3. Invertebrate Species Incidentally Recorded in the Study Area 10

List of Figures

Figure 1. Project Study Area and Vicinity
Figure 2. Topography and Soils
Figure 3. Water Resources Identified by NWI, NHD, and DAR
Figure 4. Critical Habitat in the Vicinity
Figure 5. Blackburn's Sphinx Moth and Tree Tobacco Observed During Surveys

List of Appendices

Appendix A. Representative Photographs of Study Area
Appendix B. DOFAW Response Letter on Project Pre-development Activities

1.0 Introduction

Kūihelani Solar Phase 2 LLC, a subsidiary of AES Clean Energy (AES), is proposing the Kūihelani Solar Phase 2 Project (Project), a utility-scale solar energy facility to be located northwest of Kīhei on the island of Maui. Tetra Tech, Inc. (Tetra Tech) was contracted by AES to conduct a general biological survey for the Project. The purpose of the survey was to characterize the species and habitats present, and to determine whether state or federally listed threatened or endangered species (pursuant to the federal Endangered Species Act or Hawai'i Revised Statutes [HRS] Chapter 195D), or otherwise rare plants or animals have the potential to occur and could be impacted by construction or operation of the Project. This report summarizes the results of the biological surveys conducted within the Study Area by Tetra Tech over several dates in July 2023, September 2023, November 2023, May 2024, and July 2024. A separate effort was conducted to assess potential Waters of the U.S. (including streams and gulches) within the Study Area. Supplemental observations of biological resources were made during the Waters of the U.S. assessment in July 2023.

1.1 Project Description

The Project involves construction and operation of a 40 megawatt (MW) ground-mounted solar photovoltaic system coupled with a 160 MW-hour (MWh) battery energy storage system, as well as a Project substation and other related interconnection and ancillary facilities. In total, the Project is expected to occupy no more than 50 percent of the Study Area. The solar photovoltaic system would consist of a series of modules mounted on a racking system arranged in evenly spaced rows; the racking system would include single-axis trackers which would rotate the modules along a fixed horizontal axis, from east to west, as the sun moves across the sky. The energy storage system would consist of containerized lithium-ion battery units and associated inverters installed on concrete pads distributed throughout the solar arrays. The solar arrays and battery energy storage system would connect with the Project substation via a network of medium-voltage electrical collector lines, installed either above ground and/or in underground electrical conduit. From the Project substation, the Project would interconnect with Maui Electric Company's island-wide electrical grid via a proposed Maui Electric Company switchyard with loop lines extending to the existing MPP-Waiinu and MPP-Waena 69kV transmission lines. Access for construction and operation of the Project would be via one or more existing roads that run into the Study Area, which include those extending from North Kīhei Road (South 8th and 9th Streets), Maui Veterans Highway, and Kūihelani Highway (through the existing AES Kūihelani Solar + Storage Project site). New service roads would be constructed for internal access within the Study Area.

2.0 Description of the Study Area

As shown in Figure 1, the Study Area is located in south-central Maui approximately 2 miles (3.2 kilometers [km]) northwest of Kīhei. It encompasses approximately 729.6 acres (295 hectares [ha])

within tax map key (TMK) parcel (2) 3-8-005:002-0003[por.], which is owned by MP West LLC (d.b.a. Mahi Pono). The Study Area consists of fallow agricultural fields that were previously used for sugar cane cultivation as part of the Hawaiian Commercial & Sugar Company (HC&S) plantation. The site is currently unoccupied, although there are remnant features of the former agricultural operation, including irrigation equipment and overhead electrical transmission lines. The existing AES Kūihelani Solar + Storage Project is located to the north of the Study Area; the remainder of the Study Area (to the east, south, and west) is surrounded by agricultural land. Kūihelani Highway is located to the west-northwest, Maui Veterans Highway is located to the east, Keālia Pond National Wildlife Refuge (NWR) is located to the south, and North Kīhei Road is located to the southwest.

2.1 Climate

The climate in the Study Area is characterized as arid and sunny (Price et al. 2012). According to the Online Rainfall Atlas of Hawai'i (Giambelluca et al. 2013), the area receives a mean annual rainfall of approximately 13 inches (330 millimeters [mm]). Rainfall is typically highest from December through January and lowest from June through July (Giambelluca et al. 2013).

The closest functioning National Weather Service (NWS) rainfall gage to the Study Area is at Waikapū Country Club, located 1.5 miles (2.4 km) northwest of the Study Area near Ho'opi'ilani Highway. The monthly rainfall totals recorded at the gage in 2023 and 2024 prior to and during the surveys are shown in Table 1. The year-to-date total for this gage in 2023 through the end of November 2023 was 72 percent of average and the total for 2024 through July 2024 was 88 percent of average (NWS 2024a). This suggests relatively dry conditions during the surveys. Moderate drought conditions were reported on the central plains of Maui where the Study Area is located during the survey period (NWS 2023b, 2024b).

Table 1. Monthly Rainfall at Nearby Waikapū Country Club Gage Prior to the Surveys

Month	Rainfall Total; Percentage of Average	
	2023	2024
April	2.62 inches; 136%	1.70 inches; 88%
May	0.95 inches; 64%	0.39 inches; 26%
June	0.06 inches; 15%	0.06 inches; 15%
July	0.34 inches; 85%	0.51 inches; 128%
August	0.23 inches; 45%	
September	0.01 inches; 2%	
October	0.95 inches; 67%	
November	1.83 inches; 46%	

Source: NWS 2023a, 2024a

2.2 Topography and Soils

The Study Area is relatively flat, with elevations ranging from approximately 50 to 180 feet (15 to 55 meters [m]) above sea level, gradually sloping in a southeasterly direction (Figure 2). The topography varies where gulch/stream corridors intersect the Study Area (see Section 2.3). The gulches/streams are generally oriented from north to south through the Study Area.

The Natural Resources Conservation Service (NRCS) identifies 9 soil types in the Study Area (Figure 2; NRCS 2024). The majority of the Study Area is underlain by Jaucas Sand, 0 to 15 percent slopes. Assorted Pūlehu series soil types (silt loam, cobbly silt loam, clay loam, and cobbly clay loam) also cover large areas of the Study Area, with a small portion comprised of Pu‘uone sand, 7 to 30 percent slopes. Jaucus sand consists of excessively and somewhat excessively drained soils with low runoff. The Pūlehu soils series is characterized as having moderate permeability and subject to flooding in low areas. Pu‘uone sand consists of soil on sandhills in the vicinity of the ocean, comprised of an upper surface layer of rapidly permeable calcareous sand underlain by a cemented sand layer. Runoff is slow and potential erosion by wind is considered moderate to severe (NRCS 2024).

2.3 Surface Waters

The Study Area is situated within the Waikapū and Pōhākea watersheds (Parham et al. 2008). Streams, ditches, and other water features identified by the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) data (USFWS 2024a), the U.S. Geological Survey (USGS) topographic and National Hydrography Dataset (NHD; USGS 2023), and the State of Hawai‘i Division of Aquatic Resources (DAR) dataset (DAR 2008) are shown in Figure 3. These datasets identify two gulches/streams within the Study Area; Pale‘a‘ahu Gulch intersects the central portion of the Study Area, and Pōhākea Gulch crosses the southwestern portion of the Study Area. Pale‘a‘ahu Gulch is identified as an intermittent and non-perennial stream by NHD and DAR, respectively, and as Riverine, Seasonally Flooded by NWI. Pōhākea Gulch is defined as an intermittent and non-perennial stream by NHD and DAR, respectively, and as a Palustrine, Forested, Seasonally Flooded Wetland by NWI. Waikapū Stream is outside of the Study Area, but runs along the eastern boundary of the Study Area (Figure 3). Waikapū Stream is defined as intermittent and perennial in the Study Area by NHD and DAR, respectively, and as a Freshwater Forested/Shrub Wetland by NWI. Waikapū Stream and the two gulches continue southeasterly toward Keālia Pond, which is separated from Mā‘alaea Bay by coastal dunes.

In addition to these gulches and streams, several features are also mapped along portions of the existing access roads that connect to the Study Area (Figure 3). An unnamed ditch (defined as Riverine, Unconsolidated Bottom, Permanently Flooded, Excavated by NWI) begins at Waikapū Stream and continues northeast along the access road running from Maui Veterans Highway. In addition, a portion of Waihe‘e Ditch is identified along the northern portion of this access road near Maui Veterans Highway (USGS 2023). NWI (USFWS 2024a) classifies this portion of Waihe‘e Ditch as Riverine, Unknown Perennial, Unconsolidated Bottom, Permanently Flooded, Excavated.

2.4 Listed Species and Critical Habitat

No critical habitat for listed species has been designated by the USFWS within the Study Area. The closest plant critical habitat, Lowland Dry Unit 6, is located 1.4 miles (2.3 km) to the west, upslope of the Study Area; this unit is designated critical habitat for 18 species of endangered plants and is occupied by two species (ma‘o hau hele/*Hibiscus brackenridgeii* and *Schiedea salicaria*) (Figure 4; USFWS 2016, USFWS 2024b). The nearest designated critical habitat for wildlife is for the endangered Blackburn’s sphinx moth (*Manduca blackburni*) in two units, Kanahā Pond (occupied) and Kanahā Park (unoccupied), located 4.5 miles (7.2 km) and 5.3 miles (8.6 km) to the northeast, respectively (Figure 4; USFWS 2003, USFWS 2024b).

3.0 Methods

Prior to the field survey, Tetra Tech conducted a review of relevant publicly available literature and data with respect to biological resources in and near the Study Area. This review included environmental assessments and environmental impact statements, NWI and NHD data, scientific journals and reports, and available, unpublished data that are relevant to the natural history and ecology of the area. In addition, Tetra Tech reviewed available geospatial data, aerial photographs, and topographic maps of the area to identify occurrences of state or federally listed species, or habitats that could harbor these species. The initial biological field survey was conducted by Tetra Tech on July 10 – 13, 2023. Specific surveys for the endangered Blackburn’s sphinx moth were conducted on September 11-15, 2023, November 2-3 and 9-10, 2023, and May 21-22, 2024. A supplemental biological survey was conducted on July 12, 2024 due to a slight modification in the Study Area boundary. Supplemental observations of biological resources were made during the Waters of the U.S. assessment on July 25 and 26, 2023. Details regarding the field survey methodologies are provided below.

3.1 Plants

A pedestrian survey was conducted to record common plant species and dominant vegetation types, as well as rare or listed plant species within the Study Area. Areas more likely to support native plants (e.g., rocky outcrops and shady areas) were more intensively examined. Plant identifications were made in the field; plants that could not be positively identified were photo-documented for comparison with the recent taxonomic literature. A comprehensive list of all plant species present in the area was not within the scope of this survey.

Plants recorded during this survey are indicative of the season and environmental conditions at the time of the survey. The presence and location of plants can be influenced by seasonal and temporal changes; therefore, it is possible additional species may occur within the Study Area but were not present during this survey.

The taxonomy and nomenclature of plants are in accordance with Wagner et al. (2023). Common/ Hawaiian names are provided first, followed by scientific names in parentheses. If no common or Hawaiian name is known, only the scientific name is provided.

3.2 Wildlife

Wildlife surveys consisted of observations and identification of birds, mammals, and conspicuous invertebrate species encountered while searching the Study Area. Tetra Tech recorded all wildlife seen or heard while walking and driving within the Study Area coupled with visual observation of scat, tracks, and other animal sign. Habitats or plants that could support listed wildlife species were also identified, if present (e.g., as host plants for listed invertebrates or water features as potential habitat for listed Hawaiian waterbirds). Specific survey methods of each wildlife group are provided below.

3.2.1 Birds

All birds seen or heard while walking and driving within the Study Area were recorded. Habitats or plants that could support listed birds were also identified if present (e.g., water features as potential habitat for listed Hawaiian waterbirds). Scientific nomenclature for birds follows Birds of the World (Billerman et al. 2024).

3.2.2 Mammals

The mammal survey was limited to visual and auditory detection, coupled with visual observation of scat, tracks, and other animal sign. Scientific names for mammals follow Tomich (1986).

Ultrasonic bat detectors for the endangered Hawaiian hoary bat/ʻōpeʻapeʻa (*Lasiurus semotus*) were not deployed as part of the survey. Rather, as the USFWS and State of Hawaiʻi Division of Forestry and Wildlife (DOFAW) recognize all woody vegetation greater than 15 feet (4.5 m) tall as potential bat roosting habitat (DOFAW 2015, USFWS 2023), the presence/absence of suitable bat foraging and roosting habitat within the Study Area was noted.

3.2.3 Invertebrates

The invertebrate survey primarily focused on searching the Study Area for host plants for the endangered Blackburn's sphinx moth. Larvae of this species feeds on plants in the nightshade family (Solanaceae), including the non-native, weedy tree tobacco (*Nicotiana glauca*), which is common in this region of Maui. In July 2023, tree tobacco plants encountered in the Study Area were mapped and briefly searched for obvious signs of Blackburn's sphinx moth larvae (e.g., chewed stems, frass, or large instar caterpillars). After consultation with the USFWS and DOFAW in September 2023, more systematic search for Blackburn's sphinx moth were conducted on September 11-15, 2023, November 2-3, 2023, November 9-10, 2023, and May 21-22, 2024. On these dates, Tetra Tech biologists thoroughly searched all tree tobacco plants greater than 3 feet (0.9 m) in height for Blackburn's sphinx moth eggs, larvae, and signs of larval feeding (i.e., chewed stems, frass, or leaf damage). Other large or conspicuous invertebrates incidentally observed while walking and driving through the Study Area were also identified through visual observations and were not collected as specimens in the field. Scientific nomenclature for invertebrates follows Nishida (2002).

4.0 Results and Discussion

In general, the biological resources in the Study Area have been modified by historic agricultural uses, the introduction of invasive species, and a relatively recent wildlfire in 2018, which has reduced the number and abundance of native species and habitats suitable for native species. Two federally and state-listed species—the Hawaiian goose/nēnē (*Branta sandvicensis*) and the Blackburn's sphinx moth —were observed during the surveys. Although not observed in the Study Area, several other listed animal species, including the Hawaiian hoary bat, may occur in or traverse the Study Area. These species are discussed in further detail below. Representative photographs from the surveys are presented in Appendix A.

4.1 Plants

No federal or state listed threatened, endangered, proposed listed, or candidate plant species were observed in the Study Area during the biological surveys. The Study Area is dominated by non-native plants. Two native plant species were observed in the Study Area — ʻuhaloa (*Waltheria indica*) and ʻilima (*Sida fallax*). These plants are indigenous to the Hawaiian Islands and are not considered rare throughout the Hawaiian Islands (Wagner et al. 2023).

Vegetation in the Study Area is characterized by fallow agricultural fields, formerly cultivated in sugar cane (*Saccharum officinarum*), that are now predominately covered by Buffelgrass (*Cenchrus ciliaris*) Grassland. Vegetation in the southwestern portions of the Study Area and along the Paleʻaʻahu Gulch corridor are comprised of Kiawe (*Neltuma pallida*)/Koa Haole (*Leucaena leucocephala* subsp. *leucocephala*) Forest. Descriptions of these vegetation types are provided below.

Buffelgrass Grassland: This vegetation type is dominated by non-native buffelgrass within which are scattered, various species of non-native weedy plants as well as the native uhaloa. Dominant plant species in the Buffelgrass Grassland includes the non-native lion's ear (*Leonotis nepetifolia*), golden crown-beard (*Verbesina encelioides*), and a mixture of various herbs and grasses such as Cuban jute (*Sida rhombifolia*), smooth rattlepod (*Crotolaria pallida*), fireweed (*Senecio madagascariensis*), swollen finger grass (*Chloris barbata*), common sandbur (*Cenchrus echinatus*), and Bermuda grass (*Cynodon dactylon*). Small crown flower (*Calotropis procera*) shrubs are scattered throughout the grassland, and widely dispersed individuals of kiawe and koa haole trees are also present. The native ʻuhaloa is common within the Buffelgrass Grassland and abundant where present. The native shrub, ʻilima, is uncommon and only several individuals were observed within the Study Area. Non-native tree tobacco, a larval host plant for the endangered Blackburn's sphinx moth (see Section 4.2.3), was observed scattered throughout this vegetation type.

Kiawe/ Koa Haole Forest: The Kiawe/ Koa Haole Forest is dominated by kiawe and koa haole trees, with moderately dense to open cover. Various non-native species are scattered in this vegetation type including klu (*Acacia farnesiana*), castor bean (*Ricinus communis*), small crown flower, sourbush (*Pluchea carolinensis*), and *Macaranga tanarius*. The understory is comprised of predominately buffelgrass within which are scattered patches of Guinea grass (*Megathyrsus maximus*), hairy abutilon

(*Abutilon grandifolium*), golden-crown beard, and a suite of herbs and grasses similar to those found in the Buffelgrass Grassland. Tree tobacco was also scattered throughout this vegetation type.

4.2 Wildlife

4.2.1 Birds

Twenty-one bird species were recorded in the Study Area and immediate vicinity during the surveys (Table 2). Most of these bird species are non-native to the Hawaiian Islands, and are species commonly found in rural or agricultural areas. The most common bird species recorded during the survey were African silverbill (*Euodice cantans*), scaly-breasted munia (*Lonchura punctulata*), and zebra dove (*Geopelia striata*). Two native bird species were observed in small numbers—the black-crowned night heron/ʻaukuʻu (*Nycticorax nycticorax*) and the federally-threatened and state-endangered Hawaiian goose/nēnē. Several of the bird species seen or heard are protected by the Migratory Bird Treaty Act (Table 2). Additional information about nēnē, as well as other state and federally listed birds that were not recorded during the surveys but have the potential to be present in or traverse the Study Area, are discussed below.

Table 2. Bird Species Recorded in the Study Area and Immediate Vicinity

Common Name, Hawaiian Name	Scientific Name	Status	MBTA	Listing Status[1]
African silverbill	*Euodice cantans*	NN		
Barn owl	*Tyto alba*	NN	X	
Black francolin	*Francolinus francolinus*	NN		
Black-crown night heron, ʻaukuʻu	*Nycticorax nycticorax*	I	X	
Cattle egret	*Bubulcus ibis*	NN	X	
Chestnut munia	*Lonchura atricapilla*	NN		
Common myna	*Acridotheres tristis*	NN		
Common waxbill	*Estrilda astrild*	NN		
Eurasian skylark	*Alauda arvensis*	NN	X	
Gray francolin	*Francolinus pondicerianus*	NN		
Hawaiian goose, nēnē	*Branta sandvicensis*	E	X	FT, SE
House finch	*Haemorhous mexicanus*	NN	X	
House sparrow	*Passer domesticus*	NN		
Mourning dove	*Zenaida macroura*	NN	X	
Northern cardinal	*Cardinalis cardinalis*	NN	X	
Red-crested cardinal	*Paroaria coronata*	NN		
Rock pigeon	*Columba livia*	NN		

Common Name, Hawaiian Name	Scientific Name	Status	MBTA	Listing Status[1]
Scaly-breasted munia	*Lonchura punctulata*	NN		
Spotted dove	*Spilopelia chinensis*	NN		
Warbling white-eye	*Zosterops japonicus*	NN		
Zebra dove	*Geopelia striata*	NN		

Status: E = Endemic, I = Indigenous, NN = non-native established species, MBTA = Migratory Bird Treaty Act.

1. FE = Federally endangered; SE = State endangered; FT = Federally threatened; ST = State threatened.

Nēnē: Nēnē use various habitat types, including beach strand, shrubland, grasslands and lava rock (Banko 1988, Banko et al. 2020). They are also known to use landscaped/maintained areas, such as golf courses, grazed agricultural areas, playing fields, and housing developments. Although they are not obligate waterbirds, nēnē also use surface waters, such as wetlands, reservoirs, and streams (USFWS 2021). Nēnē were observed flying over the Study Area on several occasions, and groups of nēnē were also seen in two nearby water reservoirs, including at the reservoir immediately west of the access road extending from Maui Veterans Highway and at the reservoir northwest of the Study Area near Kūihelani Highway (Figure 3). Nēnē have also been observed in the Keālia Pond NWR immediately south of the Study Area (USFWS 2011a, iNaturalist 2024a).

Listed Seabirds: The endangered Hawaiian petrel/ ʻuaʻu (*Pterodroma sandwichensis*), threatened Newell's shearwater/ ʻaʻo (*Puffinus newelli*), and endangered band-rumped storm-petrel/ ʻakēʻakē (*Hydrobates castro*) (collectively referred to as listed seabirds), have not been documented in the Study Area and suitable nesting habitat does not occur in the area. However, suitable nesting habitat exists in upper elevations of Maui, suggesting the potential for these birds to fly over the area at night between March and December while transiting between nest sites and the ocean. These listed seabirds may be attracted to construction or permanent operational lights at night. Disorientation and fallout as a result of light attraction could occur for individuals attracted to nighttime construction lighting and unshielded nighttime facility lighting. Juvenile birds are particularly vulnerable to light attraction, and grounded birds are vulnerable to mammalian predators or vehicle strikes (Rodríguez et al. 2017).

Waterbirds: Although not observed during the surveys, the endangered Hawaiian stilt/ aeʻo (*Himantopus mexicanus knudseni*) and Hawaiian coot/ ʻalae keʻokeʻo (*Fulica alai*) have the potential to fly over or near the Study Area while traveling between suitable habitat found outside of the Study Area. Both species are known to occur to the south of the Study Area in the Keālia Pond NWR (USFWS 2011a, iNaturalist 2024b, iNaturalist 2024c) and stilts were previous recorded to the north of the Study Area (Tetra Tech 2021). No suitable nesting habitat is available for the Hawaiian stilt or coot in the Study Area given the lack of surface water. Hawaiian stilts favor open wetland habitats, shallow ponds, and mud flats with minimal vegetative cover and water depths of less than 9 inches (23 centimeters [cm]) (Robinson et al. 2020). They use human-made features such as reservoirs, settling and containment basins, impoundments, and sewage treatment ponds. Nesting occurs almost exclusively on human-maintained wetlands (Robinson et al. 2020, USFWS 2011b). Hawaiian coots can be found in both

freshwater and brackish wetlands, in coastal plains, canefield reservoirs, human-made impoundments, and on golf courses (DOFAW 2015, Pratt and Brisbin 2020). Nests are constructed of floating mats of aquatic vegetation or semi-floating vegetation, and generally occur in water about 13.4 inches (34 cm) deep (Pratt and Brisbin 2020).

At some solar facilities in the continental U.S., water dependent birds (e.g., grebes, loons, rails, coots, shorebirds, and waterfowl) have been documented to collide with photovoltaic arrays (Kosciuch et al. 2020). It has been hypothesized that some water dependent birds may perceive the panel arrays as waterbodies and collide with the panels while attempting a water landing (Kagan et al. 2014, WEST 2014, Walston et al. 2016). This hypothesis has been termed the "lake effect." However, no studies have investigated or found a causal link for the source of water dependent bird mortalities observed in the continental U.S. A recent study that examined the occurrence of live water dependent birds at solar facilities in California concluded that potential attraction by water dependent birds to photovoltaic arrays, or "lake effect," is likely a nuanced process dependent on multiple environmental factors and may be species- and context-specific (Kosciuch et al. 2021). Water dependent bird activity and abundance varies regionally and may result in variation in avian mortality risk across different landscapes. In Hawai'i, there have been no reports to date supporting the "lake effect" hypothesis at operating solar facilities, or any information to indicate listed birds are colliding with or attracted to photovoltaic arrays through the islands.

4.2.2 Mammals

Four non-native terrestrial mammalian species were detected in the area during the surveys. Large herds of axis deer (*Axis axis*) were seen on several occasions throughout the Study Area. Feral pigs (*Sus scrofa*) and small Indian mongooses (*Herpestes auropunctatus*) were also seen, and evidence of the presence of cats (*Felis catus*) was observed. Although not directly observed, other introduced mammals, such as feral dogs (*Canis familiaris*), house mice (*Mus musculus*), and rats (*Rattus* spp.) are likely to occur within the Study Area.

Hawai'i's only native, extant terrestrial mammal—the endangered Hawaiian hoary bat—may transit, roost, or forage in portions of the Study Area. This species will forage in open and semi-cluttered landscapes in a wide range of habitats and vegetation types (Bonaccorso et al. 2015). Hawaiian hoary bats have been observed foraging over streams and artificial water sources such as reservoirs (Uyehara and Wiles 2009) and could forage for night-flying insects over the adjacent Waikapū Stream as well as drink water from the stream (Pinzari et al. 2019). Some trees within the Study Area (e.g., kiawe and koa haole) are over 15 feet (4.5 m) tall and have the potential to function as bat roost trees, per USFWS and DOFAW; these trees are generally concentrated along the gulch corridors and in the southernmost portion of the Study Area.

4.2.3 Invertebrates

Invertebrates observed during the surveys are listed in Table 3. Of these, only the Blackburn's sphinx moth and the two dragonflies—globe skimmer (*Pantala flavescens*) and green darner (*Anax junis*)—are native to the Hawaiian Islands.

Table 3. Invertebrate Species Incidentally Recorded in the Study Area

Common Name	Scientific Name	Status	Listing Status
Black Saddlebags	*Tramea lacerata*	NN	
Blackburn's sphinx moth	*Manduca blackburni*	E	FE, SE
Globe skimmer	*Pantala flavescens*	I	
Golden paper wasp	*Polistes aurifer*	NN	
Gray bird grasshopper	*Schistocerca nitens*	NN	
Green darner	*Anax junius*	I	
Large orange sulphur	*Phoebis agarithe*	NN	
Mantis	*Tenodera* sp.	NN	
Monarch	*Danaus plexippus*	NN	
Oleander aphid	*Aphis nerii*	NN	
Parasitoid wasp	*Anomalon* sp.	NN	
Pea blue	*Lampides boeticus*	NN	
Roseate skimmer	*Orthemis ferruginea*	NN	
Southern green stinkbug	*Nezara viridula*	NN	
Spotless lady beetle	*Cycloneda sanguinea*	NN	
Typical jumping spider	*Salticidae* sp.	NN	
Unknown grasshopper	*Acrididae* sp.	NN	
Valley carpenter bee	*Xylocopa sonorina*	NN	
Western honeybee	*Apis mellifera*	NN	
Wood cockroach	*Ectobiidae* sp.	NN	
Yellow garden spider	*Argiope aurantia*	NN	

Status: I = Indigenous, NN = non-native established species

1. FE = Federally endangered; SE = State endangered.

Blackburn's Sphinx Moth: No Blackburn's sphinx moth eggs or caterpillars were observed within the Study Area during the surveys in July 2023, September 2023, May 2024, or July 2024. However, two Blackburn's sphinx moth eggs and three Blackburn's sphinx moth caterpillars were observed on tree

tobacco plants during systematic surveys in November 2023. Figure 5 shows the locations of the eggs and caterpillars observed, as well as all tree tobacco mapped in the Study Area during the surveys. The majority of the tree tobacco was removed from the Study Area in accordance with the guidance and avoidance and minimization measures provided by USFWS and DOFAW in September 2023 (Diane Sether, USFWS, pers. comm., September 11, 2023; also see Appendix B).

The two native, larval host plants for Blackburn's sphinx moth (*Nothocestrum latifolium* and *N. breviflorum*) were not found during the survey and are not likely to occur in the Study Area. These two native host plants are considered primary constituent elements required by Blackburn's sphinx moth larvae for foraging, sheltering, maturation, and dispersal (USFWS 2003). The invasive, non-native tree tobacco is widespread across the Hawaiian Islands and is not considered a primary constituent element for Blackburn's sphinx moth critical habitat; tree tobacco is short-lived, vulnerable to prolonged drought, and the plant's water content may not be suitable for optimal larvae growth (USFWS 2003). In addition, no native adult stage host plants for the Blackburn's sphinx moth (e.g., *Capparis sandwichiana, Plumbago zeylanica, Ipomoea indica, Pleomele auwahiensis*) were observed in the Study Area.

Yellow-Faced Bees: Listed yellow-faced bees (*Hylaeus* spp.) are not known to occur in the Study Area. ʻIlima, which is considered the primary host plant for some listed yellow-faced bees, only occurs as widely scattered individuals, and therefore the Study Area does not provide enough food resources to sustain a population of listed yellow-faced bees.

5.0 Conclusions and Recommendations

As described in Section 4, the majority of the plants and animals observed in the Study Area are primarily non-native to the Hawaiian Islands. Two federal and state listed species — Blackburn's sphinx moth and nēnē — were observed during the biological surveys. Several other listed wildlife species have the potential to occur in or transit through the Study Area, particularly the Hawaiian hoary bat and Hawaiian stilt. Recommended measures to avoid and minimize impacts to listed species that could occur in or transit through the Study Area are outlined below.

5.1 Plants

No listed or rare plant species were observed during the survey. Overall, the vegetation in the Project Area is disturbed from previous and current land use activities. The majority of the plant species recorded in the Study Area are not native to the Hawaiian Islands. Only two native plant species were observed, both of which commonly occur throughout Hawaiʻi. Regardless, the following measures are recommended to avoid and minimize potential impacts to native plants:

- If landscaping is installed as part of the Project, use non-invasive plants and incorporate native plant species to the maximum extent practicable.
- Although non-native weedy species are common in the Study Area, implement invasive species minimization measures to avoid the unintentional introduction or transport of new invasive

species to the area. This includes utilizing on-site gravel, rock, and soil (or purchasing from a local supplier) when practicable; utilizing certified, weed-free seed mixes; and washing construction equipment and/or visually inspecting for excessive debris, plant materials, and invasive or harmful non-native species as appropriate.

5.2 Wildlife

Nearly all the animal species recorded in the Study Area are not native to the Hawaiian Islands. However, two listed species were recorded, and other listed wildlife have the potential to occasionally pass through the Study Area. In addition to the species-specific measures detailed in subsections 5.2.1 through 5.2.5, Tetra Tech recommends the following general measures to avoid and minimize potential impacts to native wildlife:

- Establish an environmental education and observation program for all construction and operational personnel. Staff should be trained to identify listed wildlife or MBTA-protected birds that may be found on-site (including nēnē, Blackburn's sphinx moth, listed seabirds, listed waterbirds, Hawaiian hoary bat, or Hawaiian short-eared owl/ pueo [*Asio flammeus sandwichensis*]) and to take appropriate steps if listed wildlife species are found.
- If downed listed species are observed at the Project, notify USFWS and DOFAW.
- Implement speed limits on site to reduce the risk of collision to listed wildlife.

5.2.1 Nēnē

Although their preferred habitat is not present within the Study Area, nēnē may fly through the Study Area to adjacent suitable habitat. Nēnē also have the potential to be attracted to the Study Area during or after construction if foraging habitat is created (i.e., mowed lawns). Should this species land within the Study Area, it could be impacted by construction and operation activities. Tetra Tech recommends the following avoidance measures modified from USFWS (2023) and DOFAW:

- Do not approach, feed, or disturb nēnē.
- If a nēnē is found in the Study Area during active construction, cease all activities within 100 feet (30 m) of the bird, and do not feed, approach, or disturb the bird. Work may continue after the bird leaves the area of its own accord.
- If nēnē are observed loafing or foraging within the Study Area during the breeding season (September through April), a biologist familiar with nesting behavior should survey for nests in the area prior to the resumption of work. If a nest is discovered, contact USFWS and DOFAW and cease all work within 150 feet (46 m). If a nest is not discovered, work may continue after the bird leaves the area of its own accord.

5.2.1 Listed Seabirds

The Study Area does not provide suitable nesting or foraging habitat for the three listed Hawaiian seabirds. However, individuals may fly over the area during the breeding, nesting, and fledging seasons (March 1 - December 15) and may be attracted to nighttime lighting. Tetra Tech recommends the following measures to avoid and minimize potential impacts to listed seabirds:

- Operational on-site lighting should consist of fixtures that will be shielded and/or directed downward to prevent upward radiation, triggered by a motion detector, and fitted with non-white light bulbs to the extent possible. Lighting should be situated so that light does not shine on and reflect off the solar panels.
- Restrict construction activity to daylight hours during the seabird peak fallout period (September 15 - December 15) to avoid the use of nighttime lighting that could attract seabirds.
- If a grounded seabird is found, contact the Maui Nui Seabird Recovery Project at (808) 573-2473.
- Minimize construction of overhead lines to reduce the collision risk for seabird species.

5.2.2 Waterbirds

No listed waterbirds were detected during the surveys, but listed waterbirds could potentially utilize portions of the Study Area when standing water is present. To avoid impacts to listed waterbirds during Project construction and operation, Tetra Tech recommends the following based on avoidance and minimization measures provided by USFWS (2023):

- Avoid creating areas with standing water. Design stormwater retention areas to drain within 48 hours of the end of a storm event and keep retention areas free of emergent vegetation, to avoid attracting listed waterbirds.
- If listed waterbirds are found in the Study Area during active construction, cease all activities within 100 feet (30 m) of the bird(s), and do not approach the bird(s).
- If suitable nesting habitat is created by the Project, a biological monitor that is familiar with the species' biology should conduct Hawaiian waterbird nest surveys where appropriate nesting habitat occurs. Nest surveys should be conducted before any work is conducted and after any subsequent delay in work of 3 or more days (during which birds may attempt nesting). If a nest of a listed waterbird is not discovered, work may continue after the listed waterbird leaves the area of its own accord.
- If a nest of a listed waterbird is discovered, contact USFWS and DOFAW, and establish and maintain a 100-foot (30-m) buffer around all active nests and/or broods until the chicks/ducklings have fledged.

5.2.4 Hawaiian Hoary Bat

Direct impacts to bats could occur if roost trees are disturbed or through the use of barbed wire. Tetra Tech recommends the following avoidance measures provided by USFWS (2023):

- Any fences that are erected as part of the Project should have barbless top-strand wire to prevent entanglements of the Hawaiian hoary bat on barbed wire. If fences with barbed wire are present in the Study Area, the top strand of barbed wire should be removed or replaced with barbless wire.
- Do not trim, disturb, or remove woody vegetation taller than 15 feet (4.6 m) between June 1 and September 15, when juvenile bats that are not yet capable of flying may be roosting in the trees.

5.2.5 Blackburn Sphinx Moth

As stated in Section 4.2.3, the majority of the tree tobacco was removed from the Study Area in accordance with the guidance and avoidance and minimization measures provided by USFWS and DOFAW. However, because tree tobacco is invasive and known to readily colonize disturbed areas, additional tree tobacco may establish in the Study Area prior to construction. To avoid potential take of this listed species as a result of the Project, Tetra Tech recommends qualified biologists survey the Project Area for Blackburn's sphinx moth (including eggs, larvae, and signs of larval feeding) and its larval host plants prior to any ground disturbance involving heavy equipment or machinery. If moths, eggs, larvae, or tree tobacco over 3 feet (0.9 m) tall are found during the survey, Tetra Tech recommends consultation with USFWS and DOFAW as soon as possible to obtain current guidance for addressing this species specifically for this Project.

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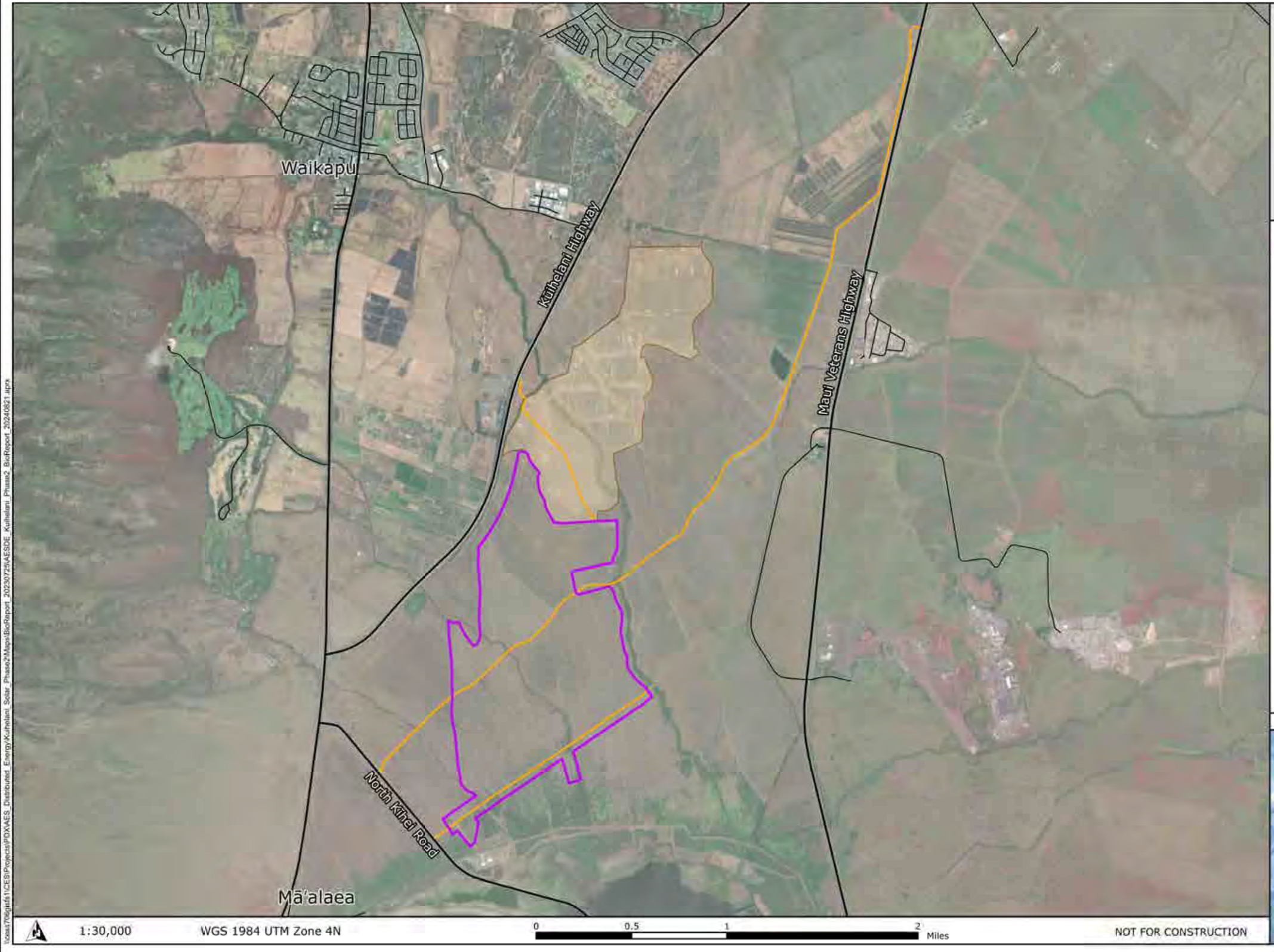
Figures



Kūihelani Solar Phase 2 Project

Figure 1
Project Study Area and Vicinity

MAUI COUNTY, HAWAI'I

- Study Area
- Existing AES Kūihelani Solar Plus Storage Project
- Access Routes
- Major Road
- Secondary Road

aes Hawai'i

TETRA TECH

Reference Map

1:30,000 WGS 1984 UTM Zone 4N 0 0.5 1 2 Miles

NOT FOR CONSTRUCTION

\\oas\706gis01\CES\Projects\PDX\AES_Distributed_Energy\Kuihelani_Solar_Phase2\Maps\BioReport_20230725\AESDE_Kuihelani_Phase2_BioReport_20240821.aprx

Kūihelani Solar Phase 2 Project

Figure 2
Topography and Soils

MAUI COUNTY, HAWAI'I

Study Area
Access Routes
Major Road
Secondary Road
100-ft Contour

NRCS Soil Type

- JaC - Jaucas sand, 0 to 15 percent slopes, MLRA 163
- PZUE - Puuone sand, 7 to 30 percent slopes
- PpA - Pulehu silt loam, 0 to 3 percent slopes
- PpB - Pulehu silt loam, 3 to 7 percent slopes
- PrA - Pulehu cobbly silt loam, 0 to 3 percent slopes
- PrB - Pulehu cobbly silt loam, 3 to 7 percent slopes
- PsA - Pulehu clay loam, 0 to 3 percent slopes , MLRA 163
- PtA - Pulehu cobbly clay loam, 0 to 3 percent slopes
- PtB - Pulehu cobbly clay loam, 3 to 7 percent slopes

aes Hawai'i

TETRA TECH

Reference Map

1:14,000

WGS 1984 UTM Zone 4N

0 0.5 1 Miles

NOT FOR CONSTRUCTION

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Kūihelani Solar Phase 2 Project

Figure 3
Water Resources Identified by NWI, NHD, and DAR Datasets

MAUI COUNTY, HAWAI'I

Kūihelani Highway
Waihee Ditch
Maui Veterans Highway
Honoapiilani Highway
North Kihei Road

- Study Area
- Access Routes
- Major Road
- Secondary Road

National Hydrography Dataset

- Canal/Ditch
- Intermittent Stream
- Underground Pipeline
- Perennial Stream
- Waterbody

Division of Aquatic Resources

- Non-Perennial Stream

National Wetlands Inventory Wetland Type

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine

aes Hawai'i

TETRA TECH

Reference Map

1:30,000 WGS 1984 UTM Zone 4N

0 0.5 1 2 Miles

NOT FOR CONSTRUCTION

\\osa700gis\f1\CESIProjects\P0XAES_Distributed_Energy\Kuihelani_Solar_Phase2\Maps\WOTUS_20231219\AESDE_Kuihelani_Phase2_WOTUS_20240814.aprx

Kūihelani Solar Phase 2 Project

Figure 4
Critical Habitat in the Vicinity

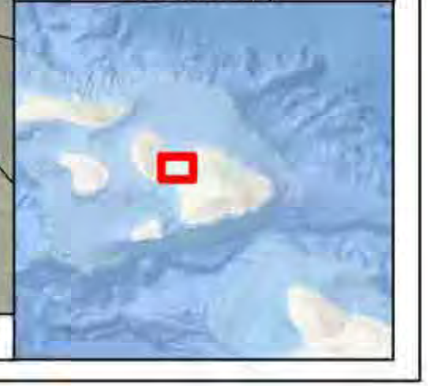
MAUI COUNTY, HAWAI'I

- Study Area
- Access Routes
- Major Road
- Secondary Road
- Blackburn's sphinx moth (*Manduca blackburni*) Critical Habitat
- Lowland Dry 06 Critical Habitat

aes Hawai'i

TETRA TECH

Reference Map



Kūihelani Highway

Maui Veterans Highway

North Kihei Road

1:48,000 WGS 1984 UTM Zone 4N 0 1 2 4 5 Miles

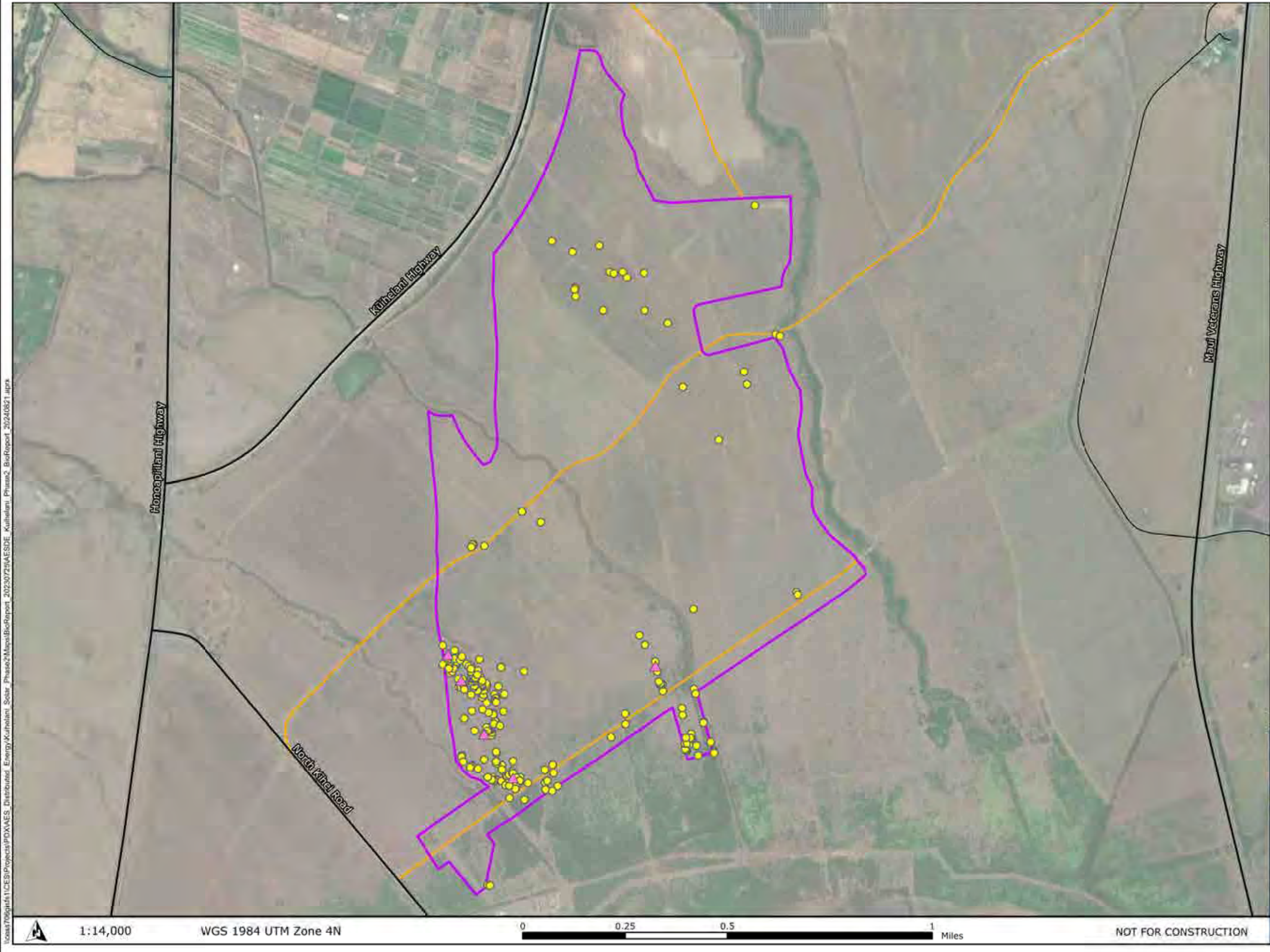
NOT FOR CONSTRUCTION

\\oas706gisfs1\CES\Projects\PDX\AES_Distributed_Energy\Kuihelani_Solar_Phase2\Maps\BioReport_20230725\AESDE_Kuihelani_Phase2_BioReport_20240821.aprx

Kūihelani Solar Phase 2 Project

Figure 5
Blackburn's Sphinx Moth and Tree Tobacco Observed During Surveys

MAUI COUNTY, HAWAI'I

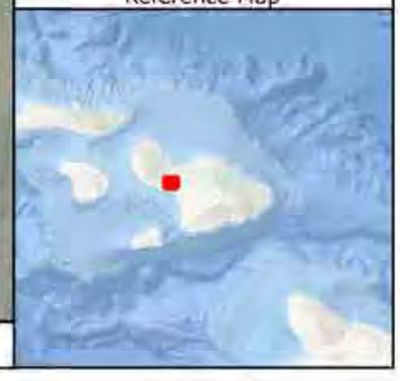


- Study Area
- Access Routes
- Major Road
- Secondary Road
- Blackburn's Sphinx Moth (Egg or Caterpillar)
- Tree Tobacco

aes Hawai'i

TETRA TECH

Reference Map



1:14,000 WGS 1984 UTM Zone 4N

0 0.25 0.5 1 Miles

NOT FOR CONSTRUCTION

\\oaa7006gis1\CES\Projects\PIDX\AES_Distributed_Energy\Kuihelani_Solar_Phase2\Maps\BioReport_20230725\AESDE_Kuihelani_Phase2_BioReport_20240821.aprx

Appendix A

Representative Photographs of the Kūihelani Solar Phase 2 Study Area

Photo 1. Looking southeast from the northwestern portion of the Study Area, depicting Buffelgrass Grassland. Lat/Long: 20.826869, -156.491718.

Photo 2. Looking northeast from the central portion of the Study Area, depicting Buffelgrass Grassland with patches of the native ʻuhaloa and scattered non-native shrubs and trees, such as small crown flower and kiawe. Lat/Long: 20.824416, -156.489365.

Photo 3. Typical vegetation within the central portion of the Study Area, depicting remnant agricultural infrastructure. Lat/Long: 20.819672, -156.488405.

Photo 4. Looking west-southwest near the southeastern corner of the Study Area, depicting Buffelgrass Grassland. Lat/Long: 20.812839, -156.482107.

Photo 5. Looking northeast from within the southwestern portion of the Study Area, with Buffelgrass Grassland in the foreground depicting co-dominant vegetation of the non-native buffelgrass and native ʻuhaloa, and moderately dense Kiawe/ Koa Haole Forest in the background. Lat/Long: 20.806126, -156.492382.

Photo 6. Vegetation along existing 9th Street in the southwestern portion of the Study Area, depicting dense Kiawe/ Koa Haole Forest where the access road intersects Pōhākea Gulch. Lat/Long: 20.804958, -156.494777.

Photo 7. Looking southeast from the ford crossing at Paleʻaʻahu Gulch at South 8th Street within the western central portion of the Study Area, depicting the banks vegetated with koa haole. Lat/Long: 20.816808, -156.492239.

Photo 8. Tree tobacco, a non-native host plant for the endangered Blackburn's sphinx moth, occurred as scattered individuals and patches throughout the Study Area. Lat/Long: 20.820514, -156.485026.

Photo 9. Young Blackburn's sphinx moth caterpillar observed on tree tobacco within the Study Area in November 2023.

Appendix B

DOFAW Response Letter on Project Pre-development Activities

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

DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET, ROOM 325
HONOLULU, HAWAII 96813

DAWN N.S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

LAURA H.E. KAAKUA
FIRST DEPUTY

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

September 12, 2023

Log no. 4257

Tiffany Bovino Agostini
Senior Biologist/ Project Manager
TetraTech
737 Bishop Street, Suite 2000
Honolulu, HI 96813
Attn: Tiffany.Agostini@tetratech.com

Dear Ms. Agostini,

The Department of Land and Natural Resources, Division of Forestry and Wildlife (DOFAW) has received your request for comments on your minimization measures proposal to avoid potential impacts to the State endangered Blackburn's sphinx moth (*Manduca blackburni*) for pre-development activities for the AES Kuihelani Phase 2 Solar Project in the Wailuku District of Maui. The project would involve the construction and operation of either a 20-megawatt (MW) or 40-MW ground-mounted solar photovoltaic system coupled with a 160-MW-hour (MWh) battery energy storage system, a substation and switchyard, and related interconnection and ancillary facilities. The study area for the project encompasses roughly 873 acres within the TMK parcel: (2) 3-8-005:002-0003[por.], which is owned by MP West LLC (d.b.a Mahi Pono). Currently, a proposal for the Project is being evaluated by Hawaiian Electric Company, Inc (Hawaiian Electric) based on AES' submittal in response to the Request for Proposals for Renewable Dispatchable Generation and Energy Storage for Maui (RFP) issued by Hawaiian Electric on January 20, 2023 (Docket 2017-0352). The final selection of projects by Hawaiian Electric is expected to occur in late October 2023. If the project is selected, pre-development due diligence studies, including geotechnical borings and subsurface archaeological testing, would commence immediately. These activities would involve limited clearing and ground disturbance in preselected, systematic locations across the study area.

DOFAW concurs with the measures included in the consultation request intended to avoid pre-development and construction impacts to Blackburn's Sphinx Moth. Beginning on September 11, 2023, Tetra Tech's qualified biologists will survey areas of proposed activities for tree tobacco and inspect the plants for Blackburn's sphinx moth to allow adequate time for tree tobacco removal prior to the pre-development activities (e.g., geotechnical drilling and subsurface archaeological testing). If tree tobacco over 3 feet in height is observed, biologists will thoroughly search the plant for eggs, larvae, and signs of larval feeding (chewed stems,

frass, or leaf damage). If appropriate, ladders and/or stools will be used to thoroughly survey taller tree tobacco plants.

If there are no signs of Blackburn's sphinx moth on tree tobacco more than 3 feet in height, the following will occur:

- The above-ground portion of the tree tobacco will be cut and removed. The cut stems will be painted with herbicide (without disturbing soil and roots) to prevent plant growth and use by caterpillars.
- A 33-foot (10-m) disturbance-free buffer will be established around the plant, and plant roots and soil within the buffer will be left undisturbed for a minimum of 3 months (or until a heavy rainfall event occurs) to prevent disturbance of any pupating larvae in the ground around the plant.
- After this period, the plant roots may be removed and the soil disturbed.

If there are signs of Blackburn's sphinx moth on tree tobacco more than 3 feet in height, the following will occur:

- The location of the plant will be mapped, and the plant will not be cut or disturbed.
- A 33-foot (10-m) disturbance-free buffer will be established around the plant. If necessary, surveys will be repeated at a future date.
- Once eggs and larvae are not present, plants will be removed following the steps outlined above.

DOFAW provides the following additional comments regarding the potential for the proposed work to affect listed species in the vicinity of the project area.

The State listed ʻōpeʻapeʻa or Hawaiian Hoary Bat (*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. 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, when young seabirds make their maiden voyage to sea.

If nighttime construction is required during the seabird fledgling season (September 15 to December 15), we recommend that a qualified biologist be present at the project site to monitor and assess the risk of seabirds being attracted or grounded due to the lighting. If seabirds are seen circling around the area, lights should then be turned off. If a downed seabird is detected, please follow DOFAW's recommended response protocol by visiting https://dlnr.hawaii.gov/wildlife/seabird-fallout-season/#response.

Permanent lighting also poses a risk of seabird attraction, and as such should be minimized or eliminated to protect seabird flyways and preserve the night sky. 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.

State-listed waterbirds such as the ae'o or Hawaiian stilt (*Himantopus mexicanus knudseni*), 'alae ke'oke'o or Hawaiian coot (*Fulica alai*), and nēnē or Hawaiian Goose (*Branta sandvicensis*) could potentially occur at or in the vicinity of the proposed project site. It is against State law to harm or harass these species. If any of these species 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) 984-8116.

The endemic pueo or Hawaiian Short-Eared Owl (*Asio flammeus sandwichensis*) could potentially nest in the project area. Before any potential vegetative alteration, especially ground-based disturbance, we recommend that line transect surveys are conducted during crepuscular hours through the project area. If a pueo nest is discovered, a minimum buffer distance of 100 meters from the nest should be established until chicks are capable of flight.

Studies on the mainland have linked solar power facilities with mortality of a variety of avian species, including waterbirds and raptors. In addition to pre-construction surveys, please consider implementing avian mortality avoidance measures during project design and conducting surveys and monitoring during operation to assess the impacts of the project to listed species. DOFAW recommends a wildlife education program that informs site personnel of species that may occur in the vicinity of the project and that could potentially be harmed by solar panels. Site personnel should document sightings of threatened or endangered species, as well as immediately report any mortality or injury of these species to DOFAW so we may assist in avoiding and minimizing impacts.

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.

DOFAW recommends using native plant species for landscaping that are appropriate for the area; i.e., 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.

We recommend that Best Management Practices are employed during and after construction to contain any soils and sediment with the purpose of preventing damage to near-shore waters and marine ecosystems.

We appreciate your efforts to work with our office for the conservation of our native species. 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 Coordinator, at (808) 265-3276 or myrna.girald-perez@hawaii.gov.

Sincerely,

Jason C. Misaki
Acting Wildlife Program Manager

Appendix R. Traffic Impact Analysis Report

September 30, 2025

Fehr & Peers
555 West Beech Street Suite 302
San Diego, CA 92101

ATTN:
Kuihelani Solar Phase 2, LLC
c/o AES Clean Energy Development, LLC
282 Century Place Suite 2000
Louisville, CO 80027

RE: Kuihelani Solar Phase 2 Transportation Impact Analysis Report, August 2025

Fehr & Peers was retained by Kuihelani Solar Phase 2, LLC (AES), to prepare a traffic assessment of the proposed Kuihelani Solar Phase 2 project (the Project); field work was conducted in May 2024, the finalized Transportation Impact Analysis Report (TIAR) provided to AES in August 2025. Fehr & Peers also conducted initial outreach to State of Hawaii and County of Maui Departments of Transportation in August 2025 for advanced review of the TIAR. A response from Hawaii Department of Transportation was received stating no further comment at this time.

In addition, after the TIAR was provided to AES, Fehr & Peers was made aware that the duration of the Project's operations may vary from the presumed 25-year operational term. Fehr & Peers understands that the Project's operational duration has not yet been finalized and is ultimately subject to approval by the Public Utility Commission. As the Project requires minimal staff to operate and employee vehicle trips are expected to remain the same, a change in operational duration is not anticipated to impact the findings nor recommendations of the TIAR.

Fehr & Peers was also made aware of the ongoing Lahaina debris transfer, which began in June 2025. The traffic assessment for the Project did not directly consider truck traffic associated with the Lahaina debris transfer. Fehr & Peers confirmed that the traffic assessment is sufficient since the Project's construction schedule will not overlap with the Lahaina debris transfer.

Sincerely,

FEHR & PEERS

Sohrab Rashid
Principal

Kuihelani Solar Phase 2 Transportation Impact Analysis Report

Prepared for:
Kuihelani Solar Phase 2, LLC

August 8, 2025

SD24-0513

FEHR PEERS

Table of Contents

Executive Summary **1**

1. Introduction **3**

1.1 Project Description 3

1.2 Study Scenarios 5

1.3 Analysis Methodology 6

1.4 Intersection Impact Criteria 7

2. Existing Conditions **8**

2.1 Existing Transportation Network 8

2.2 Existing Traffic Volumes, Lane Configurations, and Operations 8

3. Baseline (2028) Conditions **11**

3.1 Baseline (2028) Traffic Projections 11

3.2 Baseline (2028) No Project Intersection Level of Service 11

4. Project Traffic **13**

4.1 Project Trip Generation 13

4.2 Project Trip Distribution and Assignment 14

5. Baseline (2028) Plus Project Construction Conditions **16**

5.1 Baseline (2028) Plus Project Construction Traffic Projections 16

5.2 Baseline (2028) Plus Project Construction Intersection Level of Service Results 16

5.3 Alternative Operations Scenarios at North Kihei Access Points 19

5.3.1 Average Worker Traffic Volumes 19

5.3.2 Prohibition of Outbound Left-Turns 20

5.4 Recommendations for Project Access 20

5.5 Typical Project Operations and Maintenance 21

5.6 Active and Transit Mode Access 21

6. Vehicle Access **22**

Appendices

Appendix A: Traffic Count Data

Appendix B: Intersection Level of Service Results

List of Figures

Figure 1: Project Study Area 4
Figure 2: Peak Hour Traffic Volumes and Lane Configurations – Existing (2024) Conditions 10
Figure 3: Baseline (2028) Conditions 12
Figure 4: Project Trip Distribution and Assignment 15
Figure 5: Baseline (2028) Plus Project Construction Conditions 18

List of Tables

Table 1: Intersection Level of Service Criteria 6
Table 2: Existing (2024) Intersection Levels of Service 9
Table 3: Baseline (2028) Intersection Levels of Service 11
Table 4: Peak Hour and Daily Project Construction Trip Generation 13
Table 5: Baseline (2028) No Project and Plus Project Construction Intersection Levels of Service 17
Table 6: Baseline (2028) Plus Project Intersection Levels of Service with Average Worker Traffic 19
Table 7: Baseline (2028) Plus Project Intersection Levels of Service with No Left Turns Out 20

Executive Summary

This report documents the assessment of mobility and access associated with the Kuihelani Solar Phase 2 Project in Central Maui. The project site is located south of the existing Kuihelani Solar Phase Plus Storage project, north of Maalea Power Plant, northeast of North Kihei Road, southeast of Kuihelani Highway, and west of Maui Veterans Highway. The project consists of a 40-megawatt (MW) solar photovoltaic and 160 MW-hour (MWh) battery energy storage system, which would be constructed between the second quarter of 2027 and fourth quarter of 2028. Four potential access points for construction and operational traffic were individually analyzed, and each access was conservatively assumed to serve all vehicles traveling to and from the project site:

1. Maui Veterans Highway & Cane Haul Road
2. North Kihei Road & South 8th Street
3. North Kihei Road & 9th Street
4. Kuihelani Highway & Kuihelani Phase 1 Access (south of Waiko Road)

Cane Haul Road, South 8th Street, 9th Street, and Kuihelani Phase 1 Access are all existing agricultural roads on privately owned lands and are not county or state facilities.

The impacts of the proposed project on mobility and access were evaluated following guidelines and standards of the affected government agencies. All four study intersections listed above were evaluated during the weekday morning (AM) and evening (PM) peak hours for Existing (2024) Conditions, Baseline (2028) Conditions, and Baseline (2028) Plus Project Conditions.

Vehicle trip generation during the construction of the solar facility was determined based on employee and truck estimates provided by the project sponsor, AES. The proposed project is expected to generate a maximum of 200 inbound construction worker vehicle trips in the AM peak hour and 200 outbound worker trips in the PM peak hour. However, the average number of workers traveling to and from the site during the duration of construction is approximately 90. Additionally, a maximum of 20 inbound and 20 outbound heavy vehicle (i.e., large truck) trips are expected during both the AM and PM peak hours.

Optimal project access combinations could include any of the following and would result in no impact to level of service and less circuitous trips:

- Worker access from Kuihelani Phase 1 Access
- Worker access from Cane Haul Road
- Worker access from 9th Street, mornings only (inbound traffic)
- Worker access from 8th Street, mornings only (inbound traffic)
- Delivery access from 9th Street

This analysis determined that, when the maximum number of workers are present on-site, both Maui Veterans Highway & Cane Haul Road (Access Point 1) and Kuihelani Highway & Kuihelani Phase 1 Access (Access Point 4) will each function at a desired operating level. However, some turning movements in and/or out are prohibited at each location, that would result in some circuitous travel depending on the travel direction.

For Access Points 2 and 3, outbound traffic leaving the project site is projected to experience lengthy delays and undesirable operating levels on the South 8th Street and 9th Street approaches to North Kihei Road when the maximum number of workers would be present. Delays are projected to be substantially lower at these intersections under average conditions, but the side street approaches would still each operate at an undesirable level of service. Note that only workers leaving the site would experience this delay. Delays would be lower still and operations would be closer to desirable levels if no outbound left-turns were permitted from the project driveway to the main highway.

Providing more than one access point for worker and delivery access would ensure reasonable delays at intersections, limit the circuity of trips to and from the site, and help reduce the likelihood of workers making illegal or prohibited turns (i.e. turning left from Kuihelani Phase 1 Access onto Kuihelani Highway).

Very few if any pedestrian, bicycle, or transit trips will be made to or from the site given the lack of transit stops, sidewalks, and bicycle facilities. Based on a multimodal evaluation of mobility effects from the project, no potential impacts to pedestrian facilities, bicycle facilities, and transit facilities are anticipated with implementation of the proposed project.

Once fully operational, the solar project is anticipated to have approximately three (3) to four (4) employees on site at any given time to perform various maintenance activities. Under Opening Year (2028) Plus Operations Conditions, all intersections through which project traffic is routed are forecast to operate at a desirable level. The effects of employee trips generated by the proposed project under typical operations are considered negligible.

1. Introduction

Fehr & Peers has prepared a traffic assessment for the proposed Kuihelani Solar Phase 2 Project (i.e., the Project) to be constructed by Kuihelani Solar Phase 2, LLC, a subsidiary of AES Clean Energy Development, LLC (AES) in Central Maui. This assessment was prepared to support the project in obtaining approvals from the State Land Use Commission and County of Maui Planning Commission. This letter includes an assessment of the vehicle trip generation anticipated during both project construction and typical project operations, as well as an analysis of intersection operations to determine any traffic-related impacts from project implementation.

1.1 Project Description

The project proposes the development of a 40 megawatt (MW) ground-mounted solar photovoltaic system coupled with a 160 MW-hour (MWh) battery energy storage system, as well as a Project substation and other related interconnection and ancillary facilities. The project site is located south of the Kuihelani Solar Phase Plus Storage project, north of Maalea Power Plant, northeast of North Kihei Road, southeast of Kuihelani Highway, and west of Maui Veterans Highway. Most of the surrounding land use consists of open space and agriculture farming. Construction of the Project will generate clean energy on former agricultural land.

There are four (4) existing access points being considered for the Project. While more than one may be utilized, this assessment conservatively assumed each access point would independently serve all traffic to and from the site. This assessment evaluated the operations at the following four (4) intersections which serve as potential access points to the project from the main highways:

1. Maui Veterans Highway & Cane Haul Road
2. North Kihei Road & South 8th Street
3. North Kihei Road & 9th Street
4. Kuihelani Highway & Kuihelani Phase 1 Access (south of Waiko Road)

Based on previous studies and the construction management plan for Kuihelani Solar Phase 1, this study assumes only right-in right-out (RIRO) access at Intersection 4 and no northbound left-turns at Intersection 1. Full access was assumed at Intersections 3 and 4.

Vehicles will travel along existing dirt roadways between the access points and the Project site which are on privately owned (Mahi Pono) property. **Figure 1** shows the project vicinity, proposed project site, and potential access points.

Access Roadway

Project Site

Study Intersections

Figure 1

Project Location and Study Area

Once operational, the site will be primarily self-sustaining with minimal periodic maintenance required. After construction, the solar project is expected to have no more than four (4) employees on-site at any given time. No permanent employees will be on-site; however, employees will visit the site over the course of the year to conduct maintenance such as mowing and/or panel washing. As a result, the number of employee vehicle trips generated by the proposed project during typical operations is considered negligible (i.e. less than the standard daily variation in traffic during peak hours). The primary traffic issues for the proposed project are associated with potential temporary construction traffic impacts.

The project is anticipated to begin operations in late 2028 following the completion of construction. Construction is expected to begin in the second quarter of 2027 and continue through the fourth quarter of 2028. Project construction is anticipated to require up to 200 workers on-site at a time during the peak of construction, but only approximately 90 workers per day on average over the course of construction. As a conservative approach, this assessment evaluates the peak of construction with 200 workers. Workers will generally be on-site between 6:30 AM and 5:00 PM Monday through Friday.

1.2 Study Scenarios

The operations of the study intersections were evaluated during the busiest peak (one) hour in the morning (generally 7:00 to 8:00 AM) and in the afternoon (generally 3:30 to 4:30 PM) for the study area. Two-day (48-hour) roadway segment counts were collected along Kuihelani Highway, North Kihei Road, and Maui Veterans Highway, and AM and PM peak hour traffic volumes were determined from these counts. Given that there is currently little to no traffic to or from each of the proposed access points, peak hour turning movement volumes to and from the side-streets and access points were estimated from field observations and from the *Traffic Impact Analysis Report AES Kuihelani Solar Plus Storage Project* prepared in 2021 by Austin, Tsutsumi, & Associates, Inc.

Traffic operations were evaluated for the following scenarios:

- **Existing Conditions** – Traffic counts were collected along Kuihelani Highway, North Kihei Road, and Maui Veterans Highway on May 21st and May 22nd, 2024. These counts are provided in **Appendix A**.
- **Baseline (2028) Conditions** – Existing peak hour volumes were grown by one (1) percent per year to forecast traffic in 2028. This scenario only includes increases in traffic volumes from ambient growth in the study area.
- **Baseline (2028) Plus Project Construction Conditions** – This scenario consists of Baseline (2028) traffic plus the addition of project generated construction traffic. This scenario analyzes the peak construction of the Project. During non-peak months of construction there will be fewer worker vehicles arriving and departing each day. Given that the construction hours of operation will be 6:30 AM to 5:00 PM, the majority of trips departing the site will not occur within the AM and PM peak hours in the study area. To be conservative, the analysis assumed all worker trips arrive and depart during the AM and PM peak hours.

1.3 Analysis Methodology

The analysis of roadway operations performed for this study is based on procedures presented in the Highway Capacity Manual 7th Edition (HCM 7), published by the Transportation Research Board in 2022. The operations of roadway facilities are described with the term level of service (LOS). LOS is a qualitative description of traffic flow based on factors such as speed, travel time, delay, and freedom to maneuver. Six levels are defined, from LOS A, with the least congested operating conditions, to LOS F, with the most congested operating conditions. LOS E represents "at-capacity" operations. Operations are designated as LOS F when volumes exceed capacity, resulting in stop-and-go conditions.

Traffic operations at the study intersections were analyzed using procedures consistent with HCM 7. **Table 1** provides a description of each Level of Service grade and its corresponding delay for signalized and unsignalized intersections. The average control delay for all intersections was calculated using Synchro 12.0 analysis software.

Table 1: Intersection Level of Service Criteria

Level of Service	Description	Signalized Delay (Seconds)	Unsignalized Delay (Seconds)
A	Progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.	≤ 10.0	≤ 10.0
B	Progression is good, cycle lengths are short, or both. More vehicles stop than with LOS A, causing higher levels of average delay.	> 10.0 to 20.0	> 10.0 to 15.0
C	Higher congestion may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level, though many still pass through the intersection without stopping.	> 20.0 to 35.0	> 15.0 to 25.0
D	The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	> 35.0 to 55.0	> 25.0 to 35.0
E	This level is often considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences.	> 55.0 to 80.0	> 35.0 to 50.0
F	This level is often considered unacceptable with oversaturation, which is when arrival flow rates exceed the capacity of the intersection. This level may also occur at high V/C ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be contributing factors to such delay levels.	> 80.0	> 50.0

Source: Highway Capacity Manual (Transportation Research Board, 2022).

This LOS method analyzes a signalized intersection's operation based on average control delay per vehicle. Control delay alone is used to characterize LOS for the entire intersection or for an approach. Control delay includes the initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay.

An unsignalized intersection's LOS is determined by the computed control delay and is defined for each minor movement.

1.4 Intersection Impact Criteria

The analysis compares existing traffic conditions, Baseline (2028) Conditions, and Baseline (2028) Plus Project Construction conditions to determine if the addition of construction traffic to existing roadways is expected to result in a significant impact to the surrounding area. Based on previous studies conducted for both the County of Maui and the State of Hawaii Department of Transportation (HDOT), the minimum desired operating standard for a signalized intersection is LOS D. If the addition of project traffic is expected to degrade desirable service levels (LOS D or better) to lower than desirable service levels (LOS E or F) then the project is considered to have a project-specific impact. Impacts are also defined to occur when the addition of project traffic exacerbates locations already operating or projected to operate at LOS E or F. Construction-related impacts are considered temporary and are addressed with provisional mitigation measures during construction.

An impact is considered a cumulative impact at a signalized intersection if the addition of project trips exacerbates baseline LOS E or F operations and increases overall intersection delay by more than five (5) seconds.

For unsignalized intersections, the criterion for a project-specific impact is the same as for signalized intersections regarding LOS as described above, but one or more signal warrants must also be met. The signal warrants used for this evaluation are described in Chapter 4V of the *Manual on Uniform Traffic Control Devices (MUTCD, 2009)* published by the U.S. Department of Transportation Federal Highways Administration (FHWA). However, the project is determined to have a potentially significant cumulative impact when it adds any amount of traffic to a study location which includes a controlled approach operating at an undesirable level (i.e., LOS E or F) and one or more volume-based signal warrants are met.

Impacts to public transit, pedestrian facilities and travel, and bicycle facilities and travel are considered significant if the proposed project conflicts with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or if it will generate additional demand that cannot be reasonably accommodated by existing or planned multi-modal facilities.

2. Existing Conditions

This chapter describes the existing roadway network located in the vicinity of the project site. A discussion of the existing intersection LOS operation results is also included in this chapter.

2.1 Existing Transportation Network

The key roadways providing vehicular access in the vicinity of the project site are described below:

Kuihelani Highway is a north-south, four-lane divided arterial with a posted speed limit of 45 or 55 mph in the study area. The roadway begins at its intersection with Puunene Avenue and Dairy Road in Kahului and extends southward until it terminates at its intersection with Honoapiilani Highway north of Maalaea Harbor.

Maui Veterans Highway is a north-south, four-lane divided arterial with a posted speed limit of 45 mph in the study area. The roadway runs between West Kaahumanu Street in Kahului to the north and Wailea Ike Drive in Wailea to the south.

North Kihei Road is an east-west, two-lane roadway with a posted speed limit of 45 mph in the study area. The roadway runs between Honoapiilani Highway to the west and Maui Veterans Highway to the east.

An existing multimodal path runs along the mauka side of Maui Veterans Highway between Kihei and Kahului. While wide shoulders are provided along Kuihelani Highway, no official bicycle facilities are provided. Similarly, bicyclists may use the shoulders along North Kihei Road, but no designated facilities are provided. In addition, no bus stops to access existing transit service are provided near the project site.

Cane Haul Road, South 8th Street, 9th Street, and Kuihelani Phase 1 Access provide direct access to the project site from the county and state facilities described above. These roadways are all existing agricultural roads on privately owned lands and are not county or state facilities.

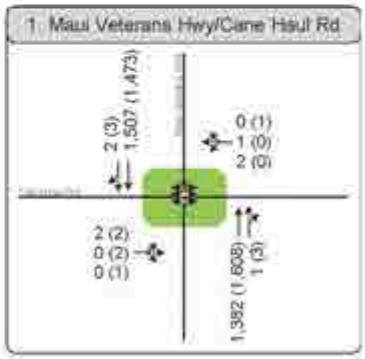
2.2 Existing Traffic Volumes, Lane Configurations, and Operations

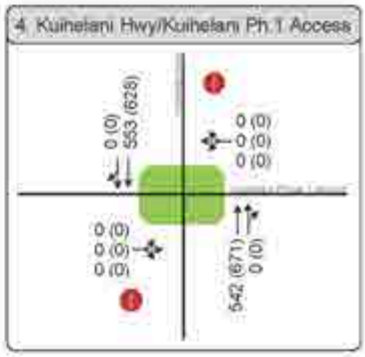
To determine potential effects of construction traffic at the access points, intersection operations at the six (6) study intersections were evaluated during weekday AM and PM peak hour conditions. **Figure 3** presents the existing weekday AM and PM turning movement volumes and lane configurations at each study intersection. **Table 2** shows the current operations at the study intersections. All intersections currently operate at a desirable level (LOS D or better). However, note that South 8th Street, 9th Street, and the Kuihelani Solar Phase 1 Access at Kuihelani Highway have little to no existing traffic.

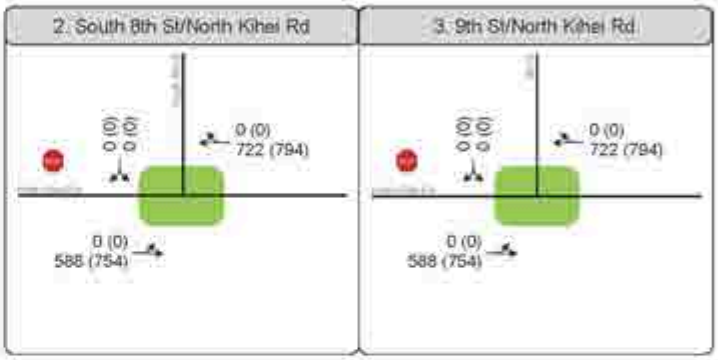
Table 2: Existing (2024) Intersection Levels of Service

Intersection	Traffic Control[1]	Peak Hour	Intersection or Worst Movement Delay (sec/veh)	LOS[2]
1. Maui Veterans Highway & Cane Haul Road	Signal	AM	2.6	A
		PM	2.2	A
2. North Kihei Road & South 8th Street	SSSC	AM	0.0	A
		PM	0.0	A
3. North Kihei Road & 9th Street	SSSC	AM	0.0	A
		PM	0.0	A
4. Kuihelani Highway & Kuihelani Phase 1 Access	SSSC	AM	0.0	A
		PM	0.0	A

Source: Fehr & Peers, 2025
[1] SSSC = Side-Street Stop-Controlled
[2] LOS = Level of Service







#	Study Intersection
AM (PM)	Peak Hour Traffic Volumes
	Lane Configuration
STOP	Stop Sign
	Signalized

AM / PM

A-C | D | E | F

Level of Service

Figure 4

Peak Hour Traffic Volumes and Lane Configurations - Existing (2024) Conditions

3. Baseline (2028) Conditions

To evaluate the potential traffic impacts generated by Project construction, it was necessary to first develop estimates of future traffic conditions in the area without the Project under construction. Future traffic conditions without the Project (i.e., Baseline Conditions) reflect increases based on regional growth and development by 2028.

3.1 Baseline (2028) Traffic Projections

Year 2024 traffic volumes were increased by an average growth factor of 1.0 percent per year and rounded to the nearest tens to forecast 2028 traffic volumes to account for ambient growth. This rate was determined by considering the difference between historic and future traffic projections and planned growth in the study area, as well as projected growth in the Maui County Travel Demand Model.

3.2 Baseline (2028) No Project Intersection Level of Service

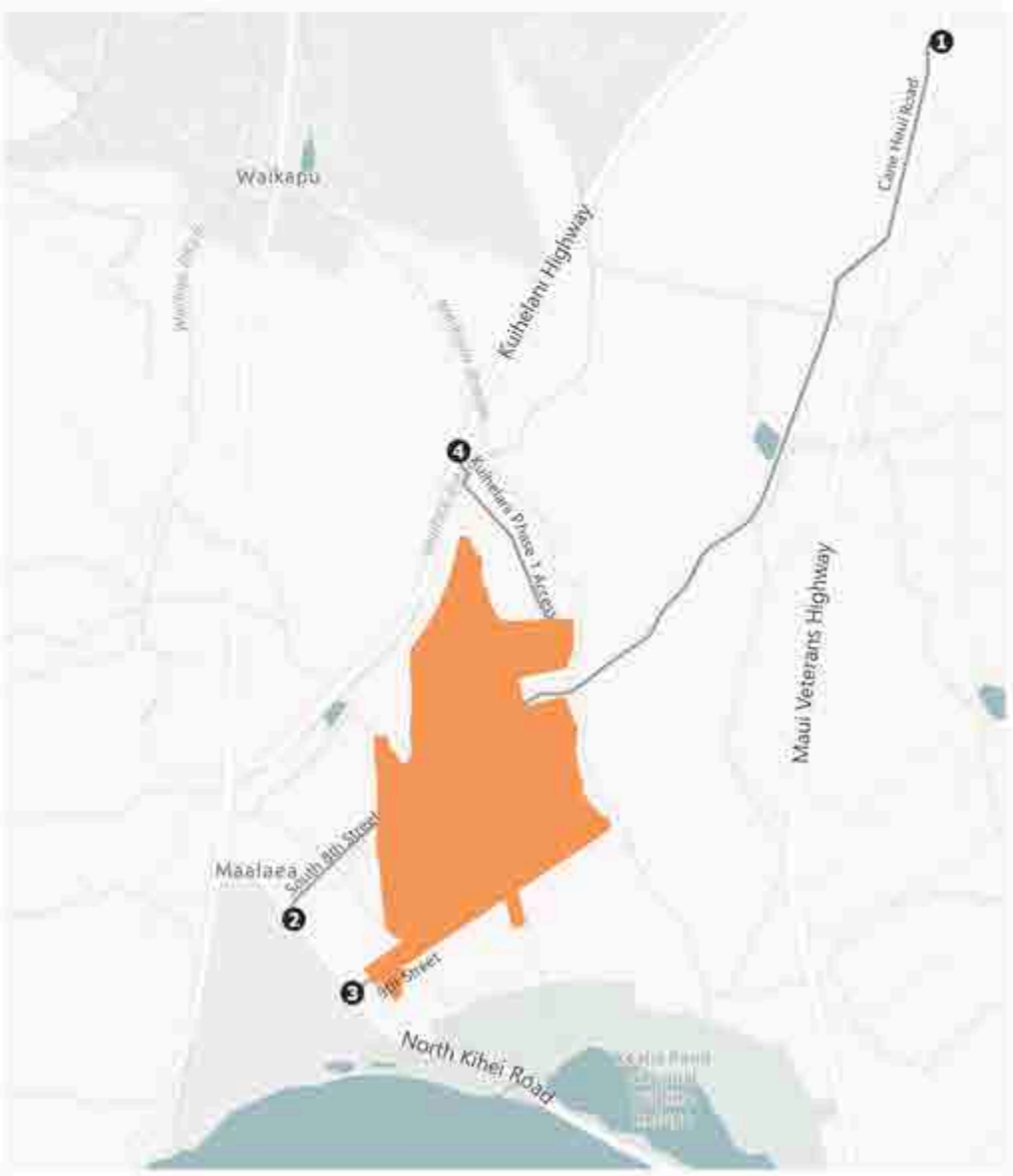
Levels of service (LOS) calculations were conducted to evaluate the operating levels of the study intersections under Baseline (2028) No Project Conditions with the forecasted growth in traffic. The results of the LOS analysis for the study intersections are presented in **Table 3.** The corresponding LOS calculation sheets are included in **Appendix B**.

The changes in operations from Existing (2024) Conditions are the result of the addition of ambient traffic growth. The analysis results indicate that all intersections will continue to operate at desirable levels of service prior to project implementation. However, note that South 8th Street and 9th Street are forecast to have little to no vehicle traffic since few land uses besides the project are expected to use those roads.

Table 3: Baseline (2028) Intersection Levels of Service

Intersection	Traffic Control[1]	Peak Hour	Intersection or Worst Movement Delay (sec/veh)	LOS[2]
1. Maui Veterans Highway & Cane Haul Road	Signal	AM	3.8	A
		PM	3.7	A
2. North Kihei Road & South 8th Street	SSSC	AM	0.0	A
		PM	0.0	A
3. North Kihei Road & 9th Street	SSSC	AM	0.0	A
		PM	0.0	A
4. Kuihelani Highway & Kuihelani Phase 1 Access	SSSC	AM	10.3	B
		PM	10.9	B

Source: Fehr & Peers, 2025
[1] SSSC = Side-Street Stop-Controlled
[2] LOS = Level of Service



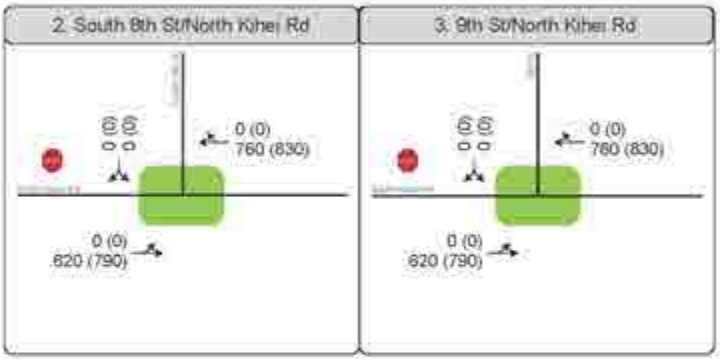


Figure 3

Peak Hour Traffic Volumes and Lane Configurations - Baseline (2028) Conditions

4. Project Traffic

This section describes the anticipated number of vehicle trips and the directionality of those trips that would result during construction of the proposed project. Construction traffic added to the roadway system by the project is estimated using a three-step process: (1) project trip generation, (2) trip distribution, and (3) trip assignment. The first step estimates the amount of project-generated traffic that would be added to the roadway network. The second step estimates the direction of travel to and from the project site. The new trips are assigned to specific street segments and intersection turning movements during the third step. This process is described in more detail in the following sections.

4.1 Project Trip Generation

Temporary construction traffic is the primary traffic issue associated with solar projects. Construction traffic is comprised of private vehicles driven by construction workers and trucks delivering materials, hauling earth and debris, and providing other services (e.g., water trucks). In general, workers are assumed to make one (1) inbound trip and one (1) outbound trip for a total of two (2) daily trips. Detailed information on construction activities was also provided by AES and included the estimated number of truck trips during the planned construction period. Estimates are expected to be no greater than those assumed herein. It is important to note that this information is preliminary and may be refined once a specific contractor is selected to construct the project. At that time, a construction traffic management plan will be prepared for county and state agencies.

During the peak period of construction, a maximum of 200 workers are anticipated to be on-site. All construction workers are assumed to arrive during the AM peak hour and depart during the PM peak hour. However, it is expected that some carpooling may occur and that some worker trips will be made outside of the peak hours of traffic.

During the peak of construction, a maximum of 20 trucks arriving and departing the Project site during the AM and PM peak hours was conservatively assumed for the purposes of this analysis. The maximum peak hour truck trips may end up lower than these estimates. Forecasted trip generation for the construction portion of the project is summarized in **Table 4**.

Table 4: Peak Hour and Daily Project Construction Trip Generation

Trip Type	Daily Trips	AM In	AM Out	AM Total	PM In	PM Out	PM Total
Auto	400	200	0	200	0	200	200
Trucks	80	20	20	40	20	20	40
Total	480	220	20	240	20	220	240

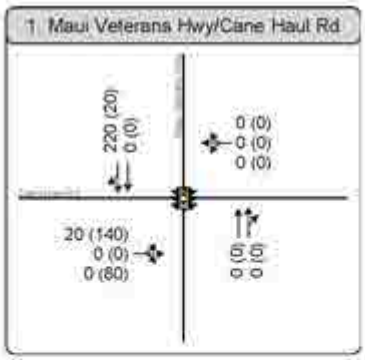
Source: Fehr & Peers, 2024

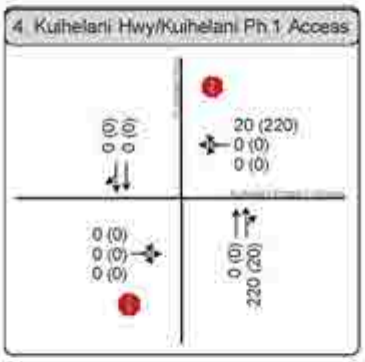
Once operational, the solar project is anticipated to have a maximum of four (4) employees on site at any given time. Given the nominal number of employee trips generated by the proposed project and the negligible effect on traffic, impact analysis under typical operating conditions was not conducted.

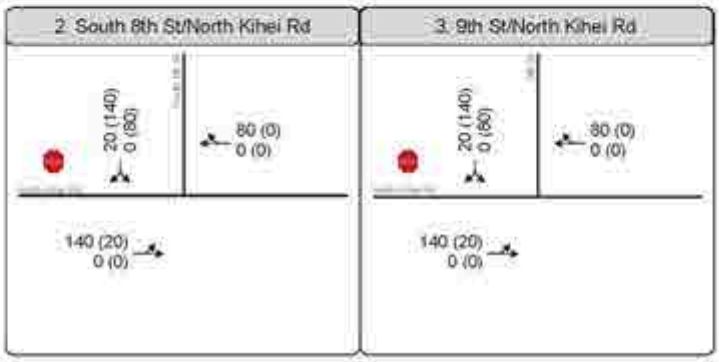
4.2 Project Trip Distribution and Assignment

The trip distribution for the project was estimated based on the population density and size of residential neighborhoods on Maui and likelihood of workers commuting to and from those locations. Based on the regional roadway network and the fact that materials will be transported from Kahului Harbor to the site, all trucks are expected to travel from the north to access the Project. Given the distribution of workers and population on Maui, 40% of workers are expected to travel to the project site from the south, and 60% of workers are expected to travel to the site from the north.

Trip distribution percentages were applied to the forecasted trip generation for each scenario and assigned to the surrounding roadway network to assess potential traffic impacts in the area. **Figure 4** illustrates the project trip distribution and trip assignment for each access point under the assumption that each is the only access point to the project site.







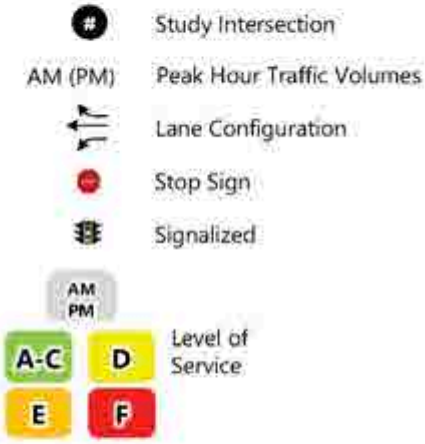


Figure 4

Peak Hour Traffic Volumes and Lane Configurations - Project Trip Distribution and Assignment

5. Baseline (2028) Plus Project Construction Conditions

This section describes the analysis of potential impacts on the roadway system due to projected future increases in traffic, including traffic generated by construction of the project in 2028. The Baseline (2028) Plus Project Construction roadway network is the same network assumed under the Baseline (2028) scenario. The analysis compares the project levels of service (LOS) at each study intersection with and without the addition of project-generated trips to determine potential impacts to the transportation network.

5.1 Baseline (2028) Plus Project Construction Traffic Projections

To forecast the peak hour operating conditions at each study intersection, the project trip assignment was superimposed on Baseline (2028) traffic volumes to yield Baseline (2028) Plus Project Construction volumes. Peak hour traffic volumes for Baseline (2028) Plus Project Construction are shown on **Figures 5**.

5.2 Baseline (2028) Plus Project Construction Intersection Level of Service Results

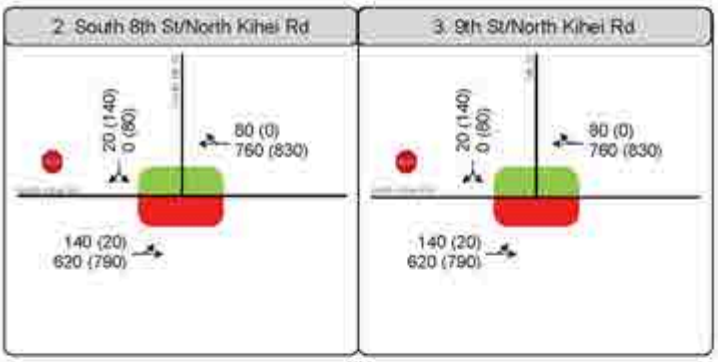
The results of the intersection LOS analysis for Baseline (2028) and Baseline (2028) Plus Project Construction are summarized in **Table 5**. Each study intersection was analyzed as if it were the single access point to the Project site. **Attachment B** includes the detailed LOS calculation worksheets.

Note that the Synchro 12 analysis software is limited in its ability to capture heavy platooning due to upstream signals. For the North Kihei Road access points, expected delays are likely lower than reported, though conclusions regarding the viability of each access point remain the same.

Table 5: Baseline (2028) No Project and Plus Project Construction Intersection Levels of Service

Intersection	Traffic Control[1]	Peak Hour	2028 No Project Delay (sec/veh)	2028 No Project LOS[2]	2028 Plus Construction Delay (sec/veh)	2028 Plus Construction LOS[2]	Change in Delay (sec/veh)
1. Maui Veterans Highway & Cane Haul Road	Signal	AM	3.8	A	3.8	A	0.0
		PM	3.7	A	8.6	A	4.9
2. North Kihei Road & South 8th Street	SSSC	AM	0.0	A	20.7	C	20.7
		PM	0.0	A	**>120.0**	**F**	**>120.0**
3. North Kihei Road & 9th Street	SSSC	AM	0.0	A	20.7	C	20.7
		PM	0.0	A	**>120.0**	**F**	**>120.0**
4. Kuihelani Highway & Kuihelani Phase 1 Access	SSSC	AM	10.3	B	15.7	C	5.4
		PM	10.9	B	15.4	C	4.5

Source: Fehr & Peers, 2025.
[1] SSSC = Side-Street Stop-Controlled
[2] LOS = Level of Service



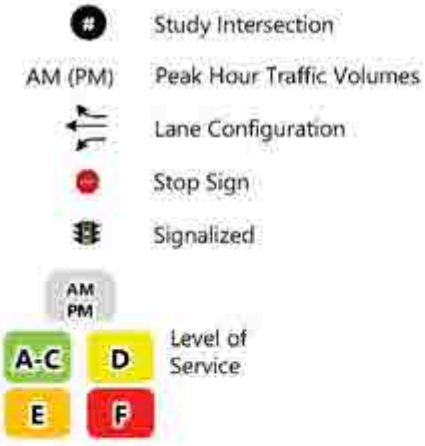


Figure 5

Peak Hour Traffic Volumes and Lane Configurations - Baseline (2028) Plus Project Construction Conditions

Maui Veterans Highway & Cane Haul Road (Intersection 1) will operate at a desirable level under peak conditions. Note that this access only allows for southbound right-turns inbound. Unless access from another study intersection, such as Kuihelani Highway & Cane Haul Road, is used concurrently with this access point, workers coming from Kihei must circle around using North Kihei Road to Kuihelani Highway to Maui Veterans Highway.

For both access points along North Kihei Road (Intersections 2 and 3), under peak conditions with 200 workers, inbound traffic will operate at a desirable level, but average delay for vehicles exiting in the PM peak hour may be two (2) minutes or more. This lengthy queuing does not adversely affect traffic along North Kihei Road, but excessive delays may cause some drivers to be overly aggressive in judging available gaps in through traffic while turning from South 8th Street or 9th Street onto North Kihei Road.

Kuihelani Highway & Kuihelani Phase 1 Access (Intersection 4) will operate at a desirable level under peak conditions. However, note that this intersection only allows for right-in and right-out access. Unless access from another study intersection, such as Maui Veterans Highway & Cane Haul Road, is used concurrently with this access point, workers coming from the north must circle around using Maui Veterans Highway to North Kihei Road to Kuihelani Highway or travel south to Honoapiilani Highway, turn left on Kapoli Street, turn left on Maalaea Road, and head back north on Honoapiilani Highway and Kuihelani Highway to the entrance.

5.3 Alternative Operations Scenarios at North Kihei Access Points

5.3.1 Average Worker Traffic Volumes

While 200 workers are expected on site during the peak of construction, the average number of construction workers over the duration of work is estimated to be 90 workers. With only 90 workers vehicles traveling to and from the site during the peak hour, delays at the North Kihei Road access points would be substantially reduced. The results of this analysis for Access Points 2 and 3 are shown in **Table 6**.

Table 6: Baseline (2028) Plus Project Intersection Levels of Service with Average Worker Traffic

Intersection	Traffic Control[1]	Peak Hour	2028 No Project Delay (sec/veh)	2028 No Project LOS[2]	2028 Plus Construction Delay (sec/veh)	2028 Plus Construction LOS[2]	Change in Delay (sec/veh)
2. North Kihei Road & South 8th Street	SSSC	PM	0.0	A	91.1	F	91.1
3. North Kihei Road & 9th Street	SSSC	PM	0.0	A	91.1	F	91.1

Source: Fehr & Peers, 2025.
[1] SSSC = Side-Street Stop-Controlled
[2] LOS = Level of Service

5.3.2 Prohibition of Outbound Left-Turns

Delays would also be substantially reduced at the North Kihei Road access points under peak conditions by prohibiting left-turns out. The results of this analysis are shown in **Table 7**.

Table 7: Baseline (2028) Plus Project Intersection Levels of Service with No Left Turns Out

Intersection	Traffic Control[1]	Peak Hour	2028 No Project Delay (sec/veh)	2028 No Project LOS[2]	2028 Plus Construction Delay (sec/veh)	2028 Plus Construction LOS[2]	Change in Delay (sec/veh)
2. North Kihei Road & South 8th Street	SSSC	PM	0.0	A	46.2	E	46.2
3. North Kihei Road & 9th Street	SSSC	PM	0.0	A	46.2	E	46.2

Source: Fehr & Peers, 2025.
[1] SSSC = Side-Street Stop-Controlled
[2] LOS = Level of Service

5.4 Recommendations for Project Access

Optimal project access combinations could include any of the following:

- Worker access from Kuihelani Phase 1 Access
- Worker access from Cane Haul Road
- Worker access from 9th Street, mornings only (inbound traffic)
- Worker access from 8th Street, mornings only (inbound traffic)
- Delivery access from 9th Street

While the results above show that Intersections 1 and 4 would operate at a desirable level as the sole access point from the main highway network to the Project site with no improvements necessary, use of either intersection by itself results in circuitous trips for some workers and/or trucks. For intersections 2 and 3, while prohibiting left-turns out would reduce delay to near desirable levels during peak construction activity, some workers and trucks would have to make excessively circuitous trips.

Providing more than one access point for worker and delivery access would ensure reasonable delays at intersections, while also limiting the circuity of trips to and from the site. Additionally, no improvements would be required for any of the access points. This will additionally help reduce the likelihood of workers making illegal or prohibited turns (i.e. turning left from Kuihelani Phase 1 Access onto Kuihelani Highway).

Access to the project site to and from 8th Street should be able to accommodate construction worker passenger vehicles without substantive changes to the intersection. However, for large trucks making deliveries during construction, manual traffic control may be needed to accommodate turning movements of larger trucks at selected times. Also note that, while delivery access could be allowed from other study intersections, 9th Street is more optimal due to proximity to the proposed switchyard and substation

within the project area, the ability to have all turning movements permitted at North Kihei Road, and the intersection not being skewed.

Additionally, carpooling and staggering of work hours such that not all workers arrive during the same one hour would further reduce delays at the access points.

5.5 Typical Project Operations and Maintenance

Once fully operational, the solar project is anticipated to have approximately three (3) to four (4) employees on site at any given time to perform various maintenance activities. Under Opening Year (2028) Plus Operations Conditions, all intersections through which project traffic is routed are forecast to operate at a desirable level. The effects of employee trips generated by the proposed project under typical operations are considered negligible.

5.6 Active and Transit Mode Access

Given the undeveloped nature of the project site and the low-density development of the surrounding area, the potential conflict is low between site-generated traffic and non-automobile modes including walking and biking. While separate bicycle and pedestrian facilities are typically encouraged to reduce vehicle traffic, the rural circulation system and distant land uses in the vicinity of the project site will not be conducive to multi-modal travel for most construction workers.

Due to a lack of bus stops in the vicinity of the site, using transit to access the site is not an option for workers. While it might be possible to provide a temporary stop on the major roadways surrounding the site, the walk required to get to the interior of the site would be beyond a typical walk for a transit patron. In addition, construction activity is not anticipated to affect any local transit circulation.

The County of Maui and HDOT do not specify impact criteria for pedestrian, bicycle, and transit impacts. However, these impacts are generally evaluated based on whether a proposed project would: 1) conflict with existing or planned pedestrian, bicycle, or transit facilities, or 2) create walking, bicycling, or transit use demand without providing adequate and appropriate facilities for non-motorized mobility. As noted above, the project is not expected to conflict with any existing active transportation modes (i.e., bicycling and walking) or transit, and it would not create demand for these modes given its isolated location. Accordingly, no impacts to non-automobile travel are anticipated.

6. Vehicle Access

As noted above, at access points where some turning movements are prohibited, inbound and outbound trucks and workers will have to use more circuitous routes to access the site. Use of more than one access point would help reduce vehicle miles traveled generated by construction activities and reduce driver frustration.

The addition of vehicles, especially large trucks, turning onto and out of the site access roadways may necessitate some modification of traffic control devices in the area to raise driver awareness and enhance safety. To minimize the potential for conflicts and impacts to traffic operations, the contractor should include the following elements in a construction traffic management plan:

- Install temporary signage prior to approaching the site access road to indicate the presence of trucks and inform drivers that trucks are entering/exiting the roadway.
- Install temporary signage on to indicate the presence of trucks and that they are entering the roadway from the site access location.
- Field verify available sight distance and maintain adequate sight distance for drivers exiting each site access location. Maintenance may include pruning vegetation and not installing signage or other barriers that would block a driver's field of vision at the intersection. A preliminary review of sight distances for the access points was conducted for this assessment and no issues were identified.
- Schedule large equipment deliveries to minimize the overlap of multiple deliveries in a single hour and minimize the number of deliveries during the AM and PM peak hours.

Appendix A: Traffic Count Data

Type of report: Tube Count - Speed Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: NB
CITY/STATE: Maalaea, HI | DATE: May 21 2024

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
12:00 AM	0	0	0	0	0	0	2	4	4	1	2	0	1	0	14	46-55	8
12:15 AM	0	0	0	0	0	1	2	3	0	1	0	0	0	0	7	41-50	5
12:30 AM	0	0	0	0	0	1	3	0	2	1	0	0	0	0	7	36-45	4
12:45 AM	0	0	0	1	0	0	1	2	0	1	0	0	0	0	5	41-50	3
01:00 AM	0	0	0	0	0	0	1	2	2	0	0	0	0	0	5	46-55	4
01:15 AM	0	0	0	0	0	0	3	3	3	0	0	0	0	0	9	41-50	6
01:30 AM	0	0	0	0	1	1	0	2	0	0	0	0	0	0	4	41-50	2
01:45 AM	0	0	0	0	0	0	0	2	1	0	0	0	0	0	3	46-55	3
02:00 AM	0	0	0	0	0	0	1	0	1	0	2	0	0	0	4	56-65	2
02:15 AM	0	0	0	0	0	0	0	3	0	2	1	0	0	1	7	56-65	3
02:30 AM	0	0	0	0	0	0	1	0	1	1	0	0	0	0	3	51-60	2
02:45 AM	0	0	0	0	0	2	1	0	0	0	0	1	0	1	5	36-45	3
03:00 AM	0	0	0	0	0	1	0	2	2	0	0	0	0	0	5	46-55	4
03:15 AM	0	0	0	0	0	0	4	0	0	0	0	0	0	0	4	36-45	4
03:30 AM	0	0	0	0	0	0	1	1	0	1	0	0	0	0	3	41-50	2
03:45 AM	0	0	0	0	1	0	0	3	1	0	0	0	0	0	5	46-55	4
04:00 AM	0	0	0	0	0	0	0	3	3	2	0	0	0	0	8	46-55	6
04:15 AM	0	0	0	0	0	1	3	4	2	1	0	0	0	0	11	41-50	7
04:30 AM	0	0	0	0	0	0	2	6	6	1	1	0	0	0	16	46-55	12
04:45 AM	1	0	0	0	2	2	3	12	3	4	1	1	0	0	29	41-50	15
05:00 AM	0	0	0	0	1	2	16	8	6	1	0	0	0	0	34	41-50	24
05:15 AM	1	0	0	0	0	5	17	24	15	5	2	0	0	0	69	41-50	41
05:30 AM	1	0	0	0	0	6	26	30	6	6	0	0	0	0	75	41-50	56
05:45 AM	0	0	0	0	0	3	11	42	29	7	0	1	0	0	93	46-55	71
Day Total Percent																	
AM Peak 15-min Vol																	
PM Peak 15-min Vol																	

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Speed Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: NB
CITY/STATE: Maalaea, HI | DATE: May 21 2024

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
06:00 AM	2	0	0	3	1	13	28	36	19	1	1	0	1	0	105	41-50	64
06:15 AM	4	0	0	0	0	21	80	51	10	1	0	0	0	0	167	41-50	131
06:30 AM	6	0	0	0	1	36	61	62	13	0	0	0	0	0	179	41-50	123
06:45 AM	6	0	0	0	3	21	82	70	14	0	0	1	0	0	197	41-50	152
07:00 AM	15	0	0	0	3	70	72	40	8	0	0	0	0	0	208	36-45	142
07:15 AM	11	0	0	0	9	39	66	63	13	1	0	0	0	0	202	41-50	129
07:30 AM	11	0	0	0	0	47	57	43	7	0	0	0	0	0	165	36-45	104
07:45 AM	5	0	0	1	3	17	39	19	16	1	0	0	0	0	101	41-50	58
08:00 AM	15	0	1	4	2	38	44	10	4	1	1	0	0	0	120	36-45	82
08:15 AM	5	0	0	1	0	8	63	31	7	0	1	1	0	0	117	41-50	94
08:30 AM	9	0	0	1	17	37	72	43	5	2	0	1	0	0	187	41-50	115
08:45 AM	8	0	0	0	9	28	38	35	11	4	0	0	0	0	133	41-50	73
09:00 AM	4	0	0	0	1	5	36	58	15	0	1	0	0	0	120	41-50	94
09:15 AM	10	0	0	0	7	28	58	26	1	1	0	0	0	0	131	36-45	86
09:30 AM	6	0	0	0	0	25	41	42	7	0	0	0	0	0	121	41-50	83
09:45 AM	5	0	0	0	0	21	65	32	5	1	0	0	0	0	129	41-50	97
10:00 AM	8	0	0	0	1	38	41	33	10	2	0	0	0	0	133	36-45	79
10:15 AM	4	0	0	0	0	15	63	40	8	1	0	0	0	0	131	41-50	103
10:30 AM	11	0	0	8	5	12	34	34	10	2	0	0	0	0	116	41-50	68
10:45 AM	8	0	0	0	0	9	37	51	12	2	0	0	1	0	120	41-50	88
11:00 AM	5	0	0	0	7	47	45	22	7	0	1	0	0	0	134	36-45	92
11:15 AM	6	0	0	0	6	22	35	38	15	1	0	0	0	0	123	41-50	73
11:30 AM	10	0	0	0	5	26	37	23	10	1	1	0	0	0	113	36-45	63
11:45 AM	5	0	0	0	1	21	34	42	6	1	0	0	0	0	110	41-50	76
Day Total																	
Percent																	
AM Peak 15-min Vol																	
PM Peak 15-min Vol																	

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Speed Data

LOCATION: N Kihei Rd south of S 8th St
SPECIFIC LOCATION:
CITY/STATE: Maalaea, HI

QC JOB #: 16589619
DIRECTION: NB
DATE: May 21 2024

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
12:00 PM	7	0	0	0	4	16	60	31	5	3	0	0	0	0	126	41-50	91
12:15 PM	9	0	0	0	1	13	49	42	6	2	0	0	0	0	122	41-50	91
12:30 PM	9	0	0	0	1	17	75	35	5	1	0	0	0	0	143	41-50	110
12:45 PM	11	0	0	0	11	21	52	21	1	1	0	0	0	0	118	41-50	73
01:00 PM	9	0	0	0	0	15	43	48	8	2	0	0	0	0	125	41-50	91
01:15 PM	8	0	0	0	11	31	34	30	6	1	0	0	0	0	121	36-45	65
01:30 PM	7	0	0	1	9	18	51	22	13	2	0	0	0	0	123	41-50	73
01:45 PM	9	0	0	3	4	12	47	44	13	1	0	0	0	0	133	41-50	91
02:00 PM	6	0	0	0	0	12	71	56	7	0	0	1	0	0	153	41-50	127
02:15 PM	13	0	0	0	2	19	66	28	13	5	0	0	0	0	146	41-50	94
02:30 PM	13	0	0	0	2	46	71	36	10	3	1	0	0	0	182	36-45	117
02:45 PM	9	0	0	0	3	28	70	43	6	0	0	0	0	0	159	41-50	113
03:00 PM	4	0	0	1	9	27	78	41	6	0	1	0	0	0	167	41-50	119
03:15 PM	16	0	0	0	1	19	76	30	13	3	0	0	1	0	159	41-50	106
03:30 PM	14	0	0	0	5	32	93	37	13	1	0	0	0	0	195	41-50	130
03:45 PM	14	0	0	0	1	33	91	28	7	2	1	0	0	0	177	36-45	124
04:00 PM	15	0	0	0	0	10	72	67	17	3	0	0	0	0	184	41-50	139
04:15 PM	16	0	0	0	5	33	52	60	24	1	0	0	0	0	191	41-50	112
04:30 PM	12	0	0	0	2	46	97	32	4	0	0	0	1	0	194	36-45	143
04:45 PM	11	0	0	0	5	52	85	36	7	1	0	0	0	0	197	36-45	137
05:00 PM	13	0	0	0	0	18	65	50	9	0	1	0	0	0	156	41-50	115
05:15 PM	8	0	0	0	0	11	58	36	20	3	0	0	0	0	136	41-50	94
05:30 PM	8	0	0	1	0	14	40	41	10	0	0	0	0	0	114	41-50	81
05:45 PM	4	0	0	0	0	4	32	53	6	4	1	0	0	0	104	41-50	85
Day Total																	
Percent																	
AM Peak 15-min Vol																	
PM Peak 15-min Vol																	

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Speed Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: NB
CITY/STATE: Maalaea, HI | DATE: May 21 2024

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
06:00 PM	6	0	0	0	2	9	36	38	8	0	0	0	0	0	99	41-50	74
06:15 PM	4	0	0	0	0	8	33	37	6	2	0	0	0	0	90	41-50	70
06:30 PM	7	0	0	0	0	12	28	25	10	4	0	0	0	0	86	41-50	53
06:45 PM	2	0	0	0	2	13	16	19	10	0	0	0	0	0	62	41-50	35
07:00 PM	3	0	0	0	0	11	37	12	4	1	0	0	0	0	68	41-50	49
07:15 PM	1	0	0	0	0	17	39	17	4	1	0	0	0	0	79	36-45	56
07:30 PM	6	0	0	3	1	24	41	12	4	3	0	0	0	0	94	36-45	65
07:45 PM	4	0	0	0	0	9	42	25	3	0	0	0	0	0	83	41-50	67
08:00 PM	2	0	0	0	5	7	27	21	2	0	1	0	0	0	65	41-50	48
08:15 PM	5	0	0	0	0	3	29	19	0	3	1	0	0	0	60	41-50	48
08:30 PM	3	0	0	0	2	21	23	14	2	0	0	0	0	0	65	36-45	44
08:45 PM	1	0	0	0	0	14	22	20	8	0	0	1	0	0	66	41-50	42
09:00 PM	3	0	0	0	0	5	11	6	10	0	0	0	0	0	35	41-50	17
09:15 PM	1	0	0	0	0	5	13	20	2	3	0	0	0	0	44	41-50	33
09:30 PM	0	0	0	0	1	4	12	18	9	4	0	1	0	1	50	41-50	30
09:45 PM	0	0	0	0	0	1	6	10	7	6	1	0	0	0	31	46-55	17
10:00 PM	0	0	0	0	0	4	8	15	12	3	1	0	0	0	43	46-55	27
10:15 PM	1	0	0	0	0	0	10	7	9	3	0	0	0	0	30	41-50	17
10:30 PM	1	0	0	0	0	2	10	14	7	2	1	0	2	0	39	41-50	24
10:45 PM	1	0	0	0	0	0	2	5	6	3	3	0	0	0	20	46-55	11
11:00 PM	0	0	0	0	0	2	5	4	7	5	2	0	0	1	26	51-60	12
11:15 PM	0	0	0	0	0	0	4	9	10	3	0	0	0	0	26	46-55	19
11:30 PM	0	0	0	0	0	0	1	7	5	2	0	2	1	0	18	46-55	12
11:45 PM	0	0	0	0	0	0	0	1	4	2	0	0	0	0	7	51-60	6
Day Total	478	0	1	28	175	1387	3309	2422	698	147	30	11	8	4	8698	41-50	5731
Percent	5.5%	0%	0%	0.3%	2%	15.9%	38%	27.8%	8%	1.7%	0.3%	0.1%	0.1%	0%			
AM Peak	7:00 AM	12:00 AM	8:00 AM	10:30 AM	8:30 AM	7:00 AM	6:45 AM	6:45 AM	5:45 AM	5:45 AM	12:00 AM	2:45 AM	12:00 AM	2:15 AM	7:00 AM		
15-min Vol	15	0	1	8	17	70	82	70	29	7	2	1	1	1	208		
PM Peak	3:15 PM	12:00 PM	12:00 PM	1:45 PM	12:45 PM	4:45 PM	4:30 PM	4:00 PM	4:15 PM	9:45 PM	10:45 PM	11:30 PM	10:30 PM	9:30 PM	4:45 PM		
15-min Vol	16	0	0	3	11	52	97	67	24	6	3	2	2	1	197		

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Speed Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: NB
CITY/STATE: Maalaea, HI | DATE: May 22 2024

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
12:00 AM	0	0	0	0	0	0	3	2	0	0	1	0	0	0	6	41-50	5
12:15 AM	0	0	0	0	1	0	0	1	4	0	0	0	0	1	7	46-55	5
12:30 AM	0	0	0	0	0	1	1	3	2	0	0	0	0	0	7	46-55	5
12:45 AM	0	0	0	0	0	0	5	2	2	0	0	0	0	1	10	41-50	7
01:00 AM	0	0	0	0	0	1	2	4	1	2	0	0	0	0	10	41-50	6
01:15 AM	0	0	0	0	0	0	3	7	1	1	0	0	0	0	12	41-50	10
01:30 AM	0	0	0	0	0	0	1	0	2	3	1	0	0	0	7	51-60	5
01:45 AM	0	0	0	0	0	0	0	0	0	5	0	0	0	0	5	51-60	5
02:00 AM	0	0	0	0	0	1	2	2	1	0	0	0	1	0	7	41-50	4
02:15 AM	0	0	0	0	0	0	0	1	0	1	0	0	0	0	2	41-50	1
02:30 AM	0	0	0	0	0	1	1	1	0	0	0	1	0	0	4	36-45	2
02:45 AM	0	0	0	0	0	2	0	0	1	0	0	0	0	0	3	31-40	2
03:00 AM	0	0	0	0	0	0	2	2	0	1	0	0	0	0	5	41-50	4
03:15 AM	0	0	0	0	0	0	0	1	3	0	0	0	0	0	4	46-55	4
03:30 AM	0	0	0	0	0	0	0	2	3	0	1	1	0	0	7	46-55	5
03:45 AM	0	0	0	0	0	0	3	1	1	2	1	0	0	0	8	41-50	4
04:00 AM	0	0	0	0	0	0	0	2	0	0	1	0	0	0	3	41-50	2
04:15 AM	0	0	0	0	0	2	1	4	1	2	0	0	0	0	10	45-54	5
04:30 AM	0	0	0	0	0	1	2	10	4	1	0	0	1	0	19	46-55	14
04:45 AM	0	0	0	0	0	0	6	8	5	4	1	0	0	0	24	41-50	14
05:00 AM	0	0	0	0	1	3	12	11	2	7	2	0	0	0	38	41-50	23
05:15 AM	2	0	0	0	0	2	12	20	16	6	1	1	0	0	60	46-55	36
05:30 AM	2	0	0	0	0	11	37	31	6	2	1	0	1	0	91	41-50	68
05:45 AM	4	0	0	0	3	5	27	36	21	4	1	0	0	0	101	41-50	63
Day Total																	
Percent																	
AM Peak 15-min Vol																	
PM Peak 15-min Vol																	

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Speed Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: NB
CITY/STATE: Maalaea, HI | DATE: May 22 2024

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
06:00 AM	3	0	0	0	7	19	49	26	14	3	1	0	0	0	122	41-50	75
06:15 AM	9	0	0	0	0	5	52	77	21	5	2	0	0	0	171	41-50	129
06:30 AM	10	0	1	5	10	12	50	83	15	0	0	0	1	0	187	41-50	133
06:45 AM	1	0	0	0	0	11	56	72	26	2	0	0	0	0	168	41-50	128
07:00 AM	11	0	0	0	3	26	82	67	12	5	0	1	0	0	207	41-50	149
07:15 AM	13	0	0	3	26	29	56	48	9	0	0	0	0	0	184	41-50	104
07:30 AM	9	0	0	0	8	35	83	44	4	1	0	0	0	0	184	41-50	127
07:45 AM	11	0	0	0	0	15	60	52	8	1	0	0	0	0	147	41-50	112
08:00 AM	11	0	0	0	5	13	36	51	16	0	0	0	0	0	132	41-50	87
08:15 AM	2	0	0	0	0	16	72	43	7	1	0	0	0	0	141	41-50	115
08:30 AM	6	0	0	0	0	21	62	46	8	0	0	0	0	0	143	41-50	108
08:45 AM	9	0	0	0	8	36	58	28	3	0	0	0	0	0	142	36-45	94
09:00 AM	5	0	3	6	12	25	43	22	7	0	0	0	0	0	123	36-45	68
09:15 AM	8	0	0	0	0	19	75	23	4	0	0	0	0	0	129	41-50	98
09:30 AM	5	0	0	0	4	35	60	25	10	1	0	0	0	0	140	36-45	95
09:45 AM	3	0	0	2	19	28	46	32	10	1	0	0	0	0	141	41-50	78
10:00 AM	7	0	0	0	1	12	65	16	5	0	0	1	0	0	107	41-50	81
10:15 AM	9	0	0	7	14	18	55	33	5	2	0	0	0	0	144	41-50	88
10:30 AM	9	0	0	0	0	28	61	29	8	2	0	0	0	0	137	41-50	90
10:45 AM	6	0	0	0	5	38	45	33	1	1	0	0	0	0	129	36-45	83
11:00 AM	3	0	0	0	0	5	43	48	18	2	1	1	0	0	121	41-50	91
11:15 AM	5	0	0	0	2	20	41	46	11	1	0	1	0	0	127	41-50	87
11:30 AM	8	0	0	1	3	30	44	29	8	0	0	0	0	0	123	36-45	74
11:45 AM	8	0	0	0	1	14	33	38	9	1	1	1	0	0	106	41-50	71
Day Total																	
Percent																	
AM Peak 15-min Vol																	
PM Peak 15-min Vol																	

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

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LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
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Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
12:00 PM	10	0	0	0	4	34	29	14	8	1	0	0	0	0	100	36-45	63
12:15 PM	9	0	0	0	4	44	42	36	9	0	0	0	0	0	144	36-45	86
12:30 PM	12	0	0	9	8	42	60	24	2	0	0	0	0	0	157	36-45	102
12:45 PM	6	0	0	0	14	30	39	29	10	2	0	0	0	0	130	36-45	69
01:00 PM	7	0	0	1	0	9	42	41	18	3	0	0	0	0	121	41-50	83
01:15 PM	14	0	0	0	0	4	67	36	5	3	0	0	0	0	129	41-50	103
01:30 PM	7	0	0	0	0	9	35	45	14	5	1	0	0	0	116	41-50	80
01:45 PM	11	0	0	0	0	26	88	30	7	0	0	0	0	0	162	41-50	118
02:00 PM	3	0	0	1	8	16	62	38	17	2	3	0	0	0	150	41-50	100
02:15 PM	11	0	0	0	4	39	71	26	1	0	0	0	0	0	152	36-45	110
02:30 PM	14	0	0	0	3	18	60	42	7	0	1	0	0	0	145	41-50	102
02:45 PM	9	0	0	0	0	22	78	59	5	2	0	0	0	0	175	41-50	137
03:00 PM	9	0	0	0	0	28	58	37	9	1	0	1	0	0	143	41-50	95
03:15 PM	4	0	0	0	1	29	69	19	2	1	0	0	0	0	125	36-45	98
03:30 PM	16	0	0	0	11	61	68	48	11	2	0	0	0	0	217	36-45	129
03:45 PM	14	0	5	41	22	5	37	50	12	0	0	0	0	0	186	41-50	87
04:00 PM	12	0	0	0	0	24	73	56	13	1	0	0	0	0	179	41-50	129
04:15 PM	12	0	0	0	0	43	115	35	3	0	0	0	0	0	208	36-45	158
04:30 PM	26	0	0	0	2	39	96	46	11	1	0	0	0	0	221	41-50	142
04:45 PM	6	0	0	0	1	8	66	73	20	5	0	0	0	0	179	41-50	139
05:00 PM	19	0	0	0	1	26	88	28	8	2	0	0	0	0	172	41-50	116
05:15 PM	3	0	0	0	0	5	67	39	12	3	0	0	0	0	129	41-50	106
05:30 PM	5	0	0	0	0	4	32	58	17	7	0	0	0	0	123	41-50	90
05:45 PM	8	0	0	0	0	2	32	37	22	2	0	0	0	1	104	41-50	69
Day Total																	
Percent																	
AM Peak 15-min Vol																	
PM Peak 15-min Vol																	

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

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LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
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Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
06:00 PM	10	0	0	0	0	12	20	39	9	1	1	0	0	0	92	41-50	59
06:15 PM	2	0	0	0	0	2	23	34	21	6	0	0	0	0	88	41-50	57
06:30 PM	4	0	0	0	1	2	20	41	10	2	0	0	0	0	80	41-50	61
06:45 PM	3	0	0	0	2	11	27	11	9	4	0	0	1	0	68	39-48	38
07:00 PM	7	0	0	0	0	23	24	21	3	2	1	0	0	0	81	36-45	47
07:15 PM	3	0	0	0	3	4	33	15	4	0	0	0	0	0	62	41-50	48
07:30 PM	8	0	0	0	10	35	46	11	0	0	1	1	0	0	112	36-45	81
07:45 PM	3	0	0	4	3	9	26	16	1	0	0	0	0	0	62	41-50	42
08:00 PM	4	0	0	0	0	3	30	21	2	0	0	0	0	0	60	41-50	51
08:15 PM	3	0	0	0	0	9	11	22	7	0	0	1	0	1	54	41-50	33
08:30 PM	2	0	0	0	1	9	31	18	5	0	0	0	0	0	66	41-50	49
08:45 PM	2	0	0	0	0	8	17	15	4	1	0	0	0	0	47	41-50	32
09:00 PM	3	0	0	0	0	6	22	19	5	0	1	0	0	0	56	41-50	41
09:15 PM	2	0	0	0	1	14	15	15	2	2	0	1	0	0	52	41-50	30
09:30 PM	0	0	0	0	0	6	27	10	6	2	0	0	0	0	51	41-50	37
09:45 PM	1	0	0	0	0	7	23	7	1	2	1	1	0	0	43	36-45	30
10:00 PM	1	0	0	0	0	0	16	13	4	1	0	0	0	0	35	41-50	29
10:15 PM	0	0	0	0	0	11	12	6	5	4	0	0	0	0	38	36-45	23
10:30 PM	0	0	0	0	0	3	15	12	5	1	2	0	0	0	38	41-50	27
10:45 PM	0	0	0	0	0	2	9	12	4	3	3	0	0	1	34	41-50	21
11:00 PM	0	0	0	0	0	0	9	5	3	2	3	0	0	0	22	41-50	14
11:15 PM	0	0	0	0	0	9	1	6	5	4	0	0	0	0	25	46-55	11
11:30 PM	0	0	0	0	0	0	5	5	5	1	2	1	0	1	20	41-50	10
11:45 PM	0	0	0	0	0	3	3	7	5	1	2	1	0	0	22	46-55	12
Day Total	484	0	9	80	237	1295	3386	2489	684	152	38	15	5	6	8880	41-50	5875
Percent	5.5%	0%	0.1%	0.9%	2.7%	14.6%	38.1%	28%	7.7%	1.7%	0.4%	0.2%	0.1%	0.1%			
AM Peak	7:15 AM	12:00 AM	9:00 AM	10:15 AM	7:15 AM	10:45 AM	7:30 AM	6:30 AM	6:45 AM	5:00 AM	5:00 AM	2:30 AM	2:00 AM	12:15 AM	7:00 AM		
15-min Vol	13	0	3	7	26	38	83	83	26	7	2	1	1	1	207		
PM Peak	4:30 PM	12:00 PM	3:45 PM	3:45 PM	3:45 PM	3:30 PM	4:15 PM	4:45 PM	5:45 PM	5:30 PM	2:00 PM	3:00 PM	6:45 PM	5:45 PM	4:30 PM		
15-min Vol	26	0	5	41	22	61	115	73	22	7	3	1	1	1	221		

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Speed Data

SUMMARY - Tube Count - Speed Data

LOCATION: N Kihei Rd south of S 8th St
SPECIFIC LOCATION:
CITY/STATE: Maalaea, HI

QC JOB #: 16589619
DIRECTION: NB
DATE: May 21 2024 - May 22 2024

Speed Range	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
Grand Total	962	0	10	108	412	2682	6695	4911	1382	299	68	26	13	10	17578	41-50	11606
Percent	5.5%	0%	0.1%	0.6%	2.3%	15.3%	38.1%	27.9%	7.9%	1.7%	0.4%	0.1%	0.1%	0.1%			
Cumulative Percent	5.5%	5.5%	5.5%	6.1%	8.5%	23.7%	61.8%	89.8%	97.6%	99.3%	99.7%	99.9%	99.9%	100%			

ADT
8789

85th Percentile: 49 MPH
Mean Speed(Average): 43 MPH
Median: 43 MPH
Mode: 43 MPH

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: NB
CITY/STATE: Maalaea, HI | DATE: May 21 2024

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
12:00 AM	0	11	2	0	1	0	0	0	0	0	0	0	0	0	14
12:15 AM	0	7	0	0	0	0	0	0	0	0	0	0	0	0	7
12:30 AM	0	6	1	0	0	0	0	0	0	0	0	0	0	0	7
12:45 AM	1	3	1	0	0	0	0	0	0	0	0	0	0	0	5
01:00 AM	0	5	0	0	0	0	0	0	0	0	0	0	0	0	5
01:15 AM	0	8	1	0	0	0	0	0	0	0	0	0	0	0	9
01:30 AM	0	0	3	0	1	0	0	0	0	0	0	0	0	0	4
01:45 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
02:00 AM	0	2	2	0	0	0	0	0	0	0	0	0	0	0	4
02:15 AM	0	6	1	0	0	0	0	0	0	0	0	0	0	0	7
02:30 AM	0	1	2	0	0	0	0	0	0	0	0	0	0	0	3
02:45 AM	0	4	0	0	0	1	0	0	0	0	0	0	0	0	5
03:00 AM	0	4	1	0	0	0	0	0	0	0	0	0	0	0	5
03:15 AM	0	3	1	0	0	0	0	0	0	0	0	0	0	0	4
03:30 AM	0	2	1	0	0	0	0	0	0	0	0	0	0	0	3
03:45 AM	0	2	3	0	0	0	0	0	0	0	0	0	0	0	5
04:00 AM	0	4	3	0	0	0	0	0	1	0	0	0	0	0	8
04:15 AM	1	6	4	0	0	0	0	0	0	0	0	0	0	0	11
04:30 AM	0	11	3	1	1	0	0	0	0	0	0	0	0	0	16
04:45 AM	1	20	4	0	2	0	0	1	0	0	0	0	0	1	29
05:00 AM	0	20	11	0	2	1	0	0	0	0	0	0	0	0	34
05:15 AM	0	42	20	0	4	1	0	0	0	1	0	0	0	1	69
05:30 AM	0	42	23	3	4	0	0	0	2	0	0	0	0	1	75
05:45 AM	0	52	38	0	3	0	0	0	0	0	0	0	0	0	93
Day Total															
Percent															
ADT 8698															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: NB
CITY/STATE: Maalaea, HI | DATE: May 21 2024

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
06:00 AM	0	67	27	0	7	1	0	0	0	1	0	0	0	2	105
06:15 AM	1	98	53	3	4	3	0	0	0	1	0	0	0	4	167
06:30 AM	0	107	53	2	7	0	1	0	3	0	0	0	0	6	179
06:45 AM	0	127	56	0	3	3	0	1	1	0	0	0	0	6	197
07:00 AM	0	127	52	0	8	0	0	0	5	1	0	0	0	15	208
07:15 AM	0	143	40	0	2	1	1	1	2	0	0	0	0	12	202
07:30 AM	1	110	32	0	7	1	0	0	2	1	0	0	0	11	165
07:45 AM	0	62	29	0	3	0	0	1	1	0	0	0	0	5	101
08:00 AM	0	71	20	0	9	2	0	1	1	1	0	0	0	15	120
08:15 AM	1	69	34	0	7	0	0	0	1	0	0	0	0	5	117
08:30 AM	0	123	47	1	5	1	0	0	1	0	0	0	0	9	187
08:45 AM	1	85	34	0	4	0	0	1	0	0	0	0	0	8	133
09:00 AM	1	74	29	1	5	0	0	2	2	2	0	0	0	4	120
09:15 AM	1	80	27	0	7	1	1	0	4	0	0	0	0	10	131
09:30 AM	0	75	32	0	6	0	0	0	2	0	0	0	0	6	121
09:45 AM	1	83	36	0	3	0	1	0	0	0	0	0	0	5	129
10:00 AM	0	85	34	0	4	0	0	0	1	1	0	0	0	8	133
10:15 AM	0	85	30	0	10	0	0	0	2	0	0	0	0	4	131
10:30 AM	2	65	24	0	11	1	0	0	1	1	0	0	0	11	116
10:45 AM	1	68	33	1	6	0	0	1	2	0	0	0	0	8	120
11:00 AM	2	74	36	1	6	2	1	0	7	0	0	0	0	5	134
11:15 AM	1	75	28	0	7	2	0	0	3	1	0	0	0	6	123
11:30 AM	0	66	33	0	4	0	0	0	0	0	0	0	0	10	113
11:45 AM	0	75	23	0	5	0	1	1	0	0	0	0	0	5	110
Day Total															
Percent															
ADT 8698															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: NB
CITY/STATE: Maalaea, HI | DATE: May 21 2024

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
12:00 PM	2	87	25	0	2	1	0	0	3	0	0	0	0	6	126
12:15 PM	0	78	27	1	7	0	0	0	0	0	0	0	0	9	122
12:30 PM	0	93	30	0	5	3	0	1	2	0	0	0	0	9	143
12:45 PM	0	74	23	0	2	1	0	2	5	0	0	0	0	11	118
01:00 PM	1	79	26	1	4	2	1	0	2	0	0	0	0	9	125
01:15 PM	0	81	28	0	2	2	0	0	0	0	0	0	0	8	121
01:30 PM	1	75	31	0	7	1	0	0	0	1	0	0	0	7	123
01:45 PM	0	82	33	1	4	2	0	0	2	0	0	0	0	9	133
02:00 PM	1	102	33	0	5	2	0	2	1	1	0	0	0	6	153
02:15 PM	0	93	31	0	7	2	0	0	0	0	0	0	0	13	146
02:30 PM	1	116	39	0	4	0	1	0	7	1	0	0	0	13	182
02:45 PM	0	104	38	1	3	1	1	0	2	0	0	0	0	9	159
03:00 PM	1	105	52	0	5	0	0	0	0	0	0	0	0	4	167
03:15 PM	1	96	42	1	3	0	0	0	0	0	0	0	0	16	159
03:30 PM	0	102	64	0	13	1	0	0	0	1	0	0	0	14	195
03:45 PM	3	103	49	1	6	0	0	1	0	0	0	0	0	14	177
04:00 PM	0	104	53	0	11	0	0	0	0	1	0	0	0	15	184
04:15 PM	1	122	46	0	6	0	0	0	0	0	0	0	0	16	191
04:30 PM	1	119	55	0	6	1	0	0	0	0	0	0	0	12	194
04:45 PM	1	110	63	1	7	4	0	0	0	0	0	0	0	11	197
05:00 PM	2	103	36	0	2	0	0	0	0	0	0	0	0	13	156
05:15 PM	0	96	28	1	3	0	0	0	0	0	0	0	0	8	136
05:30 PM	0	75	28	0	3	0	0	0	0	0	0	0	0	8	114
05:45 PM	0	73	25	0	1	0	0	1	0	0	0	0	0	4	104
Day Total															
Percent															
ADT 8698															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: N Kihei Rd south of S 8th St
SPECIFIC LOCATION:
CITY/STATE: Maalaea, HI

QC JOB #: 16589619
DIRECTION: NB
DATE: May 21 2024

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
06:00 PM	0	68	22	0	2	0	0	1	0	0	0	0	0	6	99
06:15 PM	3	60	21	0	2	0	0	0	0	0	0	0	0	4	90
06:30 PM	0	57	20	0	2	0	0	0	0	0	0	0	0	7	86
06:45 PM	0	42	18	0	0	0	0	0	0	0	0	0	0	2	62
07:00 PM	1	45	18	0	1	0	0	0	0	0	0	0	0	3	68
07:15 PM	0	61	17	0	0	0	0	0	0	0	0	0	0	1	79
07:30 PM	0	68	18	0	2	0	0	0	0	0	0	0	0	6	94
07:45 PM	1	56	22	0	0	0	0	0	0	0	0	0	0	4	83
08:00 PM	0	37	24	0	1	0	0	1	0	0	0	0	0	2	65
08:15 PM	0	44	8	0	3	0	0	0	0	0	0	0	0	5	60
08:30 PM	1	43	15	0	3	0	0	0	0	0	0	0	0	3	65
08:45 PM	0	46	16	0	3	0	0	0	0	0	0	0	0	1	66
09:00 PM	1	20	9	0	2	0	0	0	0	0	0	0	0	3	35
09:15 PM	0	29	12	0	1	0	0	1	0	0	0	0	0	1	44
09:30 PM	0	31	16	0	3	0	0	0	0	0	0	0	0	0	50
09:45 PM	0	26	5	0	0	0	0	0	0	0	0	0	0	0	31
10:00 PM	0	34	9	0	0	0	0	0	0	0	0	0	0	0	43
10:15 PM	1	18	8	0	2	0	0	0	0	0	0	0	0	1	30
10:30 PM	0	28	10	0	0	0	0	0	0	0	0	0	0	1	39
10:45 PM	0	9	7	0	3	0	0	0	0	0	0	0	0	1	20
11:00 PM	0	15	11	0	0	0	0	0	0	0	0	0	0	0	26
11:15 PM	0	19	6	0	1	0	0	0	0	0	0	0	0	0	26
11:30 PM	0	16	2	0	0	0	0	0	0	0	0	0	0	0	18
11:45 PM	0	6	1	0	0	0	0	0	0	0	0	0	0	0	7
Day Total	40	5508	2187	21	307	44	9	20	68	16	0	0	0	478	8698
Percent	0.5%	63.3%	25.1%	0.2%	3.5%	0.5%	0.1%	0.2%	0.8%	0.2%	0%	0%	0%	5.5%	
ADT 8698															
AM Peak	10:30 AM	7:15 AM	6:45 AM	5:30 AM	10:30 AM	6:15 AM	6:30 AM	9:00 AM	11:00 AM	9:00 AM	12:00 AM	12:00 AM	12:00 AM	7:00 AM	7:00 AM
15-min Vol	2	143	56	3	11	3	1	2	7	2	0	0	0	15	208
PM Peak	3:45 PM	4:15 PM	3:30 PM	12:15 PM	3:30 PM	4:45 PM	1:00 PM	12:45 PM	2:30 PM	1:30 PM	12:00 PM	12:00 PM	12:00 PM	3:15 PM	4:45 PM
15-min Vol	3	122	64	1	13	4	1	2	7	1	0	0	0	16	197

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: NB
CITY/STATE: Maalaea, HI | DATE: May 22 2024

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
12:00 AM	0	5	1	0	0	0	0	0	0	0	0	0	0	0	6
12:15 AM	2	4	1	0	0	0	0	0	0	0	0	0	0	0	7
12:30 AM	0	6	1	0	0	0	0	0	0	0	0	0	0	0	7
12:45 AM	0	8	2	0	0	0	0	0	0	0	0	0	0	0	10
01:00 AM	0	9	1	0	0	0	0	0	0	0	0	0	0	0	10
01:15 AM	0	9	2	0	1	0	0	0	0	0	0	0	0	0	12
01:30 AM	0	4	3	0	0	0	0	0	0	0	0	0	0	0	7
01:45 AM	0	4	1	0	0	0	0	0	0	0	0	0	0	0	5
02:00 AM	0	4	3	0	0	0	0	0	0	0	0	0	0	0	7
02:15 AM	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
02:30 AM	0	2	2	0	0	0	0	0	0	0	0	0	0	0	4
02:45 AM	0	2	0	1	0	0	0	0	0	0	0	0	0	0	3
03:00 AM	0	4	0	0	0	1	0	0	0	0	0	0	0	0	5
03:15 AM	0	1	2	0	1	0	0	0	0	0	0	0	0	0	4
03:30 AM	0	3	3	0	0	1	0	0	0	0	0	0	0	0	7
03:45 AM	0	3	3	0	0	2	0	0	0	0	0	0	0	0	8
04:00 AM	0	1	2	0	0	0	0	0	0	0	0	0	0	0	3
04:15 AM	0	8	2	0	0	0	0	0	0	0	0	0	0	0	10
04:30 AM	0	13	6	0	0	0	0	0	0	0	0	0	0	0	19
04:45 AM	0	16	8	0	0	0	0	0	0	0	0	0	0	0	24
05:00 AM	1	22	12	0	3	0	0	0	0	0	0	0	0	0	38
05:15 AM	0	37	16	0	4	1	0	0	0	0	0	0	0	2	60
05:30 AM	0	44	35	3	4	3	0	0	0	0	0	0	0	2	91
05:45 AM	0	50	44	0	2	0	0	0	0	1	0	0	0	4	101
Day Total															
Percent															
ADT 8880															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: NB
CITY/STATE: Maalaea, HI | DATE: May 22 2024

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
06:00 AM	0	78	32	0	6	2	0	0	1	0	0	0	0	3	122
06:15 AM	0	99	47	4	6	4	0	1	0	1	0	0	0	9	171
06:30 AM	1	108	63	0	3	0	0	0	2	0	0	0	0	10	187
06:45 AM	2	100	51	0	7	2	0	0	5	0	0	0	0	1	168
07:00 AM	1	141	44	0	8	1	0	0	1	1	0	0	0	10	207
07:15 AM	0	112	46	2	4	1	0	1	4	1	0	0	0	13	184
07:30 AM	1	117	43	0	8	2	1	1	2	0	0	0	0	9	184
07:45 AM	0	90	40	0	4	0	0	1	1	0	0	0	0	11	147
08:00 AM	0	87	28	0	5	1	0	0	0	0	0	0	0	11	132
08:15 AM	2	87	39	1	7	0	0	1	2	0	0	0	0	2	141
08:30 AM	0	98	28	0	8	0	0	1	2	0	0	0	0	6	143
08:45 AM	0	88	31	1	7	2	0	3	0	1	0	0	0	9	142
09:00 AM	0	78	29	0	5	0	0	4	1	1	0	0	0	5	123
09:15 AM	0	80	33	0	4	0	1	0	3	0	0	0	0	8	129
09:30 AM	0	93	32	0	9	0	0	0	0	1	0	0	0	5	140
09:45 AM	0	88	42	0	5	1	0	0	2	0	0	0	0	3	141
10:00 AM	1	64	27	1	6	0	0	0	1	0	0	0	0	7	107
10:15 AM	0	95	30	2	5	0	0	0	2	1	0	0	0	9	144
10:30 AM	0	79	40	0	7	0	0	1	1	0	0	0	0	9	137
10:45 AM	2	80	31	0	7	0	1	2	1	1	0	0	0	4	129
11:00 AM	0	83	25	0	7	0	0	0	3	0	0	0	0	3	121
11:15 AM	0	89	24	1	4	1	0	2	1	0	0	0	0	5	127
11:30 AM	0	72	34	0	6	1	1	0	0	1	0	0	0	8	123
11:45 AM	0	71	16	0	6	2	0	0	3	0	0	0	0	8	106
Day Total															
Percent															
ADT 8880															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: N Kihei Rd south of S 8th St
SPECIFIC LOCATION:
CITY/STATE: Maalaea, HI

QC JOB #: 16589619
DIRECTION: NB
DATE: May 22 2024

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
12:00 PM	1	59	23	1	2	2	0	1	1	1	0	0	0	9	100
12:15 PM	1	93	30	1	6	2	0	0	2	0	0	0	0	9	144
12:30 PM	0	101	34	0	4	0	1	2	2	1	0	0	0	12	157
12:45 PM	2	84	31	1	4	0	0	0	2	0	0	0	0	6	130
01:00 PM	0	75	27	2	9	0	0	0	1	0	0	0	0	7	121
01:15 PM	0	69	41	0	4	0	0	0	0	1	0	0	0	14	129
01:30 PM	0	67	35	1	6	0	0	0	0	0	0	0	0	7	116
01:45 PM	0	101	40	1	5	2	0	0	2	0	0	0	0	11	162
02:00 PM	0	97	39	0	3	2	0	1	3	2	0	0	0	3	150
02:15 PM	0	89	34	1	13	1	1	1	1	0	0	0	0	11	152
02:30 PM	1	94	31	0	3	0	0	0	2	0	0	0	0	14	145
02:45 PM	1	117	35	0	10	1	0	2	0	1	0	0	0	8	175
03:00 PM	1	98	31	0	2	0	0	1	1	0	0	0	0	9	143
03:15 PM	1	87	30	0	2	1	0	0	0	0	0	0	0	4	125
03:30 PM	0	116	74	0	10	0	0	0	0	1	0	0	0	16	217
03:45 PM	0	110	50	0	12	0	0	0	0	0	0	0	0	14	186
04:00 PM	1	109	45	0	9	1	0	1	0	1	0	0	0	12	179
04:15 PM	0	125	62	0	7	1	0	0	1	0	0	0	0	12	208
04:30 PM	1	134	53	0	6	1	0	0	0	0	0	0	0	26	221
04:45 PM	1	107	53	0	11	1	0	0	0	0	0	0	0	6	179
05:00 PM	1	105	40	0	5	1	0	0	1	0	0	0	0	19	172
05:15 PM	1	84	36	0	5	0	0	0	0	0	0	0	0	3	129
05:30 PM	0	83	28	0	6	0	0	1	0	0	0	0	0	5	123
05:45 PM	0	70	23	1	2	0	0	0	0	0	0	0	0	8	104
Day Total															
Percent															
ADT 8880															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: NB
CITY/STATE: Maalaea, HI | DATE: May 22 2024

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
06:00 PM	0	63	16	0	3	0	0	0	0	0	0	0	0	10	92
06:15 PM	0	66	18	0	2	0	0	0	0	0	0	0	0	2	88
06:30 PM	1	56	17	0	2	0	0	0	0	0	0	0	0	4	80
06:45 PM	0	52	13	0	0	0	0	0	0	0	0	0	0	3	68
07:00 PM	1	54	17	0	2	0	0	0	0	0	0	0	0	7	81
07:15 PM	0	50	9	0	0	0	0	0	0	0	0	0	0	3	62
07:30 PM	0	69	28	0	7	0	0	0	0	0	0	0	0	8	112
07:45 PM	1	42	15	0	1	0	0	0	0	0	0	0	0	3	62
08:00 PM	0	40	16	0	0	0	0	0	0	0	0	0	0	4	60
08:15 PM	0	38	12	0	1	0	0	0	0	0	0	0	0	3	54
08:30 PM	0	46	16	0	2	0	0	0	0	0	0	0	0	2	66
08:45 PM	0	28	13	0	4	0	0	0	0	0	0	0	0	2	47
09:00 PM	0	38	14	0	1	0	0	0	0	0	0	0	0	3	56
09:15 PM	0	34	15	0	1	0	0	0	0	0	0	0	0	2	52
09:30 PM	0	38	11	0	2	0	0	0	0	0	0	0	0	0	51
09:45 PM	0	28	13	0	1	0	0	0	0	0	0	0	0	1	43
10:00 PM	0	27	7	0	0	0	0	0	0	0	0	0	0	1	35
10:15 PM	0	28	9	0	1	0	0	0	0	0	0	0	0	0	38
10:30 PM	0	26	11	0	1	0	0	0	0	0	0	0	0	0	38
10:45 PM	1	20	12	0	1	0	0	0	0	0	0	0	0	0	34
11:00 PM	0	19	3	0	0	0	0	0	0	0	0	0	0	0	22
11:15 PM	0	20	5	0	0	0	0	0	0	0	0	0	0	0	25
11:30 PM	0	17	2	0	1	0	0	0	0	0	0	0	0	0	20
11:45 PM	0	13	9	0	0	0	0	0	0	0	0	0	0	0	22
Day Total	30	5624	2231	25	338	44	6	28	57	18	0	0	0	479	8880
Percent	0.3%	63.3%	25.1%	0.3%	3.8%	0.5%	0.1%	0.3%	0.6%	0.2%	0%	0%	0%	5.4%	
ADT 8880															
AM Peak	12:15 AM	7:00 AM	6:30 AM	6:15 AM	9:30 AM	6:15 AM	7:30 AM	9:00 AM	6:45 AM	5:45 AM	12:00 AM	12:00 AM	12:00 AM	7:15 AM	7:00 AM
15-min Vol	2	141	63	4	9	4	1	4	5	1	0	0	0	13	207
PM Peak	12:45 PM	4:30 PM	3:30 PM	1:00 PM	2:15 PM	12:00 PM	12:30 PM	12:30 PM	2:00 PM	2:00 PM	12:00 PM	12:00 PM	12:00 PM	4:30 PM	4:30 PM
15-min Vol	2	134	74	2	13	2	1	2	3	2	0	0	0	26	221

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

SUMMARY - Tube Count - Vehicle Classification Data

LOCATION: N Kihei Rd south of S 8th St
SPECIFIC LOCATION:
CITY/STATE: Maalaea, HI

QC JOB #: 16589619
DIRECTION: NB
DATE: May 21 2024 - May 22 2024

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
Grand Total	70	11132	4418	46	645	88	15	48	125	34	0	0	0	957	17578
Percent	0.4%	63.3%	25.1%	0.3%	3.7%	0.5%	0.1%	0.3%	0.7%	0.2%	0%	0%	0%	5.4%	
ADT 8789															

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619

SPECIFIC LOCATION: | DIRECTION: NB

CITY/STATE: Maalaea, HI | DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
12:00 AM		14	6			10			10	
12:15 AM		7	7			7			7	
12:30 AM		7	7			7			7	
12:45 AM		5	10			8			8	
01:00 AM		5	10			8			8	
01:15 AM		9	12			11			11	
01:30 AM		4	7			6			6	
01:45 AM		3	5			4			4	
02:00 AM		4	7			6			6	
02:15 AM		7	2			5			5	
02:30 AM		3	4			4			4	
02:45 AM		5	3			4			4	
03:00 AM		5	5			5			5	
03:15 AM		4	4			4			4	
03:30 AM		3	7			5			5	
03:45 AM		5	8			7			7	
04:00 AM		8	3			6			6	
04:15 AM		11	10			11			11	
04:30 AM		16	19			18			18	
04:45 AM		29	24			27			27	
05:00 AM		34	38			36			36	
05:15 AM		69	60			65			65	
05:30 AM		75	91			83			83	
05:45 AM		93	101			97			97	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: N Kihei Rd south of S 8th St
QC JOB #: 16589619

SPECIFIC LOCATION:
DIRECTION: NB

CITY/STATE: Maalaea, HI
DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
06:00 AM		105	122			114			114	
06:15 AM		167	171			169			169	
06:30 AM		179	187			183			183	
06:45 AM		197	168			183			183	
07:00 AM		208	207			208			208	
07:15 AM		202	184			193			193	
07:30 AM		165	184			175			175	
07:45 AM		101	147			124			124	
08:00 AM		120	132			126			126	
08:15 AM		117	141			129			129	
08:30 AM		187	143			165			165	
08:45 AM		133	142			138			138	
09:00 AM		120	123			122			122	
09:15 AM		131	129			130			130	
09:30 AM		121	140			131			131	
09:45 AM		129	141			135			135	
10:00 AM		133	107			120			120	
10:15 AM		131	144			138			138	
10:30 AM		116	137			127			127	
10:45 AM		120	129			125			125	
11:00 AM		134	121			128			128	
11:15 AM		123	127			125			125	
11:30 AM		113	123			118			118	
11:45 AM		110	106			108			108	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619

SPECIFIC LOCATION: | DIRECTION: NB

CITY/STATE: Maalaea, HI | DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
12:00 PM		126	100			113			113	
12:15 PM		122	144			133			133	
12:30 PM		143	157			150			150	
12:45 PM		118	130			124			124	
01:00 PM		125	121			123			123	
01:15 PM		121	129			125			125	
01:30 PM		123	116			120			120	
01:45 PM		133	162			148			148	
02:00 PM		153	150			152			152	
02:15 PM		146	152			149			149	
02:30 PM		182	145			164			164	
02:45 PM		159	175			167			167	
03:00 PM		167	143			155			155	
03:15 PM		159	125			142			142	
03:30 PM		195	217			206			206	
03:45 PM		177	186			182			182	
04:00 PM		184	179			182			182	
04:15 PM		191	208			200			200	
04:30 PM		194	221			208			208	
04:45 PM		197	179			188			188	
05:00 PM		156	172			164			164	
05:15 PM		136	129			133			133	
05:30 PM		114	123			119			119	
05:45 PM		104	104			104			104	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619

SPECIFIC LOCATION: | DIRECTION: NB

CITY/STATE: Maalaea, HI | DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
06:00 PM		99	92			96			96	
06:15 PM		90	88			89			89	
06:30 PM		86	80			83			83	
06:45 PM		62	68			65			65	
07:00 PM		68	81			75			75	
07:15 PM		79	62			71			71	
07:30 PM		94	112			103			103	
07:45 PM		83	62			73			73	
08:00 PM		65	60			63			63	
08:15 PM		60	54			57			57	
08:30 PM		65	66			66			66	
08:45 PM		66	47			57			57	
09:00 PM		35	56			46			46	
09:15 PM		44	52			48			48	
09:30 PM		50	51			51			51	
09:45 PM		31	43			37			37	
10:00 PM		43	35			39			39	
10:15 PM		30	38			34			34	
10:30 PM		39	38			39			39	
10:45 PM		20	34			27			27	
11:00 PM		26	22			24			24	
11:15 PM		26	25			26			26	
11:30 PM		18	20			19			19	
11:45 PM		7	22			15			15	
Day Total		8698	8880			8812			8812	
% Weekday Average		98.7%	100.8%							
% Week Average		98.7%	100.8%			100%				
AM Peak 15-min Vol		7:00 AM 208	7:00 AM 207			7:00 AM 208			7:00 AM 208	
PM Peak 15-min Vol		4:45 PM 197	4:30 PM 221			4:30 PM 208			4:30 PM 208	

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Speed Data

LOCATION: N Kihei Rd south of S 8th St
SPECIFIC LOCATION:
CITY/STATE: Maalaea, HI

QC JOB #: 16589619
DIRECTION: NB, SB
DATE: May 21 2024

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
12:00 AM	0	0	0	0	0	0	2	7	5	2	2	1	1	0	20	46-55	12
12:15 AM	0	0	0	0	0	1	3	5	4	1	0	0	0	0	14	46-55	9
12:30 AM	0	0	0	0	0	1	3	2	4	1	1	0	0	0	12	46-55	6
12:45 AM	0	0	0	1	1	0	1	3	2	1	0	1	0	0	10	46-55	5
01:00 AM	0	0	0	0	0	0	2	4	2	0	0	0	0	0	8	46-55	6
01:15 AM	0	0	0	0	0	0	3	5	3	1	0	1	0	0	13	41-50	8
01:30 AM	0	0	0	0	1	1	4	3	1	1	1	0	0	0	12	41-50	7
01:45 AM	0	0	0	0	0	0	0	3	1	0	0	0	0	0	4	46-55	4
02:00 AM	0	0	0	0	0	0	2	0	1	0	2	1	0	0	6	61-70	3
02:15 AM	0	0	0	0	0	0	0	3	0	3	1	1	0	1	9	56-65	4
02:30 AM	0	0	0	0	0	0	1	0	2	1	2	0	0	0	6	51-60	3
02:45 AM	0	0	0	0	0	2	1	2	1	1	1	1	0	1	10	36-45	3
03:00 AM	0	0	0	0	0	1	1	3	5	1	1	0	0	0	12	46-55	8
03:15 AM	0	0	0	0	1	0	5	2	3	3	0	0	0	0	14	41-50	7
03:30 AM	0	0	0	0	0	0	2	2	2	2	0	0	0	1	9	41-50	4
03:45 AM	0	0	0	0	1	0	0	5	6	1	0	0	0	0	13	46-55	11
04:00 AM	0	0	0	0	0	0	1	4	5	3	1	3	0	0	17	46-55	9
04:15 AM	0	0	0	0	0	1	3	8	6	4	1	2	0	0	25	46-55	14
04:30 AM	0	0	0	0	0	0	3	8	11	7	2	0	0	0	31	46-55	19
04:45 AM	1	0	0	0	2	2	3	13	7	7	2	2	0	0	39	46-55	20
05:00 AM	1	0	0	0	1	2	17	16	9	6	3	0	0	0	55	41-50	33
05:15 AM	2	0	0	0	0	6	23	30	30	11	4	0	0	0	106	46-55	60
05:30 AM	1	0	0	0	0	6	27	42	21	18	2	0	0	1	118	41-50	69
05:45 AM	0	0	0	0	0	3	12	64	48	17	4	1	1	0	150	46-55	112
Day Total																	
Percent																	
AM Peak 15-min Vol																	
PM Peak 15-min Vol																	

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Speed Data

LOCATION: N Kihei Rd south of S 8th St
SPECIFIC LOCATION:
CITY/STATE: Maalaea, HI

QC JOB #: 16589619
DIRECTION: NB, SB
DATE: May 21 2024

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
06:00 AM	4	0	0	3	1	14	48	58	47	10	2	0	3	0	190	41-50	106
06:15 AM	10	0	0	0	0	22	87	101	38	7	0	0	0	0	265	41-50	188
06:30 AM	12	0	0	0	1	40	89	105	40	5	1	0	0	0	293	41-50	194
06:45 AM	10	0	0	0	3	22	102	116	33	14	2	1	0	0	303	41-50	218
07:00 AM	24	0	0	0	3	75	94	80	29	7	4	1	0	0	317	41-50	174
07:15 AM	18	0	0	0	9	40	97	118	65	11	4	0	0	0	362	41-50	215
07:30 AM	17	0	0	1	1	54	87	99	44	12	0	0	0	1	316	41-50	186
07:45 AM	11	1	0	1	3	20	89	89	52	5	1	0	0	0	272	41-50	178
08:00 AM	21	0	1	4	7	57	76	67	25	8	2	0	0	0	268	41-50	143
08:15 AM	9	0	1	9	10	31	103	51	25	3	1	1	0	0	244	41-50	154
08:30 AM	17	0	0	1	20	43	107	95	31	7	3	1	0	0	325	41-50	202
08:45 AM	16	0	0	0	9	28	55	80	37	15	2	0	0	1	243	41-50	135
09:00 AM	9	0	0	2	1	5	43	91	59	10	2	1	0	0	223	46-55	150
09:15 AM	13	0	0	0	7	33	81	58	21	10	2	1	0	0	226	41-50	139
09:30 AM	12	0	1	1	2	29	62	113	25	1	0	0	0	0	246	41-50	175
09:45 AM	11	0	0	0	5	27	105	82	23	5	1	0	1	0	260	41-50	187
10:00 AM	15	0	1	0	2	59	67	60	30	3	2	0	0	0	239	41-50	127
10:15 AM	8	0	0	0	0	16	91	89	27	7	3	0	0	0	241	41-50	180
10:30 AM	21	0	0	8	6	15	60	96	28	9	0	2	0	0	245	41-50	156
10:45 AM	9	0	0	0	0	14	67	118	44	3	1	0	1	0	257	41-50	185
11:00 AM	10	0	0	0	7	54	76	54	23	4	3	0	0	0	231	37-46	130
11:15 AM	12	0	0	0	6	27	66	89	31	5	0	0	1	0	237	41-50	155
11:30 AM	17	0	0	2	5	26	50	87	32	6	1	0	0	0	226	41-50	137
11:45 AM	9	0	0	0	1	25	64	88	32	5	1	0	0	0	225	41-50	152
Day Total																	
Percent																	
AM Peak 15-min Vol																	
PM Peak 15-min Vol																	

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Speed Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: NB, SB
CITY/STATE: Maalaea, HI | DATE: May 21 2024

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
12:00 PM	11	0	0	0	5	27	89	70	41	17	0	0	0	1	261	41-50	159
12:15 PM	19	0	3	0	1	17	84	98	31	11	1	0	0	0	265	41-50	182
12:30 PM	14	0	0	0	1	19	103	75	38	13	3	0	0	0	266	41-50	178
12:45 PM	19	0	0	0	11	35	86	65	30	12	1	0	0	0	259	41-50	151
01:00 PM	11	0	0	0	1	18	58	109	45	19	1	0	0	0	262	41-50	167
01:15 PM	13	0	0	0	11	32	69	70	36	14	5	0	0	0	250	41-50	139
01:30 PM	11	0	0	1	9	20	69	68	56	16	1	1	0	0	252	41-50	137
01:45 PM	14	0	0	3	4	15	70	116	50	7	2	0	0	0	281	41-50	186
02:00 PM	13	0	0	0	0	12	92	106	40	13	1	2	0	0	279	41-50	198
02:15 PM	20	0	0	0	3	22	104	112	41	12	1	0	0	1	316	41-50	216
02:30 PM	23	3	0	0	2	50	110	77	32	9	3	1	0	0	310	41-50	187
02:45 PM	16	0	0	0	3	30	110	122	35	10	1	1	0	0	328	41-50	232
03:00 PM	6	0	0	1	9	40	140	117	41	4	1	0	0	1	360	41-50	257
03:15 PM	25	0	0	0	1	22	115	105	66	15	2	1	1	0	353	41-50	220
03:30 PM	25	0	0	0	5	34	108	102	57	6	6	1	1	0	345	41-50	210
03:45 PM	21	1	0	0	3	46	149	92	36	9	3	0	0	0	360	41-50	241
04:00 PM	21	0	0	0	0	12	105	139	63	19	0	0	0	0	359	41-50	244
04:15 PM	30	0	0	0	5	41	99	128	58	6	2	1	1	0	371	41-50	227
04:30 PM	23	0	0	0	2	47	132	110	41	15	9	0	1	0	380	41-50	242
04:45 PM	23	0	0	0	5	60	115	80	66	14	2	1	0	0	366	41-50	195
05:00 PM	23	0	0	0	0	28	99	118	65	14	2	1	0	0	350	41-50	217
05:15 PM	16	0	0	1	2	15	118	110	71	8	1	0	1	0	343	41-50	228
05:30 PM	13	0	0	1	0	14	71	104	62	15	2	0	0	0	282	41-50	175
05:45 PM	7	0	0	0	0	4	62	141	42	17	4	0	0	0	277	41-50	203
Day Total																	
Percent																	
AM Peak 15-min Vol																	
PM Peak 15-min Vol																	

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Speed Data

LOCATION: N Kihei Rd south of S 8th St
SPECIFIC LOCATION:
CITY/STATE: Maalaea, HI

QC JOB #: 16589619
DIRECTION: NB, SB
DATE: May 21 2024

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
06:00 PM	10	0	0	0	2	29	78	90	53	3	1	1	0	0	267	41-50	168
06:15 PM	9	0	0	0	0	9	57	71	45	12	1	1	0	0	205	41-50	128
06:30 PM	12	0	0	0	0	12	45	72	45	16	2	1	0	0	205	41-50	117
06:45 PM	3	0	0	0	2	13	38	60	38	10	0	0	0	0	164	41-50	98
07:00 PM	5	2	0	0	0	21	57	37	27	6	0	0	1	0	156	41-50	94
07:15 PM	3	0	0	0	0	23	69	44	17	10	1	0	0	0	167	41-50	113
07:30 PM	8	0	0	3	1	29	83	35	19	7	1	0	0	0	186	41-50	118
07:45 PM	4	0	0	0	0	13	72	73	16	5	0	0	0	0	183	41-50	145
08:00 PM	5	0	0	0	5	7	44	54	15	9	1	0	0	0	140	41-50	98
08:15 PM	6	0	0	0	0	6	52	45	17	9	1	0	0	0	136	41-50	97
08:30 PM	5	0	0	0	3	25	32	31	14	15	1	0	0	0	126	41-50	63
08:45 PM	1	0	0	0	0	14	34	31	27	4	1	1	0	0	113	41-50	65
09:00 PM	3	0	0	0	0	7	18	28	20	5	1	1	1	1	85	46-55	48
09:15 PM	3	0	0	0	0	5	15	34	19	17	2	0	0	0	95	46-55	53
09:30 PM	0	0	0	0	1	4	12	42	28	8	2	1	0	2	100	46-55	70
09:45 PM	0	0	0	0	0	1	12	25	25	10	1	0	1	2	77	46-55	50
10:00 PM	0	0	0	0	0	4	14	27	19	11	2	4	0	0	81	46-55	46
10:15 PM	1	0	0	0	0	0	18	20	17	14	0	0	1	1	72	41-50	38
10:30 PM	2	0	0	0	0	2	11	21	24	9	2	0	2	0	73	46-55	45
10:45 PM	2	0	0	0	0	1	3	8	9	5	3	0	1	0	32	46-55	17
11:00 PM	0	0	0	0	0	2	6	7	11	7	4	2	0	2	41	49-58	18
11:15 PM	0	0	0	0	0	0	4	12	13	5	2	1	0	0	37	46-55	25
11:30 PM	0	0	0	0	0	0	5	12	11	4	1	3	2	0	38	46-55	23
11:45 PM	0	0	0	0	0	0	0	9	9	4	0	0	0	1	23	46-55	18
Day Total	819	7	7	43	213	1689	5121	5640	2701	764	152	48	22	18	17244	41-50	10761
Percent	4.7%	0%	0%	0.2%	1.2%	9.8%	29.7%	32.7%	15.7%	4.4%	0.9%	0.3%	0.1%	0.1%			

AM Peak	7:00 AM	7:45 AM	8:00 AM	8:15 AM	8:30 AM	7:00 AM	8:30 AM	7:15 AM	7:15 AM	5:30 AM	5:15 AM	4:00 AM	6:00 AM	2:15 AM	7:15 AM		
15-min Vol	24	1	1	9	20	75	107	118	65	18	4	3	3	1	362		
PM Peak	4:15 PM	2:30 PM	12:15 PM	1:45 PM	12:45 PM	4:45 PM	3:45 PM	5:45 PM	5:15 PM	1:00 PM	4:30 PM	10:00 PM	10:30 PM	9:30 PM	4:30 PM		
15-min Vol	30	3	3	3	11	60	149	141	71	19	9	4	2	2	380		

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Speed Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: NB, SB
CITY/STATE: Maalaea, HI | DATE: May 22 2024

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
12:00 AM	0	0	0	0	0	1	5	3	2	1	1	0	0	1	14	41-50	8
12:15 AM	0	0	0	0	1	0	1	3	8	1	0	0	0	1	15	46-55	11
12:30 AM	0	0	0	0	0	1	2	5	4	1	0	0	0	0	13	46-55	9
12:45 AM	0	0	0	0	0	0	6	3	2	0	1	1	0	1	14	41-50	9
01:00 AM	0	0	0	0	0	2	2	5	3	4	0	0	1	0	17	46-55	8
01:15 AM	0	0	0	0	0	0	4	9	1	2	2	0	1	0	19	41-50	13
01:30 AM	0	0	0	0	0	0	2	4	3	4	2	1	0	1	17	50-59	7
01:45 AM	0	0	0	0	0	0	0	0	1	5	0	0	0	0	6	51-60	6
02:00 AM	0	0	0	0	0	1	4	2	1	0	1	1	2	0	12	41-50	6
02:15 AM	0	0	0	0	0	0	1	2	1	3	1	0	0	0	8	53-62	4
02:30 AM	0	0	0	0	0	1	2	1	0	0	1	2	0	0	7	41-50	3
02:45 AM	0	0	0	0	0	2	0	1	3	1	0	1	0	0	8	48-57	4
03:00 AM	0	0	0	0	0	0	2	4	0	3	0	0	0	0	9	41-50	6
03:15 AM	0	0	0	0	0	0	0	2	5	2	1	0	0	0	10	50-59	7
03:30 AM	0	0	0	0	0	0	0	2	4	2	1	1	0	0	10	51-60	6
03:45 AM	0	0	0	0	0	0	3	4	1	3	3	0	1	0	15	41-50	7
04:00 AM	0	0	0	0	0	0	0	4	2	0	2	0	0	0	8	46-55	6
04:15 AM	0	0	0	0	0	2	3	9	6	5	0	0	0	0	25	46-55	15
04:30 AM	0	0	0	0	0	1	2	13	10	8	2	1	2	0	39	46-55	23
04:45 AM	0	0	0	0	0	0	7	16	14	5	5	0	0	1	48	46-55	30
05:00 AM	0	0	0	0	1	3	12	18	9	8	5	0	0	0	56	41-50	30
05:15 AM	2	0	0	0	0	3	20	30	22	10	2	2	0	0	91	46-55	52
05:30 AM	2	0	0	0	0	11	40	46	29	9	2	0	1	0	140	41-50	86
05:45 AM	7	0	0	0	3	14	34	51	36	10	9	1	0	0	165	46-55	87
Day Total																	
Percent																	
AM Peak 15-min Vol																	
PM Peak 15-min Vol																	

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Speed Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: NB, SB
CITY/STATE: Maalaea, HI | DATE: May 22 2024

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
06:00 AM	8	0	0	0	7	19	56	61	35	11	2	1	1	0	201	41-50	117
06:15 AM	15	0	0	1	0	5	63	116	40	13	6	0	0	0	259	41-50	179
06:30 AM	14	0	1	5	10	14	61	124	51	19	6	0	1	0	306	41-50	185
06:45 AM	2	0	0	0	1	14	88	102	52	18	2	1	0	0	280	41-50	190
07:00 AM	20	0	0	0	3	27	93	117	57	16	2	1	0	0	336	41-50	210
07:15 AM	18	0	0	3	27	37	87	116	52	5	0	0	0	0	345	41-50	203
07:30 AM	17	0	0	0	8	36	105	99	38	14	1	0	0	0	318	41-50	204
07:45 AM	16	0	0	0	0	15	79	130	56	13	0	0	1	1	311	41-50	209
08:00 AM	21	0	0	1	9	26	75	116	45	6	6	3	0	0	308	41-50	191
08:15 AM	3	0	0	0	0	19	93	85	41	13	1	0	0	1	256	41-50	178
08:30 AM	9	0	0	0	0	21	80	109	37	8	5	1	0	0	270	41-50	189
08:45 AM	13	0	0	0	9	36	70	87	42	11	0	1	1	0	270	41-50	157
09:00 AM	9	0	3	6	12	32	64	56	26	6	2	2	1	0	219	41-50	120
09:15 AM	9	0	0	0	0	21	83	61	43	9	4	0	0	0	230	41-50	144
09:30 AM	7	0	0	0	6	45	65	63	50	13	3	0	0	0	252	41-50	128
09:45 AM	7	0	0	2	19	28	65	70	55	18	3	0	0	0	267	41-50	135
10:00 AM	11	0	0	0	1	16	80	56	38	24	2	1	0	0	229	41-50	136
10:15 AM	17	0	0	7	14	20	73	81	34	13	1	0	0	0	260	41-50	154
10:30 AM	12	0	0	0	0	29	84	82	36	11	1	0	0	0	255	41-50	166
10:45 AM	11	0	0	0	5	38	66	67	31	10	1	0	0	0	229	41-50	133
11:00 AM	4	0	1	1	2	6	60	92	56	6	1	1	0	0	230	41-50	152
11:15 AM	10	1	0	0	2	22	68	93	32	9	1	1	0	0	239	41-50	161
11:30 AM	13	2	0	7	10	30	93	65	31	3	1	0	1	0	256	41-50	158
11:45 AM	14	0	0	0	1	15	50	84	73	11	4	1	0	1	254	46-55	157
Day Total																	
Percent																	
AM Peak 15-min Vol																	
PM Peak 15-min Vol																	

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Speed Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: NB, SB
CITY/STATE: Maalaea, HI | DATE: May 22 2024

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
12:00 PM	20	0	0	0	4	34	59	59	27	5	1	0	0	0	209	41-50	118
12:15 PM	15	0	0	0	4	45	67	89	54	14	1	0	0	0	289	41-50	156
12:30 PM	19	0	0	9	8	44	96	104	40	5	1	2	0	0	328	41-50	200
12:45 PM	8	0	0	0	14	30	76	85	37	13	3	0	0	0	266	41-50	161
01:00 PM	9	0	0	1	0	11	59	97	51	17	4	2	0	0	251	41-50	156
01:15 PM	23	0	0	0	0	4	97	94	43	12	5	0	0	0	278	41-50	191
01:30 PM	15	0	0	0	0	9	62	115	64	9	2	1	0	0	277	46-55	179
01:45 PM	20	0	0	0	0	26	96	107	60	14	0	1	0	0	324	41-50	203
02:00 PM	11	0	0	1	8	18	84	83	56	17	6	0	0	0	284	41-50	167
02:15 PM	14	0	0	0	4	40	105	101	32	10	1	1	0	0	308	41-50	206
02:30 PM	16	0	0	0	3	25	105	109	39	16	4	2	0	0	319	41-50	214
02:45 PM	16	0	0	0	0	29	136	108	40	13	3	0	0	1	346	41-50	244
03:00 PM	14	0	0	0	0	28	65	99	87	11	6	1	0	0	311	46-55	186
03:15 PM	10	1	0	0	1	39	94	97	39	17	3	0	0	0	301	41-50	191
03:30 PM	26	0	0	0	11	67	110	130	46	18	4	0	0	0	412	41-50	240
03:45 PM	20	0	5	41	22	8	78	110	63	11	3	0	0	0	361	41-50	188
04:00 PM	25	0	0	0	2	42	117	133	50	13	1	1	0	0	384	41-50	250
04:15 PM	16	0	0	0	0	46	140	96	60	16	2	2	0	0	378	41-50	236
04:30 PM	49	0	0	0	2	48	147	103	50	18	6	2	0	0	425	41-50	250
04:45 PM	14	0	0	0	1	12	97	133	58	31	2	0	0	0	348	41-50	230
05:00 PM	27	0	0	0	1	26	102	91	59	20	3	1	0	0	330	41-50	193
05:15 PM	6	0	0	0	0	8	93	121	64	20	2	0	1	1	316	41-50	214
05:30 PM	13	0	0	0	0	4	50	121	65	23	3	0	0	0	279	46-55	186
05:45 PM	12	0	0	0	0	2	47	123	81	17	0	1	0	1	284	46-55	204
Day Total																	
Percent																	
AM Peak 15-min Vol																	
PM Peak 15-min Vol																	

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Speed Data

LOCATION: N Kihei Rd south of S 8th St
SPECIFIC LOCATION:
CITY/STATE: Maalaea, HI

QC JOB #: 16589619
DIRECTION: NB, SB
DATE: May 22 2024

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
06:00 PM	16	0	0	0	0	12	40	99	54	22	4	1	0	0	248	46-55	153
06:15 PM	2	0	0	0	0	2	30	88	65	19	8	0	1	0	215	46-55	153
06:30 PM	6	0	1	0	1	3	27	58	59	18	4	0	0	0	177	46-55	117
06:45 PM	4	0	0	0	2	11	34	66	35	10	1	1	1	1	166	46-55	101
07:00 PM	8	0	0	0	0	24	36	62	17	11	2	1	0	0	161	41-50	98
07:15 PM	8	0	0	0	3	6	61	70	16	4	1	0	0	0	169	41-50	131
07:30 PM	12	0	0	0	10	35	72	50	22	3	2	1	0	0	207	41-50	122
07:45 PM	7	0	0	4	3	9	43	66	34	5	2	0	0	0	173	41-50	109
08:00 PM	6	0	0	0	0	5	34	60	24	6	0	2	0	0	137	41-50	94
08:15 PM	6	0	0	0	0	10	14	42	36	4	0	1	0	2	115	46-55	78
08:30 PM	3	0	0	0	2	10	35	41	23	5	1	0	0	0	120	41-50	76
08:45 PM	3	0	0	0	1	8	22	49	28	3	0	0	1	1	116	46-55	77
09:00 PM	3	0	0	0	0	13	30	37	25	8	1	1	0	0	118	41-50	67
09:15 PM	3	0	0	0	1	15	26	47	14	13	0	4	0	0	123	41-50	73
09:30 PM	1	0	0	0	0	12	29	16	14	12	2	1	0	0	87	41-50	45
09:45 PM	1	0	0	0	1	7	35	22	12	8	2	2	1	0	91	41-50	57
10:00 PM	2	0	0	0	0	2	20	33	18	10	1	0	1	0	87	41-50	53
10:15 PM	1	0	0	0	0	13	15	20	17	11	0	0	0	0	77	46-55	37
10:30 PM	0	0	0	0	0	3	17	22	12	11	4	1	0	1	71	41-50	39
10:45 PM	0	0	0	0	0	2	12	18	10	6	4	1	0	1	54	41-50	30
11:00 PM	0	0	0	0	0	0	10	11	10	9	4	2	1	0	47	44-53	21
11:15 PM	0	0	0	0	0	9	6	8	11	9	1	0	2	0	46	51-60	20
11:30 PM	0	0	0	0	0	0	10	12	10	2	5	1	0	1	41	42-51	22
11:45 PM	0	0	0	0	0	3	7	11	7	4	4	1	0	0	37	44-53	18
Day Total	801	4	11	89	260	1472	4800	5885	3056	940	215	63	23	18	17637	41-50	10685
Percent	4.5%	0%	0.1%	0.5%	1.5%	8.3%	27.2%	33.4%	17.3%	5.3%	1.2%	0.4%	0.1%	0.1%			

AM Peak	8:00 AM	11:30 AM	9:00 AM	10:15 AM	7:15 AM	9:30 AM	7:30 AM	7:45 AM	11:45 AM	10:00 AM	5:45 AM	8:00 AM	2:00 AM	12:00 AM	7:15 AM		
15-min Vol	21	2	5	7	27	45	105	130	73	24	9	3	2	1	345		
PM Peak	4:30 PM	3:15 PM	3:45 PM	3:45 PM	3:45 PM	3:30 PM	4:30 PM	4:00 PM	3:00 PM	4:45 PM	6:15 PM	9:15 PM	11:15 PM	8:15 PM	4:30 PM		
15-min Vol	49	1	5	41	22	67	147	133	87	31	8	4	2	2	425		

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Speed Data

SUMMARY - Tube Count - Speed Data

LOCATION: N Kihei Rd south of S 8th St
SPECIFIC LOCATION:
CITY/STATE: Maalaea, HI

QC JOB #: 16589619
DIRECTION: NB, SB
DATE: May 21 2024 - May 22 2024

Speed Range	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
Grand Total	1620	11	18	132	473	3161	9921	11525	5757	1704	367	111	45	36	34881	41-50	21446
Percent	4.6%	0%	0.1%	0.4%	1.4%	9.1%	28.4%	33%	16.5%	4.9%	1.1%	0.3%	0.1%	0.1%			
Cumulative Percent	4.6%	4.7%	4.7%	5.1%	6.5%	15.5%	44%	77%	93.5%	98.4%	99.4%	99.8%	99.9%	100%			

ADT
17440

85th Percentile: 52 MPH
Mean Speed(Average): 45 MPH
Median: 45 MPH
Mode: 48 MPH

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: N Kihei Rd south of S 8th St
SPECIFIC LOCATION:
CITY/STATE: Maalaea, HI

QC JOB #: 16589619
DIRECTION: NB, SB
DATE: May 21 2024

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
12:00 AM	0	15	4	0	1	0	0	0	0	0	0	0	0	0	20
12:15 AM	0	11	3	0	0	0	0	0	0	0	0	0	0	0	14
12:30 AM	0	8	4	0	0	0	0	0	0	0	0	0	0	0	12
12:45 AM	1	5	4	0	0	0	0	0	0	0	0	0	0	0	10
01:00 AM	0	6	2	0	0	0	0	0	0	0	0	0	0	0	8
01:15 AM	0	11	2	0	0	0	0	0	0	0	0	0	0	0	13
01:30 AM	0	5	5	1	1	0	0	0	0	0	0	0	0	0	12
01:45 AM	0	4	0	0	0	0	0	0	0	0	0	0	0	0	4
02:00 AM	0	3	3	0	0	0	0	0	0	0	0	0	0	0	6
02:15 AM	0	6	3	0	0	0	0	0	0	0	0	0	0	0	9
02:30 AM	0	4	2	0	0	0	0	0	0	0	0	0	0	0	6
02:45 AM	0	8	1	0	0	1	0	0	0	0	0	0	0	0	10
03:00 AM	0	7	5	0	0	0	0	0	0	0	0	0	0	0	12
03:15 AM	0	7	6	0	0	1	0	0	0	0	0	0	0	0	14
03:30 AM	0	5	4	0	0	0	0	0	0	0	0	0	0	0	9
03:45 AM	0	6	7	0	0	0	0	0	0	0	0	0	0	0	13
04:00 AM	0	9	6	0	1	0	0	0	1	0	0	0	0	0	17
04:15 AM	1	15	9	0	0	0	0	0	0	0	0	0	0	0	25
04:30 AM	0	19	8	1	3	0	0	0	0	0	0	0	0	0	31
04:45 AM	1	24	9	0	3	0	0	1	0	0	0	0	0	1	39
05:00 AM	0	31	18	0	2	3	0	0	0	0	0	0	0	1	55
05:15 AM	0	64	33	0	5	1	0	0	0	1	0	0	0	2	106
05:30 AM	0	62	40	3	8	1	0	0	2	1	0	0	0	1	118
05:45 AM	0	80	65	0	5	0	0	0	0	0	0	0	0	0	150
Day Total															
Percent															
ADT 17244															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: NB, SB
CITY/STATE: Maalaea, HI | DATE: May 21 2024

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
06:00 AM	0	109	60	0	14	1	0	0	0	2	0	0	0	4	190
06:15 AM	1	144	87	4	14	4	0	0	0	1	0	0	0	10	265
06:30 AM	1	158	95	3	18	0	1	0	5	1	0	0	0	11	293
06:45 AM	0	183	92	0	11	4	0	1	1	1	0	0	0	10	303
07:00 AM	0	180	84	0	19	2	0	0	5	2	0	0	0	25	317
07:15 AM	0	234	88	0	15	1	1	2	2	0	0	0	0	19	362
07:30 AM	4	193	76	1	18	1	0	1	3	2	0	0	0	17	316
07:45 AM	2	164	74	0	16	1	0	2	3	0	0	0	0	10	272
08:00 AM	3	166	54	0	16	4	1	1	1	1	0	0	0	21	268
08:15 AM	2	142	65	1	18	2	0	1	4	0	0	0	0	9	244
08:30 AM	0	199	75	3	23	3	0	0	4	1	0	0	0	17	325
08:45 AM	2	147	63	0	12	0	0	2	1	0	0	0	0	16	243
09:00 AM	3	138	57	1	10	0	0	2	2	2	0	0	0	8	223
09:15 AM	3	132	57	0	12	3	1	0	6	0	0	0	0	12	226
09:30 AM	1	142	68	1	15	1	0	1	4	1	0	0	0	12	246
09:45 AM	4	152	77	1	11	1	1	0	3	0	0	0	0	10	260
10:00 AM	2	148	60	0	9	0	0	1	2	2	0	0	0	15	239
10:15 AM	0	148	59	0	15	4	0	0	7	0	0	0	0	8	241
10:30 AM	4	134	62	0	19	4	0	0	2	1	0	0	0	19	245
10:45 AM	2	154	73	2	11	3	0	1	2	0	0	0	0	9	257
11:00 AM	3	135	62	1	11	2	1	0	7	0	0	0	0	9	231
11:15 AM	1	136	65	1	11	3	0	0	6	2	0	0	0	12	237
11:30 AM	3	140	57	0	8	0	0	0	1	0	0	0	0	17	226
11:45 AM	1	143	53	0	16	0	1	1	1	0	0	0	0	9	225
Day Total															
Percent															
ADT 17244															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: N Kihei Rd south of S 8th St
SPECIFIC LOCATION:
CITY/STATE: Maalaea, HI

QC JOB #: 16589619
DIRECTION: NB, SB
DATE: May 21 2024

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
12:00 PM	2	167	56	3	8	3	0	2	9	1	0	0	0	10	261
12:15 PM	3	154	67	1	15	2	0	0	4	0	0	0	0	19	265
12:30 PM	1	166	69	0	7	5	0	1	2	1	0	0	0	14	266
12:45 PM	0	157	65	1	7	2	0	2	6	0	0	0	0	19	259
01:00 PM	4	158	66	1	13	3	1	1	3	1	0	0	0	11	262
01:15 PM	0	161	63	0	8	3	0	0	2	0	0	0	0	13	250
01:30 PM	2	149	70	0	15	1	0	1	1	2	0	0	0	11	252
01:45 PM	2	162	79	1	13	3	0	0	7	0	0	0	0	14	281
02:00 PM	1	181	63	0	9	4	0	2	4	2	0	0	0	13	279
02:15 PM	6	196	74	0	18	3	0	0	0	0	0	0	0	19	316
02:30 PM	4	187	72	0	15	0	1	0	7	1	0	0	0	23	310
02:45 PM	0	209	87	1	11	1	1	0	2	0	0	0	0	16	328
03:00 PM	2	211	122	3	15	0	0	0	0	1	0	0	0	6	360
03:15 PM	2	218	91	5	12	0	0	0	0	0	0	0	0	25	353
03:30 PM	1	188	108	2	18	3	0	0	0	2	0	0	0	23	345
03:45 PM	4	211	101	4	17	0	0	1	1	0	0	0	0	21	360
04:00 PM	1	202	114	0	20	0	0	0	0	1	0	0	0	21	359
04:15 PM	2	229	96	0	12	1	0	0	1	0	0	0	0	30	371
04:30 PM	3	227	107	0	17	1	0	0	2	0	0	0	0	23	380
04:45 PM	2	218	100	1	17	6	0	0	1	0	0	0	0	21	366
05:00 PM	2	218	98	0	6	1	0	1	1	0	0	0	0	23	350
05:15 PM	3	215	88	5	12	4	0	0	0	0	0	0	0	16	343
05:30 PM	0	169	82	0	16	0	0	0	2	0	0	0	0	13	282
05:45 PM	5	192	61	0	10	1	0	1	0	0	0	0	0	7	277
Day Total															
Percent															
ADT 17244															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: N Kihei Rd south of S 8th St
SPECIFIC LOCATION:
CITY/STATE: Maalaea, HI

QC JOB #: 16589619
DIRECTION: NB, SB
DATE: May 21 2024

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
06:00 PM	1	161	82	0	11	1	0	1	0	0	0	0	0	10	267
06:15 PM	3	122	60	0	11	0	0	0	0	0	0	0	0	9	205
06:30 PM	0	129	55	0	9	0	0	0	0	0	0	0	0	12	205
06:45 PM	0	111	45	0	5	0	0	0	0	0	0	0	0	3	164
07:00 PM	2	95	46	0	7	1	0	0	0	0	0	0	0	5	156
07:15 PM	0	120	41	0	3	0	0	0	0	0	0	0	0	3	167
07:30 PM	0	118	49	0	11	0	0	0	0	0	0	0	0	8	186
07:45 PM	1	119	53	0	6	0	0	0	0	0	0	0	0	4	183
08:00 PM	1	84	44	0	5	0	0	1	0	0	0	0	0	5	140
08:15 PM	0	97	26	0	7	0	0	0	0	0	0	0	0	6	136
08:30 PM	1	75	39	0	6	0	0	0	0	0	0	0	0	5	126
08:45 PM	0	76	30	0	6	0	0	0	0	0	0	0	0	1	113
09:00 PM	1	51	26	0	4	0	0	0	0	0	0	0	0	3	85
09:15 PM	0	58	30	0	3	0	0	1	0	0	0	0	0	3	95
09:30 PM	0	66	30	0	4	0	0	0	0	0	0	0	0	0	100
09:45 PM	0	56	20	0	1	0	0	0	0	0	0	0	0	0	77
10:00 PM	0	56	23	0	2	0	0	0	0	0	0	0	0	0	81
10:15 PM	1	45	20	0	5	0	0	0	0	0	0	0	0	1	72
10:30 PM	1	47	21	0	3	0	0	0	0	0	0	0	0	1	73
10:45 PM	0	14	12	0	4	0	0	0	0	0	0	0	0	2	32
11:00 PM	0	24	16	0	1	0	0	0	0	0	0	0	0	0	41
11:15 PM	0	27	8	0	2	0	0	0	0	0	0	0	0	0	37
11:30 PM	0	25	12	0	1	0	0	0	0	0	0	0	0	0	38
11:45 PM	0	16	6	0	1	0	0	0	0	0	0	0	0	0	23
Day Total	109	10473	4699	52	800	100	10	32	130	33	0	0	0	806	17244
Percent	0.6%	60.7%	27.3%	0.3%	4.6%	0.6%	0.1%	0.2%	0.8%	0.2%	0%	0%	0%	4.7%	
ADT 17244															
AM Peak	7:30 AM	7:15 AM	6:30 AM	6:15 AM	8:30 AM	6:15 AM	6:30 AM	7:15 AM	10:15 AM	6:00 AM	12:00 AM	12:00 AM	12:00 AM	7:00 AM	7:15 AM
15-min Vol	4	234	95	4	23	4	1	2	7	2	0	0	0	25	362
PM Peak	2:15 PM	4:15 PM	3:00 PM	3:15 PM	4:00 PM	4:45 PM	1:00 PM	12:00 PM	12:00 PM	1:30 PM	12:00 PM	12:00 PM	12:00 PM	4:15 PM	4:30 PM
15-min Vol	6	229	122	5	20	6	1	2	9	2	0	0	0	30	380

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: N Kihei Rd south of S 8th St
SPECIFIC LOCATION:
CITY/STATE: Maalaea, HI

QC JOB #: 16589619
DIRECTION: NB, SB
DATE: May 22 2024

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
12:00 AM	0	10	3	0	1	0	0	0	0	0	0	0	0	0	14
12:15 AM	2	10	3	0	0	0	0	0	0	0	0	0	0	0	15
12:30 AM	0	10	3	0	0	0	0	0	0	0	0	0	0	0	13
12:45 AM	0	10	4	0	0	0	0	0	0	0	0	0	0	0	14
01:00 AM	0	13	4	0	0	0	0	0	0	0	0	0	0	0	17
01:15 AM	0	15	3	0	1	0	0	0	0	0	0	0	0	0	19
01:30 AM	0	11	6	0	0	0	0	0	0	0	0	0	0	0	17
01:45 AM	0	5	1	0	0	0	0	0	0	0	0	0	0	0	6
02:00 AM	0	7	5	0	0	0	0	0	0	0	0	0	0	0	12
02:15 AM	0	6	2	0	0	0	0	0	0	0	0	0	0	0	8
02:30 AM	0	3	3	0	1	0	0	0	0	0	0	0	0	0	7
02:45 AM	0	5	2	1	0	0	0	0	0	0	0	0	0	0	8
03:00 AM	0	5	3	0	0	1	0	0	0	0	0	0	0	0	9
03:15 AM	0	4	5	0	1	0	0	0	0	0	0	0	0	0	10
03:30 AM	0	4	5	0	0	1	0	0	0	0	0	0	0	0	10
03:45 AM	0	8	5	0	0	2	0	0	0	0	0	0	0	0	15
04:00 AM	0	5	3	0	0	0	0	0	0	0	0	0	0	0	8
04:15 AM	0	16	8	0	1	0	0	0	0	0	0	0	0	0	25
04:30 AM	0	26	11	1	0	1	0	0	0	0	0	0	0	0	39
04:45 AM	0	27	18	1	2	0	0	0	0	0	0	0	0	0	48
05:00 AM	1	33	16	0	5	1	0	0	0	0	0	0	0	0	56
05:15 AM	0	54	26	0	7	1	0	0	0	1	0	0	0	2	91
05:30 AM	0	67	53	3	11	3	0	0	1	0	0	0	0	2	140
05:45 AM	0	80	66	0	9	0	0	0	1	2	0	0	0	7	165
Day Total															
Percent															
ADT 17637															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: N Kihei Rd south of S 8th St
SPECIFIC LOCATION:
CITY/STATE: Maalaea, HI

QC JOB #: 16589619
DIRECTION: NB, SB
DATE: May 22 2024

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
06:00 AM	0	113	64	0	13	2	0	0	1	0	0	0	0	8	201
06:15 AM	1	147	68	9	12	4	0	1	1	1	0	0	0	15	259
06:30 AM	1	165	113	0	9	0	0	0	3	1	0	0	0	14	306
06:45 AM	3	156	86	0	25	2	0	1	5	0	0	0	0	2	280
07:00 AM	4	219	74	0	17	1	0	1	1	2	0	0	0	17	336
07:15 AM	1	198	99	3	19	1	0	1	4	1	0	0	0	18	345
07:30 AM	3	180	91	2	18	3	1	1	2	1	0	0	0	16	318
07:45 AM	0	179	94	0	16	0	0	3	3	0	0	0	0	16	311
08:00 AM	2	208	59	0	16	2	0	0	0	0	0	0	0	21	308
08:15 AM	3	150	80	2	12	0	0	3	3	0	0	0	0	3	256
08:30 AM	0	171	60	1	18	4	0	2	4	1	0	0	0	9	270
08:45 AM	2	161	68	1	18	3	0	3	0	1	0	0	0	13	270
09:00 AM	2	127	58	1	12	0	0	5	3	2	0	0	0	9	219
09:15 AM	0	136	60	2	17	1	1	1	3	0	0	0	0	9	230
09:30 AM	1	162	64	0	12	1	0	0	3	2	0	0	0	7	252
09:45 AM	1	158	83	0	12	2	0	0	4	0	0	0	0	7	267
10:00 AM	2	132	72	1	9	0	0	1	2	0	0	0	0	10	229
10:15 AM	1	151	60	4	15	2	0	1	7	2	0	0	0	17	260
10:30 AM	0	143	81	1	13	3	0	1	1	0	0	0	0	12	255
10:45 AM	3	132	62	1	16	1	1	2	1	1	0	0	0	9	229
11:00 AM	3	150	53	1	13	0	0	0	6	0	0	0	0	4	230
11:15 AM	1	160	46	1	17	1	0	2	1	0	0	0	0	10	239
11:30 AM	2	144	76	1	11	4	1	0	4	1	0	0	0	12	256
11:45 AM	0	150	61	1	18	4	0	1	5	0	0	0	0	14	254
Day Total															
Percent															
ADT 17637															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: N Kihei Rd south of S 8th St
SPECIFIC LOCATION:
CITY/STATE: Maalaea, HI

QC JOB #: 16589619
DIRECTION: NB, SB
DATE: May 22 2024

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
12:00 PM	4	120	52	1	6	4	0	1	2	2	0	0	0	17	209
12:15 PM	4	178	69	1	17	2	0	1	2	0	0	0	0	15	289
12:30 PM	0	201	87	1	13	0	1	2	2	2	0	0	0	19	328
12:45 PM	2	159	80	1	13	0	0	0	3	0	0	0	0	8	266
01:00 PM	1	141	73	2	16	1	1	0	6	1	0	0	0	9	251
01:15 PM	1	155	87	0	7	1	0	0	1	2	1	0	0	23	278
01:30 PM	0	170	73	2	13	2	0	0	2	0	0	0	0	15	277
01:45 PM	2	193	91	2	10	3	0	0	5	0	0	0	0	18	324
02:00 PM	1	173	80	1	8	3	0	2	3	2	0	0	0	11	284
02:15 PM	2	175	88	1	21	3	1	1	1	1	0	0	0	14	308
02:30 PM	1	208	80	1	9	1	0	1	2	0	0	0	0	16	319
02:45 PM	1	226	81	4	14	1	0	2	0	2	0	0	0	15	346
03:00 PM	1	204	77	0	11	1	0	1	2	0	0	0	0	14	311
03:15 PM	3	186	85	0	15	2	0	0	0	1	0	0	0	9	301
03:30 PM	2	225	135	1	18	4	0	0	0	1	0	0	0	26	412
03:45 PM	1	217	101	3	18	1	0	0	0	0	0	0	0	20	361
04:00 PM	1	229	103	0	21	2	0	2	0	1	0	0	0	25	384
04:15 PM	1	231	112	0	14	2	0	1	1	0	0	0	0	16	378
04:30 PM	4	252	102	0	16	1	0	1	0	0	0	0	0	49	425
04:45 PM	1	218	92	0	20	2	0	0	1	0	0	0	0	14	348
05:00 PM	3	199	83	0	13	3	0	1	1	0	0	0	0	27	330
05:15 PM	4	207	73	1	23	1	0	0	0	1	0	0	0	6	316
05:30 PM	1	170	80	0	11	3	0	1	0	0	0	0	0	13	279
05:45 PM	0	171	84	1	13	1	0	0	2	0	0	0	0	12	284
Day Total															
Percent															
ADT 17637															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: N Kihei Rd south of S 8th St
SPECIFIC LOCATION:
CITY/STATE: Maalaea, HI

QC JOB #: 16589619
DIRECTION: NB, SB
DATE: May 22 2024

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
06:00 PM	0	155	50	1	24	1	0	1	0	0	0	0	0	16	248
06:15 PM	0	148	53	0	11	1	0	0	0	0	0	0	0	2	215
06:30 PM	2	115	45	0	9	0	0	0	0	0	0	0	0	6	177
06:45 PM	0	112	43	0	7	0	0	0	0	0	0	0	0	4	166
07:00 PM	1	100	44	0	6	1	0	1	0	0	0	0	0	8	161
07:15 PM	1	115	42	0	3	0	0	0	0	0	0	0	0	8	169
07:30 PM	1	135	49	0	10	0	0	0	0	0	0	0	0	12	207
07:45 PM	2	109	53	0	4	0	0	0	0	0	0	0	0	5	173
08:00 PM	1	87	38	0	5	0	0	0	0	0	0	0	0	6	137
08:15 PM	0	76	31	0	2	0	0	0	0	0	0	0	0	6	115
08:30 PM	0	83	30	0	4	0	0	0	0	0	0	0	0	3	120
08:45 PM	0	72	35	0	5	0	0	1	0	0	0	0	0	3	116
09:00 PM	0	78	35	0	2	0	0	0	0	0	0	0	0	3	118
09:15 PM	1	75	42	0	2	0	0	0	0	0	0	0	0	3	123
09:30 PM	0	67	16	0	3	0	0	0	0	0	0	0	0	1	87
09:45 PM	0	56	32	0	2	0	0	0	0	0	0	0	0	1	91
10:00 PM	0	61	21	1	2	0	0	0	0	0	0	0	0	2	87
10:15 PM	0	49	23	0	4	0	0	0	0	0	0	0	0	1	77
10:30 PM	0	48	21	0	2	0	0	0	0	0	0	0	0	0	71
10:45 PM	1	35	16	0	2	0	0	0	0	0	0	0	0	0	54
11:00 PM	0	30	13	0	4	0	0	0	0	0	0	0	0	0	47
11:15 PM	0	31	11	0	4	0	0	0	0	0	0	0	0	0	46
11:30 PM	0	31	8	0	2	0	0	0	0	0	0	0	0	0	41
11:45 PM	0	23	14	0	0	0	0	0	0	0	0	0	0	0	37
Day Total	90	10725	4823	63	856	98	7	50	105	35	1	0	0	784	17637
Percent	0.5%	60.8%	27.3%	0.4%	4.9%	0.6%	0%	0.3%	0.6%	0.2%	0%	0%	0%	4.4%	
ADT 17637															
AM Peak	7:00 AM	7:00 AM	6:30 AM	6:15 AM	6:45 AM	6:15 AM	7:30 AM	9:00 AM	10:15 AM	5:45 AM	12:00 AM	12:00 AM	12:00 AM	8:00 AM	7:15 AM
15-min Vol	4	219	113	9	25	4	1	5	7	2	0	0	0	21	345
PM Peak	12:00 PM	4:30 PM	3:30 PM	2:45 PM	6:00 PM	12:00 PM	12:30 PM	12:30 PM	1:00 PM	12:00 PM	1:15 PM	12:00 PM	12:00 PM	4:30 PM	4:30 PM
15-min Vol	4	252	135	4	24	4	1	2	6	2	1	0	0	49	425

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

SUMMARY - Tube Count - Vehicle Classification Data

LOCATION: N Kihei Rd south of S 8th St
SPECIFIC LOCATION:
CITY/STATE: Maalaea, HI

QC JOB #: 16589619
DIRECTION: NB, SB
DATE: May 21 2024 - May 22 2024

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
Grand Total	199	21198	9522	115	1656	198	17	82	235	68	1	0	0	1590	34881
Percent	0.6%	60.8%	27.3%	0.3%	4.7%	0.6%	0%	0.2%	0.7%	0.2%	0%	0%	0%	4.6%	
ADT 17440															

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619

SPECIFIC LOCATION: | DIRECTION: NB, SB

CITY/STATE: Maalaea, HI | DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
12:00 AM		20	14			17			17	
12:15 AM		14	15			15			15	
12:30 AM		12	13			13			13	
12:45 AM		10	14			12			12	
01:00 AM		8	17			13			13	
01:15 AM		13	19			16			16	
01:30 AM		12	17			15			15	
01:45 AM		4	6			5			5	
02:00 AM		6	12			9			9	
02:15 AM		9	8			9			9	
02:30 AM		6	7			7			7	
02:45 AM		10	8			9			9	
03:00 AM		12	9			11			11	
03:15 AM		14	10			12			12	
03:30 AM		9	10			10			10	
03:45 AM		13	15			14			14	
04:00 AM		17	8			13			13	
04:15 AM		25	25			25			25	
04:30 AM		31	39			35			35	
04:45 AM		39	48			44			44	
05:00 AM		55	56			56			56	
05:15 AM		106	91			99			99	
05:30 AM		118	140			129			129	
05:45 AM		150	165			158			158	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: N Kihei Rd south of S 8th St
QC JOB #: 16589619
SPECIFIC LOCATION:
DIRECTION: NB, SB
CITY/STATE: Maalaea, HI
DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
06:00 AM		190	201			196			196	
06:15 AM		265	259			262			262	
06:30 AM		293	306			300			300	
06:45 AM		303	280			292			292	
07:00 AM		317	336			327			327	
07:15 AM		**362**	**345**			**354**			**354**	
07:30 AM		316	318			317			317	
07:45 AM		272	311			292			292	
08:00 AM		268	308			288			288	
08:15 AM		244	256			250			250	
08:30 AM		325	270			298			298	
08:45 AM		243	270			257			257	
09:00 AM		223	219			221			221	
09:15 AM		226	230			228			228	
09:30 AM		246	252			249			249	
09:45 AM		260	267			264			264	
10:00 AM		239	229			234			234	
10:15 AM		241	260			251			251	
10:30 AM		245	255			250			250	
10:45 AM		257	229			243			243	
11:00 AM		231	230			231			231	
11:15 AM		237	239			238			238	
11:30 AM		226	256			241			241	
11:45 AM		225	254			240			240	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: N Kihei Rd south of S 8th St
QC JOB #: 16589619

SPECIFIC LOCATION:
DIRECTION: NB, SB

CITY/STATE: Maalaea, HI
DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
12:00 PM		261	209			235			235	
12:15 PM		265	289			277			277	
12:30 PM		266	328			297			297	
12:45 PM		259	266			263			263	
01:00 PM		262	251			257			257	
01:15 PM		250	278			264			264	
01:30 PM		252	277			265			265	
01:45 PM		281	324			303			303	
02:00 PM		279	284			282			282	
02:15 PM		316	308			312			312	
02:30 PM		310	319			315			315	
02:45 PM		328	346			337			337	
03:00 PM		360	311			336			336	
03:15 PM		353	301			327			327	
03:30 PM		345	412			379			379	
03:45 PM		360	361			361			361	
04:00 PM		359	384			372			372	
04:15 PM		371	378			375			375	
04:30 PM		380	425			403			403	
04:45 PM		366	348			357			357	
05:00 PM		350	330			340			340	
05:15 PM		343	316			330			330	
05:30 PM		282	279			281			281	
05:45 PM		277	284			281			281	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: N Kihei Rd south of S 8th St
QC JOB #: 16589619

SPECIFIC LOCATION:
DIRECTION: NB, SB

CITY/STATE: Maalaea, HI
DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
06:00 PM		267	248			258			258	
06:15 PM		205	215			210			210	
06:30 PM		205	177			191			191	
06:45 PM		164	166			165			165	
07:00 PM		156	161			159			159	
07:15 PM		167	169			168			168	
07:30 PM		186	207			197			197	
07:45 PM		183	173			178			178	
08:00 PM		140	137			139			139	
08:15 PM		136	115			126			126	
08:30 PM		126	120			123			123	
08:45 PM		113	116			115			115	
09:00 PM		85	118			102			102	
09:15 PM		95	123			109			109	
09:30 PM		100	87			94			94	
09:45 PM		77	91			84			84	
10:00 PM		81	87			84			84	
10:15 PM		72	77			75			75	
10:30 PM		73	71			72			72	
10:45 PM		32	54			43			43	
11:00 PM		41	47			44			44	
11:15 PM		37	46			42			42	
11:30 PM		38	41			40			40	
11:45 PM		23	37			30			30	
Day Total		17244	17637			17466			17466	
% Weekday Average		98.7%	101%							
% Week Average		98.7%	101%			100%				
AM Peak 15-min Vol		7:15 AM 362	7:15 AM 345			7:15 AM 354			7:15 AM 354	
PM Peak 15-min Vol		4:30 PM 380	4:30 PM 425			4:30 PM 403			4:30 PM 403	

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Speed Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: SB
CITY/STATE: Maalaea, HI | DATE: May 21 2024

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
12:00 AM	0	0	0	0	0	0	0	3	1	1	0	1	0	0	6	46-55	4
12:15 AM	0	0	0	0	0	0	1	2	4	0	0	0	0	0	7	46-55	6
12:30 AM	0	0	0	0	0	0	0	2	2	0	1	0	0	0	5	46-55	4
12:45 AM	0	0	0	0	1	0	0	1	2	0	0	1	0	0	5	46-55	3
01:00 AM	0	0	0	0	0	0	1	2	0	0	0	0	0	0	3	41-50	3
01:15 AM	0	0	0	0	0	0	0	2	0	1	0	1	0	0	4	41-50	2
01:30 AM	0	0	0	0	0	0	4	1	1	1	1	0	0	0	8	41-50	5
01:45 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	41-50	1
02:00 AM	0	0	0	0	0	0	1	0	0	0	0	1	0	0	2	36-45	1
02:15 AM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	2	51-60	1
02:30 AM	0	0	0	0	0	0	0	0	1	0	2	0	0	0	3	56-65	2
02:45 AM	0	0	0	0	0	0	0	2	1	1	1	0	0	0	5	46-55	3
03:00 AM	0	0	0	0	0	0	1	1	3	1	1	0	0	0	7	48-57	4
03:15 AM	0	0	0	0	1	0	1	2	3	3	0	0	0	0	10	51-60	6
03:30 AM	0	0	0	0	0	0	1	1	2	1	0	0	0	1	6	51-60	3
03:45 AM	0	0	0	0	0	0	0	2	5	1	0	0	0	0	8	46-55	7
04:00 AM	0	0	0	0	0	0	1	1	2	1	1	3	0	0	9	61-70	4
04:15 AM	0	0	0	0	0	0	0	4	4	3	1	2	0	0	14	46-55	8
04:30 AM	0	0	0	0	0	0	1	2	5	6	1	0	0	0	15	51-60	11
04:45 AM	0	0	0	0	0	0	0	1	4	3	1	1	0	0	10	51-60	7
05:00 AM	1	0	0	0	0	0	1	8	3	5	3	0	0	0	21	46-55	11
05:15 AM	1	0	0	0	0	1	6	6	15	6	2	0	0	0	37	46-55	21
05:30 AM	0	0	0	0	0	0	1	12	15	12	2	0	0	1	43	46-55	27
05:45 AM	0	0	0	0	0	0	1	22	19	10	4	0	1	0	57	46-55	41
Day Total																	
Percent																	
AM Peak 15-min Vol																	
PM Peak 15-min Vol																	

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Speed Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: SB
CITY/STATE: Maalaea, HI | DATE: May 21 2024

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
06:00 AM	2	0	0	0	0	1	20	22	28	9	1	0	2	0	85	46-55	50
06:15 AM	6	0	0	0	0	1	7	50	28	6	0	0	0	0	98	46-55	78
06:30 AM	6	0	0	0	0	4	28	43	27	5	1	0	0	0	114	41-50	71
06:45 AM	4	0	0	0	0	1	20	46	19	14	2	0	0	0	106	41-50	66
07:00 AM	9	0	0	0	0	5	22	40	21	7	4	1	0	0	109	41-50	62
07:15 AM	7	0	0	0	0	1	31	55	52	10	4	0	0	0	160	46-55	107
07:30 AM	6	0	0	1	1	7	30	56	37	12	0	0	0	1	151	46-55	93
07:45 AM	6	1	0	0	0	3	50	70	36	4	1	0	0	0	171	41-50	120
08:00 AM	6	0	0	0	5	19	32	57	21	7	1	0	0	0	148	41-50	89
08:15 AM	4	0	1	8	10	23	40	20	18	3	0	0	0	0	127	36-45	63
08:30 AM	8	0	0	0	3	6	35	52	26	5	3	0	0	0	138	41-50	87
08:45 AM	8	0	0	0	0	0	17	45	26	11	2	0	0	1	110	46-55	71
09:00 AM	5	0	0	2	0	0	7	33	44	10	1	1	0	0	103	46-55	77
09:15 AM	3	0	0	0	0	5	23	32	20	9	2	1	0	0	95	41-50	55
09:30 AM	6	0	1	1	2	4	21	71	18	1	0	0	0	0	125	41-50	92
09:45 AM	6	0	0	0	5	6	40	50	18	4	1	0	1	0	131	41-50	90
10:00 AM	7	0	1	0	1	21	26	27	20	1	2	0	0	0	106	41-50	53
10:15 AM	4	0	0	0	0	1	28	49	19	6	3	0	0	0	110	41-50	77
10:30 AM	10	0	0	0	1	3	26	62	18	7	0	2	0	0	129	41-50	88
10:45 AM	1	0	0	0	0	5	30	67	32	1	1	0	0	0	137	46-55	99
11:00 AM	5	0	0	0	0	7	31	32	16	4	2	0	0	0	97	41-50	63
11:15 AM	6	0	0	0	0	5	31	51	16	4	0	0	1	0	114	41-50	82
11:30 AM	7	0	0	2	0	0	13	64	22	5	0	0	0	0	113	46-55	86
11:45 AM	4	0	0	0	0	4	30	46	26	4	1	0	0	0	115	41-50	76
Day Total																	
Percent																	
AM Peak 15-min Vol																	
PM Peak 15-min Vol																	

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Speed Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: SB
CITY/STATE: Maalaea, HI | DATE: May 21 2024

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
12:00 PM	4	0	0	0	1	11	29	39	36	14	0	0	0	1	135	46-55	75
12:15 PM	10	0	3	0	0	4	35	56	25	9	1	0	0	0	143	41-50	91
12:30 PM	5	0	0	0	0	2	28	40	33	12	3	0	0	0	123	46-55	73
12:45 PM	8	0	0	0	0	14	34	44	29	11	1	0	0	0	141	41-50	78
01:00 PM	2	0	0	0	1	3	15	61	37	17	1	0	0	0	137	46-55	98
01:15 PM	5	0	0	0	0	1	35	40	30	13	5	0	0	0	129	41-50	75
01:30 PM	4	0	0	0	0	2	18	46	43	14	1	1	0	0	129	46-55	89
01:45 PM	5	0	0	0	0	3	23	72	37	6	2	0	0	0	148	46-55	109
02:00 PM	7	0	0	0	0	0	21	50	33	13	1	1	0	0	126	46-55	83
02:15 PM	7	0	0	0	1	3	38	84	28	7	1	0	0	1	170	41-50	122
02:30 PM	10	3	0	0	0	4	39	41	22	6	2	1	0	0	128	41-50	80
02:45 PM	7	0	0	0	0	2	40	79	29	10	1	1	0	0	169	41-50	119
03:00 PM	2	0	0	0	0	13	62	76	35	4	0	0	0	1	193	41-50	138
03:15 PM	9	0	0	0	0	3	39	75	53	12	2	1	0	0	194	46-55	128
03:30 PM	11	0	0	0	0	2	15	65	44	5	6	1	1	0	150	46-55	109
03:45 PM	7	1	0	0	2	13	58	64	29	7	2	0	0	0	183	41-50	122
04:00 PM	6	0	0	0	0	2	33	72	46	16	0	0	0	0	175	46-55	118
04:15 PM	14	0	0	0	0	8	47	68	34	5	2	1	1	0	180	41-50	115
04:30 PM	11	0	0	0	0	1	35	78	37	15	9	0	0	0	186	46-55	115
04:45 PM	12	0	0	0	0	8	30	44	59	13	2	1	0	0	169	46-55	103
05:00 PM	10	0	0	0	0	10	34	68	56	14	1	1	0	0	194	46-55	124
05:15 PM	8	0	0	1	2	4	60	74	51	5	1	0	1	0	207	41-50	134
05:30 PM	5	0	0	0	0	0	31	63	52	15	2	0	0	0	168	46-55	115
05:45 PM	3	0	0	0	0	0	30	88	36	13	3	0	0	0	173	46-55	124
Day Total																	
Percent																	
AM Peak 15-min Vol																	
PM Peak 15-min Vol																	

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Speed Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: SB
CITY/STATE: Maalaea, HI | DATE: May 21 2024

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
06:00 PM	4	0	0	0	0	20	42	52	45	3	1	1	0	0	168	46-55	97
06:15 PM	5	0	0	0	0	1	24	34	39	10	1	1	0	0	115	46-55	73
06:30 PM	5	0	0	0	0	0	17	47	35	12	2	1	0	0	119	46-55	82
06:45 PM	1	0	0	0	0	0	22	41	28	10	0	0	0	0	102	46-55	69
07:00 PM	2	2	0	0	0	10	20	25	23	5	0	0	1	0	88	46-55	48
07:15 PM	2	0	0	0	0	6	30	27	13	9	1	0	0	0	88	41-50	57
07:30 PM	2	0	0	0	0	5	42	23	15	4	1	0	0	0	92	41-50	65
07:45 PM	0	0	0	0	0	4	30	48	13	5	0	0	0	0	100	41-50	78
08:00 PM	3	0	0	0	0	0	17	33	13	9	0	0	0	0	75	41-50	50
08:15 PM	1	0	0	0	0	3	23	26	17	6	0	0	0	0	76	41-50	49
08:30 PM	2	0	0	0	1	4	9	17	12	15	1	0	0	0	61	46-55	29
08:45 PM	0	0	0	0	0	0	12	11	19	4	1	0	0	0	47	46-55	30
09:00 PM	0	0	0	0	0	2	7	22	10	5	1	1	1	1	50	46-55	32
09:15 PM	2	0	0	0	0	0	2	14	17	14	2	0	0	0	51	51-60	31
09:30 PM	0	0	0	0	0	0	0	24	19	4	2	0	0	1	50	46-55	43
09:45 PM	0	0	0	0	0	0	6	15	18	4	0	0	1	2	46	46-55	33
10:00 PM	0	0	0	0	0	0	6	12	7	8	1	4	0	0	38	46-55	19
10:15 PM	0	0	0	0	0	0	8	13	8	11	0	0	1	1	42	42-51	21
10:30 PM	1	0	0	0	0	0	1	7	17	7	1	0	0	0	34	46-55	24
10:45 PM	1	0	0	0	0	1	1	3	3	2	0	0	1	0	12	46-55	6
11:00 PM	0	0	0	0	0	0	1	3	4	2	2	2	0	1	15	46-55	7
11:15 PM	0	0	0	0	0	0	0	3	3	2	2	1	0	0	11	46-55	6
11:30 PM	0	0	0	0	0	0	4	5	6	2	1	1	1	0	20	46-55	11
11:45 PM	0	0	0	0	0	0	0	8	5	2	0	0	0	1	16	46-55	13
Day Total	341	7	6	15	38	302	1812	3218	2003	617	122	37	14	14	8546	46-55	5221
Percent	4%	0.1%	0.1%	0.2%	0.4%	3.5%	21.2%	37.7%	23.4%	7.2%	1.4%	0.4%	0.2%	0.2%			

AM Peak	10:30 AM	7:45 AM	8:15 AM	8:15 AM	8:15 AM	8:15 AM	7:45 AM	9:30 AM	7:15 AM	6:45 AM	5:45 AM	4:00 AM	6:00 AM	3:30 AM	7:45 AM		
15-min Vol	10	1	1	8	10	23	50	71	52	14	4	3	2	1	171		
PM Peak	4:15 PM	2:30 PM	12:15 PM	5:15 PM	3:45 PM	6:00 PM	3:00 PM	5:45 PM	4:45 PM	1:00 PM	4:30 PM	10:00 PM	3:30 PM	9:45 PM	5:15 PM		
15-min Vol	14	3	3	1	2	20	62	88	59	17	9	4	1	2	207		

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Speed Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: SB
CITY/STATE: Maalaea, HI | DATE: May 22 2024

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
12:00 AM	0	0	0	0	0	1	2	1	2	1	0	0	0	1	8	41-50	3
12:15 AM	0	0	0	0	0	0	1	2	4	1	0	0	0	0	8	46-55	6
12:30 AM	0	0	0	0	0	0	1	2	2	1	0	0	0	0	6	46-55	4
12:45 AM	0	0	0	0	0	0	1	1	0	0	1	1	0	0	4	41-50	2
01:00 AM	0	0	0	0	0	1	0	1	2	2	0	0	1	0	7	51-60	4
01:15 AM	0	0	0	0	0	0	1	2	0	1	2	0	1	0	7	41-50	3
01:30 AM	0	0	0	0	0	0	1	4	1	1	1	1	0	1	10	45-54	5
01:45 AM	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	46-55	1
02:00 AM	0	0	0	0	0	0	2	0	0	0	1	1	1	0	5	36-45	2
02:15 AM	0	0	0	0	0	0	1	1	1	2	1	0	0	0	6	56-65	3
02:30 AM	0	0	0	0	0	0	1	0	0	0	1	1	0	0	3	61-70	2
02:45 AM	0	0	0	0	0	0	0	1	2	1	0	1	0	0	5	51-60	3
03:00 AM	0	0	0	0	0	0	0	2	0	2	0	0	0	0	4	41-50	2
03:15 AM	0	0	0	0	0	0	0	1	2	2	1	0	0	0	6	51-60	4
03:30 AM	0	0	0	0	0	0	0	0	1	2	0	0	0	0	3	51-60	3
03:45 AM	0	0	0	0	0	0	0	3	0	1	2	0	1	0	7	41-50	3
04:00 AM	0	0	0	0	0	0	0	2	2	0	1	0	0	0	5	46-55	4
04:15 AM	0	0	0	0	0	0	2	5	5	3	0	0	0	0	15	46-55	10
04:30 AM	0	0	0	0	0	0	0	3	6	7	2	1	1	0	20	51-60	13
04:45 AM	0	0	0	0	0	0	1	8	9	1	4	0	0	1	24	46-55	17
05:00 AM	0	0	0	0	0	0	0	7	7	1	3	0	0	0	18	46-55	14
05:15 AM	0	0	0	0	0	1	8	10	6	4	1	1	0	0	31	41-50	18
05:30 AM	0	0	0	0	0	0	3	15	23	7	1	0	0	0	49	46-55	38
05:45 AM	3	0	0	0	0	9	7	15	15	6	8	1	0	0	64	46-55	30
Day Total																	
Percent																	
AM Peak 15-min Vol																	
PM Peak 15-min Vol																	

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Speed Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: SB
CITY/STATE: Maalaea, HI | DATE: May 22 2024

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
06:00 AM	5	0	0	0	0	0	7	35	21	8	1	1	1	0	79	46-55	56
06:15 AM	6	0	0	1	0	0	11	39	19	8	4	0	0	0	88	46-55	58
06:30 AM	4	0	0	0	0	2	11	41	36	19	6	0	0	0	119	46-55	77
06:45 AM	1	0	0	0	1	3	32	30	26	16	2	1	0	0	112	41-50	62
07:00 AM	9	0	0	0	0	1	11	50	45	11	2	0	0	0	129	46-55	95
07:15 AM	5	0	0	0	1	8	31	68	43	5	0	0	0	0	161	46-55	111
07:30 AM	8	0	0	0	0	1	22	55	34	13	1	0	0	0	134	46-55	89
07:45 AM	5	0	0	0	0	0	19	78	48	12	0	0	1	1	164	46-55	126
08:00 AM	10	0	0	1	4	13	39	65	29	6	6	3	0	0	176	41-50	104
08:15 AM	1	0	0	0	0	3	21	42	34	12	1	0	0	1	115	46-55	76
08:30 AM	3	0	0	0	0	0	18	63	29	8	5	1	0	0	127	46-55	92
08:45 AM	4	0	0	0	1	0	12	59	39	11	0	1	1	0	128	46-55	98
09:00 AM	4	0	0	0	0	7	21	34	19	6	2	2	1	0	96	41-50	55
09:15 AM	1	0	0	0	0	2	8	38	39	9	4	0	0	0	101	46-55	77
09:30 AM	2	0	0	0	2	10	5	38	40	12	3	0	0	0	112	46-55	78
09:45 AM	4	0	0	0	0	0	19	38	45	17	3	0	0	0	126	46-55	83
10:00 AM	4	0	0	0	0	4	15	40	33	24	2	0	0	0	122	46-55	73
10:15 AM	8	0	0	0	0	2	18	48	28	11	1	0	0	0	116	46-55	76
10:30 AM	3	0	0	0	0	1	23	53	28	9	1	0	0	0	118	46-55	81
10:45 AM	5	0	0	0	0	0	21	34	30	9	1	0	0	0	100	46-55	64
11:00 AM	1	0	1	1	2	1	17	44	38	4	0	0	0	0	109	46-55	82
11:15 AM	5	1	0	0	0	2	27	47	21	8	1	0	0	0	112	41-50	74
11:30 AM	5	2	0	6	7	0	49	36	23	3	1	0	1	0	133	41-50	85
11:45 AM	6	0	0	0	0	1	17	46	64	10	3	0	0	1	148	46-55	110
Day Total																	
Percent																	
AM Peak 15-min Vol																	
PM Peak 15-min Vol																	

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Speed Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: SB
CITY/STATE: Maalaea, HI | DATE: May 22 2024

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
12:00 PM	10	0	0	0	0	0	30	45	19	4	1	0	0	0	109	41-50	75
12:15 PM	6	0	0	0	0	1	25	53	45	14	1	0	0	0	145	46-55	98
12:30 PM	7	0	0	0	0	2	36	80	38	5	1	2	0	0	171	46-55	118
12:45 PM	2	0	0	0	0	0	37	56	27	11	3	0	0	0	136	41-50	93
01:00 PM	2	0	0	0	0	2	17	56	33	14	4	2	0	0	130	46-55	89
01:15 PM	9	0	0	0	0	0	30	58	38	9	5	0	0	0	149	46-55	96
01:30 PM	8	0	0	0	0	0	27	70	50	4	1	1	0	0	161	46-55	120
01:45 PM	9	0	0	0	0	0	8	77	53	14	0	1	0	0	162	46-55	130
02:00 PM	8	0	0	0	0	2	22	45	39	15	3	0	0	0	134	46-55	84
02:15 PM	3	0	0	0	0	1	34	75	31	10	1	1	0	0	156	41-50	109
02:30 PM	2	0	0	0	0	7	45	67	32	16	3	2	0	0	174	41-50	112
02:45 PM	7	0	0	0	0	7	58	49	35	11	3	0	0	1	171	41-50	107
03:00 PM	5	0	0	0	0	0	7	62	78	10	6	0	0	0	168	46-55	140
03:15 PM	6	1	0	0	0	10	25	78	37	16	3	0	0	0	176	46-55	115
03:30 PM	10	0	0	0	0	6	42	82	35	16	4	0	0	0	195	41-50	124
03:45 PM	6	0	0	0	0	3	41	60	51	11	3	0	0	0	175	46-55	111
04:00 PM	13	0	0	0	2	18	44	77	37	12	1	1	0	0	205	41-50	121
04:15 PM	4	0	0	0	0	3	25	61	57	16	2	2	0	0	170	46-55	118
04:30 PM	23	0	0	0	0	9	51	57	39	17	6	2	0	0	204	41-50	108
04:45 PM	8	0	0	0	0	4	31	60	38	26	2	0	0	0	169	46-55	98
05:00 PM	8	0	0	0	0	0	14	63	51	18	3	1	0	0	158	46-55	114
05:15 PM	3	0	0	0	0	3	26	82	52	17	2	0	1	1	187	46-55	134
05:30 PM	8	0	0	0	0	0	18	63	48	16	3	0	0	0	156	46-55	111
05:45 PM	4	0	0	0	0	0	15	86	59	15	0	1	0	0	180	46-55	145
Day Total																	
Percent																	
AM Peak 15-min Vol																	
PM Peak 15-min Vol																	

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Speed Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: SB
CITY/STATE: Maalaea, HI | DATE: May 22 2024

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
06:00 PM	6	0	0	0	0	0	20	60	45	21	3	1	0	0	156	46-55	105
06:15 PM	0	0	0	0	0	0	7	54	44	13	8	0	1	0	127	46-55	98
06:30 PM	2	0	1	0	0	1	7	17	49	16	4	0	0	0	97	46-55	66
06:45 PM	1	0	0	0	0	0	7	55	26	6	1	1	0	1	98	46-55	81
07:00 PM	1	0	0	0	0	1	12	41	14	9	1	1	0	0	80	46-55	55
07:15 PM	5	0	0	0	0	2	28	55	12	4	1	0	0	0	107	41-50	83
07:30 PM	4	0	0	0	0	0	26	39	22	3	1	0	0	0	95	41-50	65
07:45 PM	4	0	0	0	0	0	17	50	33	5	2	0	0	0	111	46-55	83
08:00 PM	2	0	0	0	0	2	4	39	22	6	0	2	0	0	77	46-55	61
08:15 PM	3	0	0	0	0	1	3	20	29	4	0	0	0	1	61	46-55	49
08:30 PM	1	0	0	0	1	1	4	23	18	5	1	0	0	0	54	46-55	41
08:45 PM	1	0	0	0	1	0	5	34	24	2	0	0	1	1	69	46-55	58
09:00 PM	0	0	0	0	0	7	8	18	20	8	0	1	0	0	62	46-55	38
09:15 PM	1	0	0	0	0	1	11	32	12	11	0	3	0	0	71	46-55	44
09:30 PM	1	0	0	0	0	6	2	6	8	10	2	1	0	0	36	51-60	18
09:45 PM	0	0	0	0	1	0	12	15	11	6	1	1	1	0	48	41-50	27
10:00 PM	1	0	0	0	0	2	4	20	14	9	1	0	1	0	52	46-55	34
10:15 PM	1	0	0	0	0	2	3	14	12	7	0	0	0	0	39	46-55	26
10:30 PM	0	0	0	0	0	0	2	10	7	10	2	1	0	1	33	46-55	17
10:45 PM	0	0	0	0	0	0	3	6	6	3	1	1	0	0	20	46-55	12
11:00 PM	0	0	0	0	0	0	1	6	7	7	1	2	1	0	25	51-60	14
11:15 PM	0	0	0	0	0	0	5	2	6	5	1	0	2	0	21	51-60	11
11:30 PM	0	0	0	0	0	0	5	7	5	1	3	0	0	0	21	41-50	12
11:45 PM	0	0	0	0	0	0	4	4	2	3	2	0	0	0	15	41-50	8
Day Total	317	4	2	9	23	177	1414	3396	2372	788	177	48	18	12	8757	46-55	5768
Percent	3.6%	0%	0%	0.1%	0.3%	2%	16.1%	38.8%	27.1%	9%	2%	0.5%	0.2%	0.1%			

AM Peak	8:00 AM	11:30 AM	11:00 AM	11:30 AM	11:30 AM	8:00 AM	11:30 AM	7:45 AM	11:45 AM	10:00 AM	5:45 AM	8:00 AM	1:00 AM	12:00 AM	8:00 AM		
15-min Vol	10	2	1	6	7	13	49	78	64	24	8	3	1	1	176		
PM Peak	4:30 PM	3:15 PM	6:30 PM	12:00 PM	4:00 PM	4:00 PM	2:45 PM	5:45 PM	3:00 PM	4:45 PM	6:15 PM	9:15 PM	11:15 PM	2:45 PM	4:00 PM		
15-min Vol	23	1	1	0	2	18	58	86	78	26	8	3	2	1	205		

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Speed Data

SUMMARY - Tube Count - Speed Data

LOCATION: N Kihei Rd south of S 8th St
SPECIFIC LOCATION:
CITY/STATE: Maalaea, HI

QC JOB #: 16589619
DIRECTION: SB
DATE: May 21 2024 - May 22 2024

Speed Range	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
Grand Total	658	11	8	24	61	479	3226	6614	4375	1405	299	85	32	26	17303	46-55	10989
Percent	3.8%	0.1%	0%	0.1%	0.4%	2.8%	18.6%	38.2%	25.3%	8.1%	1.7%	0.5%	0.2%	0.2%			
Cumulative Percent	3.8%	3.9%	3.9%	4.1%	4.4%	7.2%	25.8%	64%	89.3%	97.4%	99.2%	99.7%	99.8%	100%			

ADT
8651

85th Percentile: 54 MPH
Mean Speed(Average): 48 MPH
Median: 48 MPH
Mode: 48 MPH

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: SB
CITY/STATE: Maalaea, HI | DATE: May 21 2024

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
12:00 AM	0	4	2	0	0	0	0	0	0	0	0	0	0	0	6
12:15 AM	0	4	3	0	0	0	0	0	0	0	0	0	0	0	7
12:30 AM	0	2	3	0	0	0	0	0	0	0	0	0	0	0	5
12:45 AM	0	2	3	0	0	0	0	0	0	0	0	0	0	0	5
01:00 AM	0	1	2	0	0	0	0	0	0	0	0	0	0	0	3
01:15 AM	0	3	1	0	0	0	0	0	0	0	0	0	0	0	4
01:30 AM	0	5	2	1	0	0	0	0	0	0	0	0	0	0	8
01:45 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
02:00 AM	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2
02:15 AM	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2
02:30 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
02:45 AM	0	4	1	0	0	0	0	0	0	0	0	0	0	0	5
03:00 AM	0	3	4	0	0	0	0	0	0	0	0	0	0	0	7
03:15 AM	0	4	5	0	0	1	0	0	0	0	0	0	0	0	10
03:30 AM	0	3	3	0	0	0	0	0	0	0	0	0	0	0	6
03:45 AM	0	4	4	0	0	0	0	0	0	0	0	0	0	0	8
04:00 AM	0	5	3	0	1	0	0	0	0	0	0	0	0	0	9
04:15 AM	0	9	5	0	0	0	0	0	0	0	0	0	0	0	14
04:30 AM	0	8	5	0	2	0	0	0	0	0	0	0	0	0	15
04:45 AM	0	4	5	0	1	0	0	0	0	0	0	0	0	0	10
05:00 AM	0	11	7	0	0	2	0	0	0	0	0	0	0	1	21
05:15 AM	0	22	13	0	1	0	0	0	0	0	0	0	0	1	37
05:30 AM	0	20	17	0	4	1	0	0	0	1	0	0	0	0	43
05:45 AM	0	28	27	0	2	0	0	0	0	0	0	0	0	0	57
Day Total															
Percent															
ADT 8546															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: SB
CITY/STATE: Maalaea, HI | DATE: May 21 2024

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
06:00 AM	0	42	33	0	7	0	0	0	0	1	0	0	0	2	85
06:15 AM	0	46	34	1	10	1	0	0	0	0	0	0	0	6	98
06:30 AM	1	51	42	1	11	0	0	0	2	1	0	0	0	5	114
06:45 AM	0	56	36	0	8	1	0	0	0	1	0	0	0	4	106
07:00 AM	0	53	32	0	11	2	0	0	0	1	0	0	0	10	109
07:15 AM	0	91	48	0	13	0	0	1	0	0	0	0	0	7	160
07:30 AM	3	83	44	1	11	0	0	1	1	1	0	0	0	6	151
07:45 AM	2	102	45	0	13	1	0	1	2	0	0	0	0	5	171
08:00 AM	3	95	34	0	7	2	1	0	0	0	0	0	0	6	148
08:15 AM	1	73	31	1	11	2	0	1	3	0	0	0	0	4	127
08:30 AM	0	76	28	2	18	2	0	0	3	1	0	0	0	8	138
08:45 AM	1	62	29	0	8	0	0	1	1	0	0	0	0	8	110
09:00 AM	2	64	28	0	5	0	0	0	0	0	0	0	0	4	103
09:15 AM	2	52	30	0	5	2	0	0	2	0	0	0	0	2	95
09:30 AM	1	67	36	1	9	1	0	1	2	1	0	0	0	6	125
09:45 AM	3	69	41	1	8	1	0	0	3	0	0	0	0	5	131
10:00 AM	2	63	26	0	5	0	0	1	1	1	0	0	0	7	106
10:15 AM	0	63	29	0	5	4	0	0	5	0	0	0	0	4	110
10:30 AM	2	69	38	0	8	3	0	0	1	0	0	0	0	8	129
10:45 AM	1	86	40	1	5	3	0	0	0	0	0	0	0	1	137
11:00 AM	1	61	26	0	5	0	0	0	0	0	0	0	0	4	97
11:15 AM	0	61	37	1	4	1	0	0	3	1	0	0	0	6	114
11:30 AM	3	74	24	0	4	0	0	0	1	0	0	0	0	7	113
11:45 AM	1	68	30	0	11	0	0	0	1	0	0	0	0	4	115
Day Total															
Percent															
ADT 8546															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: SB
CITY/STATE: Maalaea, HI | DATE: May 21 2024

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
12:00 PM	0	80	31	3	6	2	0	2	6	1	0	0	0	4	135
12:15 PM	3	76	40	0	8	2	0	0	4	0	0	0	0	10	143
12:30 PM	1	73	39	0	2	2	0	0	0	1	0	0	0	5	123
12:45 PM	0	83	42	1	5	1	0	0	1	0	0	0	0	8	141
01:00 PM	3	79	40	0	9	1	0	1	1	1	0	0	0	2	137
01:15 PM	0	80	35	0	6	1	0	0	2	0	0	0	0	5	129
01:30 PM	1	74	39	0	8	0	0	1	1	1	0	0	0	4	129
01:45 PM	2	80	46	0	9	1	0	0	5	0	0	0	0	5	148
02:00 PM	0	79	30	0	4	2	0	0	3	1	0	0	0	7	126
02:15 PM	6	103	43	0	11	1	0	0	0	0	0	0	0	6	170
02:30 PM	3	71	33	0	11	0	0	0	0	0	0	0	0	10	128
02:45 PM	0	105	49	0	8	0	0	0	0	0	0	0	0	7	169
03:00 PM	1	106	70	3	10	0	0	0	0	1	0	0	0	2	193
03:15 PM	1	122	49	4	9	0	0	0	0	0	0	0	0	9	194
03:30 PM	1	86	44	2	5	2	0	0	0	1	0	0	0	9	150
03:45 PM	1	108	52	3	11	0	0	0	1	0	0	0	0	7	183
04:00 PM	1	98	61	0	9	0	0	0	0	0	0	0	0	6	175
04:15 PM	1	107	50	0	6	1	0	0	1	0	0	0	0	14	180
04:30 PM	2	108	52	0	11	0	0	0	2	0	0	0	0	11	186
04:45 PM	1	108	37	0	10	2	0	0	1	0	0	0	0	10	169
05:00 PM	0	115	62	0	4	1	0	1	1	0	0	0	0	10	194
05:15 PM	3	119	60	4	9	4	0	0	0	0	0	0	0	8	207
05:30 PM	0	94	54	0	13	0	0	0	2	0	0	0	0	5	168
05:45 PM	5	119	36	0	9	1	0	0	0	0	0	0	0	3	173
Day Total															
Percent															
ADT 8546															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: SB
CITY/STATE: Maalaea, HI | DATE: May 21 2024

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
06:00 PM	1	93	60	0	9	1	0	0	0	0	0	0	0	4	168
06:15 PM	0	62	39	0	9	0	0	0	0	0	0	0	0	5	115
06:30 PM	0	72	35	0	7	0	0	0	0	0	0	0	0	5	119
06:45 PM	0	69	27	0	5	0	0	0	0	0	0	0	0	1	102
07:00 PM	1	50	28	0	6	1	0	0	0	0	0	0	0	2	88
07:15 PM	0	59	24	0	3	0	0	0	0	0	0	0	0	2	88
07:30 PM	0	50	31	0	9	0	0	0	0	0	0	0	0	2	92
07:45 PM	0	63	31	0	6	0	0	0	0	0	0	0	0	0	100
08:00 PM	1	47	20	0	4	0	0	0	0	0	0	0	0	3	75
08:15 PM	0	53	18	0	4	0	0	0	0	0	0	0	0	1	76
08:30 PM	0	32	24	0	3	0	0	0	0	0	0	0	0	2	61
08:45 PM	0	30	14	0	3	0	0	0	0	0	0	0	0	0	47
09:00 PM	0	31	17	0	2	0	0	0	0	0	0	0	0	0	50
09:15 PM	0	29	18	0	2	0	0	0	0	0	0	0	0	2	51
09:30 PM	0	35	14	0	1	0	0	0	0	0	0	0	0	0	50
09:45 PM	0	30	15	0	1	0	0	0	0	0	0	0	0	0	46
10:00 PM	0	22	14	0	2	0	0	0	0	0	0	0	0	0	38
10:15 PM	0	27	12	0	3	0	0	0	0	0	0	0	0	0	42
10:30 PM	1	19	11	0	3	0	0	0	0	0	0	0	0	0	34
10:45 PM	0	5	5	0	1	0	0	0	0	0	0	0	0	1	12
11:00 PM	0	9	5	0	1	0	0	0	0	0	0	0	0	0	15
11:15 PM	0	8	2	0	1	0	0	0	0	0	0	0	0	0	11
11:30 PM	0	9	10	0	1	0	0	0	0	0	0	0	0	0	20
11:45 PM	0	10	5	0	1	0	0	0	0	0	0	0	0	0	16
Day Total	69	4965	2512	31	493	56	1	12	62	17	0	0	0	328	8546
Percent	0.8%	58.1%	29.4%	0.4%	5.8%	0.7%	0%	0.1%	0.7%	0.2%	0%	0%	0%	3.8%	
ADT 8546															
AM Peak	7:30 AM	7:45 AM	7:15 AM	8:30 AM	8:30 AM	10:15 AM	8:00 AM	7:15 AM	10:15 AM	5:30 AM	12:00 AM	12:00 AM	12:00 AM	7:00 AM	7:45 AM
15-min Vol	3	102	48	2	18	4	1	1	5	1	0	0	0	10	171
PM Peak	2:15 PM	3:15 PM	3:00 PM	3:15 PM	5:30 PM	5:15 PM	12:00 PM	12:00 PM	12:00 PM	12:00 PM	12:00 PM	12:00 PM	12:00 PM	4:15 PM	5:15 PM
15-min Vol	6	122	70	4	13	4	0	2	6	1	0	0	0	14	207

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: SB
CITY/STATE: Maalaea, HI | DATE: May 22 2024

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
12:00 AM	0	5	2	0	1	0	0	0	0	0	0	0	0	0	8
12:15 AM	0	6	2	0	0	0	0	0	0	0	0	0	0	0	8
12:30 AM	0	4	2	0	0	0	0	0	0	0	0	0	0	0	6
12:45 AM	0	2	2	0	0	0	0	0	0	0	0	0	0	0	4
01:00 AM	0	4	3	0	0	0	0	0	0	0	0	0	0	0	7
01:15 AM	0	6	1	0	0	0	0	0	0	0	0	0	0	0	7
01:30 AM	0	7	3	0	0	0	0	0	0	0	0	0	0	0	10
01:45 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
02:00 AM	0	3	2	0	0	0	0	0	0	0	0	0	0	0	5
02:15 AM	0	4	2	0	0	0	0	0	0	0	0	0	0	0	6
02:30 AM	0	1	1	0	1	0	0	0	0	0	0	0	0	0	3
02:45 AM	0	3	2	0	0	0	0	0	0	0	0	0	0	0	5
03:00 AM	0	1	3	0	0	0	0	0	0	0	0	0	0	0	4
03:15 AM	0	3	3	0	0	0	0	0	0	0	0	0	0	0	6
03:30 AM	0	1	2	0	0	0	0	0	0	0	0	0	0	0	3
03:45 AM	0	5	2	0	0	0	0	0	0	0	0	0	0	0	7
04:00 AM	0	4	1	0	0	0	0	0	0	0	0	0	0	0	5
04:15 AM	0	8	6	0	1	0	0	0	0	0	0	0	0	0	15
04:30 AM	0	13	5	1	0	1	0	0	0	0	0	0	0	0	20
04:45 AM	0	11	10	1	2	0	0	0	0	0	0	0	0	0	24
05:00 AM	0	11	4	0	2	1	0	0	0	0	0	0	0	0	18
05:15 AM	0	17	10	0	3	0	0	0	0	1	0	0	0	0	31
05:30 AM	0	23	18	0	7	0	0	0	1	0	0	0	0	0	49
05:45 AM	0	30	22	0	7	0	0	0	1	1	0	0	0	3	64
Day Total															
Percent															
ADT 8757															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: SB
CITY/STATE: Maalaea, HI | DATE: May 22 2024

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
06:00 AM	0	35	32	0	7	0	0	0	0	0	0	0	0	5	79
06:15 AM	1	48	21	5	6	0	0	0	1	0	0	0	0	6	88
06:30 AM	0	57	50	0	6	0	0	0	1	1	0	0	0	4	119
06:45 AM	1	56	35	0	18	0	0	1	0	0	0	0	0	1	112
07:00 AM	3	78	30	0	9	0	0	1	0	1	0	0	0	7	129
07:15 AM	1	86	53	1	15	0	0	0	0	0	0	0	0	5	161
07:30 AM	2	63	48	2	10	1	0	0	0	1	0	0	0	7	134
07:45 AM	0	89	54	0	12	0	0	2	2	0	0	0	0	5	164
08:00 AM	2	121	31	0	11	1	0	0	0	0	0	0	0	10	176
08:15 AM	1	63	41	1	5	0	0	2	1	0	0	0	0	1	115
08:30 AM	0	73	32	1	10	4	0	1	2	1	0	0	0	3	127
08:45 AM	2	73	37	0	11	1	0	0	0	0	0	0	0	4	128
09:00 AM	2	49	29	1	7	0	0	1	2	1	0	0	0	4	96
09:15 AM	0	56	27	2	13	1	0	1	0	0	0	0	0	1	101
09:30 AM	1	69	32	0	3	1	0	0	3	1	0	0	0	2	112
09:45 AM	1	70	41	0	7	1	0	0	2	0	0	0	0	4	126
10:00 AM	1	68	45	0	3	0	0	1	1	0	0	0	0	3	122
10:15 AM	1	56	30	2	10	2	0	1	5	1	0	0	0	8	116
10:30 AM	0	64	41	1	6	3	0	0	0	0	0	0	0	3	118
10:45 AM	1	52	31	1	9	1	0	0	0	0	0	0	0	5	100
11:00 AM	3	67	28	1	6	0	0	0	3	0	0	0	0	1	109
11:15 AM	1	71	22	0	13	0	0	0	0	0	0	0	0	5	112
11:30 AM	2	72	42	1	5	3	0	0	4	0	0	0	0	4	133
11:45 AM	0	79	45	1	12	2	0	1	2	0	0	0	0	6	148
Day Total															
Percent															
ADT 8757															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: SB
CITY/STATE: Maalaea, HI | DATE: May 22 2024

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
12:00 PM	3	61	29	0	4	2	0	0	1	1	0	0	0	8	109
12:15 PM	3	85	39	0	11	0	0	1	0	0	0	0	0	6	145
12:30 PM	0	100	53	1	9	0	0	0	0	1	0	0	0	7	171
12:45 PM	0	75	49	0	9	0	0	0	1	0	0	0	0	2	136
01:00 PM	1	66	46	0	7	1	1	0	5	1	0	0	0	2	130
01:15 PM	1	86	46	0	3	1	0	0	1	1	1	0	0	9	149
01:30 PM	0	103	38	1	7	2	0	0	2	0	0	0	0	8	161
01:45 PM	2	92	51	1	5	1	0	0	3	0	0	0	0	7	162
02:00 PM	1	76	41	1	5	1	0	1	0	0	0	0	0	8	134
02:15 PM	2	86	54	0	8	2	0	0	0	1	0	0	0	3	156
02:30 PM	0	114	49	1	6	1	0	1	0	0	0	0	0	2	174
02:45 PM	0	109	46	4	4	0	0	0	0	1	0	0	0	7	171
03:00 PM	0	106	46	0	9	1	0	0	1	0	0	0	0	5	168
03:15 PM	2	99	55	0	13	1	0	0	0	1	0	0	0	5	176
03:30 PM	2	109	61	1	8	4	0	0	0	0	0	0	0	10	195
03:45 PM	1	107	51	3	6	1	0	0	0	0	0	0	0	6	175
04:00 PM	0	120	58	0	12	1	0	1	0	0	0	0	0	13	205
04:15 PM	1	106	50	0	7	1	0	1	0	0	0	0	0	4	170
04:30 PM	3	118	49	0	10	0	0	1	0	0	0	0	0	23	204
04:45 PM	0	111	39	0	9	1	0	0	1	0	0	0	0	8	169
05:00 PM	2	94	43	0	8	2	0	1	0	0	0	0	0	8	158
05:15 PM	3	123	37	1	18	1	0	0	0	1	0	0	0	3	187
05:30 PM	1	87	52	0	5	3	0	0	0	0	0	0	0	8	156
05:45 PM	0	101	61	0	11	1	0	0	2	0	0	0	0	4	180
Day Total															
Percent															
ADT 8757															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619
SPECIFIC LOCATION: | DIRECTION: SB
CITY/STATE: Maalaea, HI | DATE: May 22 2024

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
06:00 PM	0	92	34	1	21	1	0	1	0	0	0	0	0	6	156
06:15 PM	0	82	35	0	9	1	0	0	0	0	0	0	0	0	127
06:30 PM	1	59	28	0	7	0	0	0	0	0	0	0	0	2	97
06:45 PM	0	60	30	0	7	0	0	0	0	0	0	0	0	1	98
07:00 PM	0	46	27	0	4	1	0	1	0	0	0	0	0	1	80
07:15 PM	1	65	33	0	3	0	0	0	0	0	0	0	0	5	107
07:30 PM	1	66	21	0	3	0	0	0	0	0	0	0	0	4	95
07:45 PM	1	67	38	0	3	0	0	0	0	0	0	0	0	2	111
08:00 PM	1	47	22	0	5	0	0	0	0	0	0	0	0	2	77
08:15 PM	0	38	19	0	1	0	0	0	0	0	0	0	0	3	61
08:30 PM	0	37	14	0	2	0	0	0	0	0	0	0	0	1	54
08:45 PM	0	44	22	0	1	0	0	1	0	0	0	0	0	1	69
09:00 PM	0	40	21	0	1	0	0	0	0	0	0	0	0	0	62
09:15 PM	1	41	27	0	1	0	0	0	0	0	0	0	0	1	71
09:30 PM	0	29	5	0	1	0	0	0	0	0	0	0	0	1	36
09:45 PM	0	28	19	0	1	0	0	0	0	0	0	0	0	0	48
10:00 PM	0	34	14	1	2	0	0	0	0	0	0	0	0	1	52
10:15 PM	0	21	14	0	3	0	0	0	0	0	0	0	0	1	39
10:30 PM	0	22	10	0	1	0	0	0	0	0	0	0	0	0	33
10:45 PM	0	15	4	0	1	0	0	0	0	0	0	0	0	0	20
11:00 PM	0	11	10	0	4	0	0	0	0	0	0	0	0	0	25
11:15 PM	0	11	6	0	4	0	0	0	0	0	0	0	0	0	21
11:30 PM	0	14	6	0	1	0	0	0	0	0	0	0	0	0	21
11:45 PM	0	10	5	0	0	0	0	0	0	0	0	0	0	0	15
Day Total	60	5101	2592	38	518	54	1	22	48	17	1	0	0	305	8757
Percent	0.7%	58.3%	29.6%	0.4%	5.9%	0.6%	0%	0.3%	0.5%	0.2%	0%	0%	0%	3.5%	
ADT 8757															
AM Peak	7:00 AM	8:00 AM	7:45 AM	6:15 AM	6:45 AM	8:30 AM	12:00 AM	7:45 AM	10:15 AM	5:15 AM	12:00 AM	12:00 AM	12:00 AM	8:00 AM	8:00 AM
15-min Vol	3	121	54	5	18	4	0	2	5	1	0	0	0	10	176
PM Peak	12:00 PM	5:15 PM	3:30 PM	2:45 PM	6:00 PM	3:30 PM	1:00 PM	12:15 PM	1:00 PM	12:00 PM	1:15 PM	12:00 PM	12:00 PM	4:30 PM	4:00 PM
15-min Vol	3	123	61	4	21	4	1	1	5	1	1	0	0	23	205

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

SUMMARY - Tube Count - Vehicle Classification Data

LOCATION: N Kihei Rd south of S 8th St
SPECIFIC LOCATION:
CITY/STATE: Maalaea, HI

QC JOB #: 16589619
DIRECTION: SB
DATE: May 21 2024 - May 22 2024

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
Grand Total	129	10066	5104	69	1011	110	2	34	110	34	1	0	0	633	17303
Percent	0.7%	58.2%	29.5%	0.4%	5.8%	0.6%	0%	0.2%	0.6%	0.2%	0%	0%	0%	3.7%	
ADT 8651															

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619

SPECIFIC LOCATION: | DIRECTION: SB

CITY/STATE: Maalaea, HI | DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
12:00 AM		6	8			7			7	
12:15 AM		7	8			8			8	
12:30 AM		5	6			6			6	
12:45 AM		5	4			5			5	
01:00 AM		3	7			5			5	
01:15 AM		4	7			6			6	
01:30 AM		8	10			9			9	
01:45 AM		1	1			1			1	
02:00 AM		2	5			4			4	
02:15 AM		2	6			4			4	
02:30 AM		3	3			3			3	
02:45 AM		5	5			5			5	
03:00 AM		7	4			6			6	
03:15 AM		10	6			8			8	
03:30 AM		6	3			5			5	
03:45 AM		8	7			8			8	
04:00 AM		9	5			7			7	
04:15 AM		14	15			15			15	
04:30 AM		15	20			18			18	
04:45 AM		10	24			17			17	
05:00 AM		21	18			20			20	
05:15 AM		37	31			34			34	
05:30 AM		43	49			46			46	
05:45 AM		57	64			61			61	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: N Kihei Rd south of S 8th St | QC JOB #: 16589619

SPECIFIC LOCATION: | DIRECTION: SB

CITY/STATE: Maalaea, HI | DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
06:00 AM		85	79			82			82	
06:15 AM		98	88			93			93	
06:30 AM		114	119			117			117	
06:45 AM		106	112			109			109	
07:00 AM		109	129			119			119	
07:15 AM		160	161			161			161	
07:30 AM		151	134			143			143	
07:45 AM		171	164			168			168	
08:00 AM		148	176			162			162	
08:15 AM		127	115			121			121	
08:30 AM		138	127			133			133	
08:45 AM		110	128			119			119	
09:00 AM		103	96			100			100	
09:15 AM		95	101			98			98	
09:30 AM		125	112			119			119	
09:45 AM		131	126			129			129	
10:00 AM		106	122			114			114	
10:15 AM		110	116			113			113	
10:30 AM		129	118			124			124	
10:45 AM		137	100			119			119	
11:00 AM		97	109			103			103	
11:15 AM		114	112			113			113	
11:30 AM		113	133			123			123	
11:45 AM		115	148			132			132	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: N Kihei Rd south of S 8th St
QC JOB #: 16589619

SPECIFIC LOCATION:
DIRECTION: SB

CITY/STATE: Maalaea, HI
DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
12:00 PM		135	109			122			122	
12:15 PM		143	145			144			144	
12:30 PM		123	171			147			147	
12:45 PM		141	136			139			139	
01:00 PM		137	130			134			134	
01:15 PM		129	149			139			139	
01:30 PM		129	161			145			145	
01:45 PM		148	162			155			155	
02:00 PM		126	134			130			130	
02:15 PM		170	156			163			163	
02:30 PM		128	174			151			151	
02:45 PM		169	171			170			170	
03:00 PM		193	168			181			181	
03:15 PM		194	176			185			185	
03:30 PM		150	195			173			173	
03:45 PM		183	175			179			179	
04:00 PM		175	205			190			190	
04:15 PM		180	170			175			175	
04:30 PM		186	204			195			195	
04:45 PM		169	169			169			169	
05:00 PM		194	158			176			176	
05:15 PM		207	187			197			197	
05:30 PM		168	156			162			162	
05:45 PM		173	180			177			177	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: N Kihei Rd south of S 8th St
QC JOB #: 16589619

SPECIFIC LOCATION:
DIRECTION: SB

CITY/STATE: Maalaea, HI
DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
06:00 PM		168	156			162			162	
06:15 PM		115	127			121			121	
06:30 PM		119	97			108			108	
06:45 PM		102	98			100			100	
07:00 PM		88	80			84			84	
07:15 PM		88	107			98			98	
07:30 PM		92	95			94			94	
07:45 PM		100	111			106			106	
08:00 PM		75	77			76			76	
08:15 PM		76	61			69			69	
08:30 PM		61	54			58			58	
08:45 PM		47	69			58			58	
09:00 PM		50	62			56			56	
09:15 PM		51	71			61			61	
09:30 PM		50	36			43			43	
09:45 PM		46	48			47			47	
10:00 PM		38	52			45			45	
10:15 PM		42	39			41			41	
10:30 PM		34	33			34			34	
10:45 PM		12	20			16			16	
11:00 PM		15	25			20			20	
11:15 PM		11	21			16			16	
11:30 PM		20	21			21			21	
11:45 PM		16	15			16			16	
Day Total		8546	8757			8670			8670	
% Weekday Average		98.6%	101%							
% Week Average		98.6%	101%			100%				
AM Peak 15-min Vol		7:45 AM 171	8:00 AM 176			7:45 AM 168			7:45 AM 168	
PM Peak 15-min Vol		5:15 PM 207	4:00 PM 205			5:15 PM 197			5:15 PM 197	

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd
SPECIFIC LOCATION:
CITY/STATE: Kahului, HI

QC JOB #: 16589621
DIRECTION: NB
DATE: May 21 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
12:00 AM	0	28	0	0	0	0	1	0	29
12:15 AM	0	18	0	0	1	0	1	0	20
12:30 AM	0	13	0	0	2	0	0	0	15
12:45 AM	0	7	0	1	1	0	0	0	9
01:00 AM	0	10	0	0	1	0	0	0	11
01:15 AM	0	9	0	0	1	0	1	0	11
01:30 AM	0	10	0	0	1	0	0	0	11
01:45 AM	0	4	0	0	0	0	0	0	4
02:00 AM	0	9	0	0	1	0	0	0	10
02:15 AM	0	14	0	0	2	0	0	0	16
02:30 AM	0	6	0	0	2	0	1	0	9
02:45 AM	0	12	0	0	2	0	1	0	15
03:00 AM	0	8	0	0	1	0	0	0	9
03:15 AM	0	12	0	0	0	0	2	0	14
03:30 AM	0	14	0	0	0	0	1	0	15
03:45 AM	0	20	0	0	1	0	1	0	22
04:00 AM	0	12	0	0	1	0	0	0	13
04:15 AM	0	26	0	0	0	0	0	0	26
04:30 AM	0	23	0	0	0	0	2	0	25
04:45 AM	0	30	0	1	1	0	1	0	33
05:00 AM	0	40	0	0	4	0	2	0	46
05:15 AM	0	73	8	0	2	0	2	0	85
05:30 AM	0	53	25	1	3	0	5	0	87
05:45 AM	0	72	49	1	7	0	4	0	133
Day Total									
Percent									
ADT 18918									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd
SPECIFIC LOCATION:
CITY/STATE: Kahului, HI

QC JOB #: 16589621
DIRECTION: NB
DATE: May 21 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
06:00 AM	0	86	40	7	8	0	4	1	146
06:15 AM	0	112	85	7	7	1	1	0	213
06:30 AM	1	135	88	6	11	1	3	0	245
06:45 AM	0	146	100	3	7	1	4	0	261
07:00 AM	1	167	85	5	6	4	7	0	275
07:15 AM	0	207	101	0	18	7	4	0	337
07:30 AM	2	223	127	0	15	3	3	0	373
07:45 AM	0	247	103	0	24	2	3	0	379
08:00 AM	2	186	84	3	13	2	4	0	294
08:15 AM	0	204	84	1	12	1	6	0	308
08:30 AM	0	192	100	1	10	5	3	0	311
08:45 AM	0	195	87	0	7	6	3	0	298
09:00 AM	0	190	84	1	4	4	5	0	288
09:15 AM	0	168	71	1	4	2	6	0	252
09:30 AM	1	253	74	0	3	4	5	0	340
09:45 AM	2	194	90	1	9	4	9	0	309
10:00 AM	3	197	86	2	11	4	6	0	309
10:15 AM	3	256	100	0	14	6	1	0	380
10:30 AM	1	213	68	2	15	1	5	0	305
10:45 AM	0	230	99	3	8	0	3	0	343
11:00 AM	0	194	73	1	14	5	5	0	292
11:15 AM	0	244	84	1	12	4	3	0	348
11:30 AM	0	188	77	2	6	4	4	0	281
11:45 AM	1	184	95	2	14	3	5	0	304
Day Total									
Percent									
ADT 18918									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd
SPECIFIC LOCATION:
CITY/STATE: Kahului, HI

QC JOB #: 16589621
DIRECTION: NB
DATE: May 21 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
12:00 PM	2	182	76	2	8	0	3	0	273
12:15 PM	0	189	79	2	11	1	6	0	288
12:30 PM	1	188	84	2	9	5	3	0	292
12:45 PM	0	221	97	2	8	2	6	0	336
01:00 PM	0	166	79	6	14	2	7	0	274
01:15 PM	1	203	114	2	12	3	6	0	341
01:30 PM	1	194	107	3	12	0	4	0	321
01:45 PM	2	190	75	4	19	3	5	0	298
02:00 PM	1	193	94	1	17	3	1	0	310
02:15 PM	1	201	114	1	13	2	7	0	339
02:30 PM	0	193	100	0	9	5	4	0	311
02:45 PM	0	201	109	2	11	1	3	0	327
03:00 PM	1	195	113	1	14	6	0	0	330
03:15 PM	1	208	127	1	8	2	0	1	348
03:30 PM	2	238	138	1	15	3	3	0	400
03:45 PM	0	239	144	2	18	3	3	0	409
04:00 PM	1	195	144	1	14	0	2	0	357
04:15 PM	3	272	153	0	14	1	2	0	445
04:30 PM	3	236	131	0	9	0	1	0	380
04:45 PM	1	264	160	0	4	2	1	0	432
05:00 PM	0	230	110	1	10	0	4	0	355
05:15 PM	0	262	128	0	6	1	5	0	402
05:30 PM	0	207	99	0	9	0	2	0	317
05:45 PM	0	176	91	0	5	0	2	0	274
Day Total									
Percent									
ADT 18918									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd
SPECIFIC LOCATION:
CITY/STATE: Kahului, HI

QC JOB #: 16589621
DIRECTION: NB
DATE: May 21 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
06:00 PM	1	152	83	1	5	0	2	0	244
06:15 PM	3	165	66	0	5	0	1	0	240
06:30 PM	1	119	66	0	4	0	1	0	191
06:45 PM	1	123	64	0	3	0	1	0	192
07:00 PM	0	127	65	1	4	0	1	0	198
07:15 PM	0	166	8	0	7	0	5	0	186
07:30 PM	0	173	0	0	2	0	0	0	175
07:45 PM	0	135	0	0	2	0	0	0	137
08:00 PM	0	135	0	0	1	0	1	0	137
08:15 PM	0	116	0	0	3	0	0	0	119
08:30 PM	0	119	0	0	2	0	0	0	121
08:45 PM	0	102	0	0	3	0	1	0	106
09:00 PM	0	66	0	0	0	0	1	0	67
09:15 PM	0	97	0	0	0	0	0	0	97
09:30 PM	0	79	0	0	1	0	0	0	80
09:45 PM	0	98	0	0	3	0	0	0	101
10:00 PM	0	97	0	0	3	0	0	0	100
10:15 PM	0	93	0	0	1	0	0	0	94
10:30 PM	0	76	0	0	3	0	1	0	80
10:45 PM	0	50	0	0	1	0	3	0	54
11:00 PM	0	52	0	0	1	0	1	0	54
11:15 PM	0	57	0	0	1	0	2	0	60
11:30 PM	0	41	0	0	0	0	0	0	41
11:45 PM	0	26	0	0	0	0	0	0	26
Day Total	44	12641	5185	89	610	119	228	2	18918
Percent	0.2%	66.8%	27.4%	0.5%	3.2%	0.6%	1.2%	0%	
ADT 18918									
AM Peak	10:00 AM	10:15 AM	7:30 AM	6:00 AM	7:45 AM	7:15 AM	9:45 AM	6:00 AM	10:15 AM
15-min Vol	3	256	127	7	24	7	9	1	380
PM Peak	4:15 PM	4:15 PM	4:45 PM	1:00 PM	1:45 PM	3:00 PM	1:00 PM	3:15 PM	4:15 PM
15-min Vol	3	272	160	6	19	6	7	1	445

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd
QC JOB #: 16589621
SPECIFIC LOCATION:
DIRECTION: NB
CITY/STATE: Kahului, HI
DATE: May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
12:00 AM	0	34	0	0	1	0	0	0	35
12:15 AM	0	31	0	0	2	0	1	0	34
12:30 AM	0	12	0	0	0	0	0	0	12
12:45 AM	0	11	0	0	2	0	0	0	13
01:00 AM	0	10	0	0	1	0	1	0	12
01:15 AM	0	18	0	0	2	0	0	0	20
01:30 AM	0	18	0	0	0	0	2	0	20
01:45 AM	0	11	0	0	1	0	0	0	12
02:00 AM	0	9	0	0	1	0	0	0	10
02:15 AM	0	16	0	0	3	0	0	0	19
02:30 AM	0	7	0	0	1	0	2	0	10
02:45 AM	0	12	0	0	1	0	1	0	14
03:00 AM	0	8	0	0	1	0	1	0	10
03:15 AM	0	16	0	0	0	0	2	0	18
03:30 AM	0	16	0	0	0	0	0	0	16
03:45 AM	0	22	0	0	0	0	1	0	23
04:00 AM	0	18	0	0	0	0	0	0	18
04:15 AM	0	17	0	0	1	0	0	0	18
04:30 AM	0	24	0	0	3	0	2	0	29
04:45 AM	0	46	0	0	0	0	1	0	47
05:00 AM	0	39	0	0	4	0	2	0	45
05:15 AM	0	62	7	1	1	0	2	0	73
05:30 AM	0	60	26	0	7	1	1	0	95
05:45 AM	0	68	56	5	7	0	3	0	139
Day Total									
Percent									
ADT 19041									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd
SPECIFIC LOCATION:
CITY/STATE: Kahului, HI

QC JOB #: 16589621
DIRECTION: NB
DATE: May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
06:00 AM	1	85	62	7	7	3	1	0	166
06:15 AM	0	115	78	6	5	0	1	0	205
06:30 AM	0	120	78	8	10	3	3	0	222
06:45 AM	0	173	82	2	15	4	0	0	276
07:00 AM	0	179	81	4	10	6	4	0	284
07:15 AM	0	245	107	1	12	7	2	0	374
07:30 AM	2	246	116	1	12	3	3	0	383
07:45 AM	0	230	104	1	14	2	1	0	352
08:00 AM	0	167	93	1	12	3	4	0	280
08:15 AM	0	194	76	1	7	6	3	0	287
08:30 AM	1	218	89	1	5	9	2	0	325
08:45 AM	2	214	80	0	12	3	2	0	313
09:00 AM	0	189	73	1	10	4	3	0	280
09:15 AM	0	177	84	1	10	3	6	0	281
09:30 AM	0	199	82	1	5	5	3	0	295
09:45 AM	0	230	88	0	11	4	6	0	339
10:00 AM	0	204	70	1	7	3	3	0	288
10:15 AM	1	212	86	1	10	3	1	0	314
10:30 AM	0	230	86	0	12	5	3	0	336
10:45 AM	1	190	66	2	13	2	3	0	277
11:00 AM	1	199	83	2	10	3	2	0	300
11:15 AM	2	196	97	2	17	2	2	0	318
11:30 AM	1	178	86	0	10	4	3	0	282
11:45 AM	0	171	86	2	10	3	9	0	281
Day Total									
Percent									
ADT 19041									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd | QC JOB #: 16589621
SPECIFIC LOCATION: | DIRECTION: NB
CITY/STATE: Kahului, HI | DATE: May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
12:00 PM	0	173	82	3	14	7	3	0	282
12:15 PM	1	185	85	5	9	1	5	0	291
12:30 PM	2	195	80	1	10	3	8	0	299
12:45 PM	0	181	89	2	14	4	5	0	295
01:00 PM	3	203	95	4	14	3	3	0	325
01:15 PM	1	187	108	5	17	1	3	0	322
01:30 PM	1	180	110	1	7	6	4	0	309
01:45 PM	1	230	124	0	14	3	5	0	377
02:00 PM	0	226	108	3	22	1	1	0	361
02:15 PM	0	204	110	1	14	3	4	0	336
02:30 PM	0	227	104	2	16	2	3	0	354
02:45 PM	1	208	115	1	15	2	1	0	343
03:00 PM	0	199	111	1	11	0	2	0	324
03:15 PM	1	239	116	0	17	0	2	0	375
03:30 PM	1	242	156	2	13	1	1	0	416
03:45 PM	3	237	159	1	9	4	1	0	414
04:00 PM	1	212	160	1	19	1	1	0	395
04:15 PM	0	251	137	0	5	1	3	0	397
04:30 PM	1	270	140	1	8	1	2	0	423
04:45 PM	2	246	111	0	5	0	3	0	367
05:00 PM	0	242	107	1	3	0	3	0	356
05:15 PM	0	229	121	0	9	1	0	0	360
05:30 PM	1	185	111	0	3	0	2	0	302
05:45 PM	3	178	84	0	8	0	1	0	274
Day Total									
Percent									
ADT 19041									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd
SPECIFIC LOCATION:
CITY/STATE: Kahului, HI

QC JOB #: 16589621
DIRECTION: NB
DATE: May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
06:00 PM	0	130	70	2	8	1	0	0	211
06:15 PM	0	178	81	1	5	0	0	0	265
06:30 PM	2	163	78	1	3	0	1	0	248
06:45 PM	1	123	70	0	4	0	0	0	198
07:00 PM	0	112	71	1	0	0	1	0	185
07:15 PM	0	151	9	0	5	0	3	0	168
07:30 PM	0	156	0	0	1	0	0	0	157
07:45 PM	0	139	0	0	5	0	2	0	146
08:00 PM	0	138	0	0	1	0	2	0	141
08:15 PM	0	130	0	0	3	0	0	0	133
08:30 PM	0	105	0	0	0	0	1	0	106
08:45 PM	0	102	0	0	2	0	0	0	104
09:00 PM	0	82	0	0	2	0	0	0	84
09:15 PM	0	93	0	0	4	0	1	0	98
09:30 PM	0	84	0	0	2	0	0	0	86
09:45 PM	0	90	0	0	1	0	0	0	91
10:00 PM	0	85	0	0	0	0	0	0	85
10:15 PM	0	101	0	0	3	0	0	0	104
10:30 PM	0	77	0	0	3	0	1	0	81
10:45 PM	0	65	0	0	1	0	2	0	68
11:00 PM	0	44	0	0	2	0	2	0	48
11:15 PM	0	67	0	0	0	0	0	0	67
11:30 PM	0	37	0	0	0	0	0	0	37
11:45 PM	0	32	0	0	1	0	0	0	33
Day Total	38	12759	5224	92	617	137	174	0	19041
Percent	0.2%	67%	27.4%	0.5%	3.2%	0.7%	0.9%	0%	
ADT 19041									
AM Peak	7:30 AM	7:30 AM	7:30 AM	6:30 AM	11:15 AM	8:30 AM	11:45 AM	12:00 AM	7:30 AM
15-min Vol	2	246	116	8	17	9	9	0	383
PM Peak	1:00 PM	4:30 PM	4:00 PM	12:15 PM	2:00 PM	12:00 PM	12:30 PM	12:00 PM	4:30 PM
15-min Vol	3	270	160	5	22	7	8	0	423

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

SUMMARY - Tube Count - Vehicle Classification Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd
SPECIFIC LOCATION:
CITY/STATE: Kahului, HI

QC JOB #: 16589621
DIRECTION: NB
DATE: May 21 2024 - May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
Grand Total	82	25400	10409	181	1227	256	402	2	37959
Percent	0.2%	66.9%	27.4%	0.5%	3.2%	0.7%	1.1%	0%	
ADT 18979									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd | QC JOB #: 16589621

SPECIFIC LOCATION: | DIRECTION: NB

CITY/STATE: Kahului, HI | DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
12:00 AM		29	35			32			32	
12:15 AM		20	34			27			27	
12:30 AM		15	12			14			14	
12:45 AM		9	13			11			11	
01:00 AM		11	12			12			12	
01:15 AM		11	20			16			16	
01:30 AM		11	20			16			16	
01:45 AM		4	12			8			8	
02:00 AM		10	10			10			10	
02:15 AM		16	19			18			18	
02:30 AM		9	10			10			10	
02:45 AM		15	14			15			15	
03:00 AM		9	10			10			10	
03:15 AM		14	18			16			16	
03:30 AM		15	16			16			16	
03:45 AM		22	23			23			23	
04:00 AM		13	18			16			16	
04:15 AM		26	18			22			22	
04:30 AM		25	29			27			27	
04:45 AM		33	47			40			40	
05:00 AM		46	45			46			46	
05:15 AM		85	73			79			79	
05:30 AM		87	95			91			91	
05:45 AM		133	139			136			136	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd | QC JOB #: 16589621

SPECIFIC LOCATION: | DIRECTION: NB

CITY/STATE: Kahului, HI | DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
06:00 AM		146	166			156			156	
06:15 AM		213	205			209			209	
06:30 AM		245	222			234			234	
06:45 AM		261	276			269			269	
07:00 AM		275	284			280			280	
07:15 AM		337	374			356			356	
07:30 AM		373	383			378			378	
07:45 AM		379	352			366			366	
08:00 AM		294	280			287			287	
08:15 AM		308	287			298			298	
08:30 AM		311	325			318			318	
08:45 AM		298	313			306			306	
09:00 AM		288	280			284			284	
09:15 AM		252	281			267			267	
09:30 AM		340	295			318			318	
09:45 AM		309	339			324			324	
10:00 AM		309	288			299			299	
10:15 AM		380	314			347			347	
10:30 AM		305	336			321			321	
10:45 AM		343	277			310			310	
11:00 AM		292	300			296			296	
11:15 AM		348	318			333			333	
11:30 AM		281	282			282			282	
11:45 AM		304	281			293			293	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd | QC JOB #: 16589621

SPECIFIC LOCATION: | DIRECTION: NB

CITY/STATE: Kahului, HI | DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
12:00 PM		273	282			278			278	
12:15 PM		288	291			290			290	
12:30 PM		292	299			296			296	
12:45 PM		336	295			316			316	
01:00 PM		274	325			300			300	
01:15 PM		341	322			332			332	
01:30 PM		321	309			315			315	
01:45 PM		298	377			338			338	
02:00 PM		310	361			336			336	
02:15 PM		339	336			338			338	
02:30 PM		311	354			333			333	
02:45 PM		327	343			335			335	
03:00 PM		330	324			327			327	
03:15 PM		348	375			362			362	
03:30 PM		400	416			408			408	
03:45 PM		409	414			412			412	
04:00 PM		357	395			376			376	
04:15 PM		**445**	397			**421**			**421**	
04:30 PM		380	**423**			402			402	
04:45 PM		432	367			400			400	
05:00 PM		355	356			356			356	
05:15 PM		402	360			381			381	
05:30 PM		317	302			310			310	
05:45 PM		274	274			274			274	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd | QC JOB #: 16589621
SPECIFIC LOCATION: | DIRECTION: NB
CITY/STATE: Kahului, HI | DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
06:00 PM		244	211			228			228	
06:15 PM		240	265			253			253	
06:30 PM		191	248			220			220	
06:45 PM		192	198			195			195	
07:00 PM		198	185			192			192	
07:15 PM		186	168			177			177	
07:30 PM		175	157			166			166	
07:45 PM		137	146			142			142	
08:00 PM		137	141			139			139	
08:15 PM		119	133			126			126	
08:30 PM		121	106			114			114	
08:45 PM		106	104			105			105	
09:00 PM		67	84			76			76	
09:15 PM		97	98			98			98	
09:30 PM		80	86			83			83	
09:45 PM		101	91			96			96	
10:00 PM		100	85			93			93	
10:15 PM		94	104			99			99	
10:30 PM		80	81			81			81	
10:45 PM		54	68			61			61	
11:00 PM		54	48			51			51	
11:15 PM		60	67			64			64	
11:30 PM		41	37			39			39	
11:45 PM		26	33			30			30	
Day Total		18918	19041			19006			19006	
% Weekday Average		99.5%	100.2%							
% Week Average		99.5%	100.2%			100%				
AM Peak 15-min Vol		10:15 AM 380	7:30 AM 383			7:30 AM 378			7:30 AM 378	
PM Peak 15-min Vol		4:15 PM 445	4:30 PM 423			4:15 PM 421			4:15 PM 421	

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd
SPECIFIC LOCATION:
CITY/STATE: Kahului, HI

QC JOB #: 16589621
DIRECTION: NB, SB
DATE: May 21 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
12:00 AM	0	43	0	0	0	0	1	0	44
12:15 AM	0	36	0	0	1	0	1	0	38
12:30 AM	0	18	0	0	3	0	0	0	21
12:45 AM	0	20	0	1	2	0	2	0	25
01:00 AM	0	23	0	0	3	0	0	0	26
01:15 AM	0	16	0	0	3	0	1	0	20
01:30 AM	0	11	0	0	1	0	0	0	12
01:45 AM	0	15	0	0	1	0	1	0	17
02:00 AM	0	16	0	0	2	0	0	0	18
02:15 AM	0	25	0	0	2	0	1	0	28
02:30 AM	0	12	0	0	2	0	1	0	15
02:45 AM	0	22	0	0	3	0	4	0	29
03:00 AM	0	22	0	0	1	0	3	0	26
03:15 AM	0	42	0	0	0	0	4	0	46
03:30 AM	0	30	0	0	3	0	1	0	34
03:45 AM	0	44	0	0	1	0	4	0	49
04:00 AM	0	61	0	0	1	0	0	0	62
04:15 AM	0	78	0	0	1	0	1	0	80
04:30 AM	0	80	0	0	0	0	2	0	82
04:45 AM	0	94	0	1	5	0	2	0	102
05:00 AM	0	137	0	0	8	0	6	0	151
05:15 AM	0	164	25	0	4	0	7	0	200
05:30 AM	0	138	90	2	6	0	10	0	246
05:45 AM	0	130	137	1	11	0	7	0	286
Day Total									
Percent									
ADT 38058									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd
SPECIFIC LOCATION:
CITY/STATE: Kahului, HI

QC JOB #: 16589621
DIRECTION: NB, SB
DATE: May 21 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
06:00 AM	0	181	151	7	18	0	6	2	365
06:15 AM	2	238	233	7	18	3	11	0	512
06:30 AM	3	273	239	7	29	1	8	0	560
06:45 AM	1	301	256	4	24	3	11	2	602
07:00 AM	4	310	249	7	23	4	10	0	607
07:15 AM	0	377	264	0	43	9	9	0	702
07:30 AM	3	440	260	1	29	4	12	0	749
07:45 AM	2	455	261	4	42	4	13	0	781
08:00 AM	2	367	223	10	39	3	16	0	660
08:15 AM	1	370	202	2	28	2	18	0	623
08:30 AM	0	399	225	5	20	6	10	1	666
08:45 AM	1	328	202	4	15	10	11	0	571
09:00 AM	0	334	172	2	17	6	12	1	544
09:15 AM	0	311	182	2	19	4	18	0	536
09:30 AM	1	397	162	5	10	5	15	0	595
09:45 AM	3	331	210	1	19	4	12	0	580
10:00 AM	6	306	167	2	25	5	10	0	521
10:15 AM	6	399	187	0	25	8	5	0	630
10:30 AM	2	378	161	3	24	3	9	0	580
10:45 AM	0	392	197	5	16	3	10	0	623
11:00 AM	0	327	154	1	22	8	14	0	526
11:15 AM	0	413	168	1	18	5	6	0	611
11:30 AM	1	343	174	4	11	6	8	0	547
11:45 AM	2	347	196	4	31	5	8	0	593
Day Total									
Percent									
ADT 38058									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd
SPECIFIC LOCATION:
CITY/STATE: Kahului, HI

QC JOB #: 16589621
DIRECTION: NB, SB
DATE: May 21 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
12:00 PM	4	359	149	5	18	3	6	0	544
12:15 PM	1	364	190	3	25	7	12	0	602
12:30 PM	1	359	176	3	17	7	9	0	572
12:45 PM	1	408	183	3	15	7	11	0	628
01:00 PM	1	380	175	6	24	5	11	0	602
01:15 PM	1	424	207	8	20	5	8	0	673
01:30 PM	1	410	229	5	21	3	8	0	677
01:45 PM	5	402	187	5	26	4	7	0	636
02:00 PM	1	386	196	1	23	5	6	0	618
02:15 PM	2	457	224	1	22	6	8	0	720
02:30 PM	3	414	192	0	14	8	7	0	638
02:45 PM	0	441	228	13	17	3	4	0	706
03:00 PM	3	410	190	4	22	9	4	0	642
03:15 PM	2	453	252	5	14	4	1	1	732
03:30 PM	4	464	253	5	22	6	5	0	759
03:45 PM	1	501	271	3	30	6	8	0	820
04:00 PM	4	452	255	3	24	1	2	0	741
04:15 PM	4	499	233	0	24	3	2	0	765
04:30 PM	4	488	220	3	14	1	4	0	734
04:45 PM	1	476	238	1	8	2	1	0	727
05:00 PM	3	444	212	2	14	1	5	0	681
05:15 PM	0	476	226	1	12	2	6	0	723
05:30 PM	2	460	178	1	12	0	2	0	655
05:45 PM	0	370	164	0	9	0	2	0	545
Day Total									
Percent									
ADT 38058									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd
SPECIFIC LOCATION:
CITY/STATE: Kahului, HI

QC JOB #: 16589621
DIRECTION: NB, SB
DATE: May 21 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
06:00 PM	1	327	166	1	8	1	3	0	507
06:15 PM	3	316	140	0	6	1	3	0	469
06:30 PM	2	275	143	1	8	0	2	1	432
06:45 PM	1	250	124	0	4	0	1	0	380
07:00 PM	0	290	113	1	18	0	2	0	424
07:15 PM	0	336	19	0	11	0	6	0	372
07:30 PM	0	340	0	0	3	0	0	0	343
07:45 PM	0	301	0	0	3	0	0	0	304
08:00 PM	0	291	0	0	1	0	1	0	293
08:15 PM	0	280	0	0	6	0	0	0	286
08:30 PM	0	256	0	0	8	0	0	0	264
08:45 PM	0	237	0	0	6	0	1	0	244
09:00 PM	0	219	0	0	1	0	1	0	221
09:15 PM	0	220	0	0	1	0	0	0	221
09:30 PM	0	181	0	0	3	0	0	0	184
09:45 PM	0	172	0	0	4	0	0	0	176
10:00 PM	0	175	0	0	3	0	3	0	181
10:15 PM	0	170	0	0	2	0	1	0	173
10:30 PM	0	129	0	0	4	0	1	0	134
10:45 PM	0	82	0	0	3	0	3	0	88
11:00 PM	0	88	0	0	2	0	1	0	91
11:15 PM	0	82	0	0	1	0	2	0	85
11:30 PM	0	58	0	0	0	0	2	0	60
11:45 PM	0	42	0	0	1	0	2	0	45
Day Total	96	25008	10880	177	1183	211	495	8	38058
Percent	0.3%	65.7%	28.6%	0.5%	3.1%	0.6%	1.3%	0%	
ADT 38058									
AM Peak	10:00 AM	7:45 AM	7:15 AM	8:00 AM	7:15 AM	8:45 AM	8:15 AM	6:00 AM	7:45 AM
15-min Vol	6	455	264	10	43	10	18	2	781
PM Peak	1:45 PM	3:45 PM	3:45 PM	2:45 PM	3:45 PM	3:00 PM	12:15 PM	3:15 PM	3:45 PM
15-min Vol	5	501	271	13	30	9	12	1	820

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd
SPECIFIC LOCATION:
CITY/STATE: Kahului, HI

QC JOB #: 16589621
DIRECTION: NB, SB
DATE: May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
12:00 AM	0	51	0	0	1	0	0	0	52
12:15 AM	0	41	0	0	2	0	1	0	44
12:30 AM	0	27	0	0	0	0	0	0	27
12:45 AM	0	26	0	0	2	0	2	0	30
01:00 AM	0	21	0	0	3	0	1	0	25
01:15 AM	0	24	0	0	2	0	2	0	28
01:30 AM	0	31	0	0	0	0	2	0	33
01:45 AM	0	16	0	0	5	0	0	0	21
02:00 AM	0	22	0	0	1	0	3	0	26
02:15 AM	0	24	0	0	4	0	3	0	31
02:30 AM	0	20	0	0	3	0	4	0	27
02:45 AM	0	29	0	0	2	0	1	0	32
03:00 AM	0	23	0	0	1	0	2	0	26
03:15 AM	0	39	0	0	1	0	3	0	43
03:30 AM	0	30	0	0	0	0	1	0	31
03:45 AM	0	54	0	0	1	0	2	0	57
04:00 AM	0	60	0	0	0	0	1	0	61
04:15 AM	0	69	0	0	2	0	0	0	71
04:30 AM	0	98	0	0	3	0	3	0	104
04:45 AM	0	103	0	0	2	0	2	0	107
05:00 AM	0	115	0	0	10	0	4	0	129
05:15 AM	0	145	43	1	2	0	5	0	196
05:30 AM	0	105	114	1	8	1	5	0	234
05:45 AM	1	132	152	5	11	0	9	0	310
Day Total									
Percent									
ADT 38357									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd
SPECIFIC LOCATION:
CITY/STATE: Kahului, HI

QC JOB #: 16589621
DIRECTION: NB, SB
DATE: May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
06:00 AM	1	171	182	8	20	4	4	1	391
06:15 AM	2	229	235	8	11	0	13	0	498
06:30 AM	0	193	261	9	22	17	22	2	526
06:45 AM	0	255	255	3	29	23	14	0	579
07:00 AM	0	320	249	6	27	9	15	1	627
07:15 AM	0	420	254	2	31	10	14	0	731
07:30 AM	3	419	282	5	34	5	9	2	759
07:45 AM	0	410	265	6	29	4	7	0	721
08:00 AM	2	338	251	6	31	4	22	0	654
08:15 AM	0	374	189	6	20	7	8	0	604
08:30 AM	1	386	208	2	14	12	7	1	631
08:45 AM	3	341	192	1	22	3	13	1	576
09:00 AM	0	306	176	1	18	6	12	1	520
09:15 AM	3	307	156	1	21	6	13	0	507
09:30 AM	0	353	171	2	19	7	7	0	559
09:45 AM	0	358	189	1	19	5	11	0	583
10:00 AM	0	326	159	1	26	8	8	0	528
10:15 AM	1	372	176	2	24	4	7	0	586
10:30 AM	0	405	186	2	22	8	8	0	631
10:45 AM	1	363	166	3	24	3	11	0	571
11:00 AM	2	359	163	3	20	6	3	0	556
11:15 AM	4	363	186	3	24	8	2	0	590
11:30 AM	1	369	182	2	17	9	9	0	589
11:45 AM	0	342	208	2	19	7	12	0	590
Day Total									
Percent									
ADT 38357									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd
SPECIFIC LOCATION:
CITY/STATE: Kahului, HI

QC JOB #: 16589621
DIRECTION: NB, SB
DATE: May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
12:00 PM	1	369	179	3	24	10	10	0	596
12:15 PM	2	376	182	7	16	2	7	0	592
12:30 PM	4	392	180	3	19	5	10	0	613
12:45 PM	0	383	192	2	25	10	10	0	622
01:00 PM	5	400	186	4	22	7	10	0	634
01:15 PM	3	394	186	5	29	4	6	0	627
01:30 PM	1	376	207	4	15	7	4	0	614
01:45 PM	1	411	205	1	23	3	7	0	651
02:00 PM	1	433	213	7	31	5	5	0	695
02:15 PM	0	444	215	5	20	4	4	0	692
02:30 PM	0	489	228	10	29	3	4	0	763
02:45 PM	1	462	238	4	20	4	2	0	731
03:00 PM	0	417	204	7	18	6	3	0	655
03:15 PM	2	477	209	1	30	2	4	0	725
03:30 PM	4	476	269	4	21	6	2	0	782
03:45 PM	3	461	262	5	18	7	2	0	758
04:00 PM	2	453	270	3	26	2	2	0	758
04:15 PM	2	505	247	1	11	1	3	0	770
04:30 PM	3	532	233	1	10	2	3	0	784
04:45 PM	3	496	211	3	11	0	3	0	727
05:00 PM	1	483	204	1	4	1	4	0	698
05:15 PM	1	456	202	0	17	1	0	0	677
05:30 PM	1	379	188	0	4	0	4	0	576
05:45 PM	4	375	161	2	12	2	2	0	558
Day Total									
Percent									
ADT 38357									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd
SPECIFIC LOCATION:
CITY/STATE: Kahului, HI

QC JOB #: 16589621
DIRECTION: NB, SB
DATE: May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
06:00 PM	0	300	146	2	10	1	0	0	459
06:15 PM	1	366	162	1	8	0	0	0	538
06:30 PM	3	308	163	2	3	0	1	0	480
06:45 PM	1	259	138	0	8	0	1	0	407
07:00 PM	0	222	134	2	9	0	2	1	370
07:15 PM	0	325	19	1	8	0	3	1	357
07:30 PM	0	363	0	0	3	0	1	0	367
07:45 PM	0	318	0	0	7	0	3	0	328
08:00 PM	0	293	0	0	2	0	3	0	298
08:15 PM	0	283	0	0	3	0	0	0	286
08:30 PM	0	248	0	0	4	0	1	0	253
08:45 PM	0	276	0	0	6	0	0	0	282
09:00 PM	0	257	0	0	4	0	0	0	261
09:15 PM	0	221	0	0	4	0	1	0	226
09:30 PM	0	204	0	0	3	0	0	0	207
09:45 PM	0	193	0	0	2	0	0	0	195
10:00 PM	0	169	0	0	0	0	3	0	172
10:15 PM	0	177	0	0	3	0	2	0	182
10:30 PM	0	131	0	0	3	0	2	0	136
10:45 PM	0	103	0	0	2	0	2	0	107
11:00 PM	0	85	0	0	2	0	2	0	89
11:15 PM	0	85	0	0	1	0	1	0	87
11:30 PM	0	60	0	0	2	0	2	0	64
11:45 PM	0	52	0	0	2	0	2	0	56
Day Total	75	25121	11083	183	1163	271	450	11	38357
Percent	0.2%	65.5%	28.9%	0.5%	3%	0.7%	1.2%	0%	
ADT 38357									
AM Peak	11:15 AM	7:15 AM	7:30 AM	6:30 AM	7:30 AM	6:45 AM	6:30 AM	6:30 AM	7:30 AM
15-min Vol	4	420	282	9	34	23	22	2	759
PM Peak	1:00 PM	4:30 PM	4:00 PM	2:30 PM	2:00 PM	12:00 PM	12:00 PM	7:00 PM	4:30 PM
15-min Vol	5	532	270	10	31	10	10	1	784

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

SUMMARY - Tube Count - Vehicle Classification Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd
SPECIFIC LOCATION:
CITY/STATE: Kahului, HI

QC JOB #: 16589621
DIRECTION: NB, SB
DATE: May 21 2024 - May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
Grand Total	171	50129	21963	360	2346	482	945	19	76415
Percent	0.2%	65.6%	28.7%	0.5%	3.1%	0.6%	1.2%	0%	
ADT 38207									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd
QC JOB #: 16589621
SPECIFIC LOCATION:
DIRECTION: NB, SB
CITY/STATE: Kahului, HI
DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
12:00 AM		44	52			48			48	
12:15 AM		38	44			41			41	
12:30 AM		21	27			24			24	
12:45 AM		25	30			28			28	
01:00 AM		26	25			26			26	
01:15 AM		20	28			24			24	
01:30 AM		12	33			23			23	
01:45 AM		17	21			19			19	
02:00 AM		18	26			22			22	
02:15 AM		28	31			30			30	
02:30 AM		15	27			21			21	
02:45 AM		29	32			31			31	
03:00 AM		26	26			26			26	
03:15 AM		46	43			45			45	
03:30 AM		34	31			33			33	
03:45 AM		49	57			53			53	
04:00 AM		62	61			62			62	
04:15 AM		80	71			76			76	
04:30 AM		82	104			93			93	
04:45 AM		102	107			105			105	
05:00 AM		151	129			140			140	
05:15 AM		200	196			198			198	
05:30 AM		246	234			240			240	
05:45 AM		286	310			298			298	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd | QC JOB #: 16589621

SPECIFIC LOCATION: | DIRECTION: NB, SB

CITY/STATE: Kahului, HI | DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
06:00 AM		365	391			378			378	
06:15 AM		512	498			505			505	
06:30 AM		560	526			543			543	
06:45 AM		602	579			591			591	
07:00 AM		607	627			617			617	
07:15 AM		702	731			717			717	
07:30 AM		749	759			754			754	
07:45 AM		781	721			751			751	
08:00 AM		660	654			657			657	
08:15 AM		623	604			614			614	
08:30 AM		666	631			649			649	
08:45 AM		571	576			574			574	
09:00 AM		544	520			532			532	
09:15 AM		536	507			522			522	
09:30 AM		595	559			577			577	
09:45 AM		580	583			582			582	
10:00 AM		521	528			525			525	
10:15 AM		630	586			608			608	
10:30 AM		580	631			606			606	
10:45 AM		623	571			597			597	
11:00 AM		526	556			541			541	
11:15 AM		611	590			601			601	
11:30 AM		547	589			568			568	
11:45 AM		593	590			592			592	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd | QC JOB #: 16589621

SPECIFIC LOCATION: | DIRECTION: NB, SB

CITY/STATE: Kahului, HI | DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
12:00 PM		544	596			570			570	
12:15 PM		602	592			597			597	
12:30 PM		572	613			593			593	
12:45 PM		628	622			625			625	
01:00 PM		602	634			618			618	
01:15 PM		673	627			650			650	
01:30 PM		677	614			646			646	
01:45 PM		636	651			644			644	
02:00 PM		618	695			657			657	
02:15 PM		720	692			706			706	
02:30 PM		638	763			701			701	
02:45 PM		706	731			719			719	
03:00 PM		642	655			649			649	
03:15 PM		732	725			729			729	
03:30 PM		759	782			771			771	
03:45 PM		820	758			789			789	
04:00 PM		741	758			750			750	
04:15 PM		765	770			768			768	
04:30 PM		734	784			759			759	
04:45 PM		727	727			727			727	
05:00 PM		681	698			690			690	
05:15 PM		723	677			700			700	
05:30 PM		655	576			616			616	
05:45 PM		545	558			552			552	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd | QC JOB #: 16589621

SPECIFIC LOCATION: | DIRECTION: NB, SB

CITY/STATE: Kahului, HI | DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
06:00 PM		507	459			483			483	
06:15 PM		469	538			504			504	
06:30 PM		432	480			456			456	
06:45 PM		380	407			394			394	
07:00 PM		424	370			397			397	
07:15 PM		372	357			365			365	
07:30 PM		343	367			355			355	
07:45 PM		304	328			316			316	
08:00 PM		293	298			296			296	
08:15 PM		286	286			286			286	
08:30 PM		264	253			259			259	
08:45 PM		244	282			263			263	
09:00 PM		221	261			241			241	
09:15 PM		221	226			224			224	
09:30 PM		184	207			196			196	
09:45 PM		176	195			186			186	
10:00 PM		181	172			177			177	
10:15 PM		173	182			178			178	
10:30 PM		134	136			135			135	
10:45 PM		88	107			98			98	
11:00 PM		91	89			90			90	
11:15 PM		85	87			86			86	
11:30 PM		60	64			62			62	
11:45 PM		45	56			51			51	
Day Total		38058	38357			38231			38231	
% Weekday Average		99.5%	100.3%							
% Week Average		99.5%	100.3%			100%				
AM Peak 15-min Vol		7:45 AM 781	7:30 AM 759			7:30 AM 754			7:30 AM 754	
PM Peak 15-min Vol		3:45 PM 820	4:30 PM 784			3:45 PM 789			3:45 PM 789	

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd
SPECIFIC LOCATION:
CITY/STATE: Kahului, HI

QC JOB #: 16589621
DIRECTION: SB
DATE: May 21 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
12:00 AM	0	15	0	0	0	0	0	0	15
12:15 AM	0	18	0	0	0	0	0	0	18
12:30 AM	0	5	0	0	1	0	0	0	6
12:45 AM	0	13	0	0	1	0	2	0	16
01:00 AM	0	13	0	0	2	0	0	0	15
01:15 AM	0	7	0	0	2	0	0	0	9
01:30 AM	0	1	0	0	0	0	0	0	1
01:45 AM	0	11	0	0	1	0	1	0	13
02:00 AM	0	7	0	0	1	0	0	0	8
02:15 AM	0	11	0	0	0	0	1	0	12
02:30 AM	0	6	0	0	0	0	0	0	6
02:45 AM	0	10	0	0	1	0	3	0	14
03:00 AM	0	14	0	0	0	0	3	0	17
03:15 AM	0	30	0	0	0	0	2	0	32
03:30 AM	0	16	0	0	3	0	0	0	19
03:45 AM	0	24	0	0	0	0	3	0	27
04:00 AM	0	49	0	0	0	0	0	0	49
04:15 AM	0	52	0	0	1	0	1	0	54
04:30 AM	0	57	0	0	0	0	0	0	57
04:45 AM	0	64	0	0	4	0	1	0	69
05:00 AM	0	97	0	0	4	0	4	0	105
05:15 AM	0	91	17	0	2	0	5	0	115
05:30 AM	0	85	65	1	3	0	5	0	159
05:45 AM	0	58	88	0	4	0	3	0	153
Day Total									
Percent									
ADT 19140									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd
SPECIFIC LOCATION:
CITY/STATE: Kahului, HI

QC JOB #: 16589621
DIRECTION: SB
DATE: May 21 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
06:00 AM	0	95	111	0	10	0	2	1	219
06:15 AM	2	126	148	0	11	2	10	0	299
06:30 AM	2	138	151	1	18	0	5	0	315
06:45 AM	1	155	156	1	17	2	7	2	341
07:00 AM	3	143	164	2	17	0	3	0	332
07:15 AM	0	170	163	0	25	2	5	0	365
07:30 AM	1	217	133	1	14	1	9	0	376
07:45 AM	2	208	158	4	18	2	10	0	402
08:00 AM	0	181	139	7	26	1	12	0	366
08:15 AM	1	166	118	1	16	1	12	0	315
08:30 AM	0	207	125	4	10	1	7	1	355
08:45 AM	1	133	115	4	8	4	8	0	273
09:00 AM	0	144	88	1	13	2	7	1	256
09:15 AM	0	143	111	1	15	2	12	0	284
09:30 AM	0	144	88	5	7	1	10	0	255
09:45 AM	1	137	120	0	10	0	3	0	271
10:00 AM	3	109	81	0	14	1	4	0	212
10:15 AM	3	143	87	0	11	2	4	0	250
10:30 AM	1	165	93	1	9	2	4	0	275
10:45 AM	0	162	98	2	8	3	7	0	280
11:00 AM	0	133	81	0	8	3	9	0	234
11:15 AM	0	169	84	0	6	1	3	0	263
11:30 AM	1	155	97	2	5	2	4	0	266
11:45 AM	1	163	101	2	17	2	3	0	289
Day Total									
Percent									
ADT 19140									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd
SPECIFIC LOCATION:
CITY/STATE: Kahului, HI

QC JOB #: 16589621
DIRECTION: SB
DATE: May 21 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
12:00 PM	2	177	73	3	10	3	3	0	271
12:15 PM	1	175	111	1	**14**	**6**	6	0	314
12:30 PM	0	171	92	1	8	2	6	0	280
12:45 PM	1	187	86	1	7	5	5	0	292
01:00 PM	1	214	96	0	10	3	4	0	328
01:15 PM	0	221	93	6	8	2	2	0	332
01:30 PM	0	216	122	2	9	3	4	0	356
01:45 PM	**3**	212	112	1	7	1	2	0	338
02:00 PM	0	193	102	0	6	2	5	0	308
02:15 PM	1	256	110	0	9	4	1	0	381
02:30 PM	3	221	92	0	5	3	3	0	327
02:45 PM	0	240	119	**11**	6	2	1	0	379
03:00 PM	2	215	77	3	8	3	4	0	312
03:15 PM	1	245	125	4	6	2	1	0	384
03:30 PM	2	226	115	4	7	3	2	0	359
03:45 PM	1	**262**	**127**	1	12	3	5	0	**411**
04:00 PM	3	257	111	2	10	1	0	0	384
04:15 PM	1	227	80	0	10	2	0	0	320
04:30 PM	1	252	89	3	5	1	3	0	354
04:45 PM	0	212	78	1	4	0	0	0	295
05:00 PM	3	214	102	1	4	1	1	0	326
05:15 PM	0	214	98	1	6	1	1	0	321
05:30 PM	2	253	79	1	3	0	0	0	338
05:45 PM	0	194	73	0	4	0	0	0	271
Day Total									
Percent									
ADT 19140									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd
SPECIFIC LOCATION:
CITY/STATE: Kahului, HI

QC JOB #: 16589621
DIRECTION: SB
DATE: May 21 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
06:00 PM	0	175	83	0	3	1	1	0	263
06:15 PM	0	151	74	0	1	1	2	0	229
06:30 PM	1	156	77	1	4	0	1	1	241
06:45 PM	0	127	60	0	1	0	0	0	188
07:00 PM	0	163	48	0	14	0	1	0	226
07:15 PM	0	170	11	0	4	0	1	0	186
07:30 PM	0	167	0	0	1	0	0	0	168
07:45 PM	0	166	0	0	1	0	0	0	167
08:00 PM	0	156	0	0	0	0	0	0	156
08:15 PM	0	164	0	0	3	0	0	0	167
08:30 PM	0	137	0	0	6	0	0	0	143
08:45 PM	0	135	0	0	3	0	0	0	138
09:00 PM	0	153	0	0	1	0	0	0	154
09:15 PM	0	123	0	0	1	0	0	0	124
09:30 PM	0	102	0	0	2	0	0	0	104
09:45 PM	0	74	0	0	1	0	0	0	75
10:00 PM	0	78	0	0	0	0	3	0	81
10:15 PM	0	77	0	0	1	0	1	0	79
10:30 PM	0	53	0	0	1	0	0	0	54
10:45 PM	0	32	0	0	2	0	0	0	34
11:00 PM	0	36	0	0	1	0	0	0	37
11:15 PM	0	25	0	0	0	0	0	0	25
11:30 PM	0	17	0	0	0	0	2	0	19
11:45 PM	0	16	0	0	1	0	2	0	19
Day Total	52	12367	5695	88	573	92	267	6	19140
Percent	0.3%	64.6%	29.8%	0.5%	3%	0.5%	1.4%	0%	
ADT 19140									
AM Peak	7:00 AM	7:30 AM	7:00 AM	8:00 AM	8:00 AM	8:45 AM	8:00 AM	6:45 AM	7:45 AM
15-min Vol	3	217	164	7	26	4	12	2	402
PM Peak	1:45 PM	3:45 PM	3:45 PM	2:45 PM	12:15 PM	12:15 PM	12:15 PM	6:30 PM	3:45 PM
15-min Vol	3	262	127	11	14	6	6	1	411

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd
QC JOB #: 16589621
SPECIFIC LOCATION:
DIRECTION: SB
CITY/STATE: Kahului, HI
DATE: May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
12:00 AM	0	17	0	0	0	0	0	0	17
12:15 AM	0	10	0	0	0	0	0	0	10
12:30 AM	0	15	0	0	0	0	0	0	15
12:45 AM	0	15	0	0	0	0	2	0	17
01:00 AM	0	11	0	0	2	0	0	0	13
01:15 AM	0	6	0	0	0	0	2	0	8
01:30 AM	0	13	0	0	0	0	0	0	13
01:45 AM	0	5	0	0	4	0	0	0	9
02:00 AM	0	13	0	0	0	0	3	0	16
02:15 AM	0	8	0	0	1	0	3	0	12
02:30 AM	0	13	0	0	2	0	2	0	17
02:45 AM	0	17	0	0	1	0	0	0	18
03:00 AM	0	15	0	0	0	0	1	0	16
03:15 AM	0	23	0	0	1	0	1	0	25
03:30 AM	0	14	0	0	0	0	1	0	15
03:45 AM	0	32	0	0	1	0	1	0	34
04:00 AM	0	42	0	0	0	0	1	0	43
04:15 AM	0	52	0	0	1	0	0	0	53
04:30 AM	0	74	0	0	0	0	1	0	75
04:45 AM	0	57	0	0	2	0	1	0	60
05:00 AM	0	76	0	0	6	0	2	0	84
05:15 AM	0	83	36	0	1	0	3	0	123
05:30 AM	0	45	88	1	1	0	4	0	139
05:45 AM	1	64	96	0	4	0	6	0	171
Day Total									
Percent									
ADT 19316									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd
SPECIFIC LOCATION:
CITY/STATE: Kahului, HI

QC JOB #: 16589621
DIRECTION: SB
DATE: May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
06:00 AM	0	86	120	1	13	1	3	1	225
06:15 AM	2	114	157	2	6	0	12	0	293
06:30 AM	0	73	183	1	12	14	19	2	304
06:45 AM	0	82	173	1	14	19	14	0	303
07:00 AM	0	141	168	2	17	3	11	1	343
07:15 AM	0	175	147	1	19	3	12	0	357
07:30 AM	1	173	166	4	22	2	6	2	376
07:45 AM	0	180	161	5	15	2	6	0	369
08:00 AM	2	171	158	5	19	1	18	0	374
08:15 AM	0	180	113	5	13	1	5	0	317
08:30 AM	0	168	119	1	9	3	5	1	306
08:45 AM	1	127	112	1	10	0	11	1	263
09:00 AM	0	117	103	0	8	2	9	1	240
09:15 AM	3	130	72	0	11	3	7	0	226
09:30 AM	0	154	89	1	14	2	4	0	264
09:45 AM	0	128	101	1	8	1	5	0	244
10:00 AM	0	122	89	0	19	5	5	0	240
10:15 AM	0	160	90	1	14	1	6	0	272
10:30 AM	0	175	100	2	10	3	5	0	295
10:45 AM	0	173	100	1	11	1	8	0	294
11:00 AM	1	160	80	1	10	3	1	0	256
11:15 AM	2	167	89	1	7	6	0	0	272
11:30 AM	0	191	96	2	7	5	6	0	307
11:45 AM	0	171	122	0	9	4	3	0	309
Day Total									
Percent									
ADT 19316									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd
SPECIFIC LOCATION:
CITY/STATE: Kahului, HI

QC JOB #: 16589621
DIRECTION: SB
DATE: May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
12:00 PM	1	196	97	0	10	3	7	0	314
12:15 PM	1	191	97	2	7	1	2	0	301
12:30 PM	2	197	100	2	9	2	2	0	314
12:45 PM	0	202	103	0	11	6	5	0	327
01:00 PM	2	197	91	0	8	4	7	0	309
01:15 PM	2	207	78	0	12	3	3	0	305
01:30 PM	0	196	97	3	8	1	0	0	305
01:45 PM	0	181	81	1	9	0	2	0	274
02:00 PM	1	207	105	4	9	4	4	0	334
02:15 PM	0	240	105	4	6	1	0	0	356
02:30 PM	0	262	124	8	13	1	1	0	409
02:45 PM	0	254	123	3	5	2	1	0	388
03:00 PM	0	218	93	6	7	6	1	0	331
03:15 PM	1	238	93	1	13	2	2	0	350
03:30 PM	3	234	113	2	8	5	1	0	366
03:45 PM	0	224	103	4	9	3	1	0	344
04:00 PM	1	241	110	2	7	1	1	0	363
04:15 PM	2	254	110	1	6	0	0	0	373
04:30 PM	2	262	93	0	2	1	1	0	361
04:45 PM	1	250	100	3	6	0	0	0	360
05:00 PM	1	241	97	0	1	1	1	0	342
05:15 PM	1	227	81	0	8	0	0	0	317
05:30 PM	0	194	77	0	1	0	2	0	274
05:45 PM	1	197	77	2	4	2	1	0	284
Day Total									
Percent									
ADT 19316									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd
SPECIFIC LOCATION:
CITY/STATE: Kahului, HI

QC JOB #: 16589621
DIRECTION: SB
DATE: May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
06:00 PM	0	170	76	0	2	0	0	0	248
06:15 PM	1	188	81	0	3	0	0	0	273
06:30 PM	1	145	85	1	0	0	0	0	232
06:45 PM	0	136	68	0	4	0	1	0	209
07:00 PM	0	110	63	1	9	0	1	1	185
07:15 PM	0	174	10	1	3	0	0	1	189
07:30 PM	0	207	0	0	2	0	1	0	210
07:45 PM	0	179	0	0	2	0	1	0	182
08:00 PM	0	155	0	0	1	0	1	0	157
08:15 PM	0	153	0	0	0	0	0	0	153
08:30 PM	0	143	0	0	4	0	0	0	147
08:45 PM	0	174	0	0	4	0	0	0	178
09:00 PM	0	175	0	0	2	0	0	0	177
09:15 PM	0	128	0	0	0	0	0	0	128
09:30 PM	0	120	0	0	1	0	0	0	121
09:45 PM	0	103	0	0	1	0	0	0	104
10:00 PM	0	84	0	0	0	0	3	0	87
10:15 PM	0	76	0	0	0	0	2	0	78
10:30 PM	0	54	0	0	0	0	1	0	55
10:45 PM	0	38	0	0	1	0	0	0	39
11:00 PM	0	41	0	0	0	0	0	0	41
11:15 PM	0	18	0	0	1	0	1	0	20
11:30 PM	0	23	0	0	2	0	2	0	27
11:45 PM	0	20	0	0	1	0	2	0	23
Day Total	37	12362	5859	91	546	134	276	11	19316
Percent	0.2%	64%	30.3%	0.5%	2.8%	0.7%	1.4%	0.1%	
ADT 19316									
AM Peak	9:15 AM	11:30 AM	6:30 AM	7:45 AM	7:30 AM	6:45 AM	6:30 AM	6:30 AM	7:30 AM
15-min Vol	3	191	183	5	22	19	19	2	376
PM Peak	3:30 PM	2:30 PM	2:30 PM	2:30 PM	2:30 PM	12:45 PM	12:00 PM	7:00 PM	2:30 PM
15-min Vol	3	262	124	8	13	6	7	1	409

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

SUMMARY - Tube Count - Vehicle Classification Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd
SPECIFIC LOCATION:
CITY/STATE: Kahului, HI

QC JOB #: 16589621
DIRECTION: SB
DATE: May 21 2024 - May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
Grand Total	89	24729	11554	179	1119	226	543	17	38456
Percent	0.2%	64.3%	30%	0.5%	2.9%	0.6%	1.4%	0%	
ADT 19228									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd
QC JOB #: 16589621
SPECIFIC LOCATION:
DIRECTION: SB
CITY/STATE: Kahului, HI
DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
12:00 AM		15	17			16			16	
12:15 AM		18	10			14			14	
12:30 AM		6	15			11			11	
12:45 AM		16	17			17			17	
01:00 AM		15	13			14			14	
01:15 AM		9	8			9			9	
01:30 AM		1	13			7			7	
01:45 AM		13	9			11			11	
02:00 AM		8	16			12			12	
02:15 AM		12	12			12			12	
02:30 AM		6	17			12			12	
02:45 AM		14	18			16			16	
03:00 AM		17	16			17			17	
03:15 AM		32	25			29			29	
03:30 AM		19	15			17			17	
03:45 AM		27	34			31			31	
04:00 AM		49	43			46			46	
04:15 AM		54	53			54			54	
04:30 AM		57	75			66			66	
04:45 AM		69	60			65			65	
05:00 AM		105	84			95			95	
05:15 AM		115	123			119			119	
05:30 AM		159	139			149			149	
05:45 AM		153	171			162			162	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd | QC JOB #: 16589621

SPECIFIC LOCATION: | DIRECTION: SB

CITY/STATE: Kahului, HI | DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
06:00 AM		219	225			222			222	
06:15 AM		299	293			296			296	
06:30 AM		315	304			310			310	
06:45 AM		341	303			322			322	
07:00 AM		332	343			338			338	
07:15 AM		365	357			361			361	
07:30 AM		376	376			376			376	
07:45 AM		402	369			386			386	
08:00 AM		366	374			370			370	
08:15 AM		315	317			316			316	
08:30 AM		355	306			331			331	
08:45 AM		273	263			268			268	
09:00 AM		256	240			248			248	
09:15 AM		284	226			255			255	
09:30 AM		255	264			260			260	
09:45 AM		271	244			258			258	
10:00 AM		212	240			226			226	
10:15 AM		250	272			261			261	
10:30 AM		275	295			285			285	
10:45 AM		280	294			287			287	
11:00 AM		234	256			245			245	
11:15 AM		263	272			268			268	
11:30 AM		266	307			287			287	
11:45 AM		289	309			299			299	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd | QC JOB #: 16589621

SPECIFIC LOCATION: | DIRECTION: SB

CITY/STATE: Kahului, HI | DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
12:00 PM		271	314			293			293	
12:15 PM		314	301			308			308	
12:30 PM		280	314			297			297	
12:45 PM		292	327			310			310	
01:00 PM		328	309			319			319	
01:15 PM		332	305			319			319	
01:30 PM		356	305			331			331	
01:45 PM		338	274			306			306	
02:00 PM		308	334			321			321	
02:15 PM		381	356			369			369	
02:30 PM		327	409			368			368	
02:45 PM		379	388			384			384	
03:00 PM		312	331			322			322	
03:15 PM		384	350			367			367	
03:30 PM		359	366			363			363	
03:45 PM		411	344			378			378	
04:00 PM		384	363			374			374	
04:15 PM		320	373			347			347	
04:30 PM		354	361			358			358	
04:45 PM		295	360			328			328	
05:00 PM		326	342			334			334	
05:15 PM		321	317			319			319	
05:30 PM		338	274			306			306	
05:45 PM		271	284			278			278	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Maui Veterans Hwy south of Cane Haul Rd | QC JOB #: 16589621

SPECIFIC LOCATION: | DIRECTION: SB

CITY/STATE: Kahului, HI | DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
06:00 PM		263	248			256			256	
06:15 PM		229	273			251			251	
06:30 PM		241	232			237			237	
06:45 PM		188	209			199			199	
07:00 PM		226	185			206			206	
07:15 PM		186	189			188			188	
07:30 PM		168	210			189			189	
07:45 PM		167	182			175			175	
08:00 PM		156	157			157			157	
08:15 PM		167	153			160			160	
08:30 PM		143	147			145			145	
08:45 PM		138	178			158			158	
09:00 PM		154	177			166			166	
09:15 PM		124	128			126			126	
09:30 PM		104	121			113			113	
09:45 PM		75	104			90			90	
10:00 PM		81	87			84			84	
10:15 PM		79	78			79			79	
10:30 PM		54	55			55			55	
10:45 PM		34	39			37			37	
11:00 PM		37	41			39			39	
11:15 PM		25	20			23			23	
11:30 PM		19	27			23			23	
11:45 PM		19	23			21			21	
Day Total		19140	19316			19252			19252	
% Weekday Average		99.4%	100.3%							
% Week Average		99.4%	100.3%			100%				
AM Peak 15-min Vol		7:45 AM 402	7:30 AM 376			7:45 AM 386			7:45 AM 386	
PM Peak 15-min Vol		3:45 PM 411	2:30 PM 409			2:45 PM 384			2:45 PM 384	

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Kuihelani Hwy south of E Waiko Rd
SPECIFIC LOCATION:
CITY/STATE: Waikapu, HI

QC JOB #: 16589622
DIRECTION: NB
DATE: May 21 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
12:00 AM	0	10	0	0	0	0	0	0	10
12:15 AM	0	5	0	0	0	0	0	0	5
12:30 AM	0	4	0	0	0	0	0	0	4
12:45 AM	0	5	0	0	0	0	0	0	5
01:00 AM	0	2	0	0	0	0	0	0	2
01:15 AM	0	0	0	0	0	0	0	0	0
01:30 AM	0	1	0	0	0	0	0	0	1
01:45 AM	0	1	0	0	0	0	0	0	1
02:00 AM	0	5	0	0	0	0	0	0	5
02:15 AM	0	5	0	0	0	0	0	0	5
02:30 AM	0	8	0	0	1	0	1	0	10
02:45 AM	0	3	0	0	0	0	0	0	3
03:00 AM	0	2	0	0	1	0	0	0	3
03:15 AM	0	7	0	0	0	0	1	0	8
03:30 AM	0	11	0	0	0	0	0	0	11
03:45 AM	0	6	0	0	1	0	0	0	7
04:00 AM	0	4	0	0	0	0	0	0	4
04:15 AM	0	5	0	0	0	0	0	0	5
04:30 AM	0	5	0	0	0	0	0	0	5
04:45 AM	0	8	0	0	0	0	1	0	9
05:00 AM	0	20	0	0	2	0	0	0	22
05:15 AM	0	25	0	0	0	0	0	0	25
05:30 AM	0	17	11	0	0	0	0	0	28
05:45 AM	0	25	21	0	2	0	0	0	48
Day Total									
Percent									
ADT 7661									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Kuiheiani Hwy south of E Waiko Rd
SPECIFIC LOCATION:
CITY/STATE: Waikapu, HI

QC JOB #: 16589622
DIRECTION: NB
DATE: May 21 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
06:00 AM	0	24	18	0	1	1	1	0	45
06:15 AM	0	20	27	0	1	1	0	0	49
06:30 AM	0	31	30	0	0	0	3	0	64
06:45 AM	0	54	29	0	3	0	0	0	86
07:00 AM	0	48	36	0	2	2	3	0	91
07:15 AM	0	54	28	1	2	0	1	0	86
07:30 AM	0	46	27	1	1	0	1	0	76
07:45 AM	0	82	38	0	2	1	0	0	123
08:00 AM	0	54	43	1	3	2	8	0	111
08:15 AM	0	85	39	1	2	0	1	0	128
08:30 AM	0	91	44	0	3	0	2	0	140
08:45 AM	0	106	50	1	4	0	2	0	163
09:00 AM	0	65	29	1	1	1	1	0	98
09:15 AM	0	75	45	0	1	0	1	0	122
09:30 AM	0	92	33	0	2	2	0	0	129
09:45 AM	0	87	52	2	4	1	1	0	147
10:00 AM	0	96	45	1	5	1	1	0	149
10:15 AM	0	95	53	0	0	1	3	0	152
10:30 AM	0	120	43	0	4	0	1	0	168
10:45 AM	1	93	34	1	6	0	1	0	136
11:00 AM	1	89	44	1	8	2	3	0	148
11:15 AM	0	101	35	0	5	1	4	0	146
11:30 AM	0	70	33	0	1	1	0	0	105
11:45 AM	0	68	30	0	1	1	2	0	102
Day Total									
Percent									
ADT 7661									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Kuiheiani Hwy south of E Waiko Rd
SPECIFIC LOCATION:
CITY/STATE: Waikapu, HI

QC JOB #: 16589622
DIRECTION: NB
DATE: May 21 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
12:00 PM	0	89	33	1	3	0	1	0	127
12:15 PM	0	50	51	0	8	3	1	0	113
12:30 PM	0	82	44	5	2	0	1	0	134
12:45 PM	0	87	55	0	4	1	2	0	149
01:00 PM	1	62	41	0	7	2	2	0	115
01:15 PM	0	93	53	1	6	4	1	0	158
01:30 PM	0	53	41	0	4	1	1	0	100
01:45 PM	0	64	42	2	5	2	2	0	117
02:00 PM	0	67	40	2	4	3	6	0	122
02:15 PM	1	75	52	0	7	3	0	0	138
02:30 PM	0	84	53	3	11	1	3	0	155
02:45 PM	0	81	68	1	10	1	1	0	162
03:00 PM	0	78	50	1	8	2	1	0	140
03:15 PM	1	72	60	0	4	1	1	0	139
03:30 PM	0	60	54	1	5	2	2	0	124
03:45 PM	2	71	69	0	9	1	3	0	155
04:00 PM	0	65	87	1	8	1	5	0	167
04:15 PM	0	94	80	1	3	1	3	0	182
04:30 PM	0	94	63	0	5	4	1	0	167
04:45 PM	0	92	61	0	11	3	2	0	169
05:00 PM	0	89	47	1	9	6	3	0	155
05:15 PM	0	99	51	2	5	5	1	0	163
05:30 PM	0	97	63	0	3	3	1	0	167
05:45 PM	1	87	48	1	8	0	2	0	147
Day Total									
Percent									
ADT 7661									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Kuihelani Hwy south of E Waiko Rd
SPECIFIC LOCATION:
CITY/STATE: Waikapu, HI

QC JOB #: 16589622
DIRECTION: NB
DATE: May 21 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
06:00 PM	0	66	61	1	4	0	0	0	132
06:15 PM	1	59	54	0	4	0	0	0	118
06:30 PM	0	43	32	0	0	1	3	0	79
06:45 PM	1	51	38	1	4	0	0	0	95
07:00 PM	0	47	28	0	1	0	0	0	76
07:15 PM	0	72	3	1	3	0	1	0	80
07:30 PM	0	59	0	0	0	0	0	0	59
07:45 PM	0	71	0	0	0	0	1	0	72
08:00 PM	0	46	0	0	0	0	1	0	47
08:15 PM	0	53	0	0	1	0	0	0	54
08:30 PM	0	50	0	0	1	0	1	0	52
08:45 PM	0	45	0	0	1	0	0	0	46
09:00 PM	0	37	0	0	0	0	0	0	37
09:15 PM	0	23	0	0	0	0	0	0	23
09:30 PM	0	38	0	0	0	0	0	0	38
09:45 PM	0	21	0	0	1	0	0	0	22
10:00 PM	0	27	0	0	1	0	0	0	28
10:15 PM	0	25	0	0	0	0	1	0	26
10:30 PM	0	28	0	0	1	0	0	0	29
10:45 PM	0	23	0	0	0	0	0	0	23
11:00 PM	0	15	0	0	0	0	0	0	15
11:15 PM	0	22	0	0	1	0	0	0	23
11:30 PM	0	22	0	0	0	0	0	0	22
11:45 PM	0	10	0	0	0	0	0	0	10
Day Total	10	4768	2439	37	241	69	97	0	7661
Percent	0.1%	62.2%	31.8%	0.5%	3.1%	0.9%	1.3%	0%	
ADT 7661									
AM Peak	10:45 AM	10:30 AM	10:15 AM	9:45 AM	11:00 AM	7:00 AM	8:00 AM	12:00 AM	10:30 AM
15-min Vol	1	120	53	2	8	2	8	0	168
PM Peak	3:45 PM	5:15 PM	4:00 PM	12:30 PM	2:30 PM	5:00 PM	2:00 PM	12:00 PM	4:15 PM
15-min Vol	2	99	87	5	11	6	6	0	182

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Kuiheiani Hwy south of E Waiko Rd
SPECIFIC LOCATION:
CITY/STATE: Waikapu, HI

QC JOB #: 16589622
DIRECTION: NB
DATE: May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
12:00 AM	0	12	0	0	0	0	0	0	12
12:15 AM	0	6	0	0	0	0	0	0	6
12:30 AM	0	10	0	0	0	0	0	0	10
12:45 AM	0	3	0	0	0	0	0	0	3
01:00 AM	0	2	0	0	0	0	0	0	2
01:15 AM	0	3	0	0	0	0	0	0	3
01:30 AM	0	3	0	0	1	0	0	0	4
01:45 AM	0	3	0	0	0	0	0	0	3
02:00 AM	0	4	0	0	0	0	0	0	4
02:15 AM	0	7	0	0	0	0	0	0	7
02:30 AM	0	4	0	0	1	0	0	0	5
02:45 AM	0	3	0	0	1	0	0	0	4
03:00 AM	0	7	0	0	0	0	0	0	7
03:15 AM	0	9	0	0	0	0	0	0	9
03:30 AM	0	8	0	0	1	0	0	0	9
03:45 AM	0	10	0	0	0	0	1	0	11
04:00 AM	0	8	0	0	0	0	0	0	8
04:15 AM	0	8	0	0	0	0	0	0	8
04:30 AM	0	6	0	0	1	0	0	0	7
04:45 AM	0	13	0	0	0	0	0	0	13
05:00 AM	0	19	0	0	3	0	0	0	22
05:15 AM	0	25	1	0	0	0	0	0	26
05:30 AM	0	11	13	0	0	0	0	0	24
05:45 AM	0	12	20	0	2	0	0	0	34
Day Total									
Percent									
ADT 7413									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Kuihelani Hwy south of E Waiko Rd | QC JOB #: 16589622
SPECIFIC LOCATION: | DIRECTION: NB
CITY/STATE: Waikapu, HI | DATE: May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
06:00 AM	0	28	28	0	1	0	1	0	58
06:15 AM	0	24	24	0	1	0	2	0	51
06:30 AM	0	34	23	0	2	4	1	0	64
06:45 AM	1	55	31	0	1	2	0	0	90
07:00 AM	0	37	36	1	1	0	3	0	78
07:15 AM	0	54	38	0	3	1	0	0	96
07:30 AM	0	67	31	1	2	2	2	0	105
07:45 AM	0	57	28	3	3	0	2	0	93
08:00 AM	0	75	38	2	2	1	1	0	119
08:15 AM	0	59	36	1	1	3	1	0	101
08:30 AM	0	51	35	0	2	1	3	0	92
08:45 AM	2	99	45	1	2	1	2	0	152
09:00 AM	0	66	36	0	3	0	1	0	106
09:15 AM	0	91	40	0	3	1	4	0	139
09:30 AM	0	84	35	0	2	2	1	0	124
09:45 AM	1	86	51	0	5	2	2	0	147
10:00 AM	0	100	39	0	5	1	3	0	148
10:15 AM	0	108	39	0	1	0	2	0	150
10:30 AM	0	103	48	1	2	4	1	0	159
10:45 AM	0	73	33	0	7	0	1	0	114
11:00 AM	0	80	33	0	7	0	3	0	123
11:15 AM	0	96	39	0	3	0	4	0	142
11:30 AM	0	74	36	0	5	0	1	0	116
11:45 AM	0	72	37	2	2	4	2	0	119
Day Total									
Percent									
ADT 7413									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Kuihelani Hwy south of E Waiko Rd
SPECIFIC LOCATION:
CITY/STATE: Waikapu, HI

QC JOB #: 16589622
DIRECTION: NB
DATE: May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
12:00 PM	0	63	31	0	7	3	1	0	105
12:15 PM	0	64	27	0	3	2	3	0	99
12:30 PM	0	56	49	0	9	1	3	0	118
12:45 PM	1	65	42	0	1	1	1	0	111
01:00 PM	0	70	45	1	3	1	1	0	121
01:15 PM	0	60	35	0	6	4	1	0	106
01:30 PM	0	82	41	0	4	1	2	0	130
01:45 PM	1	64	46	0	6	1	1	0	119
02:00 PM	0	69	42	1	13	3	2	0	130
02:15 PM	1	60	43	0	5	6	1	0	116
02:30 PM	0	64	47	1	11	2	4	0	129
02:45 PM	0	95	50	1	6	1	2	0	155
03:00 PM	0	68	51	1	3	4	0	0	127
03:15 PM	0	76	54	0	10	1	3	0	144
03:30 PM	1	82	63	0	10	2	3	0	161
03:45 PM	0	80	79	0	8	0	4	0	171
04:00 PM	1	91	88	2	10	1	2	0	195
04:15 PM	0	88	59	0	11	2	3	0	163
04:30 PM	1	78	62	0	13	1	2	0	157
04:45 PM	0	98	69	0	2	3	2	0	174
05:00 PM	0	72	58	0	6	7	4	0	147
05:15 PM	0	105	48	0	3	3	1	0	160
05:30 PM	0	68	53	1	4	6	1	0	133
05:45 PM	0	91	53	1	5	0	0	0	150
Day Total									
Percent									
ADT 7413									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Kuihelani Hwy south of E Waiko Rd
SPECIFIC LOCATION:
CITY/STATE: Waikapu, HI

QC JOB #: 16589622
DIRECTION: NB
DATE: May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
06:00 PM	0	73	57	0	6	0	0	0	136
06:15 PM	0	54	48	0	3	0	0	0	105
06:30 PM	0	37	41	1	2	0	0	0	81
06:45 PM	0	24	45	0	1	0	0	0	70
07:00 PM	0	49	24	1	4	0	0	0	78
07:15 PM	0	56	2	0	1	0	0	0	59
07:30 PM	0	60	0	0	2	0	0	0	62
07:45 PM	0	62	0	0	0	0	1	0	63
08:00 PM	0	62	0	0	2	0	0	0	64
08:15 PM	0	31	0	0	2	0	0	0	33
08:30 PM	0	40	0	0	1	0	0	0	41
08:45 PM	0	42	0	0	1	0	0	0	43
09:00 PM	0	39	0	0	0	0	0	0	39
09:15 PM	0	39	0	0	0	0	0	0	39
09:30 PM	0	34	0	0	1	0	0	0	35
09:45 PM	0	37	0	0	4	0	0	0	41
10:00 PM	0	22	0	0	0	0	0	0	22
10:15 PM	0	20	0	0	1	0	0	0	21
10:30 PM	0	29	0	0	0	0	0	0	29
10:45 PM	0	25	0	0	0	0	0	0	25
11:00 PM	0	21	0	0	1	0	0	0	22
11:15 PM	0	27	0	0	0	0	0	0	27
11:30 PM	0	17	0	0	0	0	0	0	17
11:45 PM	0	12	0	0	1	0	0	0	13
Day Total	10	4590	2345	23	268	85	92	0	7413
Percent	0.1%	61.9%	31.6%	0.3%	3.6%	1.1%	1.2%	0%	
ADT 7413									
AM Peak	8:45 AM	10:15 AM	9:45 AM	7:45 AM	10:45 AM	6:30 AM	9:15 AM	12:00 AM	10:30 AM
15-min Vol	2	108	51	3	7	4	4	0	159
PM Peak	12:45 PM	5:15 PM	4:00 PM	4:00 PM	2:00 PM	5:00 PM	2:30 PM	12:00 PM	4:00 PM
15-min Vol	1	105	88	2	13	7	4	0	195

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

SUMMARY - Tube Count - Vehicle Classification Data

LOCATION: Kuihelani Hwy south of E Waiko Rd
SPECIFIC LOCATION:
CITY/STATE: Waikapu, HI

QC JOB #: 16589622
DIRECTION: NB
DATE: May 21 2024 - May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
Grand Total	20	9358	4784	60	509	154	189	0	15074
Percent	0.1%	62.1%	31.7%	0.4%	3.4%	1%	1.3%	0%	

ADT
7537

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Kuihelani Hwy south of E Waiko Rd | QC JOB #: 16589622

SPECIFIC LOCATION: | DIRECTION: NB

CITY/STATE: Waikapu, HI | DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
12:00 AM		10	12			11			11	
12:15 AM		5	6			6			6	
12:30 AM		4	10			7			7	
12:45 AM		5	3			4			4	
01:00 AM		2	2			2			2	
01:15 AM		0	3			2			2	
01:30 AM		1	4			3			3	
01:45 AM		1	3			2			2	
02:00 AM		5	4			5			5	
02:15 AM		5	7			6			6	
02:30 AM		10	5			8			8	
02:45 AM		3	4			4			4	
03:00 AM		3	7			5			5	
03:15 AM		8	9			9			9	
03:30 AM		11	9			10			10	
03:45 AM		7	11			9			9	
04:00 AM		4	8			6			6	
04:15 AM		5	8			7			7	
04:30 AM		5	7			6			6	
04:45 AM		9	13			11			11	
05:00 AM		22	22			22			22	
05:15 AM		25	26			26			26	
05:30 AM		28	24			26			26	
05:45 AM		48	34			41			41	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Kuihelani Hwy south of E Waiko Rd
QC JOB #: 16589622

SPECIFIC LOCATION:
DIRECTION: NB

CITY/STATE: Waikapu, HI
DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
06:00 AM		45	58			52			52	
06:15 AM		49	51			50			50	
06:30 AM		64	64			64			64	
06:45 AM		86	90			88			88	
07:00 AM		91	78			85			85	
07:15 AM		86	96			91			91	
07:30 AM		76	105			91			91	
07:45 AM		123	93			108			108	
08:00 AM		111	119			115			115	
08:15 AM		128	101			115			115	
08:30 AM		140	92			116			116	
08:45 AM		163	152			158			158	
09:00 AM		98	106			102			102	
09:15 AM		122	139			131			131	
09:30 AM		129	124			127			127	
09:45 AM		147	147			147			147	
10:00 AM		149	148			149			149	
10:15 AM		152	150			151			151	
10:30 AM		**168**	**159**			**164**			**164**	
10:45 AM		136	114			125			125	
11:00 AM		148	123			136			136	
11:15 AM		146	142			144			144	
11:30 AM		105	116			111			111	
11:45 AM		102	119			111			111	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Kuihelani Hwy south of E Waiko Rd
QC JOB #: 16589622
SPECIFIC LOCATION:
DIRECTION: NB
CITY/STATE: Waikapu, HI
DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
12:00 PM		127	105			116			116	
12:15 PM		113	99			106			106	
12:30 PM		134	118			126			126	
12:45 PM		149	111			130			130	
01:00 PM		115	121			118			118	
01:15 PM		158	106			132			132	
01:30 PM		100	130			115			115	
01:45 PM		117	119			118			118	
02:00 PM		122	130			126			126	
02:15 PM		138	116			127			127	
02:30 PM		155	129			142			142	
02:45 PM		162	155			159			159	
03:00 PM		140	127			134			134	
03:15 PM		139	144			142			142	
03:30 PM		124	161			143			143	
03:45 PM		155	171			163			163	
04:00 PM		167	195			181			181	
04:15 PM		182	163			173			173	
04:30 PM		167	157			162			162	
04:45 PM		169	174			172			172	
05:00 PM		155	147			151			151	
05:15 PM		163	160			162			162	
05:30 PM		167	133			150			150	
05:45 PM		147	150			149			149	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Kuihelani Hwy south of E Waiko Rd
QC JOB #: 16589622
SPECIFIC LOCATION:
DIRECTION: NB
CITY/STATE: Waikapu, HI
DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
06:00 PM		132	136			134			134	
06:15 PM		118	105			112			112	
06:30 PM		79	81			80			80	
06:45 PM		95	70			83			83	
07:00 PM		76	78			77			77	
07:15 PM		80	59			70			70	
07:30 PM		59	62			61			61	
07:45 PM		72	63			68			68	
08:00 PM		47	64			56			56	
08:15 PM		54	33			44			44	
08:30 PM		52	41			47			47	
08:45 PM		46	43			45			45	
09:00 PM		37	39			38			38	
09:15 PM		23	39			31			31	
09:30 PM		38	35			37			37	
09:45 PM		22	41			32			32	
10:00 PM		28	22			25			25	
10:15 PM		26	21			24			24	
10:30 PM		29	29			29			29	
10:45 PM		23	25			24			24	
11:00 PM		15	22			19			19	
11:15 PM		23	27			25			25	
11:30 PM		22	17			20			20	
11:45 PM		10	13			12			12	
Day Total		7661	7413			7559			7559	
% Weekday Average		101.3%	98.1%							
% Week Average		101.3%	98.1%			100%				
AM Peak 15-min Vol		10:30 AM 168	10:30 AM 159			10:30 AM 164			10:30 AM 164	
PM Peak 15-min Vol		4:15 PM 182	4:00 PM 195			4:00 PM 181			4:00 PM 181	

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Kuihelani Hwy south of E Waiko Rd
SPECIFIC LOCATION:
CITY/STATE: Waikapu, HI

QC JOB #: 16589622
DIRECTION: NB, SB
DATE: May 21 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
12:00 AM	0	13	0	0	1	0	0	0	14
12:15 AM	0	5	0	0	0	0	0	0	5
12:30 AM	0	6	0	0	0	0	0	0	6
12:45 AM	0	5	0	0	0	0	0	0	5
01:00 AM	0	8	0	0	1	0	2	0	11
01:15 AM	0	0	0	0	0	0	0	0	0
01:30 AM	0	2	0	0	2	0	0	0	4
01:45 AM	0	2	0	0	0	0	0	0	2
02:00 AM	0	7	0	0	0	0	0	0	7
02:15 AM	0	8	0	0	0	0	1	0	9
02:30 AM	0	12	0	0	1	0	1	0	14
02:45 AM	0	6	0	0	0	0	1	0	7
03:00 AM	0	7	0	0	1	0	0	0	8
03:15 AM	0	16	0	0	0	0	2	0	18
03:30 AM	0	16	0	0	1	0	0	0	17
03:45 AM	0	20	0	0	1	0	1	0	22
04:00 AM	0	16	0	0	2	0	0	0	18
04:15 AM	0	14	0	0	0	0	2	0	16
04:30 AM	0	28	0	0	0	0	1	0	29
04:45 AM	0	46	0	0	1	0	5	0	52
05:00 AM	0	95	0	1	4	0	2	0	102
05:15 AM	0	106	4	1	3	0	2	0	116
05:30 AM	0	75	37	0	2	0	9	0	123
05:45 AM	2	84	99	0	4	0	4	0	193
Day Total									
Percent									
ADT 15697									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Kuiheiani Hwy south of E Waiko Rd
SPECIFIC LOCATION:
CITY/STATE: Waikapu, HI

QC JOB #: 16589622
DIRECTION: NB, SB
DATE: May 21 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
06:00 AM	1	63	101	0	7	1	9	0	182
06:15 AM	0	103	101	0	15	2	5	0	226
06:30 AM	0	115	112	0	8	3	12	1	251
06:45 AM	0	139	110	0	10	2	8	0	269
07:00 AM	0	128	104	0	5	4	9	1	251
07:15 AM	0	125	81	2	4	0	2	0	214
07:30 AM	0	109	80	2	10	1	9	0	211
07:45 AM	0	153	94	0	20	2	10	0	279
08:00 AM	1	116	101	1	18	3	13	0	253
08:15 AM	0	155	117	2	15	3	2	0	294
08:30 AM	0	145	104	1	9	2	8	0	269
08:45 AM	0	162	92	2	13	0	10	0	279
09:00 AM	0	121	84	1	4	1	4	0	215
09:15 AM	0	133	87	1	7	2	5	0	235
09:30 AM	1	141	65	0	6	3	0	0	216
09:45 AM	0	134	89	2	11	1	5	0	242
10:00 AM	0	148	77	2	11	2	1	0	241
10:15 AM	0	135	88	0	1	3	4	0	231
10:30 AM	0	173	79	1	6	1	3	0	263
10:45 AM	1	159	56	2	8	0	5	0	231
11:00 AM	1	154	76	1	10	2	4	0	248
11:15 AM	0	155	66	0	7	2	7	0	237
11:30 AM	0	150	60	1	5	1	0	0	217
11:45 AM	0	146	62	0	3	2	3	0	216
Day Total									
Percent									
ADT 15697									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Kuihelani Hwy south of E Waiko Rd
SPECIFIC LOCATION:
CITY/STATE: Waikapu, HI

QC JOB #: 16589622
DIRECTION: NB, SB
DATE: May 21 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
12:00 PM	0	162	56	1	10	1	5	0	235
12:15 PM	1	135	97	2	10	4	4	0	253
12:30 PM	0	185	82	7	4	1	4	0	283
12:45 PM	0	175	82	0	6	2	3	0	268
01:00 PM	1	145	81	0	9	3	4	0	243
01:15 PM	0	177	98	5	11	4	1	0	296
01:30 PM	0	142	95	0	7	1	3	0	248
01:45 PM	1	159	85	4	7	2	5	0	263
02:00 PM	1	165	67	3	7	3	9	0	255
02:15 PM	1	185	85	1	9	3	0	0	284
02:30 PM	1	179	76	6	14	2	4	0	282
02:45 PM	0	189	113	1	12	1	1	0	317
03:00 PM	1	200	87	1	11	2	3	0	305
03:15 PM	1	184	100	3	10	3	1	0	302
03:30 PM	0	146	98	3	5	2	4	0	258
03:45 PM	2	192	118	0	10	3	3	0	328
04:00 PM	0	154	124	2	9	1	5	0	295
04:15 PM	1	204	125	2	10	2	3	0	347
04:30 PM	0	199	116	1	8	4	1	0	329
04:45 PM	1	181	101	0	12	3	2	0	300
05:00 PM	0	186	82	2	11	6	3	0	290
05:15 PM	0	178	82	2	5	5	1	0	273
05:30 PM	1	182	84	2	4	4	1	0	278
05:45 PM	1	144	71	1	9	0	2	0	228
Day Total									
Percent									
ADT 15697									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

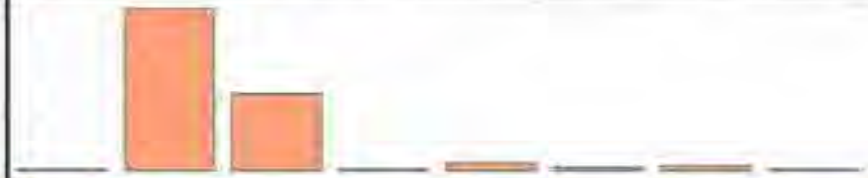
Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Kuihelani Hwy south of E Waiko Rd
SPECIFIC LOCATION:
CITY/STATE: Waikapu, HI

QC JOB #: 16589622
DIRECTION: NB, SB
DATE: May 21 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
06:00 PM	0	131	91	1	5	0	0	0	228
06:15 PM	1	127	79	0	4	0	0	0	211
06:30 PM	0	99	54	0	0	1	4	0	158
06:45 PM	1	102	60	1	5	0	0	0	169
07:00 PM	0	103	39	0	2	0	1	0	145
07:15 PM	0	153	4	1	5	0	2	0	165
07:30 PM	0	145	0	0	3	0	0	0	148
07:45 PM	0	151	0	0	1	0	1	0	153
08:00 PM	0	99	0	0	0	0	1	0	100
08:15 PM	0	118	0	0	2	0	0	0	120
08:30 PM	0	99	0	0	1	0	1	0	101
08:45 PM	0	119	0	0	1	0	0	0	120
09:00 PM	0	86	0	0	2	0	0	0	88
09:15 PM	0	55	0	0	0	0	1	0	56
09:30 PM	0	70	0	0	0	0	0	0	70
09:45 PM	0	51	0	0	1	0	0	0	52
10:00 PM	0	62	0	0	1	0	0	0	63
10:15 PM	0	43	0	0	0	0	2	0	45
10:30 PM	0	41	0	0	1	0	0	0	42
10:45 PM	0	40	0	0	0	0	0	0	40
11:00 PM	0	25	0	0	0	0	0	0	25
11:15 PM	0	28	0	0	1	0	0	0	29
11:30 PM	0	27	0	0	0	0	0	0	27
11:45 PM	0	14	0	0	0	0	0	0	14
Day Total	23	9995	4758	75	482	106	256	2	15697
Percent	0.1%	63.7%	30.3%	0.5%	3.1%	0.7%	1.6%	0%	
ADT 15697									
AM Peak	5:45 AM	10:30 AM	8:15 AM	7:15 AM	7:45 AM	7:00 AM	8:00 AM	6:30 AM	8:15 AM
15-min Vol	2	173	117	2	20	4	13	1	294
PM Peak	3:45 PM	4:15 PM	4:15 PM	12:30 PM	2:30 PM	5:00 PM	2:00 PM	12:00 PM	4:15 PM
15-min Vol	2	204	125	7	14	6	9	0	347

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Kuihelani Hwy south of E Waiko Rd
SPECIFIC LOCATION:
CITY/STATE: Waikapu, HI

QC JOB #: 16589622
DIRECTION: NB, SB
DATE: May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
12:00 AM	0	20	0	0	1	0	0	0	21
12:15 AM	0	11	0	0	0	0	0	0	11
12:30 AM	0	12	0	0	0	0	0	0	12
12:45 AM	0	7	0	0	1	0	0	0	8
01:00 AM	0	5	0	0	0	0	1	0	6
01:15 AM	0	4	0	0	0	0	1	0	5
01:30 AM	0	4	0	0	1	0	0	0	5
01:45 AM	0	4	0	0	0	0	0	0	4
02:00 AM	0	5	0	0	0	0	0	0	5
02:15 AM	0	9	0	0	0	0	1	0	10
02:30 AM	0	9	0	0	1	0	1	0	11
02:45 AM	0	6	0	0	1	0	1	0	8
03:00 AM	0	9	0	0	0	0	1	0	10
03:15 AM	0	17	0	0	1	0	3	0	21
03:30 AM	0	20	0	0	1	0	0	0	21
03:45 AM	0	23	0	0	0	0	2	0	25
04:00 AM	0	20	0	0	1	0	3	0	24
04:15 AM	0	20	0	0	1	0	1	0	22
04:30 AM	0	26	0	0	1	0	1	0	28
04:45 AM	0	41	0	0	0	0	3	0	44
05:00 AM	0	89	0	0	6	0	0	0	95
05:15 AM	0	95	16	1	2	0	6	0	120
05:30 AM	0	46	69	0	2	0	7	0	124
05:45 AM	1	58	123	1	6	0	5	0	194
Day Total									
Percent									
ADT 15325									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Kuihelani Hwy south of E Waiko Rd
SPECIFIC LOCATION:
CITY/STATE: Waikapu, HI

QC JOB #: 16589622
DIRECTION: NB, SB
DATE: May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
06:00 AM	0	73	96	1	9	0	7	1	187
06:15 AM	1	88	118	0	14	0	12	0	233
06:30 AM	0	114	104	1	19	5	12	0	255
06:45 AM	1	125	90	1	5	7	15	0	244
07:00 AM	0	118	94	1	6	2	17	1	239
07:15 AM	0	114	106	0	16	2	4	0	242
07:30 AM	0	125	83	1	12	5	13	0	239
07:45 AM	0	101	75	4	12	2	6	0	200
08:00 AM	1	138	97	3	11	1	8	0	259
08:15 AM	0	100	79	1	15	6	9	1	211
08:30 AM	0	101	91	1	16	2	10	1	222
08:45 AM	2	147	86	1	13	2	6	0	257
09:00 AM	0	120	69	0	6	0	7	0	202
09:15 AM	0	142	85	0	9	1	8	0	245
09:30 AM	1	136	68	0	10	2	3	0	220
09:45 AM	2	129	85	0	11	3	5	0	235
10:00 AM	0	152	75	0	8	2	8	0	245
10:15 AM	2	165	79	0	1	2	2	0	251
10:30 AM	0	149	72	1	5	4	3	0	234
10:45 AM	0	143	63	0	15	2	1	0	224
11:00 AM	0	152	74	0	12	0	5	0	243
11:15 AM	0	162	64	0	4	1	4	0	235
11:30 AM	1	161	74	1	7	1	4	0	249
11:45 AM	1	153	76	2	5	5	2	0	244
Day Total									
Percent									
ADT 15325									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Kuiheiani Hwy south of E Waiko Rd
SPECIFIC LOCATION:
CITY/STATE: Waikapu, HI

QC JOB #: 16589622
DIRECTION: NB, SB
DATE: May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
12:00 PM	0	155	68	0	9	3	5	0	240
12:15 PM	0	150	58	0	7	2	3	0	220
12:30 PM	0	150	90	2	14	2	6	0	264
12:45 PM	1	168	82	2	4	2	5	0	264
01:00 PM	0	166	78	2	5	1	2	0	254
01:15 PM	0	159	70	1	12	4	4	0	250
01:30 PM	0	176	71	0	4	2	3	0	256
01:45 PM	1	153	72	0	14	2	3	0	245
02:00 PM	0	166	82	2	15	4	4	0	273
02:15 PM	2	182	78	1	8	6	1	0	278
02:30 PM	0	169	74	1	12	2	7	0	265
02:45 PM	0	201	88	2	6	1	3	0	301
03:00 PM	0	157	75	2	6	4	2	0	246
03:15 PM	0	185	93	0	14	1	4	0	297
03:30 PM	1	200	106	1	11	2	4	0	325
03:45 PM	0	169	115	0	9	0	5	0	298
04:00 PM	2	193	131	3	12	2	2	0	345
04:15 PM	0	173	95	0	13	3	4	0	288
04:30 PM	1	165	95	0	14	1	3	0	279
04:45 PM	0	175	95	0	2	3	3	0	278
05:00 PM	0	166	94	0	8	7	4	0	279
05:15 PM	0	189	75	1	5	3	1	0	274
05:30 PM	0	136	84	1	4	6	1	0	232
05:45 PM	0	171	71	1	5	0	0	0	248
Day Total									
Percent									
ADT 15325									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Kuihelani Hwy south of E Waiko Rd
SPECIFIC LOCATION:
CITY/STATE: Waikapu, HI

QC JOB #: 16589622
DIRECTION: NB, SB
DATE: May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
06:00 PM	0	139	84	0	8	0	0	0	231
06:15 PM	0	126	80	0	4	0	0	0	210
06:30 PM	0	123	60	1	2	0	1	0	187
06:45 PM	0	75	71	0	2	0	0	0	148
07:00 PM	1	119	39	1	4	0	2	0	166
07:15 PM	0	137	3	0	1	0	0	0	141
07:30 PM	0	130	0	0	2	0	0	0	132
07:45 PM	0	133	0	0	1	0	2	0	136
08:00 PM	0	118	0	0	4	0	0	0	122
08:15 PM	0	89	0	0	2	0	0	0	91
08:30 PM	0	97	0	0	1	0	0	0	98
08:45 PM	0	89	0	0	3	0	0	0	92
09:00 PM	0	94	0	0	0	0	0	0	94
09:15 PM	0	82	0	0	0	0	0	0	82
09:30 PM	0	83	0	0	2	0	0	0	85
09:45 PM	0	76	0	0	4	0	0	0	80
10:00 PM	0	46	0	0	1	0	0	0	47
10:15 PM	0	44	0	0	1	0	1	0	46
10:30 PM	0	52	0	0	0	0	0	0	52
10:45 PM	0	35	0	0	0	0	0	0	35
11:00 PM	0	26	0	0	1	0	0	0	27
11:15 PM	0	38	0	0	0	0	0	0	38
11:30 PM	0	21	0	0	0	0	0	0	21
11:45 PM	0	15	0	0	1	0	0	0	16
Day Total	22	9729	4588	45	524	120	293	4	15325
Percent	0.1%	63.5%	29.9%	0.3%	3.4%	0.8%	1.9%	0%	
ADT 15325									
AM Peak	8:45 AM	10:15 AM	5:45 AM	7:45 AM	6:30 AM	6:45 AM	7:00 AM	6:00 AM	8:00 AM
15-min Vol	2	165	123	4	19	7	17	1	259
PM Peak	2:15 PM	2:45 PM	4:00 PM	4:00 PM	2:00 PM	5:00 PM	2:30 PM	12:00 PM	4:00 PM
15-min Vol	2	201	131	3	15	7	7	0	345

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

SUMMARY - Tube Count - Vehicle Classification Data

LOCATION: Kuihelani Hwy south of E Waiko Rd
SPECIFIC LOCATION:
CITY/STATE: Waikapu, HI

QC JOB #: 16589622
DIRECTION: NB, SB
DATE: May 21 2024 - May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
Grand Total	45	19724	9346	120	1006	226	549	6	31022
Percent	0.1%	63.6%	30.1%	0.4%	3.2%	0.7%	1.8%	0%	
ADT 15511									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Kuihelani Hwy south of E Waiko Rd
QC JOB #: 16589622
SPECIFIC LOCATION:
DIRECTION: NB, SB
CITY/STATE: Waikapu, HI
DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
12:00 AM		14	21			18			18	
12:15 AM		5	11			8			8	
12:30 AM		6	12			9			9	
12:45 AM		5	8			7			7	
01:00 AM		11	6			9			9	
01:15 AM		0	5			3			3	
01:30 AM		4	5			5			5	
01:45 AM		2	4			3			3	
02:00 AM		7	5			6			6	
02:15 AM		9	10			10			10	
02:30 AM		14	11			13			13	
02:45 AM		7	8			8			8	
03:00 AM		8	10			9			9	
03:15 AM		18	21			20			20	
03:30 AM		17	21			19			19	
03:45 AM		22	25			24			24	
04:00 AM		18	24			21			21	
04:15 AM		16	22			19			19	
04:30 AM		29	28			29			29	
04:45 AM		52	44			48			48	
05:00 AM		102	95			99			99	
05:15 AM		116	120			118			118	
05:30 AM		123	124			124			124	
05:45 AM		193	194			194			194	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Kuihelani Hwy south of E Waiko Rd
QC JOB #: 16589622
SPECIFIC LOCATION:
DIRECTION: NB, SB
CITY/STATE: Waikapu, HI
DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
06:00 AM		182	187			185			185	
06:15 AM		226	233			230			230	
06:30 AM		251	255			253			253	
06:45 AM		269	244			257			257	
07:00 AM		251	239			245			245	
07:15 AM		214	242			228			228	
07:30 AM		211	239			225			225	
07:45 AM		279	200			240			240	
08:00 AM		253	259			256			256	
08:15 AM		294	211			253			253	
08:30 AM		269	222			246			246	
08:45 AM		279	257			268			268	
09:00 AM		215	202			209			209	
09:15 AM		235	245			240			240	
09:30 AM		216	220			218			218	
09:45 AM		242	235			239			239	
10:00 AM		241	245			243			243	
10:15 AM		231	251			241			241	
10:30 AM		263	234			249			249	
10:45 AM		231	224			228			228	
11:00 AM		248	243			246			246	
11:15 AM		237	235			236			236	
11:30 AM		217	249			233			233	
11:45 AM		216	244			230			230	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Kuihelani Hwy south of E Waiko Rd
QC JOB #: 16589622
SPECIFIC LOCATION:
DIRECTION: NB, SB
CITY/STATE: Waikapu, HI
DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
12:00 PM		235	240			238			238	
12:15 PM		253	220			237			237	
12:30 PM		283	264			274			274	
12:45 PM		268	264			266			266	
01:00 PM		243	254			249			249	
01:15 PM		296	250			273			273	
01:30 PM		248	256			252			252	
01:45 PM		263	245			254			254	
02:00 PM		255	273			264			264	
02:15 PM		284	278			281			281	
02:30 PM		282	265			274			274	
02:45 PM		317	301			309			309	
03:00 PM		305	246			276			276	
03:15 PM		302	297			300			300	
03:30 PM		258	325			292			292	
03:45 PM		328	298			313			313	
04:00 PM		295	345			320			320	
04:15 PM		347	288			318			318	
04:30 PM		329	279			304			304	
04:45 PM		300	278			289			289	
05:00 PM		290	279			285			285	
05:15 PM		273	274			274			274	
05:30 PM		278	232			255			255	
05:45 PM		228	248			238			238	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Kuihelani Hwy south of E Waiko Rd
QC JOB #: 16589622
SPECIFIC LOCATION:
DIRECTION: NB, SB
CITY/STATE: Waikapu, HI
DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
06:00 PM		228	231			230			230	
06:15 PM		211	210			211			211	
06:30 PM		158	187			173			173	
06:45 PM		169	148			159			159	
07:00 PM		145	166			156			156	
07:15 PM		165	141			153			153	
07:30 PM		148	132			140			140	
07:45 PM		153	136			145			145	
08:00 PM		100	122			111			111	
08:15 PM		120	91			106			106	
08:30 PM		101	98			100			100	
08:45 PM		120	92			106			106	
09:00 PM		88	94			91			91	
09:15 PM		56	82			69			69	
09:30 PM		70	85			78			78	
09:45 PM		52	80			66			66	
10:00 PM		63	47			55			55	
10:15 PM		45	46			46			46	
10:30 PM		42	52			47			47	
10:45 PM		40	35			38			38	
11:00 PM		25	27			26			26	
11:15 PM		29	38			34			34	
11:30 PM		27	21			24			24	
11:45 PM		14	16			15			15	
Day Total		15697	15325			15535			15535	
% Weekday Average		101%	98.6%							
% Week Average		101%	98.6%			100%				
AM Peak 15-min Vol		8:15 AM 294	8:00 AM 259			8:45 AM 268			8:45 AM 268	
PM Peak 15-min Vol		4:15 PM 347	4:00 PM 345			4:00 PM 320			4:00 PM 320	

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Kuihelani Hwy south of E Waiko Rd
SPECIFIC LOCATION:
CITY/STATE: Waikapu, HI

QC JOB #: 16589622
DIRECTION: SB
DATE: May 21 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
12:00 AM	0	3	0	0	1	0	0	0	4
12:15 AM	0	0	0	0	0	0	0	0	0
12:30 AM	0	2	0	0	0	0	0	0	2
12:45 AM	0	0	0	0	0	0	0	0	0
01:00 AM	0	6	0	0	1	0	2	0	9
01:15 AM	0	0	0	0	0	0	0	0	0
01:30 AM	0	1	0	0	2	0	0	0	3
01:45 AM	0	1	0	0	0	0	0	0	1
02:00 AM	0	2	0	0	0	0	0	0	2
02:15 AM	0	3	0	0	0	0	1	0	4
02:30 AM	0	4	0	0	0	0	0	0	4
02:45 AM	0	3	0	0	0	0	1	0	4
03:00 AM	0	5	0	0	0	0	0	0	5
03:15 AM	0	9	0	0	0	0	1	0	10
03:30 AM	0	5	0	0	1	0	0	0	6
03:45 AM	0	14	0	0	0	0	1	0	15
04:00 AM	0	12	0	0	2	0	0	0	14
04:15 AM	0	9	0	0	0	0	2	0	11
04:30 AM	0	23	0	0	0	0	1	0	24
04:45 AM	0	38	0	0	1	0	4	0	43
05:00 AM	0	75	0	1	2	0	2	0	80
05:15 AM	0	81	4	1	3	0	2	0	91
05:30 AM	0	58	26	0	2	0	9	0	95
05:45 AM	2	59	78	0	2	0	4	0	145
Day Total									
Percent									
ADT 8036									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Kuihelani Hwy south of E Waiko Rd
SPECIFIC LOCATION:
CITY/STATE: Waikapu, HI

QC JOB #: 16589622
DIRECTION: SB
DATE: May 21 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
06:00 AM	1	39	83	0	6	0	8	0	137
06:15 AM	0	83	74	0	14	1	5	0	177
06:30 AM	0	84	82	0	8	3	9	1	187
06:45 AM	0	85	81	0	7	2	8	0	183
07:00 AM	0	80	68	0	3	2	6	1	160
07:15 AM	0	71	53	1	2	0	1	0	128
07:30 AM	0	63	53	1	9	1	8	0	135
07:45 AM	0	71	56	0	18	1	10	0	156
08:00 AM	1	62	58	0	15	1	5	0	142
08:15 AM	0	70	78	1	13	3	1	0	166
08:30 AM	0	54	60	1	6	2	6	0	129
08:45 AM	0	56	42	1	9	0	8	0	116
09:00 AM	0	56	55	0	3	0	3	0	117
09:15 AM	0	58	42	1	6	2	4	0	113
09:30 AM	1	49	32	0	4	1	0	0	87
09:45 AM	0	47	37	0	7	0	4	0	95
10:00 AM	0	52	32	1	6	1	0	0	92
10:15 AM	0	40	35	0	1	2	1	0	79
10:30 AM	0	53	36	1	2	1	2	0	95
10:45 AM	0	66	22	1	2	0	4	0	95
11:00 AM	0	65	32	0	2	0	1	0	100
11:15 AM	0	54	31	0	2	1	3	0	91
11:30 AM	0	80	27	1	4	0	0	0	112
11:45 AM	0	78	32	0	2	1	1	0	114
Day Total									
Percent									
ADT 8036									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Kuihelani Hwy south of E Waiko Rd
SPECIFIC LOCATION:
CITY/STATE: Waikapu, HI

QC JOB #: 16589622
DIRECTION: SB
DATE: May 21 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
12:00 PM	0	73	23	0	7	1	4	0	108
12:15 PM	1	85	46	2	2	1	3	0	140
12:30 PM	0	103	38	2	2	1	3	0	149
12:45 PM	0	88	27	0	2	1	1	0	119
01:00 PM	0	83	40	0	2	1	2	0	128
01:15 PM	0	84	45	4	5	0	0	0	138
01:30 PM	0	89	54	0	3	0	2	0	148
01:45 PM	1	95	43	2	2	0	3	0	146
02:00 PM	1	98	27	1	3	0	3	0	133
02:15 PM	0	110	33	1	2	0	0	0	146
02:30 PM	1	95	23	3	3	1	1	0	127
02:45 PM	0	108	45	0	2	0	0	0	155
03:00 PM	1	122	37	0	3	0	2	0	165
03:15 PM	0	112	40	3	6	2	0	0	163
03:30 PM	0	86	44	2	0	0	2	0	134
03:45 PM	0	121	49	0	1	2	0	0	173
04:00 PM	0	89	37	1	1	0	0	0	128
04:15 PM	1	110	45	1	7	1	0	0	165
04:30 PM	0	105	53	1	3	0	0	0	162
04:45 PM	1	89	40	0	1	0	0	0	131
05:00 PM	0	97	35	1	2	0	0	0	135
05:15 PM	0	79	31	0	0	0	0	0	110
05:30 PM	1	85	21	2	1	1	0	0	111
05:45 PM	0	57	23	0	1	0	0	0	81
Day Total									
Percent									
ADT 8036									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Kuihelani Hwy south of E Waiko Rd
SPECIFIC LOCATION:
CITY/STATE: Waikapu, HI

QC JOB #: 16589622
DIRECTION: SB
DATE: May 21 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
06:00 PM	0	65	30	0	1	0	0	0	96
06:15 PM	0	68	25	0	0	0	0	0	93
06:30 PM	0	56	22	0	0	0	1	0	79
06:45 PM	0	51	22	0	1	0	0	0	74
07:00 PM	0	56	11	0	1	0	1	0	69
07:15 PM	0	81	1	0	2	0	1	0	85
07:30 PM	0	86	0	0	3	0	0	0	89
07:45 PM	0	80	0	0	1	0	0	0	81
08:00 PM	0	53	0	0	0	0	0	0	53
08:15 PM	0	65	0	0	1	0	0	0	66
08:30 PM	0	49	0	0	0	0	0	0	49
08:45 PM	0	74	0	0	0	0	0	0	74
09:00 PM	0	49	0	0	2	0	0	0	51
09:15 PM	0	32	0	0	0	0	1	0	33
09:30 PM	0	32	0	0	0	0	0	0	32
09:45 PM	0	30	0	0	0	0	0	0	30
10:00 PM	0	35	0	0	0	0	0	0	35
10:15 PM	0	18	0	0	0	0	1	0	19
10:30 PM	0	13	0	0	0	0	0	0	13
10:45 PM	0	17	0	0	0	0	0	0	17
11:00 PM	0	10	0	0	0	0	0	0	10
11:15 PM	0	6	0	0	0	0	0	0	6
11:30 PM	0	5	0	0	0	0	0	0	5
11:45 PM	0	4	0	0	0	0	0	0	4
Day Total	13	5227	2319	38	241	37	159	2	8036
Percent	0.2%	65%	28.9%	0.5%	3%	0.5%	2%	0%	
ADT 8036									
AM Peak	5:45 AM	6:45 AM	6:00 AM	5:00 AM	7:45 AM	6:30 AM	7:45 AM	6:30 AM	6:30 AM
15-min Vol	2	85	83	1	18	3	10	1	187
PM Peak	12:15 PM	3:00 PM	1:30 PM	1:15 PM	12:00 PM	3:15 PM	12:00 PM	12:00 PM	3:45 PM
15-min Vol	1	122	54	4	7	2	4	0	173

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Kuihelani Hwy south of E Waiko Rd
SPECIFIC LOCATION:
CITY/STATE: Waikapu, HI

QC JOB #: 16589622
DIRECTION: SB
DATE: May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
12:00 AM	0	8	0	0	1	0	0	0	9
12:15 AM	0	5	0	0	0	0	0	0	5
12:30 AM	0	2	0	0	0	0	0	0	2
12:45 AM	0	4	0	0	1	0	0	0	5
01:00 AM	0	3	0	0	0	0	1	0	4
01:15 AM	0	1	0	0	0	0	1	0	2
01:30 AM	0	1	0	0	0	0	0	0	1
01:45 AM	0	1	0	0	0	0	0	0	1
02:00 AM	0	1	0	0	0	0	0	0	1
02:15 AM	0	2	0	0	0	0	1	0	3
02:30 AM	0	5	0	0	0	0	1	0	6
02:45 AM	0	3	0	0	0	0	1	0	4
03:00 AM	0	2	0	0	0	0	1	0	3
03:15 AM	0	8	0	0	1	0	3	0	12
03:30 AM	0	12	0	0	0	0	0	0	12
03:45 AM	0	13	0	0	0	0	1	0	14
04:00 AM	0	12	0	0	1	0	3	0	16
04:15 AM	0	12	0	0	1	0	1	0	14
04:30 AM	0	20	0	0	0	0	1	0	21
04:45 AM	0	28	0	0	0	0	3	0	31
05:00 AM	0	70	0	0	3	0	0	0	73
05:15 AM	0	70	15	1	2	0	6	0	94
05:30 AM	0	35	56	0	2	0	7	0	100
05:45 AM	1	46	103	1	4	0	5	0	160
Day Total									
Percent									
ADT 7912									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Kuihelani Hwy south of E Waiko Rd
SPECIFIC LOCATION:
CITY/STATE: Waikapu, HI

QC JOB #: 16589622
DIRECTION: SB
DATE: May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
06:00 AM	0	45	68	1	8	0	6	1	129
06:15 AM	1	64	94	0	13	0	10	0	182
06:30 AM	0	80	81	1	17	1	11	0	191
06:45 AM	0	70	59	1	4	5	15	0	154
07:00 AM	0	81	58	0	5	2	14	1	161
07:15 AM	0	60	68	0	13	1	4	0	146
07:30 AM	0	58	52	0	10	3	11	0	134
07:45 AM	0	44	47	1	9	2	4	0	107
08:00 AM	1	63	59	1	9	0	7	0	140
08:15 AM	0	41	43	0	14	3	8	1	110
08:30 AM	0	50	56	1	14	1	7	1	130
08:45 AM	0	48	41	0	11	1	4	0	105
09:00 AM	0	54	33	0	3	0	6	0	96
09:15 AM	0	51	45	0	6	0	4	0	106
09:30 AM	1	52	33	0	8	0	2	0	96
09:45 AM	1	43	34	0	6	1	3	0	88
10:00 AM	0	52	36	0	3	1	5	0	97
10:15 AM	2	57	40	0	0	2	0	0	101
10:30 AM	0	46	24	0	3	0	2	0	75
10:45 AM	0	70	30	0	8	2	0	0	110
11:00 AM	0	72	41	0	5	0	2	0	120
11:15 AM	0	66	25	0	1	1	0	0	93
11:30 AM	1	87	38	1	2	1	3	0	133
11:45 AM	1	81	39	0	3	1	0	0	125
Day Total									
Percent									
ADT 7912									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Kuiheiani Hwy south of E Waiko Rd
SPECIFIC LOCATION:
CITY/STATE: Waikapu, HI

QC JOB #: 16589622
DIRECTION: SB
DATE: May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
12:00 PM	0	92	37	0	2	0	4	0	135
12:15 PM	0	86	31	0	4	0	0	0	121
12:30 PM	0	94	41	2	5	1	3	0	146
12:45 PM	0	103	40	2	3	1	4	0	153
01:00 PM	0	96	33	1	2	0	1	0	133
01:15 PM	0	99	35	1	6	0	3	0	144
01:30 PM	0	94	30	0	0	1	1	0	126
01:45 PM	0	89	26	0	8	1	2	0	126
02:00 PM	0	97	40	1	2	1	2	0	143
02:15 PM	1	122	35	1	3	0	0	0	162
02:30 PM	0	105	27	0	1	0	3	0	136
02:45 PM	0	106	38	1	0	0	1	0	146
03:00 PM	0	89	24	1	3	0	2	0	119
03:15 PM	0	109	39	0	4	0	1	0	153
03:30 PM	0	118	43	1	1	0	1	0	164
03:45 PM	0	89	36	0	1	0	1	0	127
04:00 PM	1	102	43	1	2	1	0	0	150
04:15 PM	0	85	36	0	2	1	1	0	125
04:30 PM	0	87	33	0	1	0	1	0	122
04:45 PM	0	77	26	0	0	0	1	0	104
05:00 PM	0	94	36	0	2	0	0	0	132
05:15 PM	0	84	27	1	2	0	0	0	114
05:30 PM	0	68	31	0	0	0	0	0	99
05:45 PM	0	80	18	0	0	0	0	0	98
Day Total									
Percent									
ADT 7912									
AM Peak 15-min Vol									
PM Peak 15-min Vol									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Kuihelani Hwy south of E Waiko Rd
SPECIFIC LOCATION:
CITY/STATE: Waikapu, HI

QC JOB #: 16589622
DIRECTION: SB
DATE: May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
06:00 PM	0	66	27	0	2	0	0	0	95
06:15 PM	0	72	32	0	1	0	0	0	105
06:30 PM	0	86	19	0	0	0	1	0	106
06:45 PM	0	51	26	0	1	0	0	0	78
07:00 PM	1	70	15	0	0	0	2	0	88
07:15 PM	0	81	1	0	0	0	0	0	82
07:30 PM	0	70	0	0	0	0	0	0	70
07:45 PM	0	71	0	0	1	0	1	0	73
08:00 PM	0	56	0	0	2	0	0	0	58
08:15 PM	0	58	0	0	0	0	0	0	58
08:30 PM	0	57	0	0	0	0	0	0	57
08:45 PM	0	47	0	0	2	0	0	0	49
09:00 PM	0	55	0	0	0	0	0	0	55
09:15 PM	0	43	0	0	0	0	0	0	43
09:30 PM	0	49	0	0	1	0	0	0	50
09:45 PM	0	39	0	0	0	0	0	0	39
10:00 PM	0	24	0	0	1	0	0	0	25
10:15 PM	0	24	0	0	0	0	1	0	25
10:30 PM	0	23	0	0	0	0	0	0	23
10:45 PM	0	10	0	0	0	0	0	0	10
11:00 PM	0	5	0	0	0	0	0	0	5
11:15 PM	0	11	0	0	0	0	0	0	11
11:30 PM	0	4	0	0	0	0	0	0	4
11:45 PM	0	3	0	0	0	0	0	0	3
Day Total	12	5139	2243	22	256	35	201	4	7912
Percent	0.2%	65%	28.3%	0.3%	3.2%	0.4%	2.5%	0.1%	
ADT 7912									
AM Peak	10:15 AM	11:30 AM	5:45 AM	5:15 AM	6:30 AM	6:45 AM	6:45 AM	6:00 AM	6:30 AM
15-min Vol	2	87	103	1	17	5	15	1	191
PM Peak	2:15 PM	2:15 PM	3:30 PM	12:30 PM	1:45 PM	12:30 PM	12:00 PM	12:00 PM	3:30 PM
15-min Vol	1	122	43	2	8	1	4	0	164

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

SUMMARY - Tube Count - Vehicle Classification Data

LOCATION: Kuihelani Hwy south of E Waiko Rd
SPECIFIC LOCATION:
CITY/STATE: Waikapu, HI

QC JOB #: 16589622
DIRECTION: SB
DATE: May 21 2024 - May 22 2024

Start Time	FHWA 1	FHWA 2	FHWA 3	FHWA 4	FHWA 5	FHWA 6-7	FHWA 8-10	FHWA 11-13	Total
Grand Total	25	10366	4562	60	497	72	360	6	15948
Percent	0.2%	65%	28.6%	0.4%	3.1%	0.5%	2.3%	0%	
ADT 7974									

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Kuihelani Hwy south of E Waiko Rd | QC JOB #: 16589622

SPECIFIC LOCATION: | DIRECTION: SB

CITY/STATE: Waikapu, HI | DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
12:00 AM		4	9			7			7	
12:15 AM		0	5			3			3	
12:30 AM		2	2			2			2	
12:45 AM		0	5			3			3	
01:00 AM		9	4			7			7	
01:15 AM		0	2			1			1	
01:30 AM		3	1			2			2	
01:45 AM		1	1			1			1	
02:00 AM		2	1			2			2	
02:15 AM		4	3			4			4	
02:30 AM		4	6			5			5	
02:45 AM		4	4			4			4	
03:00 AM		5	3			4			4	
03:15 AM		10	12			11			11	
03:30 AM		6	12			9			9	
03:45 AM		15	14			15			15	
04:00 AM		14	16			15			15	
04:15 AM		11	14			13			13	
04:30 AM		24	21			23			23	
04:45 AM		43	31			37			37	
05:00 AM		80	73			77			77	
05:15 AM		91	94			93			93	
05:30 AM		95	100			98			98	
05:45 AM		145	160			153			153	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Kuihelani Hwy south of E Waiko Rd | QC JOB #: 16589622

SPECIFIC LOCATION: | DIRECTION: SB

CITY/STATE: Waikapu, HI | DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
06:00 AM		137	129			133			133	
06:15 AM		177	182			180			180	
06:30 AM		187	191			189			189	
06:45 AM		183	154			169			169	
07:00 AM		160	161			161			161	
07:15 AM		128	146			137			137	
07:30 AM		135	134			135			135	
07:45 AM		156	107			132			132	
08:00 AM		142	140			141			141	
08:15 AM		166	110			138			138	
08:30 AM		129	130			130			130	
08:45 AM		116	105			111			111	
09:00 AM		117	96			107			107	
09:15 AM		113	106			110			110	
09:30 AM		87	96			92			92	
09:45 AM		95	88			92			92	
10:00 AM		92	97			95			95	
10:15 AM		79	101			90			90	
10:30 AM		95	75			85			85	
10:45 AM		95	110			103			103	
11:00 AM		100	120			110			110	
11:15 AM		91	93			92			92	
11:30 AM		112	133			123			123	
11:45 AM		114	125			120			120	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Kuihelani Hwy south of E Waiko Rd | QC JOB #: 16589622

SPECIFIC LOCATION: | DIRECTION: SB

CITY/STATE: Waikapu, HI | DATE: May 21 2024 - May 22 2024

Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
12:00 PM		108	135			122			122	
12:15 PM		140	121			131			131	
12:30 PM		149	146			148			148	
12:45 PM		119	153			136			136	
01:00 PM		128	133			131			131	
01:15 PM		138	144			141			141	
01:30 PM		148	126			137			137	
01:45 PM		146	126			136			136	
02:00 PM		133	143			138			138	
02:15 PM		146	162			154			154	
02:30 PM		127	136			132			132	
02:45 PM		155	146			151			151	
03:00 PM		165	119			142			142	
03:15 PM		163	153			158			158	
03:30 PM		134	164			149			149	
03:45 PM		173	127			150			150	
04:00 PM		128	150			139			139	
04:15 PM		165	125			145			145	
04:30 PM		162	122			142			142	
04:45 PM		131	104			118			118	
05:00 PM		135	132			134			134	
05:15 PM		110	114			112			112	
05:30 PM		111	99			105			105	
05:45 PM		81	98			90			90	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: Kuihelani Hwy south of E Waiko Rd
QC JOB #: 16589622

SPECIFIC LOCATION:
DIRECTION: SB

CITY/STATE: Waikapu, HI
DATE: May 21 2024 - May 22 2024

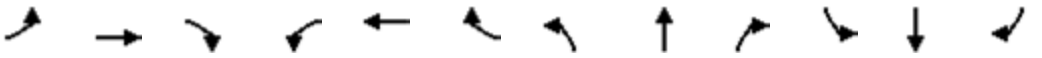
Start Time	Mon	Tue 21 May 24	Wed 22 May 24	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
06:00 PM		96	95			96			96	
06:15 PM		93	105			99			99	
06:30 PM		79	106			93			93	
06:45 PM		74	78			76			76	
07:00 PM		69	88			79			79	
07:15 PM		85	82			84			84	
07:30 PM		89	70			80			80	
07:45 PM		81	73			77			77	
08:00 PM		53	58			56			56	
08:15 PM		66	58			62			62	
08:30 PM		49	57			53			53	
08:45 PM		74	49			62			62	
09:00 PM		51	55			53			53	
09:15 PM		33	43			38			38	
09:30 PM		32	50			41			41	
09:45 PM		30	39			35			35	
10:00 PM		35	25			30			30	
10:15 PM		19	25			22			22	
10:30 PM		13	23			18			18	
10:45 PM		17	10			14			14	
11:00 PM		10	5			8			8	
11:15 PM		6	11			9			9	
11:30 PM		5	4			5			5	
11:45 PM		4	3			4			4	
Day Total		8036	7912			7999			7999	
% Weekday Average		100.5%	98.9%							
% Week Average		100.5%	98.9%			100%				
AM Peak 15-min Vol		6:30 AM 187	6:30 AM 191			6:30 AM 189			6:30 AM 189	
PM Peak 15-min Vol		3:45 PM 173	3:30 PM 164			3:15 PM 158			3:15 PM 158	

Comments:

Report generated on 5/30/2024 11:26 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Appendix B: Intersection Level of Service Results



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	0	0	2	1	0	0	1382	1	0	1507	2
Future Volume (veh/h)	2	0	0	2	1	0	0	1382	1	0	1507	2
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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	0	1796	1870	0	1767	1870
Adj Flow Rate, veh/h	2	0	0	2	1	0	0	1486	1	0	1620	2
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	0	7	2	0	9	2
Cap, veh/h	203	0	0	168	4	0	0	2633	2	0	2588	3
Arrive On Green	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.75	0.75	0.00	0.75	0.75
Sat Flow, veh/h	1510	0	0	1057	529	0	0	3590	2	0	3528	4
Grp Volume(v), veh/h	2	0	0	3	0	0	0	724	763	0	790	832
Grp Sat Flow(s),veh/h/ln	1510	0	0	1586	0	0	0	1706	1796	0	1678	1766
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.8	6.8	0.0	8.2	8.2
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.1	0.0	0.0	0.0	6.8	6.8	0.0	8.2	8.2
Prop In Lane	1.00		0.00	0.67		0.00	0.00		0.00	0.00		0.00
Lane Grp Cap(c), veh/h	203	0	0	171	0	0	0	1284	1351	0	1263	1329
V/C Ratio(X)	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.56	0.56	0.00	0.63	0.63
Avail Cap(c_a), veh/h	591	0	0	594	0	0	0	4590	4831	0	4514	4750
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	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	18.4	0.0	0.0	18.5	0.0	0.0	0.0	2.0	2.0	0.0	2.2	2.2
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.4	0.0	0.5	0.5
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.2	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	18.5	0.0	0.0	18.5	0.0	0.0	0.0	2.4	2.4	0.0	2.7	2.7
LnGrp LOS	B			B				A	A		A	A
Approach Vol, veh/h		2			3			1487			1622	
Approach Delay, s/veh		18.5			18.5			2.4			2.7	
Approach LOS		B			B			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		4.8		32.6		4.8		32.6				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		10.5		100.5		10.5		100.5				
Max Q Clear Time (g_c+I1), s		2.0		8.8		2.1		10.2				
Green Ext Time (p_c), s		0.0		14.6		0.0		17.9				

Intersection Summary												
HCM 7th Control Delay, s/veh			2.6									
HCM 7th LOS			A									

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	588	722	0	0	0
Future Vol, veh/h	0	588	722	0	0	0
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	5	8	2	2	2
Mvmt Flow	0	619	760	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	760	0	-	0	1379	760
Stage 1	-	-	-	-	760	-
Stage 2	-	-	-	-	619	-
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	852	-	-	-	159	406
Stage 1	-	-	-	-	462	-
Stage 2	-	-	-	-	537	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	852	-	-	-	159	406
Mov Cap-2 Maneuver	-	-	-	-	159	-
Stage 1	-	-	-	-	462	-
Stage 2	-	-	-	-	537	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	852	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s/veh)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	588	722	0	0	0
Future Vol, veh/h	0	588	722	0	0	0
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	5	8	2	2	2
Mvmt Flow	0	619	760	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	760	0	-	0	1379	760
Stage 1	-	-	-	-	760	-
Stage 2	-	-	-	-	619	-
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	852	-	-	-	159	406
Stage 1	-	-	-	-	462	-
Stage 2	-	-	-	-	537	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	852	-	-	-	159	406
Mov Cap-2 Maneuver	-	-	-	-	159	-
Stage 1	-	-	-	-	462	-
Stage 2	-	-	-	-	537	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	852	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s/veh)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	0	0	0	0	542	0	0	553	0
Future Vol, veh/h	0	0	0	0	0	0	0	542	0	0	553	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	6	2	2	13	2
Mvmt Flow	0	0	0	0	0	0	0	583	0	0	595	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	886	1177	297	880	1177	291	-	0	0	-	-	0
Stage 1	595	595	-	583	583	-	-	-	-	-	-	-
Stage 2	291	583	-	297	595	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	-	-	-	-	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	-	-	-	-	-	-
Pot Cap-1 Maneuver	239	190	699	241	190	705	0	-	-	0	-	-
Stage 1	458	491	-	465	497	-	0	-	-	0	-	-
Stage 2	692	497	-	687	491	-	0	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	239	190	699	241	190	705	-	-	-	-	-	-
Mov Cap-2 Maneuver	239	190	-	241	190	-	-	-	-	-	-	-
Stage 1	458	491	-	465	497	-	-	-	-	-	-	-
Stage 2	692	497	-	687	491	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0	0	0	0
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-	-
HCM Control Delay (s/veh)	-	-	0	0	-	-
HCM Lane LOS	-	-	A	A	-	-
HCM 95th %tile Q(veh)	-	-	-	-	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	2	1	0	0	1	0	1608	3	0	1473	3
Future Volume (veh/h)	2	2	1	0	0	1	0	1608	3	0	1473	3
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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	0	1826	1870	0	1841	1870
Adj Flow Rate, veh/h	2	2	1	0	0	1	0	1711	3	0	1567	3
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	0	5	2	0	4	2
Cap, veh/h	116	5	2	0	0	13	0	2817	5	0	2839	5
Arrive On Green	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.79	0.79	0.00	0.79	0.79
Sat Flow, veh/h	592	592	296	0	0	1585	0	3644	6	0	3673	7
Grp Volume(v), veh/h	5	0	0	0	0	1	0	835	879	0	765	805
Grp Sat Flow(s),veh/h/ln	1481	0	0	0	0	1585	0	1735	1825	0	1749	1839
Q Serve(g_s), s	0.1	0.0	0.0	0.0	0.0	0.0	0.0	8.7	8.7	0.0	7.3	7.3
Cycle Q Clear(g_c), s	0.2	0.0	0.0	0.0	0.0	0.0	0.0	8.7	8.7	0.0	7.3	7.3
Prop In Lane	0.40		0.20	0.00		1.00	0.00		0.00	0.00		0.00
Lane Grp Cap(c), veh/h	123	0	0	0	0	13	0	1375	1447	0	1386	1458
V/C Ratio(X)	0.04	0.00	0.00	0.00	0.00	0.08	0.00	0.61	0.61	0.00	0.55	0.55
Avail Cap(c_a), veh/h	484	0	0	0	0	368	0	3860	4060	0	3891	4093
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	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	22.3	0.0	0.0	0.0	0.0	22.2	0.0	1.9	1.9	0.0	1.7	1.7
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.0	0.0	2.6	0.0	0.4	0.4	0.0	0.3	0.3
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	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.1	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	22.5	0.0	0.0	0.0	0.0	24.8	0.0	2.3	2.3	0.0	2.1	2.1
LnGrp LOS	C					C		A	A		A	A
Approach Vol, veh/h		5			1			1714			1570	
Approach Delay, s/veh		22.5			24.8			2.3			2.1	
Approach LOS		C			C			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	4.9	40.3	4.9	40.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	10.5	100.5	10.5	100.5
Max Q Clear Time (g_c+I1), s	2.2	10.7	2.0	9.3
Green Ext Time (p_c), s	0.0	25.1	0.0	20.2

Intersection Summary	
HCM 7th Control Delay, s/veh	2.2
HCM 7th LOS	A

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		⋔	
Traffic Vol, veh/h	0	754	794	0	0	0
Future Vol, veh/h	0	754	794	0	0	0
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	91	91	91	91	91	91
Heavy Vehicles, %	2	7	9	2	2	2
Mvmt Flow	0	829	873	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	873	0	-	0	1701	873
Stage 1	-	-	-	-	873	-
Stage 2	-	-	-	-	829	-
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	773	-	-	-	101	350
Stage 1	-	-	-	-	409	-
Stage 2	-	-	-	-	429	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	773	-	-	-	101	350
Mov Cap-2 Maneuver	-	-	-	-	101	-
Stage 1	-	-	-	-	409	-
Stage 2	-	-	-	-	429	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	773	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s/veh)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		⋔	
Traffic Vol, veh/h	0	754	794	0	0	0
Future Vol, veh/h	0	754	794	0	0	0
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	91	91	91	91	91	91
Heavy Vehicles, %	2	7	9	2	2	2
Mvmt Flow	0	829	873	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	873	0	-	0	1701	873
Stage 1	-	-	-	-	873	-
Stage 2	-	-	-	-	829	-
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	773	-	-	-	101	350
Stage 1	-	-	-	-	409	-
Stage 2	-	-	-	-	429	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	773	-	-	-	101	350
Mov Cap-2 Maneuver	-	-	-	-	101	-
Stage 1	-	-	-	-	409	-
Stage 2	-	-	-	-	429	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	773	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s/veh)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

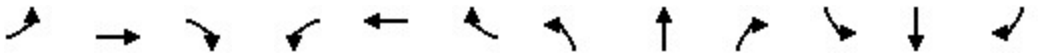
Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↑↕			↑↕	
Traffic Vol, veh/h	0	0	0	0	0	0	0	671	0	0	628	0
Future Vol, veh/h	0	0	0	0	0	0	0	671	0	0	628	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2	2	7	2	2	3	2
Mvmt Flow	0	0	0	0	0	0	0	714	0	0	668	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1025	1382	334	1048	1382	357	-	0	0	-	-	0
Stage 1	668	668	-	714	714	-	-	-	-	-	-	-
Stage 2	357	714	-	334	668	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	-	-	-	-	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	-	-	-	-	-	-
Pot Cap-1 Maneuver	189	143	662	182	143	640	0	-	-	0	-	-
Stage 1	414	455	-	388	433	-	0	-	-	0	-	-
Stage 2	633	433	-	653	455	-	0	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	189	143	662	182	143	640	-	-	-	-	-	-
Mov Cap-2 Maneuver	189	143	-	182	143	-	-	-	-	-	-	-
Stage 1	414	455	-	388	433	-	-	-	-	-	-	-
Stage 2	633	433	-	653	455	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0	0	0	0
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-	-
HCM Control Delay (s/veh)	-	-	0	0	-	-
HCM Lane LOS	-	-	A	A	-	-
HCM 95th %tile Q(veh)	-	-	-	-	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	10	10	10	10	10	0	1440	10	0	1570	10
Future Volume (veh/h)	10	10	10	10	10	10	0	1440	10	0	1570	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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	0	1796	1870	0	1767	1870
Adj Flow Rate, veh/h	11	11	11	11	11	11	0	1548	11	0	1688	11
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	0	7	2	0	9	2
Cap, veh/h	138	37	34	138	37	34	0	2568	18	0	2528	16
Arrive On Green	0.06	0.06	0.06	0.06	0.06	0.06	0.00	0.74	0.74	0.00	0.74	0.74
Sat Flow, veh/h	509	594	552	509	594	552	0	3563	25	0	3507	22
Grp Volume(v), veh/h	33	0	0	33	0	0	0	760	799	0	828	871
Grp Sat Flow(s),veh/h/ln	1655	0	0	1655	0	0	0	1706	1792	0	1678	1763
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.5	9.5	0.0	11.5	11.5
Cycle Q Clear(g_c), s	0.8	0.0	0.0	0.8	0.0	0.0	0.0	9.5	9.5	0.0	11.5	11.5
Prop In Lane	0.33		0.33	0.33		0.33	0.00		0.01	0.00		0.01
Lane Grp Cap(c), veh/h	209	0	0	209	0	0	0	1262	1325	0	1241	1303
V/C Ratio(X)	0.16	0.00	0.00	0.16	0.00	0.00	0.00	0.60	0.60	0.00	0.67	0.67
Avail Cap(c_a), veh/h	478	0	0	478	0	0	0	3780	3969	0	3718	3905
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	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	20.3	0.0	0.0	20.3	0.0	0.0	0.0	2.8	2.8	0.0	3.0	3.0
Incr Delay (d2), s/veh	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.5	0.4	0.0	0.6	0.6
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	0.0	0.0	0.3	0.0	0.0	0.0	0.2	0.2	0.0	0.2	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	20.7	0.0	0.0	20.7	0.0	0.0	0.0	3.2	3.2	0.0	3.7	3.6
LnGrp LOS	C			C				A	A		A	A
Approach Vol, veh/h		33			33			1559			1699	
Approach Delay, s/veh		20.7			20.7			3.2			3.7	
Approach LOS		C			C			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		7.3		38.0		7.3		38.0				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		10.5		100.5		10.5		100.5				
Max Q Clear Time (g_c+I1), s		2.8		11.5		2.8		13.5				
Green Ext Time (p_c), s		0.0		16.2		0.0		20.0				

Intersection Summary												
HCM 7th Control Delay, s/veh			3.8									
HCM 7th LOS			A									

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	620	760	0	0	0
Future Vol, veh/h	0	620	760	0	0	0
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	5	8	2	2	2
Mvmt Flow	0	653	800	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	800	0	-	0	1453	800
Stage 1	-	-	-	-	800	-
Stage 2	-	-	-	-	653	-
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	823	-	-	-	144	385
Stage 1	-	-	-	-	442	-
Stage 2	-	-	-	-	518	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	823	-	-	-	144	385
Mov Cap-2 Maneuver	-	-	-	-	144	-
Stage 1	-	-	-	-	442	-
Stage 2	-	-	-	-	518	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	823	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s/veh)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	620	760	0	0	0
Future Vol, veh/h	0	620	760	0	0	0
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	5	8	2	2	2
Mvmt Flow	0	653	800	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	800	0	-	0	1453	800
Stage 1	-	-	-	-	800	-
Stage 2	-	-	-	-	653	-
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	823	-	-	-	144	385
Stage 1	-	-	-	-	442	-
Stage 2	-	-	-	-	518	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	823	-	-	-	144	385
Mov Cap-2 Maneuver	-	-	-	-	144	-
Stage 1	-	-	-	-	442	-
Stage 2	-	-	-	-	518	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	823	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s/veh)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

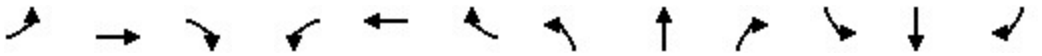
Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	0	0	10	0	570	10	0	580	0
Future Vol, veh/h	0	0	0	0	0	10	0	570	10	0	580	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	6	2	2	13	2
Mvmt Flow	0	0	0	0	0	11	0	613	11	0	624	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	930	1247	312	930	1242	312	-	0	0	-	-	0
Stage 1	624	624	-	618	618	-	-	-	-	-	-	-
Stage 2	306	624	-	312	624	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	-	-	-	-	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	-	-	-	-	-	-
Pot Cap-1 Maneuver	222	172	684	222	173	684	0	-	-	0	-	-
Stage 1	440	476	-	443	479	-	0	-	-	0	-	-
Stage 2	678	476	-	673	476	-	0	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	219	172	684	222	173	684	-	-	-	-	-	-
Mov Cap-2 Maneuver	219	172	-	222	173	-	-	-	-	-	-	-
Stage 1	440	476	-	443	479	-	-	-	-	-	-	-
Stage 2	668	476	-	673	476	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0	10.35	0	0
HCM LOS	A	B		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	-	684	-	-
HCM Lane V/C Ratio	-	-	-	0.016	-	-
HCM Control Delay (s/veh)	-	-	0	10.3	-	-
HCM Lane LOS	-	-	A	B	-	-
HCM 95th %tile Q(veh)	-	-	-	0	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	10	10	10	10	10	0	1680	10	0	1540	10
Future Volume (veh/h)	10	10	10	10	10	10	0	1680	10	0	1540	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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	0	1826	1870	0	1841	1870
Adj Flow Rate, veh/h	11	11	11	11	11	11	0	1787	11	0	1638	11
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	0	5	2	0	4	2
Cap, veh/h	128	37	33	128	37	33	0	2674	16	0	2694	18
Arrive On Green	0.06	0.06	0.06	0.06	0.06	0.06	0.00	0.76	0.76	0.00	0.76	0.76
Sat Flow, veh/h	495	609	552	495	609	552	0	3626	22	0	3653	24
Grp Volume(v), veh/h	33	0	0	33	0	0	0	876	922	0	804	845
Grp Sat Flow(s),veh/h/ln	1656	0	0	1656	0	0	0	1735	1822	0	1749	1836
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.2	12.3	0.0	10.2	10.2
Cycle Q Clear(g_c), s	0.9	0.0	0.0	0.9	0.0	0.0	0.0	12.2	12.3	0.0	10.2	10.2
Prop In Lane	0.33		0.33	0.33		0.33	0.00		0.01	0.00		0.01
Lane Grp Cap(c), veh/h	198	0	0	198	0	0	0	1312	1378	0	1323	1389
V/C Ratio(X)	0.17	0.00	0.00	0.17	0.00	0.00	0.00	0.67	0.67	0.00	0.61	0.61
Avail Cap(c_a), veh/h	442	0	0	442	0	0	0	3547	3726	0	3576	3755
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	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	22.1	0.0	0.0	22.1	0.0	0.0	0.0	2.9	2.9	0.0	2.7	2.7
Incr Delay (d2), s/veh	0.4	0.0	0.0	0.4	0.0	0.0	0.0	0.6	0.6	0.0	0.5	0.4
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	0.0	0.0	0.4	0.0	0.0	0.0	0.2	0.2	0.0	0.2	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	22.5	0.0	0.0	22.5	0.0	0.0	0.0	3.5	3.5	0.0	3.2	3.1
LnGrp LOS	C			C				A	A		A	A
Approach Vol, veh/h		33			33			1798			1649	
Approach Delay, s/veh		22.5			22.5			3.5			3.1	
Approach LOS		C			C			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	7.5	41.7	7.5	41.7
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	10.5	100.5	10.5	100.5
Max Q Clear Time (g_c+I1), s	2.9	14.3	2.9	12.2
Green Ext Time (p_c), s	0.0	22.9	0.0	18.4

Intersection Summary	
HCM 7th Control Delay, s/veh	3.7
HCM 7th LOS	A

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	790	830	0	0	0
Future Vol, veh/h	0	790	830	0	0	0
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	91	91	91	91	91	91
Heavy Vehicles, %	2	7	9	2	2	2
Mvmt Flow	0	868	912	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	912	0	-	0	1780	912
Stage 1	-	-	-	-	912	-
Stage 2	-	-	-	-	868	-
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	747	-	-	-	90	332
Stage 1	-	-	-	-	392	-
Stage 2	-	-	-	-	411	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	747	-	-	-	90	332
Mov Cap-2 Maneuver	-	-	-	-	90	-
Stage 1	-	-	-	-	392	-
Stage 2	-	-	-	-	411	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	747	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s/veh)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	790	830	0	0	0
Future Vol, veh/h	0	790	830	0	0	0
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	91	91	91	91	91	91
Heavy Vehicles, %	2	7	9	2	2	2
Mvmt Flow	0	868	912	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	912	0	-	0	1780	912
Stage 1	-	-	-	-	912	-
Stage 2	-	-	-	-	868	-
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	747	-	-	-	90	332
Stage 1	-	-	-	-	392	-
Stage 2	-	-	-	-	411	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	747	-	-	-	90	332
Mov Cap-2 Maneuver	-	-	-	-	90	-
Stage 1	-	-	-	-	392	-
Stage 2	-	-	-	-	411	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	747	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s/veh)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

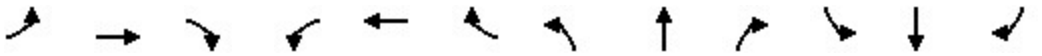
Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	0	0	10	0	700	10	0	660	0
Future Vol, veh/h	0	0	0	0	0	10	0	700	10	0	660	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2	2	7	2	2	3	2
Mvmt Flow	0	0	0	0	0	11	0	745	11	0	702	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1074	1457	351	1101	1452	378	-	0	0	-	-	0
Stage 1	702	702	-	750	750	-	-	-	-	-	-	-
Stage 2	372	755	-	351	702	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	-	-	-	-	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	-	-	-	-	-	-
Pot Cap-1 Maneuver	174	128	645	166	129	620	0	-	-	0	-	-
Stage 1	395	439	-	369	417	-	0	-	-	0	-	-
Stage 2	620	415	-	639	439	-	0	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	171	128	645	166	129	620	-	-	-	-	-	-
Mov Cap-2 Maneuver	171	128	-	166	129	-	-	-	-	-	-	-
Stage 1	395	439	-	369	417	-	-	-	-	-	-	-
Stage 2	610	415	-	639	439	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0	10.91	0	0
HCM LOS	A	B		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	-	620	-	-
HCM Lane V/C Ratio	-	-	-	0.017	-	-
HCM Control Delay (s/veh)	-	-	0	10.9	-	-
HCM Lane LOS	-	-	A	B	-	-
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)	30	10	10	10	10	10	0	1440	10	0	1570	230
Future Volume (veh/h)	30	10	10	10	10	10	0	1440	10	0	1570	230
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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	922	1870	1870	1870	1870	1870	0	1796	1870	0	1767	1752
Adj Flow Rate, veh/h	32	11	5	11	11	1	0	1548	11	0	1688	234
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	66	2	2	2	2	2	0	7	2	0	9	10
Cap, veh/h	161	21	9	128	56	4	0	2749	20	0	2351	319
Arrive On Green	0.06	0.06	0.06	0.06	0.06	0.06	0.00	0.79	0.79	0.00	0.79	0.79
Sat Flow, veh/h	1046	360	163	673	969	75	0	3563	25	0	3058	403
Grp Volume(v), veh/h	48	0	0	23	0	0	0	760	799	0	937	985
Grp Sat Flow(s),veh/h/ln	1569	0	0	1716	0	0	0	1706	1792	0	1678	1694
Q Serve(g_s), s	1.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	10.0	0.0	15.8	17.3
Cycle Q Clear(g_c), s	1.7	0.0	0.0	0.7	0.0	0.0	0.0	10.0	10.0	0.0	15.8	17.3
Prop In Lane	0.67		0.10	0.48		0.04	0.00		0.01	0.00		0.24
Lane Grp Cap(c), veh/h	191	0	0	188	0	0	0	1351	1418	0	1328	1341
V/C Ratio(X)	0.25	0.00	0.00	0.12	0.00	0.00	0.00	0.56	0.56	0.00	0.71	0.73
Avail Cap(c_a), veh/h	369	0	0	377	0	0	0	2869	3013	0	2822	2849
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	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	27.3	0.0	0.0	26.9	0.0	0.0	0.0	2.3	2.3	0.0	2.9	3.1
Incr Delay (d2), s/veh	0.7	0.0	0.0	0.3	0.0	0.0	0.0	0.4	0.4	0.0	0.7	0.8
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	0.7	0.0	0.0	0.3	0.0	0.0	0.0	0.1	0.1	0.0	0.3	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	28.0	0.0	0.0	27.1	0.0	0.0	0.0	2.7	2.7	0.0	3.6	3.9
LnGrp LOS	C			C				A	A		A	A
Approach Vol, veh/h		48			23			1559			1922	
Approach Delay, s/veh		28.0			27.1			2.7			3.8	
Approach LOS		C			C			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	8.0	51.8	8.0	51.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	10.5	100.5	10.5	100.5
Max Q Clear Time (g_c+I1), s	3.7	12.0	2.7	19.3
Green Ext Time (p_c), s	0.1	16.2	0.0	28.0

Intersection Summary	
HCM 7th Control Delay, s/veh	3.8
HCM 7th LOS	A

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	140	620	760	80	0	20
Future Vol, veh/h	140	620	760	80	0	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	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	15	5	8	2	2	100
Mvmt Flow	147	653	800	84	0	21

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	884	0	-	0	1789	842
Stage 1	-	-	-	-	842	-
Stage 2	-	-	-	-	947	-
Critical Hdwy	4.25	-	-	-	6.42	7.2
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.335	-	-	-	3.518	4.2
Pot Cap-1 Maneuver	713	-	-	-	89	250
Stage 1	-	-	-	-	423	-
Stage 2	-	-	-	-	377	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	713	-	-	-	60	250
Mov Cap-2 Maneuver	-	-	-	-	60	-
Stage 1	-	-	-	-	286	-
Stage 2	-	-	-	-	377	-

Approach	EB	WB	SB
HCM Control Delay, s/v	2.09	0	20.73
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	332	-	-	-	250
HCM Lane V/C Ratio	0.207	-	-	-	0.084
HCM Control Delay (s/veh)	11.4	0	-	-	20.7
HCM Lane LOS	B	A	-	-	C
HCM 95th %tile Q(veh)	0.8	-	-	-	0.3

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	140	620	760	80	0	20
Future Vol, veh/h	140	620	760	80	0	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	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	15	5	8	2	2	100
Mvmt Flow	147	653	800	84	0	21

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	884	0	-	0	1789	842
Stage 1	-	-	-	-	842	-
Stage 2	-	-	-	-	947	-
Critical Hdwy	4.25	-	-	-	6.42	7.2
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.335	-	-	-	3.518	4.2
Pot Cap-1 Maneuver	713	-	-	-	89	250
Stage 1	-	-	-	-	423	-
Stage 2	-	-	-	-	377	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	713	-	-	-	60	250
Mov Cap-2 Maneuver	-	-	-	-	60	-
Stage 1	-	-	-	-	286	-
Stage 2	-	-	-	-	377	-

Approach	EB	WB	SB
HCM Control Delay, s/v	2.09	0	20.73
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	332	-	-	-	250
HCM Lane V/C Ratio	0.207	-	-	-	0.084
HCM Control Delay (s/veh)	11.4	0	-	-	20.7
HCM Lane LOS	B	A	-	-	C
HCM 95th %tile Q(veh)	0.8	-	-	-	0.3

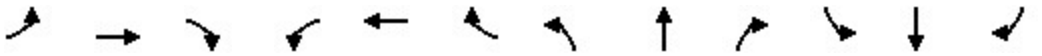
Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	0	0	30	0	570	230	0	580	0
Future Vol, veh/h	0	0	0	0	0	30	0	570	230	0	580	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	100	2	6	10	2	13	2
Mvmt Flow	0	0	0	0	0	32	0	613	247	0	624	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	930	1484	312	1048	1360	430	-	0	0	-	-	0
Stage 1	624	624	-	737	737	-	-	-	-	-	-	-
Stage 2	306	860	-	312	624	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	8.9	-	-	-	-	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	4.3	-	-	-	-	-	-
Pot Cap-1 Maneuver	222	124	684	182	147	370	0	-	-	0	-	-
Stage 1	440	476	-	376	423	-	0	-	-	0	-	-
Stage 2	678	371	-	673	476	-	0	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	203	124	684	182	147	370	-	-	-	-	-	-
Mov Cap-2 Maneuver	203	124	-	182	147	-	-	-	-	-	-	-
Stage 1	440	476	-	376	423	-	-	-	-	-	-	-
Stage 2	619	371	-	673	476	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0	15.67	0	0
HCM LOS	A	C		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	-	370	-	-
HCM Lane V/C Ratio	-	-	-	0.087	-	-
HCM Control Delay (s/veh)	-	-	0	15.7	-	-
HCM Lane LOS	-	-	A	C	-	-
HCM 95th %tile Q(veh)	-	-	-	0.3	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	150	10	90	10	10	10	0	1680	10	0	1540	30
Future Volume (veh/h)	150	10	90	10	10	10	0	1680	10	0	1540	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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	1678	1870	1870	1870	1870	1870	0	1826	1870	0	1841	922
Adj Flow Rate, veh/h	160	11	81	11	11	2	0	1787	11	0	1638	32
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	15	2	2	2	2	2	0	5	2	0	4	66
Cap, veh/h	247	11	79	174	152	22	0	2459	15	0	2441	48
Arrive On Green	0.16	0.16	0.16	0.16	0.16	0.16	0.00	0.70	0.70	0.00	0.70	0.70
Sat Flow, veh/h	949	65	481	564	929	136	0	3626	22	0	3601	68
Grp Volume(v), veh/h	252	0	0	24	0	0	0	876	922	0	815	855
Grp Sat Flow(s),veh/h/ln	1495	0	0	1629	0	0	0	1735	1822	0	1749	1828
Q Serve(g_s), s	9.8	0.0	0.0	0.0	0.0	0.0	0.0	19.9	20.0	0.0	17.0	17.1
Cycle Q Clear(g_c), s	10.5	0.0	0.0	0.7	0.0	0.0	0.0	19.9	20.0	0.0	17.0	17.1
Prop In Lane	0.63		0.32	0.46		0.08	0.00		0.01	0.00		0.04
Lane Grp Cap(c), veh/h	337	0	0	349	0	0	0	1207	1267	0	1216	1272
V/C Ratio(X)	0.75	0.00	0.00	0.07	0.00	0.00	0.00	0.73	0.73	0.00	0.67	0.67
Avail Cap(c_a), veh/h	337	0	0	349	0	0	0	2721	2858	0	2743	2868
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	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	26.9	0.0	0.0	22.7	0.0	0.0	0.0	6.0	6.0	0.0	5.6	5.6
Incr Delay (d2), s/veh	8.9	0.0	0.0	0.1	0.0	0.0	0.0	0.8	0.8	0.0	0.6	0.6
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	4.5	0.0	0.0	0.3	0.0	0.0	0.0	3.6	3.7	0.0	3.0	3.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	35.8	0.0	0.0	22.8	0.0	0.0	0.0	6.8	6.8	0.0	6.2	6.2
LnGrp LOS	D			C				A	A		A	A
Approach Vol, veh/h		252			24			1798			1670	
Approach Delay, s/veh		35.8			22.8			6.8			6.2	
Approach LOS		D			C			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		15.0		49.1		15.0		49.1				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		10.5		100.5		10.5		100.5				
Max Q Clear Time (g_c+I1), s		12.5		22.0		2.7		19.1				
Green Ext Time (p_c), s		0.0		22.6		0.0		18.9				

Intersection Summary												
HCM 7th Control Delay, s/veh			8.6									
HCM 7th LOS			A									

Intersection	
Int Delay, s/veh	43.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	790	830	0	80	140
Future Vol, veh/h	20	790	830	0	80	140
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	91	91	91	91	91	91
Heavy Vehicles, %	100	7	9	2	2	15
Mvmt Flow	22	868	912	0	88	154

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	912	0	-	0	1824	912
Stage 1	-	-	-	-	912	-
Stage 2	-	-	-	-	912	-
Critical Hdwy	5.1	-	-	-	6.42	6.35
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	3.1	-	-	-	3.518	3.435
Pot Cap-1 Maneuver	460	-	-	-	~ 85	314
Stage 1	-	-	-	-	392	-
Stage 2	-	-	-	-	392	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	460	-	-	-	~ 77	314
Mov Cap-2 Maneuver	-	-	-	-	~ 77	-
Stage 1	-	-	-	-	356	-
Stage 2	-	-	-	-	392	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0.33	0	$ 366.72
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	44	-	-	-	148
HCM Lane V/C Ratio	0.048	-	-	-	1.632
HCM Control Delay (s/veh)	13.2	0	-	-	$ 366.7
HCM Lane LOS	B	A	-	-	F
HCM 95th %tile Q(veh)	0.1	-	-	-	17

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	43.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	790	830	0	80	140
Future Vol, veh/h	20	790	830	0	80	140
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	91	91	91	91	91	91
Heavy Vehicles, %	100	7	9	2	2	15
Mvmt Flow	22	868	912	0	88	154

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	912	0	-	0	1824	912
Stage 1	-	-	-	-	912	-
Stage 2	-	-	-	-	912	-
Critical Hdwy	5.1	-	-	-	6.42	6.35
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	3.1	-	-	-	3.518	3.435
Pot Cap-1 Maneuver	460	-	-	-	~ 85	314
Stage 1	-	-	-	-	392	-
Stage 2	-	-	-	-	392	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	460	-	-	-	~ 77	314
Mov Cap-2 Maneuver	-	-	-	-	~ 77	-
Stage 1	-	-	-	-	356	-
Stage 2	-	-	-	-	392	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0.33	0	$ 366.72
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	44	-	-	-	148
HCM Lane V/C Ratio	0.048	-	-	-	1.632
HCM Control Delay (s/veh)	13.2	0	-	-	$ 366.7
HCM Lane LOS	B	A	-	-	F
HCM 95th %tile Q(veh)	0.1	-	-	-	17

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	0	0	230	0	700	30	0	660	0
Future Vol, veh/h	0	0	0	0	0	230	0	700	30	0	660	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	10	2	7	100	2	3	2
Mvmt Flow	0	0	0	0	0	245	0	745	32	0	702	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1074	1479	351	1112	1463	388	-	0	0	-	-	0
Stage 1	702	702	-	761	761	-	-	-	-	-	-	-
Stage 2	372	777	-	351	702	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	7.1	-	-	-	-	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.4	-	-	-	-	-	-
Pot Cap-1 Maneuver	174	125	645	163	127	588	0	-	-	0	-	-
Stage 1	395	439	-	364	412	-	0	-	-	0	-	-
Stage 2	620	405	-	639	439	-	0	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	102	125	645	163	127	588	-	-	-	-	-	-
Mov Cap-2 Maneuver	102	125	-	163	127	-	-	-	-	-	-	-
Stage 1	395	439	-	364	412	-	-	-	-	-	-	-
Stage 2	362	405	-	639	439	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0	15.41	0	0
HCM LOS	A	C		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	-	588	-	-
HCM Lane V/C Ratio	-	-	-	0.416	-	-
HCM Control Delay (s/veh)	-	-	0	15.4	-	-
HCM Lane LOS	-	-	A	C	-	-
HCM 95th %tile Q(veh)	-	-	-	2	-	-

Intersection	
Int Delay, s/veh	5.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	790	830	0	40	70
Future Vol, veh/h	20	790	830	0	40	70
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	91	91	91	91	91	91
Heavy Vehicles, %	100	7	9	2	2	15
Mvmt Flow	22	868	912	0	44	77

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	912	0	-	0	1824	912
Stage 1	-	-	-	-	912	-
Stage 2	-	-	-	-	912	-
Critical Hdwy	5.1	-	-	-	6.42	6.35
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	3.1	-	-	-	3.518	3.435
Pot Cap-1 Maneuver	460	-	-	-	85	314
Stage 1	-	-	-	-	392	-
Stage 2	-	-	-	-	392	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	460	-	-	-	77	314
Mov Cap-2 Maneuver	-	-	-	-	77	-
Stage 1	-	-	-	-	356	-
Stage 2	-	-	-	-	392	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0.33	0	91.07
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	44	-	-	-	148
HCM Lane V/C Ratio	0.048	-	-	-	0.816
HCM Control Delay (s/veh)	13.2	0	-	-	91.1
HCM Lane LOS	B	A	-	-	F
HCM 95th %tile Q(veh)	0.1	-	-	-	5.2

Intersection	
Int Delay, s/veh	5.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	790	830	0	40	70
Future Vol, veh/h	20	790	830	0	40	70
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	91	91	91	91	91	91
Heavy Vehicles, %	100	7	9	2	2	15
Mvmt Flow	22	868	912	0	44	77

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	912	0	-	0	1824	912
Stage 1	-	-	-	-	912	-
Stage 2	-	-	-	-	912	-
Critical Hdwy	5.1	-	-	-	6.42	6.35
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	3.1	-	-	-	3.518	3.435
Pot Cap-1 Maneuver	460	-	-	-	85	314
Stage 1	-	-	-	-	392	-
Stage 2	-	-	-	-	392	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	460	-	-	-	77	314
Mov Cap-2 Maneuver	-	-	-	-	77	-
Stage 1	-	-	-	-	356	-
Stage 2	-	-	-	-	392	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0.33	0	91.07
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	44	-	-	-	148
HCM Lane V/C Ratio	0.048	-	-	-	0.816
HCM Control Delay (s/veh)	13.2	0	-	-	91.1
HCM Lane LOS	B	A	-	-	F
HCM 95th %tile Q(veh)	0.1	-	-	-	5.2

Intersection	
Int Delay, s/veh	5.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	790	830	0	0	220
Future Vol, veh/h	20	790	830	0	0	220
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	91	91	91	91	91	91
Heavy Vehicles, %	100	7	9	2	2	15
Mvmt Flow	22	868	912	0	0	242

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	912	0	-	0	1824	912
Stage 1	-	-	-	-	912	-
Stage 2	-	-	-	-	912	-
Critical Hdwy	5.1	-	-	-	6.42	6.35
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	3.1	-	-	-	3.518	3.435
Pot Cap-1 Maneuver	460	-	-	-	85	314
Stage 1	-	-	-	-	392	-
Stage 2	-	-	-	-	392	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	460	-	-	-	77	314
Mov Cap-2 Maneuver	-	-	-	-	77	-
Stage 1	-	-	-	-	356	-
Stage 2	-	-	-	-	392	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0.33	0	46.23
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	44	-	-	-	314
HCM Lane V/C Ratio	0.048	-	-	-	0.77
HCM Control Delay (s/veh)	13.2	0	-	-	46.2
HCM Lane LOS	B	A	-	-	E
HCM 95th %tile Q(veh)	0.1	-	-	-	6

Intersection	
Int Delay, s/veh	5.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	790	830	0	0	220
Future Vol, veh/h	20	790	830	0	0	220
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	91	91	91	91	91	91
Heavy Vehicles, %	100	7	9	2	2	15
Mvmt Flow	22	868	912	0	0	242

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	912	0	-	0	1824	912
Stage 1	-	-	-	-	912	-
Stage 2	-	-	-	-	912	-
Critical Hdwy	5.1	-	-	-	6.42	6.35
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	3.1	-	-	-	3.518	3.435
Pot Cap-1 Maneuver	460	-	-	-	85	314
Stage 1	-	-	-	-	392	-
Stage 2	-	-	-	-	392	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	460	-	-	-	77	314
Mov Cap-2 Maneuver	-	-	-	-	77	-
Stage 1	-	-	-	-	356	-
Stage 2	-	-	-	-	392	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0.33	0	46.23
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	44	-	-	-	314
HCM Lane V/C Ratio	0.048	-	-	-	0.77
HCM Control Delay (s/veh)	13.2	0	-	-	46.2
HCM Lane LOS	B	A	-	-	E
HCM 95th %tile Q(veh)	0.1	-	-	-	6

Appendix S. Community Meeting and Outreach Summary Report

PETERS COMMUNICATIONS

Kūihelani Solar Phase 2

COMMUNITY OUTREACH REPORT

Prepared For:
Kūihelani Solar Phase 2, LLC,
an affiliate of AES Clean Energy

UPDATED
November 27, 2024

Photo: Kūihelani Solar + Storage

INTRODUCTION

As part of its Stage 3 Request for Proposals (RFP), Hawaiian Electric Company (HECO) selected the Kūihelani Solar Phase 2 project (Project) to provide clean, locally produced renewable energy to the utility to support the achievement of Hawai‘i’s goal to generate 100 percent of the state’s electricity from renewable sources by 2045. The Project will be developed by AES and is located in Central Maui, approximately 5 miles south of Kahului, on land owned by Mahi Pono.

The Project features a 40 MWac solar photovoltaic array and 160 MWh of containerized lithium-ion Battery Energy Storage System (BESS). The Project team studied roughly 730 acres to responsibly site the Project, avoid sensitive features, and minimize potential impacts. The Project Area is planned to be sited within less than 575 acres of the study area. Solar panels, batteries, substation, and other project components are anticipated to occupy a footprint of less than 250 acres. The Project will require an approval by the State Public Utilities Commission (PUC) for a 25-year Power Purchase Agreement (PPA) between AES and HECO at a stable price for the duration of the agreement.

To support development efforts for this important project, AES retained Peters Communications to assist with community outreach efforts.

This report is a compilation of community outreach activities conducted in association with the Project and includes verbatim comments received with redacted personal information as described under HECO’s RFP Stage 3 requirements. Note that the names and identities of elected officials, individuals acting in a professional capacity, and certain community or cultural leaders have not been redacted.

TABLE OF CONTENTS

Project Website, Email and Community Engagement Representative		4
Cultural Outreach and Consultation (Cultural Impact Assessment)		5
Area Elected Officials		12
Group and Community Association Meetings		18
AES-Hosted Public Meeting		22
Questions, Comments and Communications Received		25
EXHIBITS		
Exhibit 1	Advertising and Paid Media	a
Exhibit 2	Media Advisory	b
Exhibit 3	Media Coverage	c
Exhibit 4	Public Meeting Questions and Comments	d
Exhibit 5	Questions, Comments and Communications Received PRIOR to 30-Day Comment Period	e
Exhibit 6	Questions, Comments and Communications Received DURING the 30-Day Comment Period	f
Exhibit 7	Questions, Comments and Communications Received AFTER the 30-Day Comment Period	g
ADDENDA		
Addendum 1	Questions, Comments and Communications Inadvertently Omitted from October 28, 2024 [CORRECTED], Kūihelani Phase 2 Solar + Storage Community Outreach Report	h

PROJECT WEBSITE, EMAIL, AND COMMUNITY ENGAGEMENT REPRESENTATIVE

Project Website

Upon project award, AES Hawai'i established a Project website that includes critical information as required under HECO's Stage 3 RFP. In addition, the website includes a portal for requests for information, to register to receive updates, and to submit questions, feedback and comments.

Website: https://www.aes-hawaii.com/hawaii/project/kuihelani-solar-phase-2

Project Email and Hotline

In addition, a dedicated Project email and a telephone hotline were also established at the time of award to receive questions, comments, and requests for information as well as to register to receive updates.

Email: kuihelani2solar@aes.com

Hotline: +1 (808) 800-3942

To date, 41 individuals and organizations are registered to receive Project updates.

Community Engagement Representative

AES Hawai'i's Senior Manager of Stakeholder Relations, Carrice Gardner, serves as the "Community Engagement Representative" on matters related to the Kūihelani Solar Phase 2 project.

CULTURAL OUTREACH AND CONSULTATION – CULTURAL IMPACT ASSESSMENT

Upon Project award, AES retained Cultural Surveys Hawaii (CSH) to conduct a Cultural Impact Assessment (CIA) to understand the potential effects the Project may have on area cultural practices. As part of that effort, CSH reached out to native Hawaiian organizations, area cultural practitioners, kupuna and others. In January and again in March 2024, letters and email were sent to these groups and individuals with information about the project and requesting their feedback on cultural matters related to the Project site. Outreach letters were sent to 46 individuals or groups; seven responded and one *kama'āina* and/or *kupuna* met with CSH for a more in-depth interview.

Name	Affiliation	Notes
Adolpho, Glenn	Waikapu Gardens Homeowners Association	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024 Mr. Adolpho responded on 4 March 2024 and recommended contacting Hōkūao and Wallette Pellegrino. CSH responded same day thanking Mr. Adolpho for his recommendation and will reach out to both Hōkūao and Wallette Pellegrino
Ahia, Jennifer Noelani	Mālama Kakanilua	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Ampong, Foster	Kama'āina	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Apana, Clare	Cultural Practitioner; Mālama Kakanilua; Aha Moku Council Burial Committee	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Apo, Allanette	Paukukalo Hawaiian Homes Community Association	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Biga, Marie	Hawaiian Cultural Practitioner/Leader, Maui Waena Hawaiian Club	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024

Cameron, Don	Kamaʻāina	Letter and figures sent via USPS on 31 January 2024 Second round letter and figures sent via USPS 6 March 2024
Fisher, Scott	Chief Conservation Officer, HILT; Chief, MLIBC	Letter and figures sent via email on 26 January 2024 Dr. Fisher responded same day wanting to participate CSH responded on 29 January 2024 with availability Dr. Fisher responded same day with availability CSH responded on 30 January 2024 requesting preferred method to do an interview Dr. Fisher responded same day that he prefers Zoom CSH sent Zoom invited for interview on 30 January 2024 Interview via zoom on 31 January 2024 CSH sent interview summary on 16 February 2024 along with answers to questions during interview: *Aloha e Scott,* *Just wanted to update you on the questions you had during our interview on 31 January 2024. Please see below for responses from the client.* *Total amount of acres for both the phase 1 and current phase 2 solar project* *Kuihelani Solar (Kuihelani Phase 1) has a final fenced in solar area of roughly 330 acres. Therefore projects, when fully constructed, is expected to be no more than 630 acres.* *Reason for why the phase 2 solar project is placed right below the phase 1 instead of elsewhere* *Kuihelani Solar Phase 2 is one of five renewable energy projects awarded by HECO under the recent Stage 3 RFP. These projects are located across the island. More details can be found at the HECO Renewable Energy status page https://www.hawaiianelectric.com/clean-energy-hawaii/our-clean-energy-portfolio/renewable-project-status-board* *Project siting is based on multiple criteria including (1) adequate solar resource, (2) availability of land, including enough space and site characteristics suitable for solar energy facilities, (3) proximity to the electrical grid and infrastructure with capacity to accept generation load, and (4) landowner support. Based on these criteria, sites that are suitable for utility-scale solar and energy storage projects are limited. Based on due diligence to date, the proposed site is well suited for a solar and energy project.* *Request for a more detailed map of the proposed phase 2 project*

		Design, engineering, and due diligence is ongoing for this project. We can follow up in a few weeks once more details are available. Dr. Fisher responded same day: *Mahalo Tehani! I really appreciate you taking the time to answer these questions.* CSH responded on 20 February 2024 CSH sent a follow-up email regarding interview summary review on 8 March 2024: Dr. Fisher responded same day: *Mahalo Tehani! This looks great. Thanks so much for sharing it with me.* CSH responded on 10 March 2024 with authorization form attached CSH sent a link with updated maps of the proposed project on 12 March 2024: *Hey Scott,* *Just heard back from the client and project maps were updated on the following link for this project if you would like to review it. Please let me know if you have any other questions or if you would like to add or change anything in your interview summary.* *Link:* *https://www.aes-hawaii.com/hawaii/project/kuihelani-solar-phase-2* Dr. Fisher responded on the same day: *Mahalo Tehani! I really appreciate it.* CSH notified Dr. Fisher via email on 23 July 2024 that there was a slight change to the study area and provided project maps and his interview summary for review. Dr. Fisher responded same day: *Thanks for letting me know. I don't believe it will affect my project summary.*
Hall, Dana	Hui Alanui o Makena	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Harders, Zelie	Kamaʻāina	Letter and figures sent via USPS on 31 January 2024 Second round letter and figures sent via USPS 6 March 2024
Harger, Brad	President, Waikapu Community Association	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Hokoana, Lui	President, Central Maui Hawaiian Civic Club/Chancellor, CEO of UH Maui College	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024

Holt-Padilla, Hokulani	Kumu Hukla/Pāʻū o Hiʻiaka/Cultural Specialist	Letter and figures sent via USPS on 31 January 2024 Second round letter and figures sent via USPS 6 March 2024
Hoʻopiʻi, Michele	Maui Island Burial Council – Wailuku Representative	Letter and Figures sent via USPS on 31 January 2024 Ms. Hoʻopiʻi responded on 9 February 2024 via email and recommended contacting Hōkūao and Wallette Pellegrino CSH responded same day and thanked Ms. Hoʻopiʻi for her recommendations Ms. Hoʻopiʻi responded on 11 February 2024
Kahalehau, Clyde	Aha Moku, Wailuku representative	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Kalanikau, Paula	Kamaʻāina/Kupuna	Letter and figures sent via USPS on 31 January 2024 Second round letter and figures sent via USPS 6 March 2024
Kalanikau, Vernon	Kamaʻāina;Honuaʻula Representative, MLIBC	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Kalili, Dre	AHCC, President	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Kamaunu, Johanna	Kamaʻāina	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Kamaunu, Kaniloa	Aha Moku Council Wailuku Representative; Aha Moku Council Burial Committee	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Kamekona, Carol Lee	Ahahui Kaahumanu - Wailuku	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Kapu, Keʻeaumoku	Chair, Aha Moku o Maui/Koani Foundation (501C3)	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024

Kapu, Uilani	Treasurer, Na Aikane o Maui	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Kuloloio, Manuel	Makuakāne, Kuloloi‘a Lineage I ke Kai ‘o Kuloloi‘a	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Lake-Farm, Sissy	Executive Director, Maui Museum/ *Kumu Hula*, Nā Hanona Kūlike ‘o Pi‘ilani	Letter and figures sent via USPS on 31 January 2024 Second round letter and figures sent via USPS 6 March 2024
Lu‘uwai, Kalei	*Kama‘āina;* ‘Aha Moku O Maui, Committee Member	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024 Mr. Lu‘uwai responded on 6 March 2024 stating that he did not have anything to contribute to this project CSH responded same day thanking him for his response
Maunupau, Ku‘uleinani	Ka‘ehu, Interim Executive Director	Letter and figures sent via email on 26 January 2024 Second round
Nakahashi, Ikaika	Cultural Historian, SHPD	Letter and figures sent via email on 26 January 2024 Mr. Nakahashi responded on 09 February 2024: *Aloha Tehani,* *Mahalo for contacting me regarding the Cultural Impact Assessment for the proposed Kuihelani Solar Project, ahupua‘a of Waikapū, Maui.* *I recommend CSH and the landowner utilize the media (e.x. OHA’s Ka Wai Ola, Maui News, etc.) to solicit additional information for this CIA.* *I recommend your organization and the landowner consult with:* • Hōkūao Pellegrino • Ke‘eaumoku Kapu - ‘Aha Moku o Maui Inc., I recommend your *organization and the landowner meet with any native tenants and people who currently live or* previously lived in the ahupua‘a listed above on Maui for *information about the cultural resources and cultural practices for this CIA.* *Koe nae ke kuleana o na kanaka ma loko = reserving the rights of native tenants.* *Please let me know if I can help with anything else.* *A hui hou* CSH responded on 12 February 2024 thanking him for response and recommendations

Nakanelua, Kyle	Aha Moku Advisory Interim Committee Member, Maui Representative	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024 Mr. Nakanelua responded same day and recommended Hōkūao Pellegrino CSH responded on 4 March 2024 thanking him for his recommendation
Nanoza, Carmela	Hanona, Chair	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Nekaifes, Maraea K.	Nekaifes Ohana	Letter and figures sent via USPS on 31 January 2024 Second round letter and figures sent via USPS 6 March 2024
Oliveira, Roy Kalani	President, Waiehu Kou Phase 3 Association	Letter and figures sent via USPS on 31 January 2024 Second round letter and figures sent via USPS 6 March 2024
Ornellas, Daniel L.	Vice President, Waiehu Kou Phase 3 Association	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Pahia, Bobby	Founder, Hawai‘i Taro Farm LLC	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Pellegrino, Hōkūao	Noho‘ana Farm Owner/Manager; Land Education Specialist for Kamehameha Schools Maui; President, Hui Nā Wai ‘Ehā	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Polido, Travis	Waikapu Community Association Former President	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Pridemore, Jill	Director, Alexander and Baldwin Sugar Museum	Letter and figures sent via USPS on 31 January 2024 Second round letter and figures sent via USPS 6 March 2024
Pundyke, Kawewehi	Wailuku Representative, ‘Aha Moku O Maui ‘Āina Committee	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Purdy, Malia	Hui No Ke Ola Pono, Executive Director	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024

Raymond, Kiʻope	Hawaiian Studies Teacher, UH Maui	Letter and figures sent via email on 26 January 2024 Mr. Raymond responded on 27 January 2024 stated that he had no comments for this project CSH responded on 29 January 2024 thanked him for his response
Rogers, Waldemar "Wally" Frank	Kamaʻāina	Letter and figures sent via USPS on 31 January 2024 Second round letter and figures sent via USPS 6 March 2024
Schattenburg-Raymond, Lisa	Horticulturalist/Former Executive Director, Maui Nui Botanical Gardens	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Sherill, Tamara	Executive Director, Maui Nui Botanical Gardens	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Six, Janet	Principal Investigator, County of Maui	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Smythe, Crystal	Lineal/Cultural Descendant	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024
Watanabe, Evalina "Noelani"	Maui, Vice-Chair, OHA's Native Hawaiian Historic Preservation Council (NHHPC)	Letter and figures sent via email on 26 January 2024 Second round letter and figures sent via email on 1 March 2024

Area Elected Officials

Soon after award, the Project team conducted one-on-one meetings with area elected officials. The meetings included presentations on Project details, opportunities for discussion regarding important regional issues, and to receive feedback on the Project design and Community Benefits Package. These meetings were not recorded and verbatim transcripts are not available, however, feedback received and questions posed to the Project team are summarized herein.

Rep. Tyson Miyake (House District 10 - Portion of Waiehu, Paukūkalo, Wailuku, Wailuku Heights, Waikapū)

The Project team conducted an initial virtual presentation and meeting with Rep. Miyake on February 27, 2024. The team sought to provide information and gather feedback on the proposed Project, the potential Community Benefits Package (CBP), and other issues in the region that may be relevant to the Project. Since the initial meeting, the Project team has continued to maintain communication with the Representative that included project updates and details regarding community meetings. A summary of feedback and questions posed during the meeting is included below.

Comments/Questions:

- Senator Hashimoto and myself are local, born and raised on Maui, and we support projects like this.
- For Wailuku, a good stakeholder who is very prominent is the Waikapū Community Association. They're very involved, and the project is adjacent to their community. One of their major concerns was traffic and speeding on Honoapi'ilani Highway.
- Several years ago, a big fire traveled within feet of the HECO's power plant fence line. You talked about vegetation management and the batteries on-site, but that area is windy and dry – not as bad as the Mahi Pono land in Kihei. What are you doing on that subject?
    - A: AES projects include robust on-site fire prevention. In addition, we build in fire breaks around the perimeter to be a responsible community member.
- Q: What is the lifespan, decommissioning the batteries – 25 years? Afterward, are they recycled?
    - A: It is yet to be determined, but it is expected that a lot of the materials will still be useful, like steel and some of the components. It is our hope and objective that it will be feasible for those to be be recycled within the community. At the time of decommissioning, we'll follow every regulation in place.
- Q: If one panel goes down, would that shut down the whole row? (He visited an older solar project in the past where this was the case.)
    - A: The way the technology is built now, there's a certain amount of panels on the table. Based on the undulations of the ground, you can build your steel and the tables more freely than a straight row. It is that table that would go down, and it would be isolated to one fraction of that row. The rest is operational.

Community Issues Identified:

- Traffic and speeding on Honoapi'ilani Highway are a concern of the Waikapū Community Association
- Wildfire mitigation
- State DOT putting speed bumps on Honoapi'ilani Highway in December/early January

Sen. Troy Hashimoto (Senate District 5 - Wailuku, Kahului, Waiheʻe, Waikapu Mauka, Waiʻehu)

The Project team conducted an initial virtual presentation and meeting with Sen. Hashimoto on March 1, 2024. The team sought to provide information and gather feedback on the proposed Project, the potential Community Benefits Package (CBP), and other issues in the region that may be relevant to the Project. Since the initial meeting, the Project team has continued to maintain communication with the Senator that included project updates and details regarding community meetings. A summary of feedback and questions posed during the meeting is included below.

Comments/Questions:

- The last time, I thought the community might pause due to the size. But we sent it out in our newsletter twice, and I don't think there was anything people were that concerned about. The Kuihelani Solar Phase 2 location is probably better than the first since it is out of view, and you can't see it from the roadway. You only see it when you fly in, so I think it's a good location.
- Q: Is the Agricultural Land still classified as C&D (Land Study Bureau Soil Classifications), or is it better agricultural lands?
  - A: It's slightly better. It's B and C class soils. We have compatible ag requirements, but we do that anyway because our landowner is an agricultural operator, Mahi Pono.
- I don't think there's farming activity there anyway, so it's neither here nor there.
  - A: We're also sensitive to water use with these projects, so it's always a balancing act, especially with the recent settlement and decision on water issues on Maui.
- If you send that fact sheet over, we'll happily get it circulated again. I don't think there will be a change. The Wailuku and Kahului guys don't have a problem. This one is a little closer to Māʻalaea, so I that's not my district.
- Phase 1 has been going smoothly. It looks like you're mostly complete.
  - A: Pretty close. You'll be receiving an invitation to the blessing when the time comes. We're starting conditioning activities with the utility on Phase 1 and are on the last stretch to get it online.
- I appreciate the update; I'm glad to hear you're doing another phase. I think it's needed, especially with the other solar projects that didn't get through. We can use these lands where there's some synergy. Hopefully, it doesn't surprise the community. I'll let you know if I hear anything, but from what I went through last time, I hopefully expect the same thing, which is not very much - except for the one guy who wanted you to make it in the shape of a turtle.

Community Issues Identified

- These days, it's workforce development. It's having a conversation with the college. That's what we're seeing – there's a labor and job shortage. That's something the college also needs to get better at – adapting to the industry's needs. It's a dual thing where you want to help the community, but the college needs to help you too.
  - A: Community college trade programs for the industry - that's a great thought. We're also working with the carpenters, electricians, laborers, and operating engineers unions. It can be difficult to get a sufficient workforce to construct these projects, and they're great-paying jobs.

- Area schools might benefit from a project partnership such as Kui (Pu'u Kukui Elementary). They can always use assistance. When they built the school they tried to build renewable energy into it. From a sustainability standpoint, that would be interesting – teaching the young about the components of allowing renewables to happen. I'm not sure if they're teaching that.

Council Member Tom Cook (South Maui)

The Project team conducted an initial virtual presentation and meeting with Council Member Cook on March 1, 2024. The team sought to provide information and gather feedback on the proposed Project, the potential Community Benefits Package (CBP), and other issues in the region that may be relevant to the Project. Since the initial meeting, the Project team has continued to maintain communication with the Council Member that included project updates and details regarding community meetings. A summary of feedback and questions posed during the meeting is included below.

Comments/Questions:

- Q: Great presentation. I'm a very avid supporter of alternative energy. What is the decommissioning timeline – how many years and to what extent? I'm asking because I look at the wind farm, and from what I understand, they're supposed to do the same process and revert it. But now they're going to do it again because it's appropriate. Is there anything in the lease for renewal? I understand the need to decommission it at the end of its lifecycle, but we're also looking for sustainability and resiliency, so it's illogical to erase this at a certain period in time.
  - A: There's always an option to propose and resubmit the use of the same lands. Generally, however, unlike wind farms, the velocity at which technology in solar + battery improves is incredible. This project would not have been possible 25 years ago. Thirty-five years from now, there may be other types of technology to consider along these same lines that might occupy a fraction of the area or there might be totally new technology.
    A decommissioning provision provides some assurance to the community that, at a bare minimum, you have to restore the site to as-is condition. That's prescribed under state law but does not preclude the provision to consider submitting for an extension through the utility and PUC.
- Q: There were a few percentages. Is 10% this phase and 25% both projects (Kūihelani Solar + Storage and Kūihelani Solar Phase 2) combined?
  - A: Yes.
- Q: Is there a plan for spare parts on the island? Thinking of resilience and the shift to this being our primary energy source as we decommission the oil-fired plants, which I'm supportive of, I'm just curious. That would be one of my challenges as a builder for most of my life. Having had a lot of heavy equipment, when you need a part – it's not always available and can be very expensive and problematic.
  - A: Part of AES's strength is our number of operational projects. We have a local, dedicated operations and maintenance staff on every island. Many of our facilities employ the same technology, so we can trade parts between plants and stockpile materials that we know will be needed throughout the 25-year operational periods.

- Q: What is the status of the permitting? I got involved a little in the first phase, prodding it along. Is the administration supportive?
  - A: Right now, we're in the design phase. We learned some good lessons through our previous adjacent project, Kuihelani Solar + Storage. We are trying to work earlier on the permitting. We're planning towards that, and we hope we can move quickly to go through the permitting process and give ourselves and the agencies more time for those approvals – grading, construction, and building permits.
- As Chair of the Infrastructure Committee, I'm supportive, and it would be appropriate for me to weigh in on encouraging the administration to prioritize.
- I don't see you having opposition. In Kīhei, there's opposition because of the view plane mauka of Maui Meadows, but I think your area is handled visually.
- Congratulations! As a community member, I'm grateful for your company's investment.
- Q: The less reliant we are on imported oil, the more capital should stay here. The lower the electrical rates are, the less burden they are on a household's finances, the more money they should have. So besides becoming more energy-independent, it should be a big plus for our economy. Do you have any studies on this?
  - A: For this project alone, over $100 million is going into the economy and more than 500 jobs.
- For us, policywise, having more tools to educate people about the benefits helps. The jobs are short-term benefits, but we are also interested in the long-term benefits of changing to being resilient.
- Q: What's your next project?
  - A: We've got one on the Big Island – we have 3 in the works and others in the pipeline that will soon be complete. We hope to have more and will work closely with your office.

GROUP AND COMMUNITY ASSOCIATION MEETINGS

Labor Representatives and Community Associations

The Project team conducted group meetings with labor representatives and the region's largest and most active community association in the course of outreach. These meetings were not recorded and verbatim transcripts are not available, however, feedback received and questions posed are summarized herein.

Labor Leaders

Nathaniel Kinney (Hawaii Carpenters Union)

Christopher Delauney (Pacific Resource Partnership)

Pane Maetoga, III (Operating Engineers, Local 3)

Joy Kimura (Hawaii Laborers & Employers Cooperation and Education Trust (LECET) Fund)

On March 14, 2024, Project team members met with a small group of construction union representatives to present details about two AES Stage 3 RFP projects, including Kūihelani Solar Phase 2. The team sought to provide information and gather feedback on the proposed Project, including workforce development issues. A summary of feedback and comments received during the meeting is included below. It should be noted that AES Hawai'i has ongoing relationships with these unions and has been committed to working with contractors that are signatory to these unions across its portfolio of utility-scale projects.

Comments

- The positives of this, for us, are the jobs. What does that exactly mean? First of all, the jobs are an opportunity for living wages and benefits for local people to live on and raise families in Hawai'i. It creates a long-term career path for people. They start off at a lower level (apprenticeship or pre-apprenticeship) and can eventually move up. This would help build the workforce we need for the future and would be helping the state meet its 2045 energy goals. It's important to not have pauses in the permitting process because you have to tell the workers it's delayed and then the workers have to move on to other jobs to be able to support their families—which creates a loss in workers that have the experience. The projects create green jobs for local people.
- The projects create good-paying jobs, not just jobs, but careers in green energy. There are two parties: the environmentalists, who typically oppose development, and construction unions, who typically support it. With this, we can come to what is called a blue- green alliance, where green is the environmentalists and blue is the unions, and two opposing groups are actually promoting something together. It also helps with the State and Federal goals to transition to renewable energy. Hawai'i is actually the most union-dense state in the nation, but also has a huge environmental presence. AES Hawai'i has done this at a fair wage rate, which is the reason AES Hawai'i has been and will continue to be successful. AES Hawai'i's community outreach is another reason they are successful. We don't have to reach out to them, they come to us.
- The problem with going last, or almost last, is that everything has already been said. I agree with what the others have said and want to really point out that this project does support the State's energy goals, so hopefully there won't be too much opposition. Hopefully there will be a very strong blue-green alliance.
- The commitment AES Hawai'i has to the community, the due diligence with doing surveys and getting out in front is a plus of AES Hawai'i.

Industry Issues Identified

- For operating engineers, all of the apprenticeship programs happen on Oʻahu. It might be possible to establish a community benefits package to offset travel costs for apprentices on Maui to receive training on Oʻahu.
- We can discuss job training opportunities and renewable energy developer partnerships with the training director for the Laborers Union. The State Workforce Development Council may also be helpful.
- The carpenters union is always open to recruiting for apprenticeships. Maybe some kind of package for fire victims or young adults to get out of their situation and give them an opportunity, to give them some hope could be good.

Waikapū Community Association

Waikapū Community Association is the largest and most active community association in the region near the Project site.

The Project team conducted a virtual presentation and fielded questions at the Association's monthly meeting on September 9, 2024. There were 35 attendees including area elected officials Council Chair Alice Lee and Rep. Tyson Miyake.

The Project team sought to provide information and gather feedback on the proposed Project, the potential Community Benefits Package (CBP), and other issues in the region that may be relevant to the Project. The Project team provided an 18-minute presentation and offered to answer questions from attendees. Questions posed are described below:

<u>Questions</u>

- Q: When does the 25-year lease start/finish?
    - A: This Project, Kūihelani Solar Phase 2 is slated to begin in 2027 and will operate for a 25-year period.
- Q: Does each phase have a different start/finish date?
    - A: The adjacent recently completed project, Kūihelani Solar + Storage began operations earlier this year in 2024 and will operate for a 25-year period. Both will be followed by a decommissioning phase at the end where all project components will be removed and the land restored to as is condition.
- Q: How many total phases will there be?
    - A: Kūihelani Solar Phase 2 was selected by HECO based on the current needs and available capacity for renewable energy production. There are no guarantees nor current plans for subsequent phases.

AES-HOSTED PROJECT MEETING

The AES Project team scheduled the Kūihelani Solar Phase 2 public meeting to occur on Tuesday, August 27, 2024. To enable community members to easily and effectively participate, the meeting was planned to be held via video teleconference. This approach also enables interested individuals to watch the recording if they were unable to participate live. More than 30 days prior, the Project team issued the required public notifications.

The recording of the public meeting has been posted onto the Project website for the public to view. https://www.aes-hawaii.com/hawaii/project/kuihelani-solar-phase-2

A total of 29 people participated in the meeting with 4 presenters and 25 attendees.

Notification of Public Meeting

Advertising and Paid Media

On Thursday, July 25, 2024 and again on Saturday, July 27, 2024, a quarter page advertisement announcing the meeting and encouraging participation was published in Maui News.

The ads are included as “Exhibit 1”.

Media Advisory

On Wednesday, July 24, 2024, a media advisory was issued to statewide and regional news outlets.

The media advisory is included as “Exhibit 2”.

- KHON 2
- KITV
- Hawaii News Now
- Hawaii Public Radio
- Associated Press
- Civil Beat
- Maui News
- Maui Now

Media Coverage

Articles are included as “Exhibit 3”. Note that AES’s adjacent project, Kūihelani Solar + Storage held their blessing and ceremonial opening at nearly the same time and media coverage included information on both projects.

- “AES Hawai‘i to host virtual community meeting on proposed solar projects in Central Maui, Kūihelani Solar Phase 2,” Maui Now, Thursday, July 25, 2024

- “AES launches state’s largest solar power facility on Maui,” Honolulu Star-Advertiser, September 9, 2024

Public Meeting Questions and Comments

Following the presentation on Project details during the public meeting, the AES team provided an opportunity for attendees to provide questions and comments. Attendees were given the option to verbally offer questions or comments or to post into the chat. No verbal comments or questions were received, and attendees opted only to utilize the chat function for their feedback.

An unedited transcript of questions and comments posted to the chat have been included as “Exhibit 4”. Individual personally identifiable information has been redacted.

WRITTEN QUESTIONS, COMMENTS, AND COMMUNICATIONS

Questions, Comments and Communications Received PRIOR to 30-Day Comment Period

Since Kūihelani Solar Phase 2 was awarded under the Stage 3 RFP, the Project team has continued to receive questions, comments, and other communication through the Project website, email, and telephone hotline. Unedited email and web submissions, as well as voicemail transcriptions received prior to the Project public meeting on August 27, 2024 are included as "Exhibit 5" (redacted of personally identifiable information).

12 total email, web, and hotline communications were received during this period.

Questions, Comments and Communications Received DURING 30-Day Comment Period

The August 27, 2024 Kūihelani Solar Phase 2 public meeting marked the beginning of the 30-day comment period, a requirement for all Stage 3 RFP projects. The 30-day comment period ended on September 26, 2024. Unedited email and web submissions as well as voicemail transcriptions received during this 30-day comment period are included as "Exhibit 6" (redacted of personally identifiable information).

Three (3) total email, web, and hotline communications were received during this period.

Questions, Comments, and Communications Received AFTER 30-Day Comment Period

Since the close of the 30-day comment period on September 26, 2024, the Project team has continued to receive questions, comments and communications through the Project email, website and telephone hotline. Unedited email and web submissions as well as voicemail transcriptions received prior to the Project public meeting on August 27, 2024 are included as "Exhibit 7" (redacted of personally identifiable information).

Four (4) total email, web, and hotline communications were received during this period.

EXHIBIT 1

Advertising and Paid Media

PANIOLO'S CORNER

Change is never easy

It was a long day for the five planning commissioners on Maui Tuesday as they continued their meeting to ultimately hold a 5-0 vote in favor of phasing out 7,000 short term rental units on the Minatoya List.

It wasn't an easy decision or vote to hold and now the controversial bill is heading to the Maui County Council for a vote after going to the planning commission for two meetings over the course of June and July. The commissioners listened to a total of 18-hours of public testimony.

It is a little surprising that none of the commissioners voted against the bill considering a large majority of public testimony was vehemently against the bill. Nonetheless, the difficult vote in the planning commission is now a thing of the past.

It isn't easy to sit through 18-hours of public testimony and the sheer volume of testimony speaks to the polarizing nature of this bill. I applaud those who had the courage to speak their minds on both sides of the coin. It's not easy to get in front of a crowd of passionate people and let your thoughts be known.

As Mayor Bissen said when he answered questions from the planning commission, this is the start of a difficult discussion that he feels needs to be had. It's a conversation that will take on many shapes in the coming days, weeks, months, and years. As of right now the bill is heading as is to the Maui County Council for a vote that would ratify it into law if passed by the council.

There are going to be legal challenges that arise out of this conversation. That is almost a guarantee at this point. That is something the county is banking on as well. It will be interesting to see how this plays out, but I applaud those who let it be known how they felt and it is my sincere hope that the information that came out of this meeting is disseminated by the powers that be and that they listen to their constituents voices instead of thinking they know better.

After all, if they don't listen, they will be forced to listen to the collective voices of their constituents on election day.

Change is never easy and especially this kind of change that will eliminate 7,000 short-term rentals on the island of Maui. This bill will have a profound impact on the community the second it goes into law. What that impact will look like remains to be seen, but it is sure to shake up the housing and rental market as we know it on Maui.

Mayor Bissen stated that Kauai has done a good job with how they have handled short term rentals where no new permits are being granted, but I can speak from personal experience that it hasn't helped with the housing crisis in the least.

If the goal of the bill is to help with the housing crisis, the pressure will surely be on for immediate relief for a problem that has been ongoing for decades now.

Our Local HEROES

SPONSORED BY SERVICE RENTALS AND SUPPLIES

ARTHUR KURAHARA

Known for his singing of "Danny Boy", a song he learned on his way to Camp Shelby for basic training, Arthur "Art" Kurahara of Paia joined the 442nd Regiment in March of 1943. Kurahara was selected early on as a replacement to the 100th Infantry Battalion to serve as a radio operator. After being discharged in 1946, Kurahara recalls visiting a record store in Ireland looking for a copy of his signature "Danny Boy", which the clerk gave to him for free after hearing it was his favorite song. He later returned to Maui and worked as a mechanic at the Paia Mill.

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MAUI HEALTH

July 2024
EMPLOYEES OF THE MONTH

JoAnne Voest
Transporter, Nursing Float Pool

JoAnne exemplifies Maui Health's mission, vision, and values through her selfless dedication. She possesses a remarkable talent for uplifting and comforting patients during their most vulnerable moments, shining brightly as a beacon of compassion. JoAnne's ability to improve the overall well-being of our patients leaves a lasting impression on our community. Her commitment to delivering compassionate care sets a standard of *EXCELLENCE* that serves as an inspiration to us all.

Heather Bryce
Diagnostic Cardiac Sonographer, Echocardiography

Heather's unwavering dedication to *EXCELLENCE* at Maui Health has made a lasting impact on patient care, particularly during a recent critical moment in our ICU. Her selfless and decisive actions ensure quality care for our patients and her invaluable contributions underscore the crucial role each team member plays in achieving exceptional patient outcomes. Heather continually goes above and beyond, demonstrating a steadfast devotion to patient welfare and exceptional service. She is a shining example of our core values and we are grateful to have her on our team.

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1-800-442-VOTE
elections.hawaii.gov

HAWAII VOTES

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KŪIHELANI SOLAR PHASE 2
VIRTUAL COMMUNITY MEETING

Tuesday, August 27, 2024
5:30 PM

Link to Meeting:
https://us06web.zoom.us/j/87167982372

Email to RSVP:
kuihelani2solar@aes.com

Area residents and interested parties are welcome to attend and participate in a virtual community meeting.

AES Hawai'i will provide an overview, answer questions, and gather feedback on a proposed solar and battery storage renewable energy project called Kūihelani Solar Phase 2.

Project Specifications
- Located in Central Maui, approximately 5 miles south of Kahului
- 40 MWac Solar PV Array
- 160 MWh Battery Storage
- Approx. 575 Acres
- 10% of Maui's Energy
- 18,425 Homes Powered (equivalent)

aes Hawai'i
WWW.AES-HAWAII.COM/PROJECT/KEAMUKU-SOLAR

OBITUARIES

Chi Kanno, 71

Chi Kanno, 71, of Wailuku, Maui passed away on July 16, 2024 under the care of Hospice Maui. She was born on October 8, 1952 in Korea.

Chi is survived by her husband, James Kanno.

Private services will be held at a later date.

To Place A Classified Ad Call: 242-6333

Veterans

Continued from Page A2

groundbreaking" research on the drug by MAPS, or the Multidisciplinary Association for Psychedelic Studies, the leading nonprofit advocating for the medical and legal use of hallucinogenic drugs.

But expectations for MDMA's first-of-a-kind approval unraveled a few weeks later when Food and Drug Administration advisers voted overwhelmingly against the drug, citing flawed data, questionable research conduct, and potential safety and addiction risks. The panel's recommendation isn't binding, but the FDA is widely expected to delay or decline approval when it makes its decision by mid-August.

The potential rejection has sent shockwaves through the psychedelic community, including combat veterans who have spent years lobbying for the drug, which is also known as ecstasy or molly. The advocacy effort has long been intertwined with MAPS, which has funded or supported some of the most vocal veterans supporting psychedelic therapy.

Dr. Harold Kudler of Duke University met with veterans and MAPS leaders while serving as the VA's top consultant on mental health services. He believes FDA's experts are justifiably skeptical of the science behind the drug, which he says has been drowned out by messaging from MAPS and its leader, Rick Doblin, who began pursuing MDMA's approval in the mid-1980s.

"Rick is the most persuasive advocate within the scientific community that I've ever seen. You want to believe him because he's offering you something you sorely need — an effective treatment for PTSD," Kudler said. "But I think the FDA committee caught a glimpse of how much of this is Rick's zeal and how much is real."

MAPS declined to make Doblin available for an interview. Instead the group pointed to a recent statement by two dozen scientists and pharmaceutical executives — many with backgrounds in psychedelic research — supporting MDMA's approval.

Casey Tylek photo via AP

Casey Tylek served in the U.S. Army in Iraq in 2007, shown here.

Earlier this year, MAPS changed the name of its drug development arm to Lykos Therapeutics, allowing the new company to raise funds from outside investors.

In addition to shortcomings in Lykos' studies, FDA panelists voiced concern about separate allegations that some MAPS-affiliated researchers suppressed negative study results or coached patients to inflate positive results. The FDA says it's investigating those claims.

Casey Tylek, an Army veteran, says he didn't experience any of that while participating in the study. When he asked researchers for guidance in evaluating the effect of the drug, Tylek says he was repeatedly rebuffed and told he had to rate the treatment without any outside influence.

Tylek says he was "pessimistic" going into the trial, but credits MDMA-assisted therapy with resolving anger, anxiety and trauma stemming from a rocket attack in Iraq.

"It basically rewrote that memory in my mind and how it functioned," Tylek said. "I was able to just kind of let go of it and not be hung up on it."

Kudler and other researchers say they want to see the MDMA results confirmed in larger studies that have no links to the psychedelic community.

That work would take years. Veterans who support the treatment say it would jeopardize patients suffering from PTSD who haven't been helped by antidepressants and other existing therapies. The suicide rate among veterans is 70% higher than the general population, according to government figures, with 18 veteran suicides per day in 2021.

Jon Lubecky, who served in both the Marines and the Army, says he tried to kill himself five times after returning from deployment to Iraq in 2006. After years of struggling with PTSD he enrolled in a MAPS trial in 2014. He credits MDMA-assisted therapy with curing his condition.

Since then, Lubecky has told his story hundreds of times in media interviews, congressional hearings and private meetings with military officials and federal lawmakers, including conservatives like Sen. Rand Paul and Rep. Dan Crenshaw.

Lubecky worked as a consultant for MAPS for more than five years. But he rejects the idea that he was merely advancing the agenda of psychedelic boosters who want to see the drugs outright legalized.

"I'm not in this for ending the drug war or any of those other things," he said. "I'm in it for my friends."

Lubecky's work helped secure $20 million in funding for the VA to conduct its own studies of psychedelics, including MDMA and ketamine.

Part of the rationale for that research: Many veterans now leave the U.S. to undergo psychedelic therapy at clinics in Mexico, Peru and other countries where it is more accessible.

A nonprofit group, Heroic Hearts Project, currently has a waiting list of over 1,000 veterans seeking financial and logistical support to travel abroad. A former Army Ranger, Jesse Gould, founded the group after returning from a wrenching retreat in Peru using ayahuasca, the psychedelic brew associated with indigenous cultures of the Amazon. After the experience, he said he was able to overcome anxiety, anger and depression that had burdened him after three deployments to Afghanistan.

Gould says MAPS deserves credit for kickstarting research that could eventually help thousands of veterans.

"I think MAPS has done more for the veteran community in this area than most politicians have done in the last 20 years," said Gould, whose group has no financial ties to MAPS. "Time and time again our needs either go unheard or go to the back of the line."

Heroic Hearts hosted an event on Capitol Hill earlier this month where several House lawmakers and veterans called for MDMA's approval.

Gould doesn't expect the FDA to flatly reject MDMA. Instead he and others say the agency may ask Lykos to perform additional studies.

Even if the company is unable to quickly conduct that research, experts say others could benefit by avoiding the pitfalls in Lykos' MDMA application, including a small patient population with little diversity and a high potential for bias.

Dozens of other drugmakers are studying psilocybin, LSD and other psychedelics for depression, anxiety and addiction.

Dr. John Krystal, a Yale University psychiatry professor, said Lykos' setback "will hopefully ensure that future studies are conducted in ways that give reviewers greater confidence about the effectiveness and the safety of these drugs."

Our Local HEROES

SPONSORED BY SERVICE RENTALS AND SUPPLIES

ARTHUR KURAHARA

Known for his singing of "Danny Boy", a song he learned on his way to Camp Shelby for basic training, Arthur "Art" Kurahara of Paia joined the 442nd Regiment in March of 1943. Kurahara was selected early on as a replacement to the 100th Infantry Battalion to serve as a radio operator. After being discharged in 1946, Kurahara recalls visiting a record store in Ireland looking for a copy of his signature "Danny Boy", which the clerk gave to him for free after hearing it was his favorite song. He later returned to Maui and worked as a mechanic at the Paia Mill.

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KŪIHELANI SOLAR PHASE 2

VIRTUAL COMMUNITY MEETING

Tuesday, August 27, 2024
5:30 PM

Link to Meeting:
https://us06web.zoom.us/j/87167982372

Email to RSVP:
kuihelani2solar@aes.com

Area residents and interested parties are welcome to attend and participate in a virtual community meeting.

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Project Specifications

- Located in Central Maui, approximately 5 miles south of Kahului
- 40 MWac Solar PV Array
- 160 MWh Battery Storage
- Approx. 575 Acres
- 10% of Maui's Energy
- 18,425 Homes Powered (equivalent)

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EXHIBIT 2

Media Advisory

aes Hawai'i

FOR EVENTS OCCURING
Tuesday, August 27, 2024

Contact:
[redacted]

MEDIA ADVISORY/COMMUNITY MEETING

AES Hawai'i to host virtual community meeting regarding proposed solar project in Central Maui, Kūihelani Solar Phase 2

WHAT: A virtual community meeting will be held for area residents and interested parties to learn more about Kūihelani Solar Phase 2, a proposed utility-scale solar project in Central Maui.

AES team members will provide an overview of the project, answer questions, and gather feedback.

WHERE: Virtual (via Zoom)
https://us06web.zoom.us/j/87167982372

WHEN: Tuesday, August 27, 2024
5:30 p.m.

WHO: All interested parties are invited to participate, especially area community members.

Attendees are encouraged to RSVP by email: kuihelani2solar@aes.com

ABOUT KŪIHELANI SOLAR PHASE 2:
Specifications

- Located in Central Maui, approximately 5 miles south of Kahului
- 40 MWac Solar PV Array
- 160 MWh Battery Storage
- Approximately 575 Acres - Preliminary Project Area
- Approximately 10% of Maui's Energy
- 18,425 Homes Powered (equivalent)

To learn more, visit: www.aes-hawaii.com/kuihelani-40mw

###

EXHIBIT 3

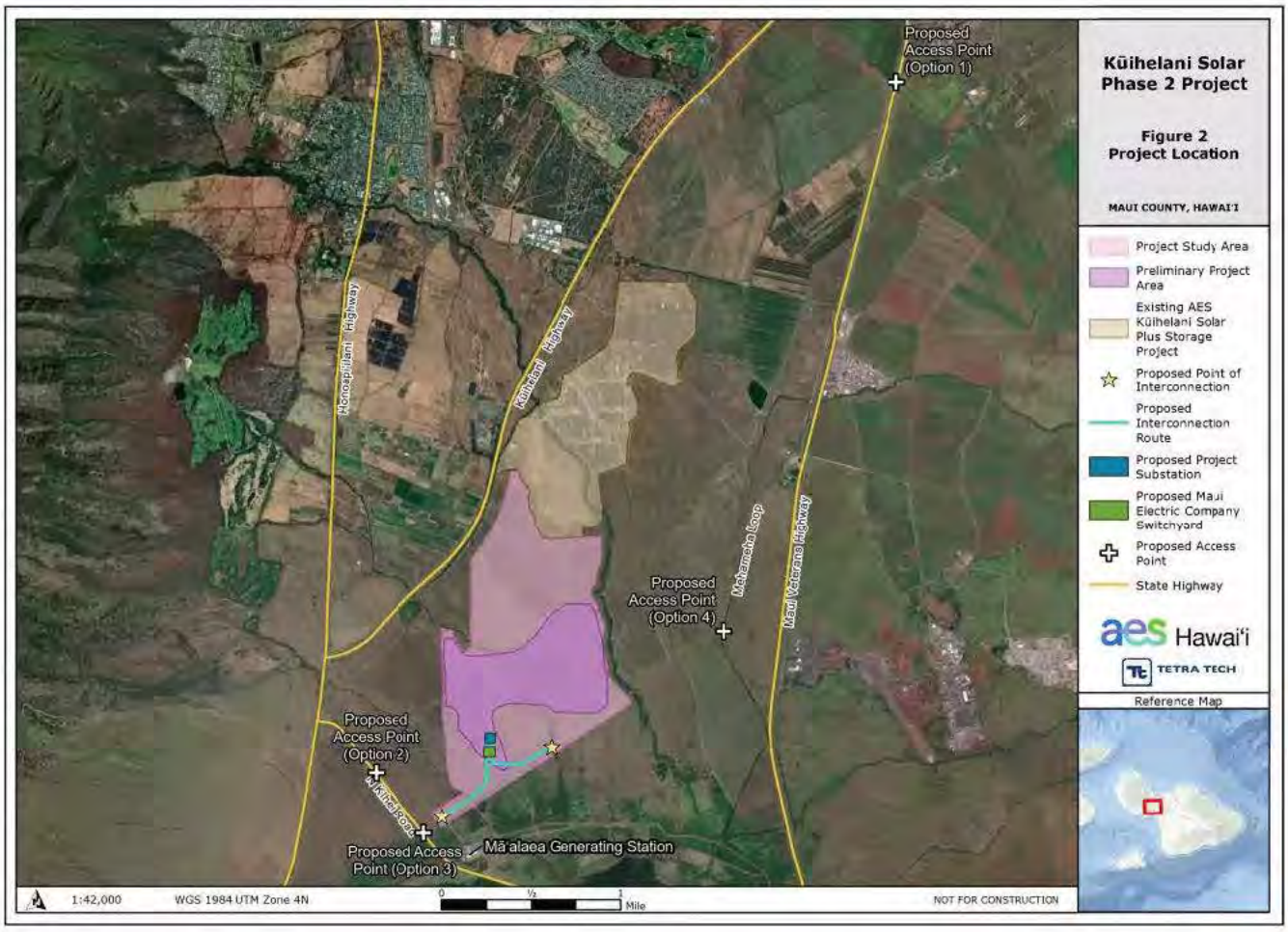
Media Coverage

MAUI

Maui News

AES Hawai‘i to host virtual community meeting on proposed solar projects in Central Maui, Kūihelani Solar Phase 2

July 25, 2024 · 12:00 PM HST



Preliminary Project Area (highlighted in dark purple) comprises approximately 575

acres* for the proposed new solar PV array and battery storage in Kūihelani Solar Phase 2. It lies within the Project Study area (highlighted in light purple). The existing solar facility (highlighted in grey) sits on 450 acres to the north. **NOTE: This map, along with acreage info on the AES' project summary website, is not up-to-date as of writing this. It reflects a smaller portion of the Preliminary Project Area than the current Preliminary Project Area today, which is 575 acres, clarified AES Hawai'i on Wednesday, June 24.* Map courtesy: AES Hawai'i

A virtual community meeting will be held for area residents and interested parties to learn more about Kūihelani Solar Phase 2, a proposed utility-scale solar project in Central Maui. The virtual meeting will take place via Zoom on Tuesday, Aug. 27 at 5:30 p.m. Click here for the Zoom link.

AES Hawai'i team members will provide an overview of the project, answer questions and gather feedback. All interested parties, especially those in the area community, are invited to participate. Attendees are encouraged to RSVP by emailing kuihelani2solar@aes.com.

According to a public advisory on Wednesday, Kūihelani Solar Phase 2 proposes developing a 40 MWac Solar PV Array and 160 MWh Battery Storage on 575 acres located in Central Maui, approximately five miles south of Kahului. The solar facility says this project aims to provide an additional 9.8% of Maui's energy needs, or the equivalent of 18,425 homes.

Kuihelani Solar-plus-Storage facility. PC: AES Hawai‘i

The meeting announcement comes after AES Hawai‘i commenced operations of Kūihelani Solar-plus Storage (Phase 1) this past June. It is the largest solar farm in the state, supplying an estimated 15% of Maui’s energy needs — equivalent to powering 27,000 homes.

Kūihelani Solar Phase 2 is one of five projects that were selected by the Hawaiian Electric Company (HECO) this year to ensure it meets state Renewable Portfolio Standards, as the utility plans on replacing 35% of Maui’s existing power grid with renewable energy sources by 2028.

To learn more about Kūihelani Solar Phase 2, visit: www.aes-hawaii.com/kuihelani-40mw.

Star Advertiser

Monday, October 7, 2024

81°

Today's Paper

HAWAII NEWS

AES launches state's largest solar power facility on Maui

By Allison Schaefers

Sept. 9, 2024

Editors' Picks Maui

1/2

BRYAN BERKOWITZ / SPECIAL TO THE STAR-ADVERTISER

AES Hawai'i held a blessing for its Kuihelani solar-plus-storage, the state's largest solar power facility.

AES Hawai'i has launched Kuihelani solar-plus-storage, the state's largest solar power facility.

The Central Maui project is a key part of Hawaii's aggressive 2045 Clean Energy Initiative goals as well as AES' own 2040 goal of net zero carbon emissions from electricity sales.

Bernerd Da Santos, executive vice president and president of Global Renewables for The AES Corp., and AES Hawai'i President Sandra Larsen met with the Honolulu Star-Advertiser on Thursday in advance of a Friday blessing for the Kuihelani project, which is producing electricity for Maui at 8 cents a kilowatt-hour, the lowest renewable energy cost in the state.

ADVERTISING

“Our (goal) is as aggressive as Hawaii. We are 2040, so I’m supportive of 2045,” Da Santos said. “I think Hawaii took a lead in order to set an aggressive target in the United States. Climate change is the largest challenge in mankind, and every state and every organization and every industry that set themselves in a goal that is aggressive is the right thing to do. That will drive change. That will drive technology and the focus of the resources that need to be deployed in order to make it happen.”

The closure of AES Hawai‘i’s coal plant in 2022 dovetailed with the end of a 30-year power-purchase contract with Hawaiian Electric. Since then AES and partners are working toward the state’s goal to derive all energy from renewable sources by 2045.

“We wanted to invest in Hawaii, and we wanted to invest in a size that would replace the energy of that coal facility,” Da Santos said. “That coal facility was 41 workers. We said that we were going to find jobs for our people that work in that facility, and we did. Today our people are working for HECO, for AES in the renewable environment and for other companies in the sustainable side.

“We had 180 (megawatts) in that (coal) facility, and we are right now running 366 MW in solar plus more than 1,000 MWh of energy storage. That just by itself is more than three time that (coal) facility’s capacity.”

Kuihelani comes as AES Hawai‘i is accelerating its commitment to Hawaii’s Clean Energy Initiative. With the Kuihelani project, AES is making progress across the state on 11 renewable projects — the most of any other renewable energy developer. AES Hawai‘i already has six operational projects in Hawaii, including Lawa‘i Solar and Energy Storage Project and the AES PMRF Solar-plus storage on Kauai; the Na Pua Makani wind project in Kahuku and the HECO AES West O‘ahu Solar project on Oahu; the HELCO AES Waikoloa Solar on Hawaii island; and the Kuihelani on Maui.

AES has under development the West Kauai Energy Project on Kauai; the HECO Waiawa Phase 2 Solar in Pearl City and the HECO AES Mountain View Solar in Waianae on

Oahu; the HELCO Keʻamuku Solar + Storage on Hawaii island and a MECO Kuihelani Solar Phase 2 in Central Maui, which is in a 30-day comment period that runs through Sept. 26.

Da Santos said the Hawaii renewable projects are part of a dramatic shift for AES, a Fortune 500 global energy company that was founded in 1981 and built a significant number of coal facilities through 2016, when it made the decision to stop.

He said about two-thirds of AES' business was coal in 2016, and the percentage of coal is now shy of 20%. To get to that companywide goal, AES is commissioning more renewable energy projects in wind, solar and energy storage.

To meet decarbonization objectives and pursue innovation, AES also is building its clean hydrogen business. AES is part of two regional clean Hydrogen Hubs receiving up to $2.4 billion in funding from the U.S. Department of Energy to support the development and scaling of clean hydrogen infrastructure in California and along the Gulf Coast.

Da Santos said green hydrogen holds promise for Hawaii, but not until it becomes more scalable and prices come down, maybe in the early 2030s. He said Hawaii also should look at geothermal, and other

alternate renewable energy sources may be considered as part of a diversification strategy.

Right now it’s projects like Kuihelani, which opened May 31, that allow utility operator Hawaiian Electric to accept and use more intermittent power generation from renewable sources, including rooftop solar, in its long-term transition away from fossil fuel power plants and toward 100% renewable energy.

Da Santos said Kuihelani showcases the power of widespread collaboration between government and industry partners.

“Everyone wins with this project, Maui County, the state of Hawaii, Hawaiian Electric, and, most of all, the people of Maui who want and expect their power be generated effectively, efficiently and inexpensively for future generations,” he said in a statement.

Larsen said Kuihelani solar-plus-storage already is producing 60 MW of renewable energy supported by a 240 MWh lithium-ion battery energy storage system, which is generating enough electricity for 27,000 homes, providing 15% of Maui's energy needs. The project also offsets the need to import 2 million barrels of oil to produce electricity.

Larsen said Kuihelani, which is on 450 acres in Central Maui, also has a dual agricultural use that supports Maui's food production needs. She said AES Hawai‘i is partnering with Ho‘oulu ‘Aina Farms in Waikapu to have sheep graze on the land.

“We're pleased with the positive impact that Kuihelani and its dual-use capabilities are contributing to Maui's quality of life,” Larsen said in a statement. “Our collective team's intent at AES Hawai‘i is always on the future and how our production of clean, renewable energy can make the enjoyment and affordability of life in Hawai‘i a better and more promising outlook for families and children.”

Friday’s blessing ceremony recognized the project’s impact on Maui’s power grid and the island’s economy.

Maui Mayor Richard Bissen presented Da Santos and AES Hawai‘i with a proclamation declaring Friday as Energy Resiliency Day for the County of Maui. Kuihelani is supporting 300 jobs and generating $68 million for Maui’s economy.

Larsen said in a statement that AES Hawai‘i is grateful for the widespread support for its first utility-scale solar project on Maui, which included a power-purchase agreement with Hawaiian Electric.

She said, “The outstanding support we have received from trusted community partners, like Maui County, Hawaiian Electric, and our Maui-based contractors, have made it possible to launch Kuihelani and enabled us to generate low-cost renewable energy for Maui for the next 25 years.”

Hawaiian Electric President and CEO Shelee Kimura said in a statement that Kuihelani solar-plus-storage represents a success story in the utility’s decade-long work to broaden the renewable energy portfolios on each island.

“By creating the market for partners like AES Hawai‘i and designing long-term contracts that benefit customers, we will continue to see projects that meet a critical need for renewable generation and make progress toward our state’s goals for renewable energy and reduced carbon emissions,” Kimura said.

Correction: An earlier version of this story listed the incorrect number of workers in a quote.

31 COMMENTS

EXHIBIT 4

Public Meeting Questions and Comments

Kuihelani Solar Phase 2 Community Meeting Chat 08/27 5:30

01:16:52 Waikapu Community [redacted]
Aloha guys, Can someone be at our Waikapu Community Zoom coming up on 9/9 @ 7pm?

01:17:30 Waikapu Community Association: Thanks!

01:17:51 Waikapu Community Association: [redacted] but email is best

01:18:05 Waikapu Community Association: 👍

01:18:05 [redacted]: A few detailed questions: vegetation mitigation will be done mostly by sheep?; any plans for soil enrichment?, how many participants on this call?

01:20:14 [redacted]: Mahalo plenty

01:20:54 [redacted]: I have a very technical question which may not be answered here

01:22:05 [redacted]: Last I knew a MWatt of storage was about a $1million per MB bar for storage.

01:22:17 [redacted]: Is that about the price still?

01:24:19 [redacted]: Thank you. I prolly need to chat with a HECO tech.

EXHIBIT 5

Questions, Comments and Communications Received
PRIOR to 30-Day Comment Period

Date: Friday, February 16, 2024
Time: 4:24:39 PM
Voice message sent to (808) 800-3942 mailbox 82 at 4:24:39 PM on 2/16/2024 from [redacted].

Message: hang up

From: [redacted]
To: Kuihelani Phase 2 PV+BESS
Subject: Re: Community Meetings - Kuihelani Solar Phase 2
Date: Friday, April 5, 2024 7:18:04 AM

CAUTION: This email originated from outside AES. Do not click links or open attachments unless you recognize the sender.

Perfect, appreciate the prompt response. Looking forward to receiving future updates.

Thanks,

[redacted]

From: Kuihelani Phase 2 PV+BESS <kuihelani2solar@aes.com>
Sent: Thursday, April 4, 2024 5:50 PM
To: [redacted]
Cc: Kuihelani Phase 2 PV+BESS <kuihelani2solar@aes.com>
Subject: [EXTERNAL] RE: Community Meetings - Kuihelani Solar Phase 2

Aloha [redacted],

Thank you for your email. AES Hawai‘i is currently in the process of holding smaller meetings with key stakeholders. We have not yet scheduled a broader community meeting for Kuihelani Solar Phase 2.

We've added you to our email distribution list and will let you know once the community meeting for this project is scheduled. Additionally, we will provide public notice as required by the Stage 3 RFP.

Mahalo,
Kuihelani Solar Phase 2

From: [redacted]
Sent: Thursday, April 4, 2024 3:25 PM
To: [redacted]
Subject: Community Meetings - Kuihelani Solar Phase 2

CAUTION: This email originated from outside AES. Do not click links or open attachments unless you recognize the sender.

Aloha,

My name is [redacted]. I'm reaching out to see if AES Hawaii has any upcoming community meetings planned for the Kuihelani Solar Phase 2 project. If so, would someone from the AES team please share the event information?

Thanks,

[redacted]

[redacted]

Caller: [redacted]
Date: Monday, April 15, 2024
Time: 3:09:23 PM
Voice message sent to (808) 800-3942 mailbox 82 at 3:09:23 PM on 4/15/2024 from [redacted].

Message: Hello my name is [redacted] contacting because I'm interested in working on the project, wondering if there are any ongoing field service positions open. Seeing if you can reach back out to me and how I can proceed to find positions in the area. I am a current resident on Maui and have extensive experience servicing commercial solar. Number is [redacted] and my email is [redacted]. Look forward to hearing from a project manager. Thank you.

Caller: [redacted]
Date: Monday, July 1, 2024
Time: 3:37:54 PM
Voice message sent to (808) 800-3942 mailbox 82 at 3:37:54 PM on 7/1/2024 from [redacted].
Message: inaudible

From: [redacted]
To: Kuihelani Phase 2 PV+BESS
Subject: FW: Kūihelani Solar Phase 2 - Virtual Community Meeting August 27 at 5:30 PM
Date: Thursday, July 25, 2024 2:47:47 PM
Attachments: image001.png

From: [redacted]
Sent: Thursday, July 25, 2024 2:46 PM
To: [redacted]
Subject: RE: Kūihelani Solar Phase 2 - Virtual Community Meeting August 27 at 5:30 PM

CAUTION: This email originated from outside AES. Do not click links or open attachments unless you recognize the sender.

Thank you! Our team will be there!

[redacted]

From: [redacted]
Sent: Thursday, July 25, 2024 2:29 PM
To: [redacted]
Subject: Kūihelani Solar Phase 2 - Virtual Community Meeting August 27 at 5:30 PM

[This email is coming from an EXTERNAL source. Please use caution when opening attachments or links in suspicious email.]

Aloha [redacted],

You're cordially invited to a virtual community meeting for area residents and interested parties to learn more about Kūihelani Solar Phase 2, a proposed utility-scale solar project in Central Maui, approximately 5 miles south of Kahului.

AES Hawai'i team members will provide an overview of the project, answer questions, and gather feedback on this important project.

The meeting will be held online via zoom. A flyer has been attached for your convenience.

Kūihelani Solar Phase 2 Virtual Community Meeting

Tuesday, August 27, 2024 at 5:30 p.m.
Meeting Link: https://us06web.zoom.us/j/87167982372

All interested parties, especially area residents, are welcome to attend. Attendees are encouraged to RSVP by email: kuihelani2solar@aes.com

Please feel free to share this information with others. We hope to see you at the meeting.

For your awareness, community and stakeholder notifications were sent out today. I have also attached PDF of the ad placed in The Maui News on Thursday, July 25, along with the media advisory.

Mahalo,

[redacted]

aes Hawai'i

CONFIDENTIALITY NOTICE: This e-mail message, including any attachments, is for the sole use of the intended recipient(s) and may contain confidential and/or privileged information. Any unauthorized review, use, copying, disclosure or distribution is prohibited. If you are not the intended recipient, please contact the sender immediately by reply e-mail and destroy the original message and all copies.

From: [redacted]
To: Kuihelani Phase 2 PV+BESS
Subject: I would like to attend
Date: Friday, July 26, 2024 1:19:48 PM

CAUTION: This email originated from outside AES. Do not click links or open attachments unless you recognize the sender.

[redacted]

From me to you

From: [redacted]
To: Kuihelani Phase 2 PV+BESS
Cc: [redacted]
Subject: RSVP for Virtual Community Meeting on August 27, 2024
Date: Monday, July 29, 2024 9:55:04 AM

CAUTION: This email originated from outside AES. Do not click links or open attachments unless you recognize the sender.

Good morning,

[redacted] will be attending the virtual community meeting on August 27, 2024.

Please let us know if there is any other information needed. Thank you.

Yours truly,

[redacted]

Confidentiality Notice: This message is intended for the use of the individual or entity to which it is addressed and may contain information that is privileged, confidential and exempt from disclosure under applicable law. If you are not the intended recipient, any dissemination, distribution, forwarding or copying of this communication is strictly prohibited. If you think you have received this communication in error, please notify us immediately by reply e-mail or by telephone [redacted], and delete the original message. Thank you.

From: [redacted]
To: Kuihelani Phase 2 PV+BESS
Subject: Follow up For Blockchain Projects
Date: Tuesday, August 13, 2024 11:23:33 PM
Sensitivity: Confidential

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Hi,
Following up on my previous email regarding enhancing your applications with AI, ML, and IoT technologies. I'm keen to discuss how these advancements can benefit your business. Let's schedule a time to explore this further.
Best regards,
[redacted]

From: [redacted]
Date: 07 Jan 2024 12:02,
To: [redacted]
Subject: Re: Explore Innovative Blockchain Solutions for the BTC Industry

Hi,

I'm reaching out to explore if you're interested in upgrading or developing new Blockchain solutions for the BTC & Finance industry. I specialize in creating innovative blockchain applications that enhance security, efficiency, and transparency. My expertise in blockchain technology can significantly boost your operations and offer advanced solutions tailored to your needs.

Let's discuss how our expertise can elevate your business. Please share your requirements and contact details to schedule a consultation.

Best regards,
[redacted]

From: [redacted]
To: Kuihelani Phase 2 PV+BESS
Subject: Kuihelani solar phase 2
Date: Wednesday, August 14, 2024 1:42:53 PM

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Please accept my registration to the Aug 27 virtual community meeting at 5:30 pm.
Aloha, [redacted]

From: [redacted]
To: Kuihelani Phase 2 PV+BESS
Subject: RE: Reminder - Kūihelani Solar Phase 2 - Virtual Community Meeting on August 27 at 5:30 PM
Date: Tuesday, August 20, 2024 11:43:23 AM

CAUTION: This email originated from outside AES. Do not click links or open attachments unless you recognize the sender.

Mahalo! I'll be sure to attend.

From: Kūihelani Solar Phase 2 <kuihelani2solar@aes.com>
Sent: Tuesday, August 20, 2024 11:28 AM
To: [redacted]
Subject: Reminder - Kūihelani Solar Phase 2 - Virtual Community Meeting on August 27 at 5:30 PM

Aloha [redacted],

This is a friendly reminder of our upcoming virtual community meeting for area residents and interested parties to learn more about Kūihelani Solar Phase 2, a proposed utility-scale solar project in Central Maui, approximately 5 miles south of Kahului.

AES Hawai'i team members will provide an overview of the project, answer questions, and gather feedback on this important project.

The meeting will be held online via Zoom. A flyer has been attached for your convenience.

Kūihelani Solar Phase 2 Virtual Community Meeting
Tuesday, August 27, 2024 at 5:30 p.m.
Meeting Link: https://us06web.zoom.us/j/87167982372

All interested parties, especially area residents, are welcome to attend. Attendees are encouraged to RSVP by email: kuihelani2solar@aes.com

Please feel free to share this information with others. We hope to see you at the meeting.

Mahalo,
Kūihelani Solar Phase 2

From: [redacted]
To: Kuihelani Phase 2 PV+BESS
Cc: Rep. Tyson K. Miyake
Subject: RE: Reminder - Kūihelani Solar Phase 2 - Virtual Community Meeting on August 27 at 5:30 PM
Date: Wednesday, August 21, 2024 9:43:53 AM
Attachments: image001.png
image002.png

CAUTION: This email originated from outside AES. Do not click links or open attachments unless you recognize the sender.

Aloha,

Representatives Miyake would like to RSVP to a Virtual Community Meeting for the Kūihelani Solar Phase 2.

Mahalo,
[redacted]

[redacted]

From: Rep. Tyson K. Miyake <repmiyake@capitol.hawaii.gov>
Sent: Tuesday, August 20, 2024 3:31 PM
To: [redacted]
Subject: Fwd: Reminder - Kūihelani Solar Phase 2 - Virtual Community Meeting on August 27 at 5:30 PM

Representative Tyson K. Miyake
District 10 - **Portion of Wai'ehu, Paukūkalo, Wailuku, Wailuku Heights, Waikapū, Hyashi Village**
Hawai'i House of Representatives - Majority
(808) 586-9444
repmiyake@capitol.hawaii.gov
415 S. Beretania St., Room #328
Honolulu HI, 96813
Stay updated at www.hawaiihousedemocrats.com

From: Kūihelani Solar Phase 2 <kuihelani2solar@aes.com>

Sent: Tuesday, August 20, 2024 11:28:18 AM
To: Rep. Tyson K. Miyake <repmiyake@capitol.hawaii.gov>
Subject: Reminder - Kūihelani Solar Phase 2 - Virtual Community Meeting on August 27 at 5:30 PM

You don't often get email from kuihelani2solar@aes.com. Learn why this is important

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Aloha Representative Miyake,

This is a friendly reminder of our upcoming virtual community meeting for area residents and interested parties to learn more about Kūihelani Solar Phase 2, a proposed utility-scale solar project in Central Maui, approximately 5 miles south of Kahului.

AES Hawai'i team members will provide an overview of the project, answer questions, and gather feedback on this important project.

The meeting will be held online via Zoom. A flyer has been attached for your convenience.

Kūihelani Solar Phase 2 Virtual Community Meeting
Tuesday, August 27, 2024 at 5:30 p.m.
Meeting Link: https://us06web.zoom.us/j/87167982372

All interested parties, especially area residents, are welcome to attend. Attendees are encouraged to RSVP by email: kuihelani2solar@aes.com

Please feel free to share this information with others. We hope to see you at the meeting.

Mahalo,
Kūihelani Solar Phase 2

From: no-reply@aes.com on behalf of AES Hawai'i
To: Kuihelani Phase 2 PV+BESS
Subject: Webform submission from: Kuihelani Phase 2 Solar
Date: Friday, August 23, 2024 7:50:00 AM

CAUTION: This email originated from outside AES. Do not click links or open attachments unless you recognize the sender.

Submitted on Fri, 08/23/2024 - 13:49

Submitted by: Anonymous

First name
[redacted]

Last name
[redacted]

Email address
[redacted]

Comments
test

EXHIBIT 6

Questions, Comments and Communications Received during the 30-Day Comment Period

Caller: [redacted]
Date: Tuesday, August 27, 2024
Time: 11:14:08 AM
Voice message sent to (808) 800-3942 mailbox 82 at 11:14:08 AM on 8/27/2024 from [redacted].

Message: Good morning my name is [redacted] and I'm wanting to know about the community meeting tonight for the solar farm phase 2. My number is [redacted]. I'd appreciate a call back with some information. Thank you so much. Have a good day.

From: [redacted]
To: Kuihelani Phase 2 PV+BESS
Subject: Kūihelani Solar Phase 2 Community Meeting RSVP
Date: Tuesday, August 27, 2024 4:20:10 PM

Aloha,

I'm RSVP'ing for the commmunity meeting this evening.

Thank you,

[redacted]

From: [redacted]
To: [redacted]
Cc: [redacted]
Subject: RFP Proposal Project-Document from County of Maui| 9.13.24
Date: Friday, September 13, 2024 10:55:35 AM
Attachments: County of Maui RFP Proposal Project-Docs20240717(2).msg

CAUTION: This email originated from outside AES. Do not click links or open attachments unless you recognize the sender.

Please find the attached.

Thank you.

Regards,

[redacted]

[redacted]

Office of Maui County Councilmember Tom Cook
South Maui Residency Area Office
Research and Technology Park
1305 North Holopono Street, Suite 9
Kihei, Maui, Hawaii 96753

808.793.1200

EXHIBIT 7

Questions, Comments and Communications Received
AFTER 30-Day Comment Period

From: no-reply@aes.com on behalf of AES Hawai'i
To: Kuihelani Phase 2 PV+BESS
Subject: Webform submission from: Kuihelani Phase 2 Solar
Date: Thursday, October 10, 2024 9:16:40 AM

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Submitted on Thu, 10/10/2024 - 15:16

Submitted by: Anonymous

First name
[redacted]

Last name
[redacted]

Email address
[redacted]

Comments
interested in ocean shipping of materials

Caller: [redacted]
Date: Wednesday, October 10, 2024
Time: 12:36:01 PM
Voice message sent to (808) 800-3942 mailbox 82 at 12:36:01 PM on 10/10/2024.
[redacted].

Message: Good morning this is [redacted] over at [redacted] on Maui trying to get in touch with Carrice Gardner. Just following up on some shipping information for equipment and materials for the Kuihelani solar 2 project. If someone could give me a call back I'd appreciate it. Again this is [redacted] on Maui. My office number is [redacted] and my cell is [redacted] and its Thursday morning, approximately 9:40. Thank you so much. Aloha.

From: EIA-860@eia.gov
To: Kuihelani Phase 2 PV+BESS
Subject: Mandatory EIA-860 Filing
Date: Thursday, October 10, 2024 9:41:41 AM
Attachments: 2023 Instructions.pdf
860 2023 Form.xlsx
How to Complete the EIA-860 Excel Form.pdf

CAUTION: This email originated from outside AES. Do not click links or open attachments unless you recognize the sender.

October 10, 2024

Hello [redacted],

The U.S. Energy Information Administration (EIA) has identified your company as the potential owner who is responsible for filing the EIA-860 report for the project(s) listed at the bottom of this email.

The EIA-860 **(Annual Electric Generator Report)** report collects data on the status of existing electric generating plants and associated equipment (including generators, boilers, cooling systems and air emission control systems) in the United States and Puerto Rico, and those scheduled for initial commercial operation within 5 or 10 years, as applicable.

The EIA-860 report is required to be filed by all **existing** or **proposed** electric generators in the United States and Puerto Rico if:

- The project's total generator nameplate capacity is 1 Megawatt (MW AC) or greater **and**
- The project's generator(s), or the facility in which they reside, are connected to the local or regional electric power grid and have the ability to draw power from or deliver power to the grid.

Proposed renewables that will be operational within 5 years and demonstrate development progress need to file. Development progress hurdles are, but not limited to, securing a location, financing, key permits and a power purchase agreement (PPA).

Please fill out the attached excel sheet for the facility(ies) listed below or for any other non-listed facilities that meets the EIA-860 reporting requirements and email them at EIA-860@EIA.GOV by **November 11, 2024**.

Note: Any generator that is mobile/portable does not need to be filed. If this is the case, please let us know.

Please inform EIA if you believe the listed project does not meet the EIA-860 reporting criteria or if you are not the appropriate person to contact.

If you have any questions regarding this email or Form EIA-860 in general, please contact the EIA-860 survey team at eia-860@eia.gov.

Thank you for your time and cooperation in submitting timely and accurate data to the U.S. Energy

Information Administration.

Sincerely,
[redacted]
Office of Survey Operations
U.S. Energy Information Administration

Kuihelani Phase 2 Solar Project: 40.0 MW AC Solar expected to be operational in 2027, located in Maui County, HI.

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From:	no-reply@aes.com on behalf of AES Hawai'i
To:	Kuihelani Phase 2 PV+BESS
Subject:	Webform submission from: Kuihelani Phase 2 Solar
Date:	Tuesday, October 15, 2024 5:25:03 AM

CAUTION: This email originated from outside AES. Do not click links or open attachments unless you recognize the sender.

Submitted on Tue, 10/15/2024 - 11:24

Submitted by: Anonymous

First name
[redacted]

Last name
[redacted]

Email address
[redacted]

Comments
I'm interested in the inverter technology used and if the BESS is grid forming or grid following and what batteries are being used.

Thanks,
[redacted]

ADDENDUM 1

Questions, Comments and Communications Inadvertently Omitted from October 28, 2024 [CORRECTED], Kūihelani Solar Phase 2 Community Outreach Report

On October 28, 2024 [CORRECTED], Peters Communications prepared a Community Outreach Report for Kūihelani Solar Phase 2. Since that report was prepared, the Project Team has reviewed the record of questions, comments and communications received through the Project email and website and has since noted a website submission was inadvertently omitted from the report. The unedited web submission received but omitted from the October 28, 2024 Kūihelani Solar Phase 2 Community Outreach Report is included as "Addendum 1" (redacted of personally identifiable information).

From: Kuihelani Phase 2 PV+BESS
To: [redacted]; Kuihelani Phase 2 PV+BESS
Subject: RE: Webform submission from: Kuihelani Phase 2 Solar
Date: Tuesday, October 22, 2024 1:42:53 PM

Aloha Mr. [redacted],

Thank you for your interest in the Kūihelani Solar Phase 2 project.

The preliminary project specifications include:

- Inverter: GPTech, grid forming
- BESS: Samsung modular lithium-ion batteries

AES will continue to assess the technology and components with our partner suppliers as the project design is finalized.

Mahalo,
Kūihelani Solar Phase 2

From: no-reply@aes.com <no-reply@aes.com>
Sent: Tuesday, October 15, 2024 5:25 AM
To: Kuihelani Phase 2 PV+BESS <kuihelani2solar@aes.com>
Subject: Webform submission from: Kuihelani Phase 2 Solar

CAUTION: This email originated from outside AES. Do not click links or open attachments unless you recognize the sender.

Submitted on Tue, 10/15/2024 - 11:24

Submitted by: Anonymous

First name

[redacted]

Last name

[redacted]

Email address

[redacted]

Comments

I'm interested in the inverter technology used and if the BESS is grid forming or grid following and what batteries are being used.

Thanks,

[redacted]

Appendix T. Maui Wetland Ordinance Report

Kūihelani Solar Phase 2 Project

Maui County Wetlands Overlay Review

Prepared for:

Kuihelani Solar Phase 2, LLC

July 2025

TETRA TECH

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Table of Contents

1.0 Introduction 1
1.1 Regulatory Setting 1
1.2 Project Description 2
1.2.1 Proposed Work Proximate to Pōhākea Gulch and Paleʻaʻahu Gulch 3
2.0 Description of Project Site 7
2.1 Climate 7
2.2 Topography and Soils 7
2.3 Surface Waters 7
2.4 Flora and Fauna 8
3.0 MCC Chapter 19.47.030 Review 10
3.1 Pōhākea Gulch 10
3.2 Paleʻaʻahu Gulch 10
3.3 Ecosystem Values 11
3.4 Potential Impacts 12
3.4.1 Pōhākea Gulch 14
3.4.2 Paleʻaʻahu Gulch 14
3.5 Maintenance and Enhancement 15
3.6 Other Requested Information 15
4.0 Conclusions 20
5.0 Literature Cited 21

List of Figures

Figure 1. Project Location
Figure 2. Project Site Plan
Figure 3. Proposed Work Proximate to Pōhākea Gulch and Paleʻaʻahu Gulch
Figure 4. Proposed Overhead Lines Across Paleʻaʻahu Gulch
Figure 5. Water Resources Identified by the NWI, NHD, and DAR Datasets
Figure 6. Maui County Wetlands Overlay Map

List of Appendices

Appendix A. Figures
Appendix B. Representative Photographs

1.0 Introduction

Kuihelani Solar Phase 2, LLC, a subsidiary of AES Clean Energy Development, LLC (AES), is proposing the Kūihelani Solar Phase 2 Project (Project) on the island of Maui, Hawai'i. The Project involves construction and operation of a solar photovoltaic and battery energy storage system approximately 3 miles south of Kahului in Central Maui. The Project site encompasses 476.303 acres of land within tax map key (TMK) parcel (2) 3-8-005:002-0003, which is owned by MP West LLC (d.b.a Mahi Pono) (Figure 1).

The Project site includes two surface water features—Pōhākea Gulch and Pale'a'ahu Gulch—which are identified as "flowing waters" on the Maui County Wetlands Overlay Map (Maui County 2024a). This map was prepared by the Maui County Planning Department and its consultants based on the requirements of Ordinance 5421 (and subsequent amendments to Maui County Code [MCC] Chapter 19.47) and provides an inventory of the approximate location of wetlands and other waters throughout the county (Maui County 2024b). The county council has yet to adopt zoning requirements and an enabling ordinance for the wetlands overlay district (including protective buffers and grading and grubbing restrictions) based on this map. As a result, per MCC Chapter 19.47.010, the associated reporting requirements specified in MCC Chapter 19.47.030 are not currently in effect. However, recognizing the county's intent to potentially develop a wetlands overlay district to protect and restore wetlands and associated ecosystem services, AES contracted Tetra Tech, Inc. (Tetra Tech) to conduct a review of the components specified in MCC Chapter 19.47.030 as related to the ecosystem values, potential impacts, and efforts to protect and maintain Pōhākea Gulch and Pale'a'ahu Gulch for consideration as part of the County's Special Use Permit process for the Project.

1.1 Regulatory Setting

In 2022, Maui County adopted Ordinance 5421 relating to wetlands restoration and protection with a purpose to "conserve and protect sensitive ecosystems and the natural environment, mitigate climate change, and work toward building environmental resilience by establishing a policy for wetlands restoration and protection." Following adoption of Ordinance 5421, titles 2, 18, and 19 of the county code were amended, including establishment of a new chapter designated "Wetlands Overlay District" (MCC Chapter 19.47). Per MCC Chapter 19.04.040, "wetlands" are defined as:

> *Those areas that are under normal circumstances (e.g., no filling or introduction of invasive plants) or were inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support—and that under normal circumstances do support—a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and estuarine systems; flowing, intermittent, or ephemeral streams and associated drainages; and similar areas: but do not include agricultural ditches or reservoirs*.

Per MCC Chapter 19.47.070, the Maui County Planning Department was required to produce a map showing the approximate location of wetlands and other waters throughout the county. The

resulting map was published by Maui County in June 2024 (Maui County 2024a). MCC Chapter 19.47.010 specifies that following receipt of the wetlands inventory map, the county council may establish, by ordinance, wetlands overlay district zoning (including protective buffers and grading and grubbing restrictions); land in the wetlands overlay district would be subject to both this as well as the underlying zoning requirements. Furthermore, MCC Chapter 19.47.050 and 19.47.060 specify the uses that may be permitted and prohibited within the wetlands overlay district once zoning requirements are adopted via ordinance. Permitted uses may include, among others, "uses permitted in the base or underlying zoning district that are not inconsistent with the purposes of this chapter." Potential prohibited uses are those that would create significant negative biologic, physical, or chemical impacts to wetlands. If an enabling ordinance is adopted for requirements related to the wetlands overlay district then, pursuant to MCC Chapter 19.47.030, a report must be prepared on the feasibility and advisability of wetlands restoration or protection prior to approval of certain discretionary county approvals (including a County Special Use Permit [SSP]). Specifically, such a report would need to outline the ecosystem values, determine potential wetland impacts, and provide how wetlands may be maintained and enhanced.

The wetlands inventory map prepared by Maui County Planning Department and its consultants (referred to by Maui County as the Wetlands Overlay Map) identifies two surface water features within the Project site — Pōhākea Gulch and Paleʻaʻahu Gulch — with a 200-foot buffer along each gulch (Maui County 2024a). However, wetlands overlay district zoning requirements have yet to be adopted by the county council via enabling ordinance. Without wetlands overlay district zoning requirements in place, it is understood that neither the protective buffer nor grading and grubbing restrictions are in effect. Despite the fact that there is no regulatory effect (until such time that the county council moves to adopt the wetlands inventory map and establish via ordinance the wetlands overlay district zoning), the Project has been sited to avoid the features identified on the wetlands inventory map, with this review conducted to demonstrate consistency with the intent of MCC Chapter 19.47 and a potential future wetlands overlay district zoning ordinance.

Alongside the County ordinance, the U.S. Army Corps of Engineers (USACE) has regulatory authority over certain waters from two federal laws: (1) Section 404 of the Clean Water Act (CWA) of 1972, and (2) Section 10 of the Rivers and Harbors Act (RHA) of 1899. In January 2025, the USACE issued an Approved Jurisdictional Determination confirming that Pōhākea Gulch and Paleʻaʻahu Gulch are not considered jurisdictional Waters of the U.S. (WOTUS) under the current federal regulations (POH-2024-00108).

1.2 Project Description

The Project involves construction and operation of a 40-MW mounted solar photovoltaic system coupled with a 160-MWh battery energy storage system, as well as a Project substation, switchyard and related interconnection lines, and other ancillary facilities (Figure 2). The solar photovoltaic system would consist of modules mounted on a racking system arranged in evenly spaced rows; the racking system would include single-axis trackers which would rotate the modules along a fixed horizontal axis, from east to west, as the sun moves across the sky. The energy storage system

would consist of containerized lithium-ion battery units distributed throughout the solar arrays. The solar photovoltaic panels and battery units would connect with the Project substation via a network of medium-voltage electrical collector lines. The electrical collector lines would primarily be installed underground; however, some short overhead electrical spans would be needed to facilitate connections within the Project site where underground trenching is constrained by the onsite gulches or existing utilities. From the substation, the Project would interconnect with the island-wide electrical grid via the proposed Maui Electric Company Ltd. (Maui Electric) switchyard with interconnection lines extending to a designated Grid Connection Point (GCP) on each of the two existing Maui Electric transmission lines that transect the Project site (Figure 2). The interconnection lines for each GCP would consist of two high-voltage lines, configured as a parallel loop to allow for electricity to flow in both directions between the Project and Maui Electric's grid. Both the switchyard and interconnection lines would be constructed by AES as part of the Project, with ownership transferred to Maui Electric following construction.

Access to the Project site would be via a combination of existing privately-owned roads that extend to the Project site from Maui Veterans Highway, Kūihelani Highway, and North Kīhei Road. The existing access point on Maui Veterans Highway is a signalized intersection approximately 3.5 miles northeast of the Project site; Cane Haul Road (an approximately 25-foot-wide plantation road) extends from this existing access point into the Project site. The existing access point from Kūihelani Highway is approximately 0.8 miles north of the Project site; the road extending from this access point services the existing AES Kūihelani Solar + Storage Project and would be extended through the Project site to also provide access to the Kūihelani Solar Phase 2 Project. The two existing access points from North Kīhei Road are located southwest of the Project site; existing plantation roads, referred to as South 8th and 9th Streets,[1] extend from these access points into the Project site (Figure 2). These existing roads cross Paleʻaʻahu Gulch and Pōhākea Gulch, as well as nearby Waikapū Stream.

1.2.1 Proposed Work Proximate to Pōhākea Gulch and Paleʻaʻahu Gulch

As part of the Project development process, AES proactively engaged in an iterative siting and design process to minimize potential impacts to the surrounding environment and nearby communities. In particular, this process sought to proactively avoid and minimize impacts to the features identified on Maui County's wetland inventory map, including Paleʻaʻahu Gulch and Pōhākea Gulch, as well as the nearby Waikapū Stream. Through this effort, the Project was sited to entirely avoid perennial Waikapū Stream, with a minimum 650-foot setback. Furthermore, the design and layout within the Project site incorporated buffers around Paleʻaʻahu Gulch and Pōhākea Gulch.

Based on these buffers, no solar modules, battery energy storge equipment, or substation/switchyard facilities would be located within 200 feet of either Paleʻaʻahu Gulch or Pōhākea Gulch. Additionally, no improvements would be made to any of the existing roads within

[1] Certain documents also refer to South 8th Street and 9th Street as Upper Māʻalaea Road and Lower Māʻalaea Road, respectively. South 8th Street (Upper Māʻalaea Road) joins with Cane Haul Road within the Project site.

200 feet of these gulches (including the crossings at South 8th Street and 9th Street). However, given the location of Maui Electric's existing transmission lines relative to both Pōhākea Gulch and Pale'a'ahu Gulch, installation of the interconnection lines to reach the designated GCPs identified by Maui Electric would necessitate a limited amount of work proximate to each of these gulches. Furthermore, two spans of overhead medium-voltage electrical collector lines within the Project site would also require work over Pale'a'ahu Gulch. The activities that would occur within 200 feet of Pōhākea Gulch and Pale'a'ahu Gulch are briefly summarized below, with additional details provided in Section 3.4.

Pōhākea Gulch

The westernmost of the two GCPs designated by Maui Electric (Western GCP) is located along the existing transmission line which is parallel and immediately adjacent to Pōhākea Gulch near 9th Street. Given the location of the existing transmission line, the interconnection line for the Project would need to be installed proximate to the gulch. As Maui Electric prohibits work by any other entity within their energized electrical corridor, work to be conducted by AES in the vicinity of Pōhākea Gulch would terminate at the nearest poles outside the energized corridor (Poles E3X-1 and E2X-1 [dead-end poles]; see Figure 3); the remaining work to facilitate interconnection at the Western GCP would be conducted by Maui Electric.[2] Based on this demarcation, no work would be conducted by AES within 50 feet of Pōhākea Gulch. Specific activities that would be conducted by AES within 50-200 feet of Pōhākea Gulch near 9th Street include vegetation clearing, establishment of a work pad, and installation of two dead-end poles and associated electrical conductors; these activities are described in more detail below.[3]

- **Vegetation Clearing:** To facilitate installation of the dead-end pole structures and associated electrical conductors, vegetation would be cut, grubbed, and woody stems removed from within a 30-foot radius around each of the two structures (E2X-1 and E3X-1) and within an approximately 60-foot by 60-foot work pad between the pole structures. In addition, vegetation would be cut, grubbed, and woody stems removed from within 40 feet to either side of the electrical conductors, as needed to maintain a minimum 18.5-foot clearance between the surrounding vegetation and each electrical line.
- **Work Pad:** An approximately 60-foot by 60-foot work pad would be installed, spanning across 9th Street between the pole structures, to support staging, access, and installation of the two dead-end pole structures and associated electrical conductors (see Figure 3). The portions of the work pad that extend beyond 9th Street would require vegetation clearing (as described above), removal of topsoil (if necessary to match existing grades), placement of geotextile fabric and approximately 6 inches of aggregate (gravel). Erosion and sediment

[2] Work within the energized corridor, which is expected to involve similar activities to those described herein, would be designed and constructed by Maui Electric. Detailed design information for this work would be included in Maui Electric's application to the Public Utilities Commission (PUC) to interconnect the Project. The PUC application process, which would include a public hearing, is expected to be initiated by Maui Electric in late 2025 or early 2026.

[3] The final design specifications are subject to Maui Electric's final design and subsequent PUC approval.

control BMPs would be installed around the perimeter of the work pad prior to ground disturbance and would be maintained as long as the work pad is in place. Once installation of the interconnection line is complete, the portions of the work pad that extend beyond 9th Street would be removed (including geotextile fabric and aggregate), topsoil would be replaced (as appropriate), and re-vegetation would be conducted as needed; erosion and sediment control BMPs would be kept in place until vegetation is adequately established.

- **Dead-End Poles and Electrical Conductors:** The dead-end poles have been sited to maximize distance from Pōhākea Gulch while balancing technical requirements, engineering requirements, and constructability; based on these considerations, the two dead-end poles (E2X-1 and E3X-1) would be located approximately 88 feet and 120 feet from the centerline of Pōhākea Gulch, respectively. The poles would be steel monopole structures, approximately 70 feet in height (above grade). Installation of the poles would involve foundation excavation (up to 6-foot in diameter and 21 feet deep), pouring concrete foundations with embedded rebar and grounding wires, and erecting and securing the poles to the anchor bolts and attachment hardware. The use of guywires would be minimized but may be used as needed to support the pole loads. Following pole installation, the high-voltage electrical conductors (as well as fiber optic cable and shield wires) would be strung using pulling and tensioning equipment. All activities associated with installation of poles structures and electrical conductors would be conducted from the work pad and/or 9th Street.

Following construction, ownership of the interconnection lines would be transferred to Maui Electric, along with all related operations and maintenance responsibilities. An easement containing the switchyard and interconnection lines would be conveyed from the landowner to Maui Electric; it is anticipated that the easement would extend approximately 30 feet from the centerline of the interconnection lines. On-going maintenance of the lines over the operational period of the Project would be conducted by Maui Electric. It is anticipated that maintenance activities would involve routine vegetation management within their easement to ensure adequate clearance around the lines and minimization of combustible materials for fuel reduction.

Paleʻaʻahu Gulch

The easternmost of the two GCPs designated by Maui Electric (Eastern GCP) is located on the existing transmission line which is parallel and immediately adjacent to Paleʻaʻahu Gulch near 9th Street. Given the location of the existing transmission line, the Project's interconnection line would need to be installed proximate to the gulch. Similar to the Western GCP, all work within the energized corridor in the vicinity of Paleʻaʻahu Gulch would be conducted by Maui Electric; work to be conducted by AES would terminate at the dead-end poles located just west of the energized corridor (Poles E12-1 and E13; see Figure 3); the remaining work to facilitate interconnection at the Eastern GCP would be conducted by Maui Electric.[4] Based on this demarcation, no work would

[4] Similar to Pōhākea Gulch (described above), work within the energized corridor would be designed and constructed by Maui Electric.

be conducted by AES within 50 feet of Paleʻaʻahu Gulch. Specific activities that would be conducted by AES within 50-200 feet of Paleʻaʻahu Gulch near 9th Street include vegetation clearing, establishment of work pads, and installation of two dead-end pole foundations (E13 and E12-1), with Maui Electric installing the two dead-end poles and associated electrical conductors to the west of Paleʻaʻahu Gulch (Figure 3).[5] The details of these activities would be the same as those described for Pōhākea Gulch above, except that the dead-end poles near Paleʻaʻahu Gulch would be located approximately 70 and 80 feet from the centerline of Paleʻaʻahu Gulch, two 60-foot by 60-foot work pads would likely be required (one for each pole), and final pole erection and installation would be performed by Maui Electric. Long-term maintenance of these lines over the operational period of the Project would also be the responsibility of Maui Electric, with maintenance activities including routine vegetation management within their easement to ensure adequate clearance.

In addition to installation of the dead-end pole foundations needed to interconnect with the Eastern GCP near 9th Street, other work within 200 feet of Paleʻaʻahu Gulch would include installation of two overhead spans of medium-voltage electrical collector lines (and associated optical ground wire and shield wire) just southeast of South 8th Street (Figure 4), to electrically connect the solar array areas to the Project substation. The poles to support these overhead lines would be installed more than 200 feet from Paleʻaʻahu Gulch (Figure 4), and no grading would occur within 200 feet of the gulch. Installation of the overhead electrical collector lines would require vegetation trimming/removal within an approximately 20-foot-wide corridor for each span, as needed to maintain a minimum 20.5-foot clearance between the surrounding vegetation and each electrical line. Vegetation would be cut, grubbed, and woody stems removed within the corridor. The lines would be installed either from the ground (i.e., pulling the lines through temporary stringing blocks on the poles using manual or assisted tensioning equipment) or aerially using a boom crane or manlift (or similar). No vehicles or heavy equipment would operate within the gulch boundaries. Following installation, ongoing vegetation management would occur along these electrical line corridors over the lifetime of the Project as needed to facilitate operational reliability and fuel reduction for fire mitigation purposes. Vegetation management would include mowing and weed whacking within the 20-foot-wide corridor to maintain adequate clearance along each electrical line. Although herbicides would not be routinely used, if needed, herbicide use would be limited to localized areas and applied in accordance with applicable regulations.

[5] Due to the orientation of the existing transmission lines at the Eastern GCP, Maui Electric would perform the dead-end pole erection and conductor installation/stringing. Maui Electric determined this difference in scope, as compared to the Western GCP, was necessary to reduce line outage time and grid stability risk during pole construction and final line-splicing.

2.0 Description of Project Site

As shown in Figure 1, the Project site is located in the central Maui isthmus approximately 3 miles south of Kahului. It encompasses approximately 476 acres within the southwestern portion of TMK (2) 3-8-005:002-0003. The Project site is comprised of fallow agricultural fields which were part of the former Hawaiian Commercial & Sugar Company (HC&S) plantation, an extensive area cultivated with sugar cane (*Saccharum officinarum*) for more than 100 years until plantation operations ceased in 2016. The site is currently undeveloped, although there are remnant features of the former agricultural operation, including irrigation equipment. Existing overhead electrical transmission lines, which are owned and operated by Maui Electric, span the southern portion of the Project site.

The existing AES Kūihelani Solar + Storage Project is located to the north of the Project site, beyond which is Kūihelani Highway. The areas to the east and west of the Project site comprise agricultural land, some of which is being actively cultivated by Mahi Pono. Surrounding land uses to the south include fallow agricultural fields and Maui Electric's Māʻalaea Power Plant. Further south beyond the power plant, approximately 0.3 miles from the southern boundary of the Project site, is the Keālia Pond National Wildlife Refuge.

2.1 Climate

The climate in the Project site is characterized as arid and sunny (Price et al. 2012). According to the Online Rainfall Atlas of Hawaiʻi (Giambelluca et al. 2013), the area receives a mean annual rainfall of approximately 13 inches. Rainfall is typically highest from December through January and lowest from June through July (Giambelluca et al. 2013).

2.2 Topography and Soils

The elevation of the site ranges from approximately 30 feet above mean sea level (amsl) along the southern edge to approximately 150 feet amsl along the northwestern edge. The topography is generally flat with some variation where Paleʻaʻahu Gulch and Pōhākea Gulch intersect the Project site.

According to the Natural Resources Conservation Service (NRCS), the majority of the Project site is underlain by Jaucas Sand, 0 to 15 percent slopes. Assorted Pūlehu series soil types (silt loam, cobbly silt loam, clay loam, and cobbly clay loam) cover the remainder of the Project site (NRCS 2024). The soil units mapped by NRCS in the Project site are not listed as hydric soils by NRCS' National List of Hydric Soils (NRCS 2023).

2.3 Surface Waters

The Project site is situated within the Waikapū and Pōhākea watersheds (Parham et al. 2008). Streams, ditches, and other surface water features identified by the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) data (USFWS 2024), the U.S. Geological Survey (USGS) topographic and National Hydrography Dataset (NHD; USGS 2023), and the State of Hawaiʻi

Division of Aquatic Resources (DAR) dataset (DAR 2008) are shown in Figure 5. Features identified in Maui County's Wetland Overlay Map (Maui County 2024a) are shown in Figure 6. These datasets identify two non-perennial streams within the Project site; Pōhākea Gulch intersects the southwestern portion of the Project site, and Paleʻaʻahu Gulch crosses through the central portion of the Project site. The perennial Waikapū Stream is outside of the Project site, approximately 650 feet to the east, and a tributary of Waikapū Stream is mapped to the north. No wetlands, as defined by 1987 Corps of Engineers Wetlands Delineation Manual (USACE 1987) or Hawaiʻi Regional Supplement (USACE 2012), occur in the Project site.

Tetra Tech delineated the boundaries of the streams within and immediately adjacent to the Project site (Tetra Tech 2024a) by recording the location of the Ordinary High Water Mark (OHWM) as defined in the USACE Regulatory Guidance Letter 05-05 (USACE 2005), Rapanos Guidance (EPA and USACE 2008), and the interim national OHWM manual (David et al. 2022).[6] These boundaries were confirmed by the USACE in January 2025; furthermore, the USACE determined Pōhākea Gulch and Paleʻaʻahu Gulch are not jurisdictional WOTUS under the current federal regulations (POH-2024-00108).

The results of Tetra Tech's delineation were submitted to Maui County Planning Department and its consultant during the public review period for consideration in the development of their Wetlands Overlay Map. As such, the location of Pōhākea Gulch and Paleʻaʻahu Gulch shown on the Wetlands Overlay Map (Maui County 2024a) is based on the centerline of the gulch locations delineated by Tetra Tech and approved by the USACE.

2.4 Flora and Fauna

Tetra Tech conducted general biological surveys within the Project site over several dates in July 2023, September 2023, November 2023, May 2024, and July 2024. In general, the biological resources in the Project site are dominated by non-native species. Habitat suitable for native species has been modified by historic agricultural uses, the introduction of invasive species, and a relatively recent wildfire in 2018. However, two federally and state-listed species have been recorded in the Project site—the Blackburn's sphinx moth (*Manduca blackburnii*) and the Hawaiian goose/nēnē (*Branta sandvicensis*). Two Blackburn's sphinx moth eggs and three Blackburn's sphinx moth caterpillars were observed on tree tobacco plants (*Nicotiana glauca*) within the Project site. Nēnē were observed flying over the Project site on several occasions. Several other listed animal species that weren't observed but may occasionally occur in or fly through the Project site include the Hawaiian stilt/ aeʻo (*Himantopus mexicanus knudseni*), Hawaiian coot/ ʻalae keʻokeʻo (*Fulica alai*), Hawaiian petrel/ ʻuaʻu (*Pterodroma sandwichensis*), Newell's shearwater/ ʻaʻo (*Puffinus newelli),* band-rumped storm-petrel/ ʻakēʻakē (*Hydrobates castro*), and the Hawaiian hoary bat/ ʻōpeʻapeʻa (*Lasiurus semotus*) (Tetra Tech 2024b).

Two main vegetation types occur in the Project site: Buffelgrass Grassland and Kiawe/ Koa Haole Forest. The Buffelgrass Grassland is dominated by swaths of non-native buffelgrass (*Cenchrus*

[6] This methodology is consistent with the definition of stream boundaries as described in MCC Chapter 19.47.070.

ciliaris) along with scattered non-native plant species such as lion's ear (*Leonotis nepetifolia*), golden crown-beard (Verbesina encelioides), smooth rattlepod (*Crotolaria pallida*), swollen finger grass (*Chloris barbata*), and small crown flower (*Calotropis procera*) shrubs. The Kiawe/ Koa Haole Forest vegetation type is more common adjacent to the gulches and is dominated by kiawe (*Neltuma pallida*) and koa haole (*Leucaena leucocephala* subsp. *leucocephala*) trees, with predominately buffelgrass and Guinea grass (*Megathyrsus maximus*) in the understory. Prior to removal, the non-native tree tobacco was also scattered throughout the Project site. Only two native plant species were observed in the Project site—ʻuhaloa (*Waltheria indica*) and ʻilima (*Sida fallax*) (Tetra Tech 2024b).

Most of the wildlife recorded in the Project site are also non-native to the Hawaiian Islands. The most common bird species recorded during the surveys were African silverbill (*Euodice cantans*), scaly-breasted munia (*Lonchura punctulata*), and zebra dove (*Geopelia striata*). Besides the endangered Blackburn's sphinx moth and listed Hawaiian goose, only three other native wildlife species were recorded—black-crowned night heron/ aukuʻu (*Nycticorax nycticorax*), globe skimmer (*Pantala flavescens*), and green darner (*Anax junis*) (Tetra Tech 2024b).

3.0 MCC Chapter 19.47.030 Assessment

As stated above, it is understood that the reporting requirements specified in MCC Chapter 19.47.030 are not currently in effect given that wetlands overlay district zoning has not yet been established by ordinance. However, recognizing the intent of the county's wetlands overlay district, this section addresses the reporting components specified in MCC Chapter 19.47.030 including the ecosystem values, potential impacts, and other requested information. This assessment is based on field surveys conducted by Tetra Tech between July 2023 and July 2024, as well as publicly available information of the area, and discussions with relevant land managers in the vicinity. It is important to note that gulch/stream characteristics change over time, including evidence of flow, channel features, sediment characteristics, geomorphology, vegetation, and hydrologic variables.

3.1 Pōhākea Gulch

Pōhākea Gulch originates in the West Maui Mountains at roughly 4,000 feet elevation. The gulch continues in a southeasterly direction, crossing Honoapiʻilani Highway via a culvert system, then turns southeast through Mahi Pono's agricultural fields and crosses the South 8th Street access road. Pōhākea Gulch intersects the Project site near the existing 9th Street access road (Figures 3 and 5); Tetra Tech delineated approximately 385 linear feet of Pōhākea Gulch within the Project site. Pōhākea Gulch is ephemeral within the Project site, and no surface water was observed in the gulch during Tetra Tech's surveys (see details in Section 3.3). Representative photos of the gulch within the Project site are provided in Appendix B. South of the Project site, Pōhākea Gulch runs along the eastern edge of the Maui Electric Company Māʻalaea Power Plant. Although Tetra Tech did not investigate Pōhākea Gulch south of the Project site, according to the NHD (USGS 2023), USFWS (USFWS 2011), and the Pōhākea Watershed Plan (MEC and Central Maui SWCD 2023), Pōhākea Gulch connects to Keālia Pond, which occasionally receives surface water flow from the gulch. This connection is not displayed in the county's Wetlands Overlay Map (Figure 6). Keālia Pond occasionally discharges to Māʻalaea Bay.

3.2 Paleʻaʻahu Gulch

Paleʻaʻahu Gulch begins at roughly 3,000 feet elevation in the West Maui Mountains. It converges with several tributaries before crossing Kūihelani Highway and then intersects with the Project site near South 8th Street. Paleʻaʻahu Gulch crosses the South 8th and 9th Street access roads within the Project site (Figures 3 and 4). Tetra Tech delineated nearly 3,600 feet linear feet of Paleʻaʻahu Gulch within the Project site. Paleʻaʻahu Gulch is ephemeral within the Project site, and no surface water was observed in the gulch during Tetra Tech's surveys (see details in Section 3.3). Representative photos of the gulch within the Project site are provided in Appendix B. Although Tetra Tech did not investigate Paleʻaʻahu Gulch south of the Project site, according to the NHD (USGS 2023) and the Pōhākea Watershed Plan (MEC and Central Maui SWCD 2023), Paleʻaʻahu Gulch connects to Keālia Pond, which occasionally receives surface water flow from the gulch. This connection is not displayed in the county's Wetland Overlay Map (Figure 6). Keālia Pond occasionally discharges to Māʻalaea Bay.

3.3 Ecosystem Values

Ecosystem values (i.e., the importance or worth of ecosystem functions or benefits) and valuation methods are not defined in the MCC; however, the wetland services referenced in MCC Chapter 19.47.020 are flood control, water quality enhancement, species protection, and climate adaptation and mitigation benefits.

Pōhākea Gulch and Paleʻaʻahu Gulch are ephemeral streams, meaning they flow briefly only in direct response to precipitation, and do not have base flow or groundwater input (David et al. 2025). When functioning properly, ephemeral streams can provide important ecological and hydrological functions and benefits. This may include intercepting and filtering excessive sediments or pollution in runoff; nutrient retention and cycling; dissipating flow energy and storing water to reduce downstream flooding; improving downstream water quality; recharging groundwater; providing wildlife habitat such as foraging and breeding areas and movement corridors; supporting native plant communities; and maintaining hydrologic connectivity throughout a watershed by transporting water, nutrients, and sediments (Levick et al. 2008, Brinkerhoff et al. 2024).

Overall, the ecosystem values of Pōhākea Gulch and Paleʻaʻahu Gulch have been reduced by a range of anthropogenic stressors as well as the introduction and spread of invasive species. Based on the low sinuosity (straightness) of the gulches, it is likely that portions of the gulches have been altered in the past, particularly in the lower reaches. Pōhākea Gulch and Paleʻaʻahu Gulch were not ranked in the Hawaii Stream Assessment (Hawaii Cooperative Park Service Unit 1990) or listed in the 1988 USFWS list of "High Quality" streams (in Parham et al. 2008). However, it is assumed that Pōhākea Gulch and Paleʻaʻahu Gulch provide some ecosystem values. A review of the ecosystem values and services referenced in MCC Chapter 19.47.020 are provided below. Additional details are provided in Section 3.6.

Flood Control:

Streams can offer flood control benefits by slowing runoff and storing floodwater. Flood control values are directly tied to functions such as water conveyance, and water storage and attenuation. Pōhākea Gulch and Paleʻaʻahu Gulch have infrequent, or short duration flow in direct response to precipitation; flowing or standing water is not present year-round or continuously during the wet season (or other times of the year). Although no surface water was observed in the gulches during Tetra Tech's surveys (July 2023, September 2023, November 2023, and July 2024), evidence of previous high flow events was observed and OHWMs were observed throughout most of the delineated features. Drift or wrack (accumulation of woody debris and other material deposited by flow events) was found at several locations where it collected behind obstructions.

According to the Pōhākea Watershed Plan (MEC and Central Maui SWCD 2023), Pōhākea Gulch and Paleʻaʻahu Gulch occasionally convey surface water from upslope areas to Keālia Pond; however, the water conveyance value is low because these features are not a primary source of hydrology for the pond. According to the Kealia Pond National Wildlife Refuge Comprehensive Conservation Plan, Pōhākea Gulch is not considered a major contributor of inflow to downstream Keālia Pond, and the gulch was dry an average of 50 percent during weekly visits between 2001-2006 (USFWS 2011).

Paleʻaʻahu Gulch has been identified as contributing a small fraction of flow to Keālia Pond; the gulch was dry an average of 20 percent during weekly visits between 2001-2006 (USFWS 2011).

Pōhākea Gulch and Paleʻaʻahu Gulch are relatively straight (low stream sinuosity or curvature) which limits the ability to reduce flow velocity and discharge, delay downstream water movement, and store water. During the surveys in 2023 and 2024, the channels of Pōhākea Gulch and Paleʻaʻahu Gulch were minimally vegetated with few to no trees or other plants rooted within the channel or along the banks (see photos in Appendix B), which also limits their ability to slow water flow. As such, water storage value associated with both gulches is low.

Water Quality Enhancement

Ephemeral streams provide pathways for water, sediments, and nutrients which can influence downstream water quality. Due to the lack of vegetation within the gulch channels and low channel sinuosity or curvature, Pōhākea Gulch and Paleʻaʻahu Gulch have limited ability to trap and absorb toxins, nutrients, sediments, or other pollutants present in runoff. As water quality enhancement functions are minimal, the associated ecosystem value for water quality enhancement is low.

Native Species Habitat and Protection

In general, the plants and animals in the Project site are dominated by species non-native to the Hawaiian Islands, and the gulches do not contain suitable habitat for native plants or animals. Pōhākea Gulch and Paleʻaʻahu Gulch have limited ability to maintain biodiversity of native species. Additional details are provided in Section 3.6.

Climate Adaptation

As ephemeral gulches, Pōhākea Gulch and Paleʻaʻahu Gulch have minimal potential to mitigate or contribute to adaptation in response to the negative impacts of climate change (e.g., rising sea levels, more extreme weather events).

3.4 Potential Impacts

As described in Section 1.2.1, the Project would not involve any placement of fill or other materials within either Pōhākea Gulch or Paleʻaʻahu Gulch, or channel alteration. Furthermore, protective buffers have been incorporated into the design. As a result, the solar modules, battery energy storage equipment, and substation/switchyard facilities would all be sited more than 200 feet from the gulch centerlines, consistent with the maximum buffer specifications identified for the wetlands overlay district per MCC Chapter 19.47. Given the proximity of the designated GCPs along the existing Maui Electric transmission lines, the Project would involve a limited amount of work within 50-200 feet of the gulches near 9th Street; this work would include vegetation clearing, establishment of work pads, and installation of dead-end poles and associated electrical conductors.[7] The Project would also include two spans of electrical collector lines over Paleʻaʻahu

[7] Work within Maui Electric's energized corridor, overlapping with Pōhākea Gulch and Paleʻaʻahu Gulch, would be conducted by Maui Electric. This work is expected to be similar in nature to the activities described herein; detailed information regarding this work would be included in Maui Electric's application to the PUC.

Gulch near South 8th Street and associated vegetation cutting; however, the poles supporting these lines across Paleʻaʻahu Gulch have been sited more than 200 feet from the gulch centerline.

Indirect impacts to Pōhākea Gulch and Paleʻaʻahu Gulch could include minor changes in drainage patterns, decreased infiltration and increased volume or velocity of stormwater runoff, and/or discharge of pollutants to downstream waters as a result of ground disturbing activities within the Project site. However, potential indirect impacts would be minimized through appropriate siting as well as implementation of best management practices (BMPs) prior to any land disturbing activities.

In addition to incorporating buffers along the gulches, the Project includes site design strategies using low impact development (LID) techniques to maintain hydrologic and hydraulic functions and would not be expected to substantively alter existing drainage patterns within the Project site. The Project has been sited and designed based on the existing topography in order to minimize the amount of earthwork needed, with grading for installation of the solar photovoltaic equipment generally limited to smoothing existing topography in localized areas. Although the overall Project would increase the amount of impervious surface within the Project site, which can increase stormwater runoff, it is expected that impervious surfaces would increase by only approximately 12.8 acres (2.7 percent) of the overall 476-acre Project site with sufficient areas for infiltration remaining. To further minimize the potential for stormwater-related impacts, the Project would also incorporate stormwater retention BMPs during and post-construction to maintain peak flows below pre-development levels. These BMPs would include drainage basins installed along the downgradient edge of new impervious surfaces to retain and allow for infiltration or evapotranspiration of stormwater runoff generated by the Project. Given the relatively minimal increase in impervious surfaces, coupled with the site design strategies and stormwater retention measures, the Project would not be expected to measurably increase the volume or velocity of discharge to Pōhākea Gulch and Paleʻaʻahu Gulch or other surface waters.

To address the potential for downstream water quality impacts associated with increased sediment and other pollutants (for example, trace oil, grease, and fuel) in stormwater runoff, a Storm Water Pollution Prevention Plan (SWPPP) would be prepared as part of the application for Notice of General Permit Coverage for construction-related stormwater runoff, pursuant to National Pollution Discharge Elimination System (NPDES) regulations. The SWPPP would identify BMPs including minimization of soil disturbance (particularly during periods of heavy rain), erosion prevention and sediment control measures (e.g., silt fencing), proper stabilization and stockpiling procedures, and good housekeeping measures that would be implemented to prevent and minimize discharge of pollutants to downstream waters. The BMPs to be implemented would also be detailed in an Erosion Control Plan, which would be submitted along with a drainage plan and report, as part of the application for a grading permit from the County of Maui pursuant to the requirements of MCC Chapter 20.08. Implementation of these measures would minimize the potential for discharge of sediment and other pollutants in stormwater runoff.

The sections below provide more details on the potential impacts specifically within 200 feet of Pōhākea Gulch and Paleʻaʻahu Gulch.

3.4.1 Pōhākea Gulch

As stated in Section 1.2.1, no work would be conducted by AES within 50 feet of Pōhākea Gulch. This buffer was established by the Project to minimize potential impacts to the gulch; the vegetated buffer is expected to protect the gulch through absorption of stormwater, reduction in erosion, and filtering of sediment, chemicals, and organic material.

Minor indirect impacts could occur as a result of the proposed work within 50-200 feet of Pōhākea Gulch (e.g., vegetation clearing, creation of a work pad, and installation of pole structures and associated electrical conductors); however, these impacts would be minimized through implementation of BMPs. Prior to any ground disturbance for the work pads, erosion and sediment control BMPs would be installed around the perimeter of the work pad to minimize the potential for discharge of sediment and other pollutants. The permanent increase in impervious surfaces adjacent to the gulch due to pole installation is considered negligible. Decreased infiltration associated with the work pad would be temporary; after pole installation is complete, the work pad would be removed (including aggregate), topsoil would be replaced, and the area would be re-vegetated with non-invasive plants for soil stabilization and erosion control purposes. Erosion and sediment control BMPs would be kept in place until vegetation is adequately established.

Although vegetation clearing for the poles and electrical conductors adjacent to the gulch could lead to an increase in erosion and sedimentation, it is expected that impacts would be minor given the remaining vegetated buffer adjacent to the gulch, the small amount of vegetation to be removed (as compared to the sufficient vegetated areas in the surrounding area), and the natural regrowth of vegetation expected from the seedbank. The vegetation to be cleared is dominated by species non-native to the Hawaiian Islands and generally does not contain suitable habitat for native plants or animals.

3.4.2 Paleʻaʻahu Gulch

The potential impacts to Paleʻaʻahu Gulch near 9th Street as a result of installation of two dead-end pole foundations would be similar to impacts described above for the poles adjacent to Pōhākea Gulch. However, two work pads would likely be required for the poles adjacent to Paleʻaʻahu Gulch, resulting in slightly more temporary impacts due to more vegetation clearing and decreased infiltration at the work pads. However, overall impacts are anticipated to be minor with the implementation of BMPs as described above.

Installation of two overhead spans of electrical collector lines across Paleʻaʻahu Gulch just southeast of South 8th Street would also result in minimal impacts. As no grading or placement of materials would occur within 200 feet of the gulch centerline, this work would not change the drainage patterns or increase impervious surfaces near Paleʻaʻahu Gulch. Vegetation trimming/removal within an approximately 20-foot-wide corridor for each span could lead to an increase in soil erosion and sedimentation; however, natural regrowth of the vegetation is expected to minimize any such impacts. Furthermore, no vehicles or heavy equipment would operate within or directly adjacent to the gulch boundaries.

3.5 Maintenance and Enhancement

As the Project would not alter the physical gulch characteristics, involve placement of fill or other materials within the gulches, or substantially affect stormwater flows to Pōhākea Gulch and Paleʻaʻahu Gulch, the current functions and benefits of these two gulches would be maintained. As previously described, the Project has incorporated protective buffers along both gulches, with most Project components sites more than 200 feet from the gulch centerlines. These buffers would serve to further protect the existing ecosystem services of the gulches. Because no significant adverse impacts to Pōhākea Gulch and Paleʻaʻahu Gulch are expected as a result of the Project, additional enhancement of the gulches is not proposed.

3.6 Other Requested Information

This section provides information and conclusions relative to the specific items that are listed in MCC Chapter 19.47.030(B).

1. The ability of the stream[8] to filter harmful toxins, nutrients, and sediment from surface and stormwater runoff.

During the surveys in 2023 and 2024, the channels of Pōhākea Gulch and Paleʻaʻahu Gulch were minimally vegetated with few to no trees or other plants rooted within the channel or along the banks (see photos in Appendix B). Due to the lack of vegetation within the channels, Pōhākea Gulch and Paleʻaʻahu Gulch have limited ability to trap and absorb toxins, nutrients, sediments, or other pollutants present in surface and stormwater runoff. During flow events, suspended sediment is most likely to flow through the gulch versus being intercepted and retained within the gulch by vegetation. Furthermore, Pōhākea Gulch and Paleʻaʻahu Gulch are relatively straight (low sinuosity or curvature) within the Project site which further limits their ability to trap sediments as water is transported downstream. As the Project would not affect these characteristics, the ability of the gulches to filter harmful toxins, nutrients, and sediment is not anticipated to measurably change as a result of the Project. The Project would also not introduce harmful toxins or nutrients to Pōhākea Gulch or Paleʻaʻahu Gulch, as discussed in Section 3.4.

2. The ability of the stream to store floodwaters and reduce the magnitude of flood events.

As noted above, field observations indicate that there is minimal vegetation within the gulch channels or along the banks, which suggests limited ability to dissipate flow energy and aid in flood control. Pōhākea Gulch and Paleʻaʻahu Gulch are also relatively straight (low stream sinuosity or curvature) within the Project site which further limits the ability to reduce flow velocity and discharge, delay downstream water movement, and store water. However, some downed woody vegetation was observed in small portions of the gulches during the surveys. The presence of this downed vegetation and other debris in portions of the stream channel could help to dissipate some

[8] Although MMC Chapter 19.04 includes streams in the definition of wetlands, in this report, the term wetland has been changed to stream to more accurately describe the type of feature present.

flow energy. Additionally, cobbles and coarse sediment were present within portions of the channel bed, which could slow flow and slightly reduce the magnitude of downstream flood events.

Because the gulch channels would not be altered, and only a minor amount of vegetation would be removed at the South 8th Street Paleʻaʻahu Gulch crossing, the Project would not alter the streams' ability to store floodwaters or reduce the magnitude of flood events.

3. The ability of the stream to provide valuable habitat for a diverse array of flora and fauna, including any existing native, rare, threatened, or endangered species.

In general, the biological resources in the Project site have been modified by historic agricultural uses, the introduction and spread of invasive species, and wildfires. No rare or listed native plants or animals were observed within Pōhākea Gulch or Paleʻaʻahu Gulch during the surveys. While some non-native tree tobacco (a host plant for the endangered Blackburn's sphinx moth) could be present along the gulch edges, this plant is not considered a primary constituent element for Blackburn's sphinx moth critical habitat. Most of the tree tobacco was removed from the Project site in 2024 in accordance with the guidance and avoidance and minimization measures provided by USFWS and Division of Forestry and Wildlife. Tree tobacco will continue to be monitored and removed per agency recommendations.

The only native plants seen within the vicinity of the gulches were ʻuhaloa and ʻilima, which are common through the Hawaiian Islands. The gulch corridors (just outside of the channel) generally contain a greater density of trees compared to other areas of the Project site; however, the trees along the gulches are all common, non-native plants (e.g., koa haole).

The gulches generally do not contain suitable habitat for native animals. Native Hawaiian stream animals, including ʻoʻopu (fish), crustaceans, mollusks, and insects, are not likely to occur in Pōhākea Gulch or Paleʻaʻahu Gulch due to the lack of surface water during most of the year. Most of the native Hawaiian stream species are amphidromous and require a surface water connection between the stream and the ocean. Pōhākea Gulch and Paleʻaʻahu Gulch also do not offer suitable nesting or foraging habitat for native waterbirds due to the lack of standing water. The riparian area is expected to provide little to no habitat for foraging and nesting/breeding for native bird species; no hydrophytic plants were observed in the channel or on the banks.

Pōhākea Gulch is also not expected to function as a movement corridor for native wildlife. Native birds are unlikely to use Pōhākea Gulch as a fly corridor due to its narrow width and overlapping/closed tree canopy. Although bat activity has been shown to increase along edge, gulch, and riparian habitats (Law and Chidel 2002, Lloyd et al. 2006, Jantzen 2012), Pōhākea Gulch is not likely to function as a corridor or provide edge habitat for the endangered Hawaiian hoary bat due to its narrow width and overlapping/closed tree canopy. Generally, Paleʻaʻahu Gulch is also not expected to function as a movement corridor for native wildlife. However, portions of Paleʻaʻahu Gulch within the Project site are wider than Pōhākea Gulch. In the sections of the gulch where the tree canopy is not overlapping, the gulch has the potential to provide some edge habitat for the Hawaiian hoary bat.

Given the existing low-value quality habitat and limited proposed work that would occur proximate to the gulches, the value of the habitat for native plants and animals within and along Pōhākea Gulch or Paleʻaʻahu Gulch would not substantially change as a result of the Project.

4. The ability of the stream to maintain surface-water flow during dry periods.

There is no data on the duration and frequency of water flow in Pōhākea Gulch or Paleʻaʻahu Gulch; however, according to the Pōhākea Watershed Plan, Pōhākea Gulch and Paleʻaʻahu Gulch typically only flow during stormwater events (MEC and Central Maui SWCD 2023). This conclusion is supported by Tetra Tech's observations in the field. No standing or flowing surface water was observed during surveys in 2023 or 2024. Although dry conditions were present on Maui during the surveys, flowing and standing water was observed in nearby Waikapū Stream. Thus, Pōhākea Gulch and Paleʻaʻahu Gulch are understood to have infrequent or short duration flow only following precipitation, and no surface water flow occurs during dry periods.

Surface water flow in the gulches are not expected to be affected by the Project (during dry or wet periods). As stated in Section 3.4, the Project includes site design strategies using LID techniques to maintain hydrologic and hydraulic functions. New impervious surfaces would increase by less than 12 acres (or 2.5 percent of the overall 476-acre Project site), with the remainder of the Project site maintained as a natural, pervious surface that is able to absorb and infiltrate stormwater. The Project would also include BMPs, including stormwater retention features installed along the downgradient edge of new impervious surfaces, which would be designed to retain and allow for infiltration or evapotranspiration of stormwater runoff generated by the Project. The size and design of the features would be based on site-specific conditions as well as the requirements of the County of Maui's Rules for the Design of Storm Water Treatment Best Management Practices (Maui County Administrative Rules Sections 15-111) and would serve to maintain peak flows at pre-development levels.

5. The prior or potential future impacts of any excessive siltation resulting from surface runoff from construction sites and lack of erosion control on steep slopes.

There is no known documentation regarding prior excessive siltation events into Pōhākea Gulch and Paleʻaʻahu Gulch within the Project site. No future excessive siltation is anticipated from the Project. As stated in Section 3.4, the Project would incorporate BMPs to minimize the potential discharge of sediment and other pollutants to the gulches and other downstream waters, including minimization of soil disturbance (particularly during periods of heavy rain), erosion prevention and sediment control measures (e.g., silt fencing), proper stabilization and stockpiling procedures, and good housekeeping measures. The specific BMPs would be determined in accordance with applicable regulatory requirements, including those associated with the NPDES program and MCC Chapter 20.08 (Soil Erosion and Sedimentation Control), which require approval of a SWPPP and Drainage and Erosion Control Plan prior to construction, respectively. These BMPs would be implemented adjacent to the gulches, such as around the perimeter of the work pads, to minimize the potential for discharge of sediment and other pollutants in stormwater runoff. There are no steep slopes within the Project site.

6. The prior or potential future impacts of pollution by garbage, litter, and refuse.

The extent of prior pollution in Pōhākea Gulch and Paleʻaʻahu Gulch is not known. Construction of the Project is not anticipated to generate a significant amount of solid waste. No garbage, litter, or refuse would be placed in the gulches during construction or operation. Good housekeeping measures would be implemented to prevent indirect input into the gulches. Construction waste would be temporarily stored onsite away from the gulches and periodically transported for recycling or disposal at a permitted off-site landfill. Operation of the Project is expected to generate little to no garbage due to minimal on-site staff. As such, the Project is not expected to result in any garbage, litter, or refuse within either Pōhākea Gulch or Paleʻaʻahu Gulch.

7. The prior or potential future impacts of a reduction in the flow of watercourses, including groundwater, due to destruction of wetlands/streams.

The extent of previous modifications to Pōhākea Gulch and Paleʻaʻahu Gulch is not known; however, the lower reaches of both gulches are notably straight, suggesting they may have been altered in the past. No diversions or water withdrawals were observed within the gulches in the Project site.

Destruction of wetlands or streams would not occur as a result of the Project. The Project would not alter the watercourse, reduce flow, or affect groundwater associated with either Pōhākea Gulch or Paleʻaʻahu Gulch. See Section 3.4.

8. Any potential significant adverse impact on natural drainage patterns, the destruction of important habitat or the discharge of toxic substances.

As stated in Section 3.4, the Project would incorporate site design strategies using LID techniques to maintain hydrologic and hydraulic functions, and would minimize grading, such that it would not be expected to substantively alter existing drainage patterns. No important habitat would be destroyed as a result of the Project (see #3 in Section 3.6 above). Toxic substances would not be directly or indirectly discharged into the gulches as a result of the Project.

9. Measures to ensure that stream functions and habitat are maintained and, where possible, enhanced to increase the potential for survival of native, rare, threatened or endangered flora and fauna.

Because most Project components would be sited more than 200 feet from the gulches, no sediment or materials would be placed in the gulches, and gulch channels would not be altered, no significant adverse impacts to the functions and values of Pōhākea Gulch and Paleʻaʻahu Gulch are anticipated. Pōhākea Gulch and Paleʻaʻahu Gulch currently do not provide valuable habitat for native, rare, threatened or endangered plants or animals (see #3 in Section 3.6 above). Due to the lack of valuable habitat for native species, and dominance of non-native species in the area that threatened native species, no enhancements to the gulches are proposed.

10. Identification of public lands in or adjacent to the stream so that they can be identified for maintenance and possible hazard mitigation.

The lands along and surrounding Pōhākea Gulch and Paleʻaʻahu Gulch within the Project site are privately owned by MP West LLC. There are no public lands for which maintenance and possible hazard mitigation can be identified.

Keālia Pond National Wildlife Refuge is located approximately 0.3 miles south of the southern Project boundary near Pōhākea Gulch and 0.4 miles south of the boundary near Paleʻaʻahu Gulch. This coastal wetland and wildlife refuge is on privately-owned land, but is managed by USFWS via a perpetual conservation easement (USFWS 2011). Keālia Pond National Wildlife Refuge occasionally receives surface water input from Pōhākea Gulch and Paleʻaʻahu Gulch (USFWS 2011, MEC and Central Maui SWCD 2023); however, the Project would not alter the type or amount of flow within Pōhākea Gulch and Paleʻaʻahu Gulch, nor would it increase the need for maintenance or hazard mitigation.

11. Proposed protective buffers—with a minimum requirement of 50 feet and a maximum of 200 hundred feet—based on the report's assessment of stream functions, valuation, and the need for protection.

Maui County has proposed 200-foot buffers for all flowing waters on the island, including Pōhākea Gulch and Paleʻaʻahu Gulch. As stated in Section 1.1, it is understood that the buffers identified in the map are not currently in effect (until such time that the county council moves to adopt zoning requirements and an enabling ordinance for the wetlands overlay district zoning); however, the Project has sited nearly all project components outside of the 200 foot buffer (e.g., solar modules, battery energy storge equipment, or substation/switchyard facilities) to provide the maximum level of protection intended for the wetlands overlay district pursuant to MCC Chapter 19.47. Where a 200-foot buffer is not possible, given the location of Maui Electric's existing infrastructure, a limited amount of work proximate to each of these gulches would occur. As stated in Section 3.4, no work would be conducted by AES within 50 feet of Pōhākea Gulch and Paleʻaʻahu Gulch adjacent to 9th Street. Installation of overhead lines and vegetation clearing would be needed for the Paleʻaʻahu Gulch crossing just southeast of South 8th Street. As detailed throughout this document, the proposed buffers would serve to maintain the current functions and values of the ephemeral gulches. Work adjacent to the gulches would not create significant negative biological, physical, or chemical impacts to Pōhākea Gulch or Paleʻaʻahu Gulch (i.e., prohibited uses in MCC Chapter 19.47.060). As such, the Project would comply with the intent of MCC Chapter 19.47 to protect flowing waters beyond what is required by the Clean Water Act.

12. Areas that formerly had wetland/stream characteristics or functions but have been altered or degraded by channelization, filling, draining, dredging, grading, grubbing, deep ripping, groundwater pumping, hardening of surfaces, or introduction of non-native or aggressive-invasive plant and animal species.

Besides Pōhākea Gulch and Paleʻaʻahu Gulch, no other wetlands or streams are known to have occurred in the Project site. As compared to historical conditions, the characteristics, conditions,

and functions of Pōhākea Gulch and Paleʻaʻahu Gulch have been altered as a result of previous land uses and the introduction and spread of invasive species. The lower reaches of Pōhākea Gulch and Paleʻaʻahu Gulch are notably straight suggesting they may have been altered in the past, possibly to accommodate agricultural activities. No diversions or water withdrawals were observed within the gulches, likely due to the infrequent nature of surface flow events. Minimal hardened surfaces were observed on the channel bottoms or sides within the Project site. For example, an armored low water crossing is present on Paleʻaʻahu Gulch at South 8th Street (see Appendix B). Non-native and invasive plants and animals dominate the Project site, including within, along, and adjacent to the gulches. Large herds of axis deer (*Axis axis*) were seen on several occasions through the site, and the main plant species (buffelgrass, kiawe, and koa haole) are considered invasive. The introduction and spread of these invasive species has contributed to the degradation of ecosystem functions associated with the gulches.

4.0 Conclusions

Two ephemeral streams—Pōhākea Gulch and Paleʻaʻahu Gulch—occur within the Project site. These streams were identified on the county's wetlands inventory map (Maui County 2024a) and delineated by Tetra Tech (Tetra Tech 2024b), but are not considered jurisdictional WOTUS by the USACE. This review of the technical information specified in MCC Chapter 19.47.030 indicates that the current ecosystem values of Pōhākea Gulch and Paleʻaʻahu Gulch within the Project site are relatively low. Although wetlands overlay district zoning requirements (including protective buffers and grading and grubbing restrictions) have not yet been adopted by the county council, AES has sited the Kūihelani Solar Phase 2 Project and incorporated buffers along both gulches. Given the limited amount of work that would occur proximate to the gulches and with implementation of BMPs, as described herein, the Project is not expected to diminish ecosystem functions or result in significant adverse effects to either of the gulches. As such, the Project is consistent with the intent of MCC Chapter 19.47 and a potential future wetlands overlay district zoning ordinance to protect wetlands/streams and associated ecosystem services on Maui.

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Appendix A. Figures

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1:60,000 WGS 1984 UTM Zone 4N 0 0.5 1 2 Miles NOT FOR CONSTRUCTION

Kūihelani Solar Phase 2 Project

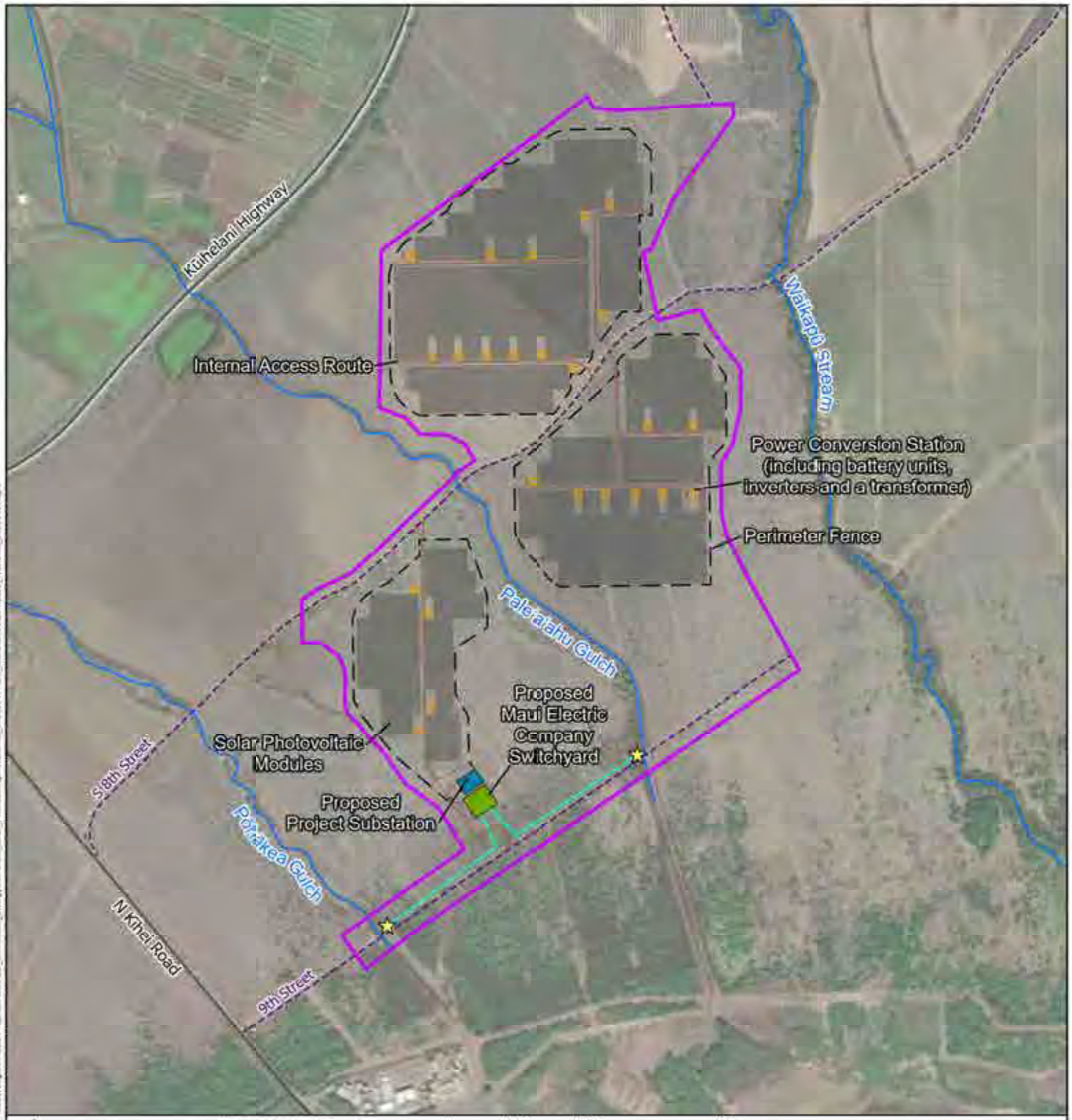
Figure 1
Project Location

MAUI COUNTY, HAWAI'I

- Project Site
- Existing AES Kūihelani Solar Plus Storage Project
- Major Road
- Secondary Road

Reference Map

TETRA TECH aes Hawai'i



1:15,000 WGS 1984 UTM Zone 4N 0 0.13 0.25 0.5 Miles NOT FOR CONSTRUCTION

Kūihelani Solar Phase 2 Project

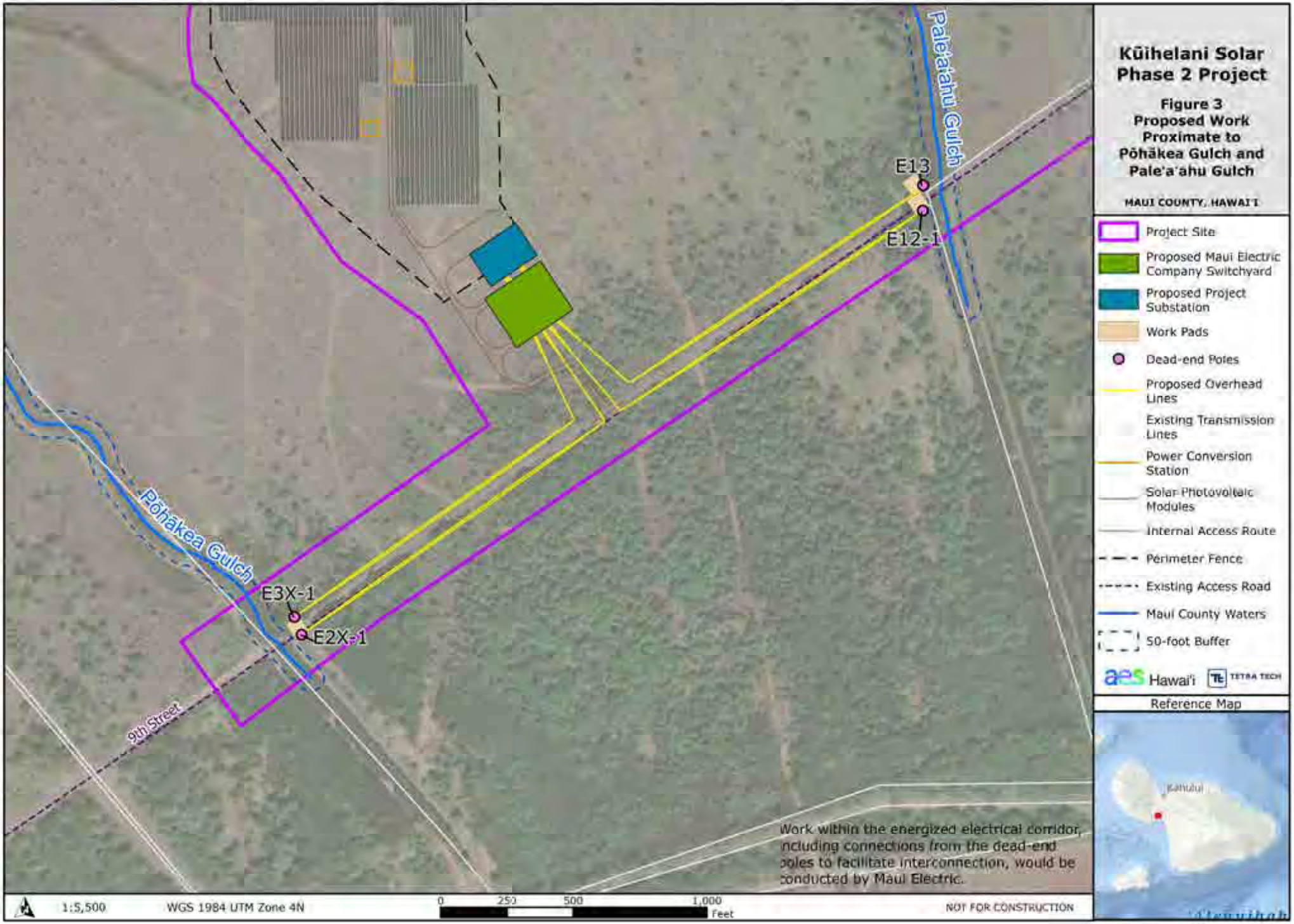
Figure 2
Project Site Plan

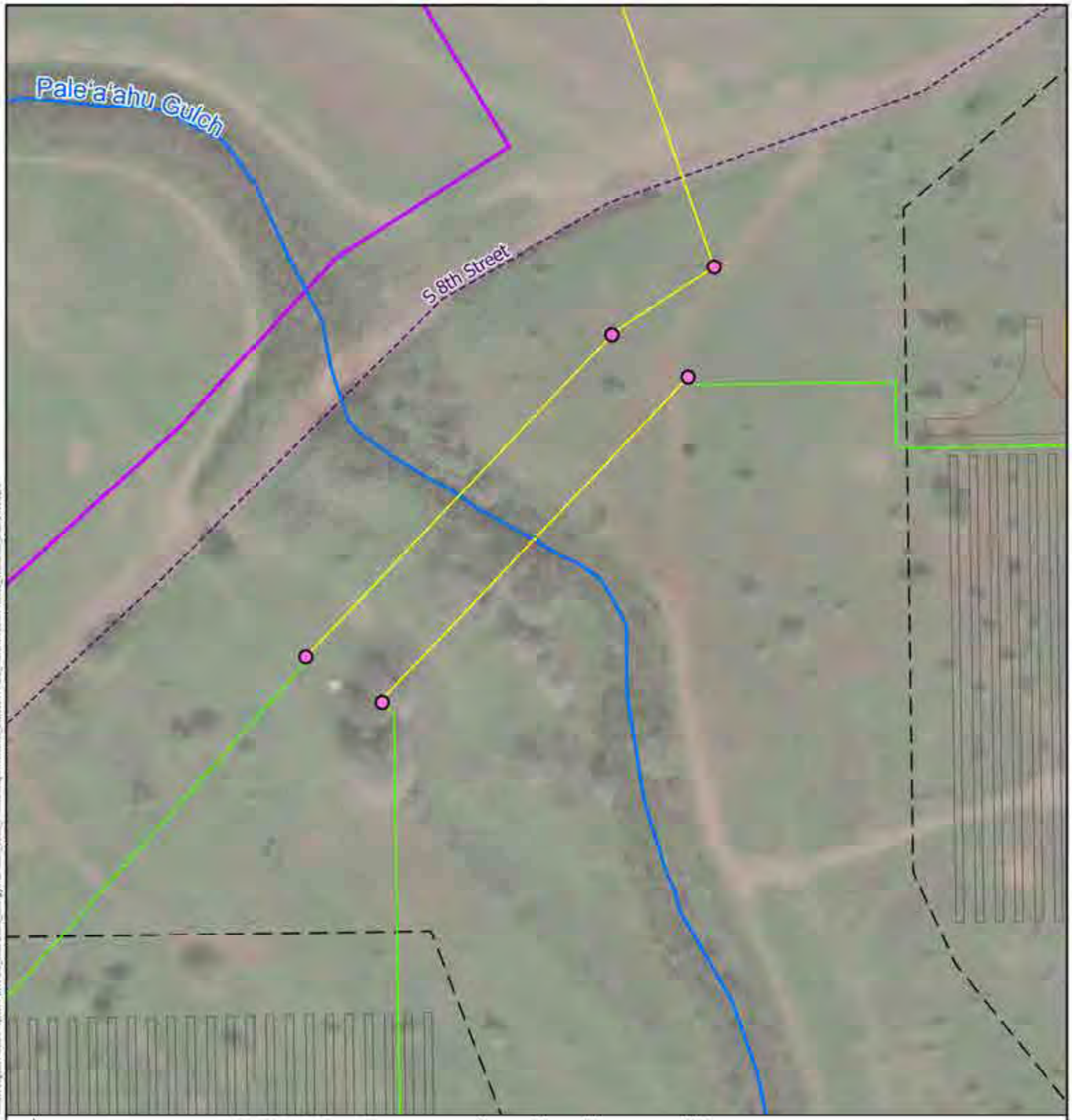
MAUI COUNTY, HAWAI'I

- Project Site
- Proposed Project Substation
- Proposed Maui Electric Company Switchyard
- Grid Connection Point
- Proposed Interconnection Route
- Maui County Waters
- Solar Photovoltaic Modules
- Power Conversion Station
- Perimeter Fence
- Internal Access Route
- Major Road
- Existing Access Road

TETRA TECH aes Hawai'i

Reference Map


Kūihelani Solar Phase 2 Project
Figure 3
Proposed Work Proximate to Pōhākea Gulch and Pale'a'ahu Gulch
MAUI COUNTY, HAWAI'I
Project Site
Proposed Maui Electric Company Switchyard
Proposed Project Substation
Work Pads
Dead-end Poles
Proposed Overhead Lines
Existing Transmission Lines
Power Conversion Station
Solar Photovoltaic Modules
Internal Access Route
Perimeter Fence
Existing Access Road
Maui County Waters
50-foot Buffer
aes Hawai'i
TETRA TECH
Reference Map
Kahului
E13
E12-1
E3X-1
E2X-1
Pōhākea Gulch
Pale'a'ahu Gulch
9th Street
Work within the energized electrical corridor, including connections from the dead-end poles to facilitate interconnection, would be conducted by Maui Electric.
1:5,500
WGS 1984 UTM Zone 4N
0
250
500
1,000
feet
NOT FOR CONSTRUCTION



1:1,500 WGS 1984 UTM Zone 4N 0 50 100 200 feet NOT FOR CONSTRUCTION

Kūihelani Solar Phase 2 Project

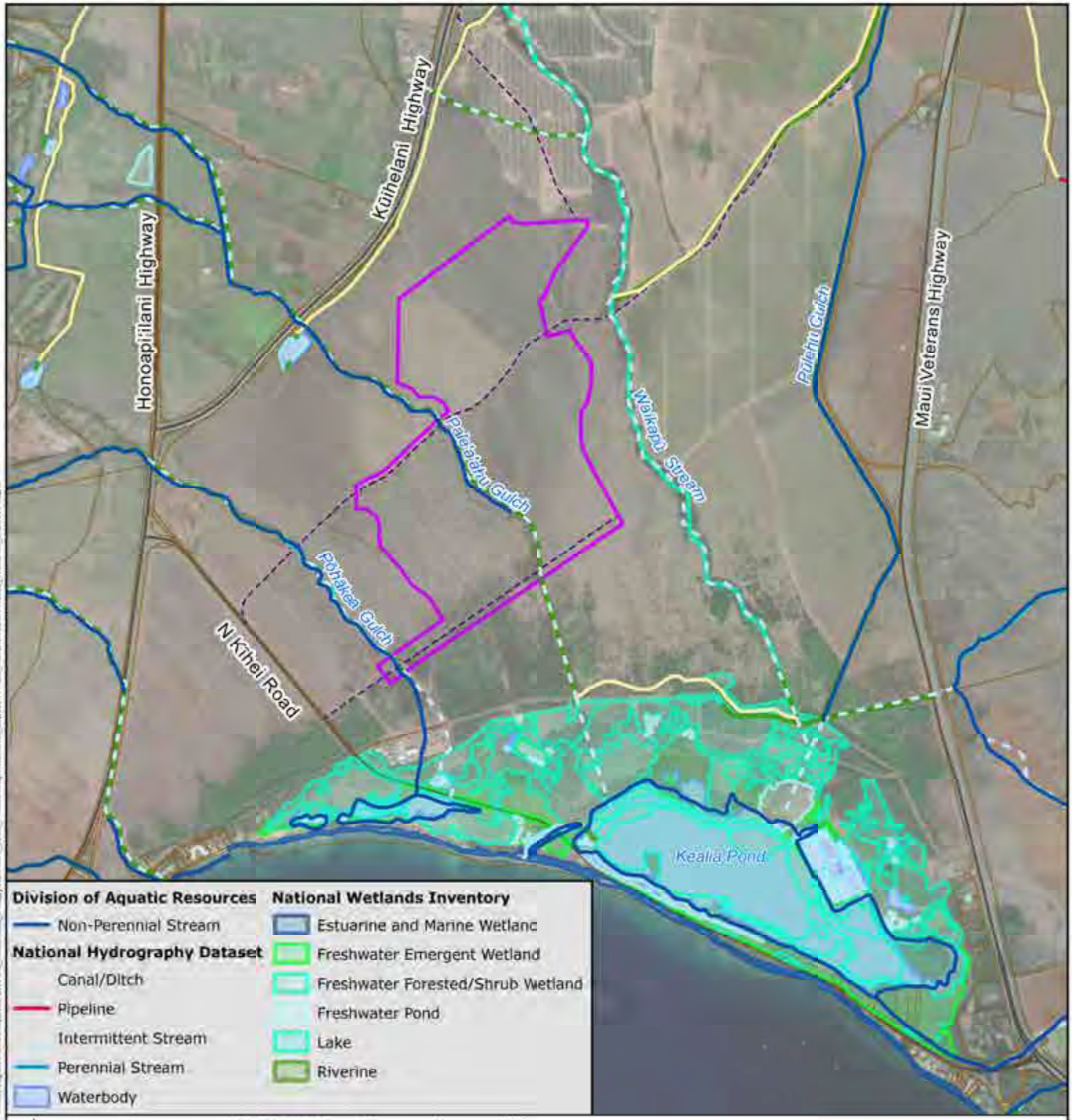
Figure 4
Proposed Overhead Lines Across Pale'a'ahu Gulch

MAUI COUNTY, HAWAI'I

- Project Site
- Proposed Maui Electric Company Switchyard
- Proposed Project Substation
- Poles
- Overhead Collector Lines
- Underground Collector Lines
- Maui County Waters
- Solar Photovoltaic Modules
- Power Conversion Station
- Perimeter Fence
- Internal Access Route
- Existing Access Road

TETRA TECH aes Hawai'i

Reference Map



Kūihelani Solar Phase 2 Project

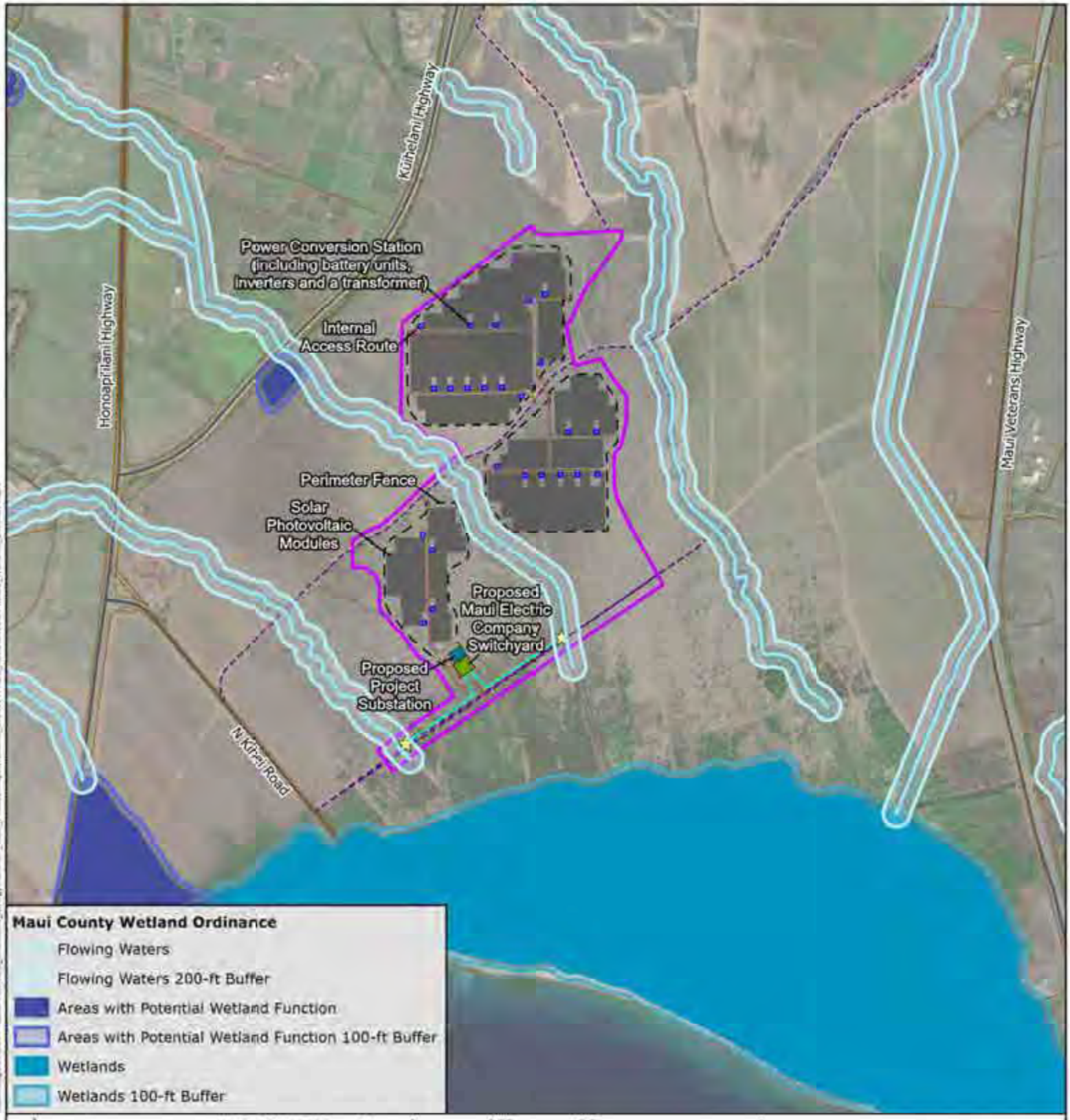
Figure 5
Water Resources Identified by the NWI, NHD, and DAR Datasets

MAUI COUNTY, HAWAI'I

- Project Site
- TMK Boundary
- Existing Access Road
- Major Road

Reference Map

TETRA TECH aes Hawai'i



Kūihelani Solar Phase 2 Project

Figure 6
Maui County Wetlands Overlay Map

MAUI COUNTY, HAWAI'I

- Project Site
- TMK Boundary
- Proposed Project Substation
- Proposed Maui Electric Switchyard
- Proposed Grid Connection Points
- Proposed Interconnection Route
- Solar Photovoltaic Modules
- Power Conversion Station
- Perimeter Fence
- Existing Access Road
- Internal Access Route
- Major Road

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Reference Map

Appendix B. Representative Photographs

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Photo 1. Pōhākea Gulch within the Project site (mauka of 9th Street) showing steep, unvegetated channel banks and lack of vegetation or surface water within the channel. Date: 07/25/2023. Lat/Long: 20.805656, -156.494929.

Photo 2. Pōhākea Gulch within the Project site (mauka of 9th Street) showing lack of vegetation or surface water within the channel. Date: 07/25/2023. Lat/Long: 20.805182, -156.494683.

Photo 3. Wrack within Pōhākea Gulch showing evidence of previous flow event(s) makai of 9th Street. Date: 07/25/2023. Lat/Long: 20.804784, -156.494251

Photo 4. Looking east along 9th Street showing existing overhead lines along Pōhākea Gulch and existing road crossing. Date: 07/10/2023. Lat/Long: 20.804958, -156.494777.

Photo 5. Pale'a'ahu Gulch looking upstream from South 8th Street crossing showing existing road and no surface water. Date: 07/11/2023. Lat/Long: 20.816808, -156.492239.

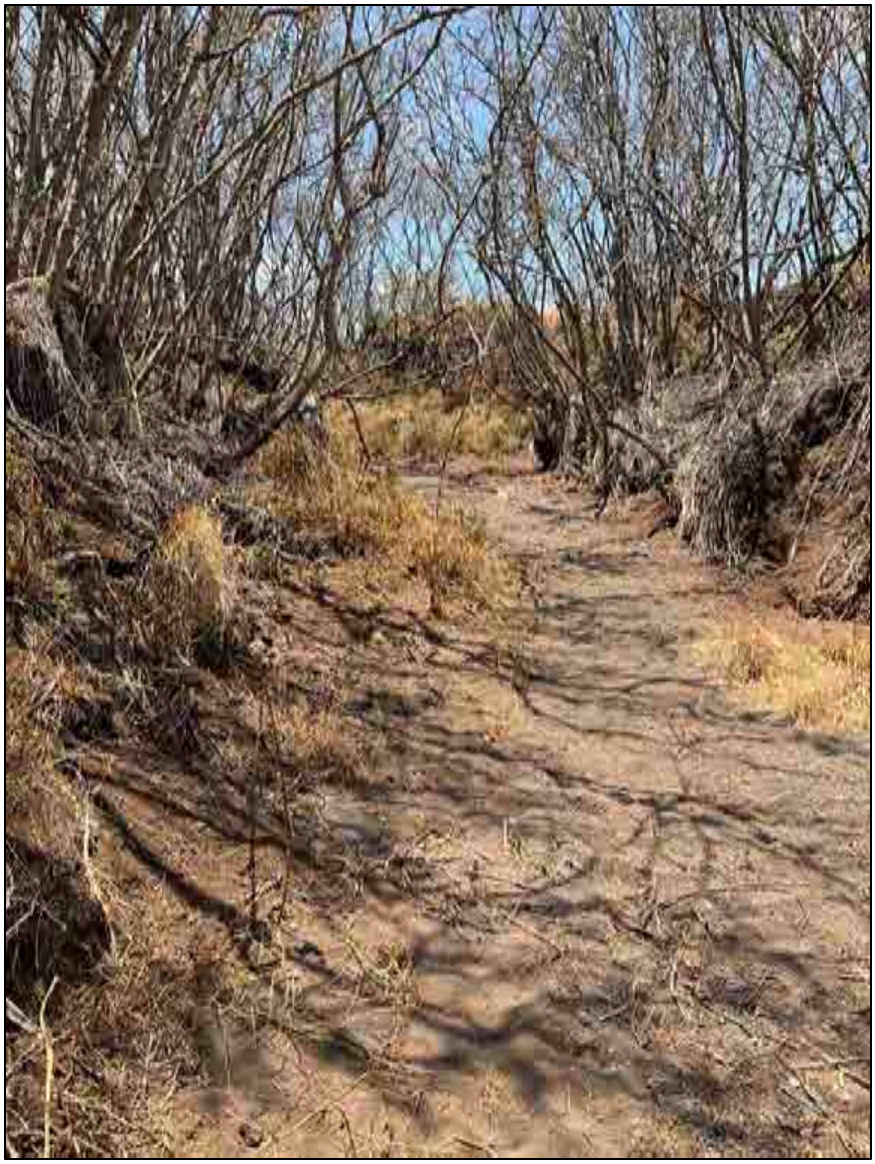

Photo 6. Paleʻaʻahu Gulch showing no standing water, lack of vegetation within channel mauka of South 8th Street. Date: 07/25/2023. Lat/Long: 20.816831, -156.492253

Photo 7. Paleʻaʻahu Gulch looking upstream at South 8th Street road crossing showing armored low water crossing. Date: 07/25/2023. Lat/Long: 20.81667, -156.492146.

Photo 8. Paleʻaʻahu Gulch showing typical section with no standing water, lack of vegetation within channel, and low sinuosity. Date: 07/25/2023. Lat/Long: 20.814205, -156.490707.

Photo 9. Paleʻaʻahu Gulch showing no standing water, lack of vegetation within channel, and small cobbles. Date: 07/25/2023. Lat/Long: 20.813145, -156.489185.

Photo 10. Paleʻaʻahu Gulch showing no surface water and minimal vegetation within the channel. Date: 07/11/2023. Lat/Long: 20.811411244755, -156.487416131587.

Photo 11. Paleʻaʻahu Gulch showing straight course at lower extent of the Study Area. Date: 07/25/2023. Lat/Long: 20.810349, -156.487236.

Photo 12. Paleʻaʻahu Gulch looking down from the right bank at existing 9th Street road crossing. Date: 07/25/2023. Lat/Long: 20.809626, -156.487203.

Photo 13. Paleʻaʻahu Gulch looking up at existing road crossing on 9th Street access road. Date: 07/25/2023. Lat/Long: 20.809573, -156.487161.