

# NEW ALOHA STADIUM ENTERTAINMENT DISTRICT

## PROGRAMMATIC FINAL ENVIRONMENTAL IMPACT STATEMENT

---

April 2022



PREPARED FOR:  
**STATE OF HAWAII**  
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES



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## **Appendix N:**

### Climate Change - Sector Resilience Assessment



*CLIMATE CHANGE  
SECTOR RESILIENCE ASSESSMENT*

**New Aloha Stadium Entertainment District**

Hālawa, Oahu, Hawai‘i  
Tax Map Keys (TMK): [1] 9-9-003:061,  
[1] 9-9-003:055, 070, and 071.

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## **EXECUTIVE SUMMARY**

This New Aloha Stadium Entertainment District (NASED) Climate Change - Sector Resilience Assessment was prepared by Wilson Okamoto in response to the City and County of Honolulu Department of Planning (DPP) input received during the 30-day comment period for the Programmatic Draft EIS. DPP submitted a formal comment letter requesting the examination of potential impacts on specific sectors. The purpose of this report is to summarize the findings of a climate change assessment for the proposed project and to identify the potential direct, indirect, and cumulative impacts that may be associated with the construction and operation of the New Aloha Entertainment District as it relates to climate change. This assessment considers how climate change would impact the proposed project as well as how the proposed project would impact climate change.

Climate change impacts were based on region specific trends identified for the State of Hawai'i from a qualitative frame view that is primarily centered on available data and metrics. Region specific climate change trends likely to affect the project or be affected by the project include a rise in air temperature and variations in rainfall patterns. Other region specific climate change trends such as flooding, sea level rise and shoreline erosion are not anticipated to affect or be affected by the project due to the location of the project site outside of areas of vulnerability. Cumulatively, the proposed project is anticipated to generate GHG emissions that will contribute to the overall concentration of GHG in the atmosphere. Various design strategies and mitigation measures have been incorporated into the proposed project that will minimize potential impacts. Additional mitigation measures and best management practices are recommended to further minimize these impacts.

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## 1. INTRODUCTION

### 1.1 Project Overview

The Proposed Action encompasses the construction the Stadium Development and will be supported by complimentary Real Estate Development. The build out of the Proposed Action is anticipated to be accomplished through the immediate construction of the New Aloha Stadium and Initial Entertainment District and is intended to ultimately deliver a vibrant, thriving community-centric entertainment district that will offer a range of resident and visitor amenities, invigorate economic development and job creation, and celebrate Hawai'i's spirit of achievement and resiliency as well as the history and culture of Aloha Stadium and the communities that surround it.

The development and construction of the Proposed Action will be pursued under series of arrangements between the Proposing Agency and a one or more private District Developers, herein, singularly or collectively referred to as "District Developer(s)" over a period of several years. The Programmatic Final EIS discusses this development and construction occurring within to actions being the Stadium Development and the Real Estate Development. These two developments are intended to illustrate various impacts and requirements for potential milestones of development. In practice, development may occur in a more linear (or other).

The Programmatic Master Plan (PMP) sets forth the vision for an initial tranche of development that consists of the construction of a new 27,500 - 35,000 seat Stadium and supporting Initial Entertainment District consisting of approximately 700 residential units, 263,000 Gross Square Feet (GSF) of retail and entertainment, 83,500 GSF of office space and 240 hotel keys, along with supporting infrastructure and public amenity and requisite utilities. This Initial Development is intended to serve as a catalyst to support a New Aloha Stadium and set the stage for the remainder of the Proposed Action to be sequentially developed in the future. The Proposed Action's total Real Estate Development is envisioned to encompass approximately 1,813 residential units, 680,500 GSF of retail and entertainment space, 216,000 GSF of office space, and 621 hotel keys. Crawford Architects has developed this program based on detailed market analysis of the Project Site and Project Region conducted by Victus / RCLCO in 2019.

### 1.2 Project Location

The NASED site, herein also referred to as the "Project Site", is located in Hālawa in the central portion of the island of O'ahu (See Figure 1-1: Project Location Map). Hālawa, herein also referred to as the "Project Region," is situated approximately 8 miles to the west of downtown Honolulu on the eastern side of Pearl Harbor's East Loch. The Project Site encompasses approximately 98 acres and can be further identified by four discrete adjoining Tax Map Key (TMK) parcels partially separated by Salt Lake Boulevard (See Figure 1-2: TMK Map). The larger northeastern parcel, TMK: [1] 9-9-003:061 at 99-500 Salt Lake Boulevard includes the existing Aloha Stadium and an adjacent parking area to the southeast generally bounded by Kamehameha Highway on the west, Moanalua Freeway on the north, the H-1 Freeway on the east and Salt Lake Boulevard on the south. The smaller parcels to the west, TMK: [1] 9-9-003:055, 070, and 071 at 99-501 Salt Lake Boulevard, and 99-252 and 99-232 Kamehameha Highway are generally bound by Kamehameha Highway to the northwest, and legs of Salt Lake Boulevard on the northeast, southeast and southwest sides. TMK: [1] 9-9-003:071 will contain the future Hālawa/Aloha Stadium HART Transit Station.

### 1.3 Existing and Surrounding Land Use

The Project Site is situated near large residential and commercial areas, across Kamehameha Highway from Joint Base Pearl Harbor-Hickam and adjacent to the Hālawa Interchange, which is the largest highway interchange in the State of Hawai'i, converging Interstate Routes H-1 (Queen Liliuokalani Freeway), H-3 (John A. Burns Freeway), H-201 (Moanalua Freeway); and Kamehameha Highway (Route 99), which collectively provide access to urban Honolulu, Ko'olau Poko, 'Ewa, and Central O'ahu (See Figure 1-3: Surrounding Uses Map)

Within the Project Region, and immediately southwest of the Project Site across Salt Lake Boulevard are the Pu'uawai Momi Public Housing project, the Hālawa Valley Estates single-family subdivision and the Stadium Marketplace shopping mall, the latter of which is anchored by a K-Mart and a Sack N Save supermarket. To the southeast across Interstate H-1 is the Crosspointe Townhome Community and across Kahuapaani Street from there is Stadium Mall, which includes the only permanent public ice skating rink in Hawai'i at Ice Palace Hawaii. Further to the southeast are the residential communities of Foster Village, Āliamanu and Salt Lake. Within these communities, there is a mixture of single and multi-family residential developments as well as Radford High School, a public school administered by the Hawai'i Department of Education (DOE), Salt Lake District Park, the Honolulu Country Club golf course, and neighborhood and regional commercial centers.

The Project Site is located approximately 0.25 miles from the nearest shoreline of Pearl Harbor's East Loch, and 0.7 miles to the northeast of The Pearl Harbor Visitor Center and Historic Sites complex. The Pearl Harbor Visitor Center and Historic Sites complex receives approximately two million visitors per year. Much of Pearl Harbor and more than 10,000 acres of adjacent properties are occupied by the U.S. Navy, including the Naval Station Pearl Harbor and Pearl Harbor Naval Shipyard (the regional maintenance center for the U.S. Navy). In 2010, the Navy and Air Force merged their two nearby bases; Naval Base Pearl Harbor joined with Hickam Air Force Base to create Joint Base Pearl Harbor-Hickam. There are over 17,500 active duty U.S. Military and over 20,000 dependents and civilians located in Joint Base Pearl Harbor Hickam. The Pearl Harbor Naval Shipyard is the largest industrial complex in Hawai'i, with a workforce of 4,700 civilians and military personnel (Foley & Lardner, 2014).

To the northwest beyond the Hālawa Interchange is the residential subdivision known as Hālawa Heights, which extends up the hillside to Marine Corps Base Hawai'i, Camp H.M. Smith. The installation serves as headquarters for U.S. Marine Corps Forces, Pacific; U.S. Pacific Command; and other regional commands and detachments. On a lower portion of the subdivision is the DOE's Gustav H. Webling Elementary School.

The town of 'Aiea is located to the north across Moanalua Freeway from the Project Site. The area is home to a small strip mall, the 'Aiea Shopping Center, which contains the 'Aiea Bowl bowling alley, a Times Market supermarket, restaurants, and other businesses. The area also includes several churches, schools and other community facilities including two DOE schools, 'Aiea Elementary School and Alvah A. Scott Elementary School.

'Aiea is divided by Interstate H-1 (Queen Liliuokalani Freeway) with the northeastern portion (mauka side) containing more businesses and public facilities such as 'Aiea Intermediate

School, 'Aiea High School, 'Aiea Public Library, all of which are part of the DOE system, and, 'Aiea District Park. Rising mauka towards the Ko'olau Mountain Range is the residential subdivision of 'Aiea Heights. Makai (southwest) of 'Aiea Town across Kamehameha Highway is 'Aiea Bay State Recreation Area, which lies along the shoreline of 'Aiea Bay, a small inlet of Pearl Harbor's East Loch. Forming the northwestern side of 'Aiea Bay is McGrew Point, where the McGrew Point Naval Housing Area is located.

On the west side of McGrew Point, Kalauao Stream discharges about 400 feet west of Loko Pa'aiau Fishpond, which is one of three fishponds that remain relatively intact out of 22 that historically were located along the shoreline of Pearl Harbor. At the invitation of the U.S. Navy, Hawaiian civic clubs and members of the 'Aiea community are restoring the fishpond. The fishpond is located in the ahupua'a of Aiea, which is relatively small, sandwiched between Kalauao Stream and 'Aiea Stream, which drains into 'Aiea Bay about 0.60 mile to the southwest. Nevertheless, the postal district of 'Aiea, zip code 96701, includes the areas of Red Hill on the east side of Interstate Route H-3, Hālawa, 'Aiea, Kalauao and Waimalu.

Northwest of Kalauao Stream is the ahupua'a of Kalauao, which extends to Waimalu Stream to the northwest. This area has seen extensive development in recent decades, creating a commercial and residential hub commonly referred to as "Pearlridge." The area, located less than two miles northwest of the Project Site, is dense with commercial development (retail and office), high-density apartment buildings, light-industrial uses, a medical complex, and various community facilities. The area gets its name from the Pearlridge Center, the largest enclosed shopping center in Hawai'i. Now renamed simply Pearlridge, the mall houses over 170 stores, food courts, numerous full-service restaurants, 16 theaters, an emergency clinic, and an 8-story office complex. Amidst Pearlridge remains the iconic Sumida Watercress Farm that harkens back to an earlier era of agriculture in the area.

#### **1.4 Purpose and Objectives**

The purpose of the NASED Climate Change - Sector Resilience Assessment is to supplement the Programmatic Final EIS by providing an overview of climate change projections and an analysis of the expected impacts of climate change as it relates to sector specific resilience within the Hālawa Region, and the State of Hawai'i in general.

The objectives of this report are:

- Review and summarize existing climate research within the Hālawa region, and the State of Hawai'i in general.
- Establish an understanding of existing conditions at the Project Site, including observed current climate change trends and future projections.
- Assess current and future climate change trends that have the potential to impact the Proposed Action.
- Analyze the potential impacts climate change will have on sector specific resilience, such as sector vulnerabilities.

Provide recommendations for best management practices (BMPs) and mitigation strategies to avoid or minimize potential climate change impacts.



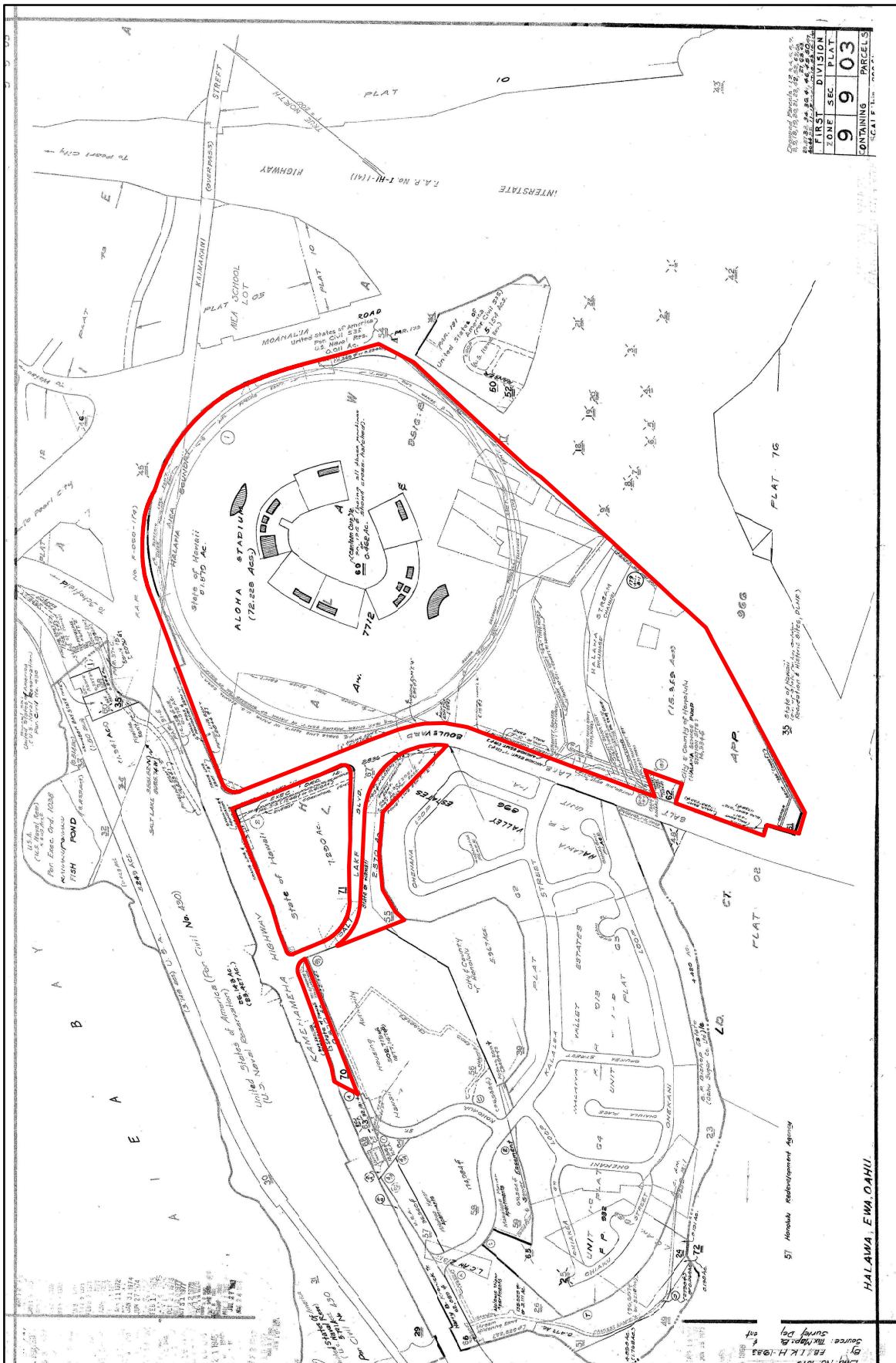
FIGURE 1-1

## Project Location Map

New Aloha Stadium Entertainment District  
Hālawa, O'ahu, Hawai'i

New Aloha Stadium Entertainment District  
Hālawa, Oahu, Hawai'i

**TMK Map**



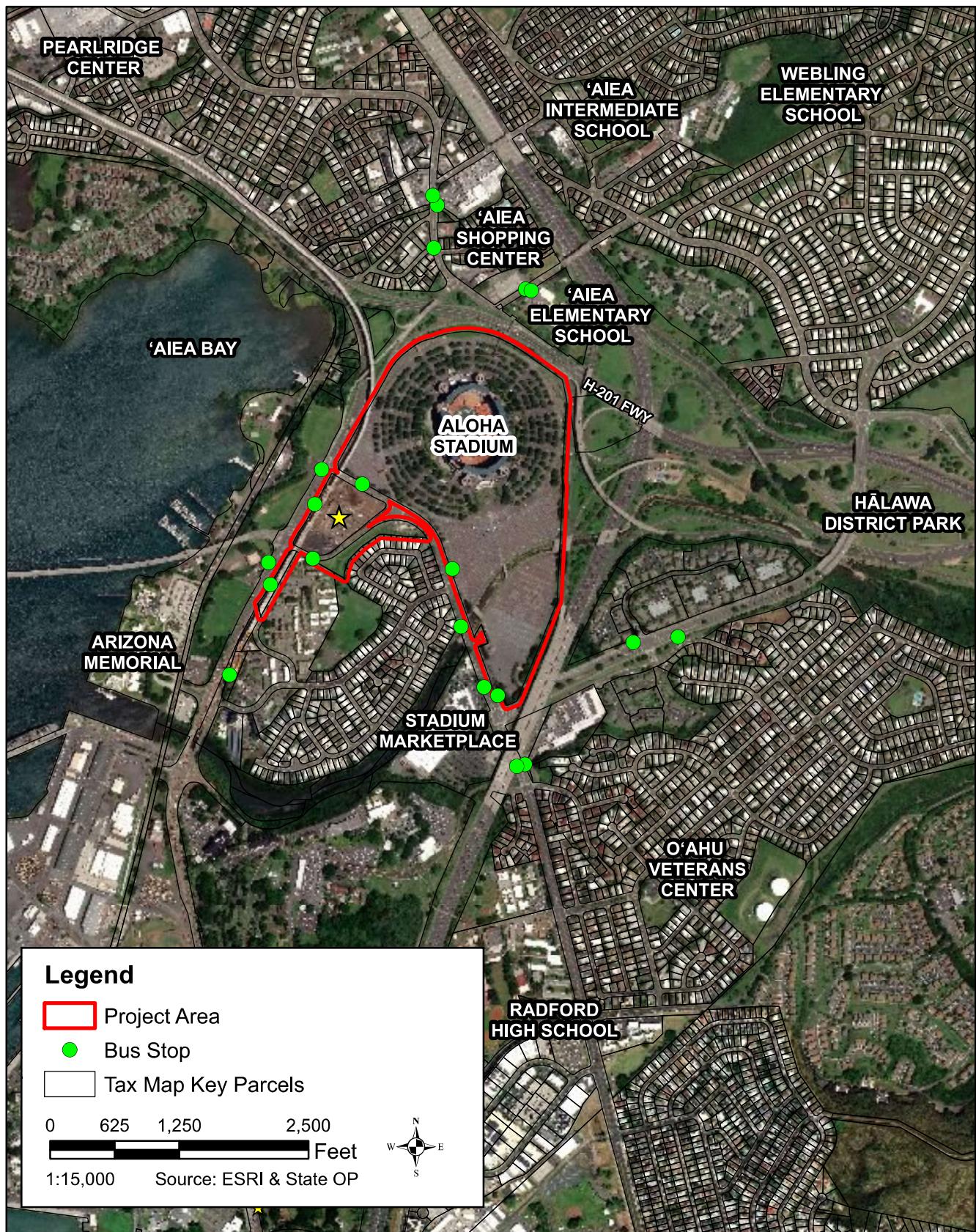


FIGURE 1-3

### Surrounding Uses Map

New Aloha Stadium Entertainment District  
Hālawa, O'ahu, Hawai'i

## 2. EXISTING CONDITIONS

### 2.1 General Climate

Climate is defined as long-term averages and variations in weather measured over a period of several decades. The climate system includes the land surface, atmosphere, ocean, and ice. The climate of O'ahu is relatively moderate throughout most of the year and is characterized as semi-tropical with two seasons. The summer period runs from May through September and is generally warm and dry, with predominantly northeast trade winds. In contrast, the winter season runs from October through April and is associated with lower temperatures, higher rainfall and less prevalent trade winds.

The Project Site is located in Hālawa in the 'Ewa District of Honolulu on O'ahu. The area is characterized by abundant sunshine, persistent trade winds, relatively constant temperatures, moderate humidity, and the infrequency of severe storms. Northeasterly trade winds vary from 10 to 20 miles per hour on average and prevail throughout the year although its frequency varies.

The mean temperature measured at Daniel K. Inouye International Airport (HNL), located approximately three miles away, ranges from 70 degrees Fahrenheit ( $^{\circ}\text{F}$ ) in the winter to 84  $^{\circ}\text{F}$  in the summer. Average annual precipitation at the Project Site is approximately 30 inches, with rainfall occurring mostly between October and March.

### 2.2 Topography

The island of O'ahu is a volcanic doublet created by the extrusion of basaltic lava from the Wai'anae and Ko'olau Shield Volcanoes. As volcanic activity ceased, erosion incised deep valleys into the shield volcanoes and formed the Wai'anae Range to the west and the younger Ko'olau Range to the east. The term "range" indicates that they have lost most of their original shield outlines and are now long, narrow ridges shaped largely by erosion.

Between 30,000 and 800,000 years ago volcanic activity returned to portions of the island of O'ahu as a series of localized flows followed by explosive cinder and tuff cone formations. The oldest of the eruptions at Āliamanu Crater caused the initial large diversion of Hālawa stream to the north of its original location thereby resulting in the deposition of alluvial soils. The Project Site is located on the Southern O'ahu Coastal Plain and north of Makalapa Crater and northwest of Āliamanu and Salt Lake tuff cones. In general, the subsurface materials underlain by the Project Site consist of alluvial soils and volcanic tuff overlain by recent fills. There are no known lava tubes or caves within the Project Site.

The topography of the Project Site is generally flat with no steep slopes (i.e., no slopes greater than 20%), primarily because the Project Site was graded extensively during construction (See Figure: 2-1 Topography Map). Terrain at the Project Site slopes gently with existing ground elevations that range from about +65 feet Mean Sea Level (MSL) in the north to about +5 MSL in the south.

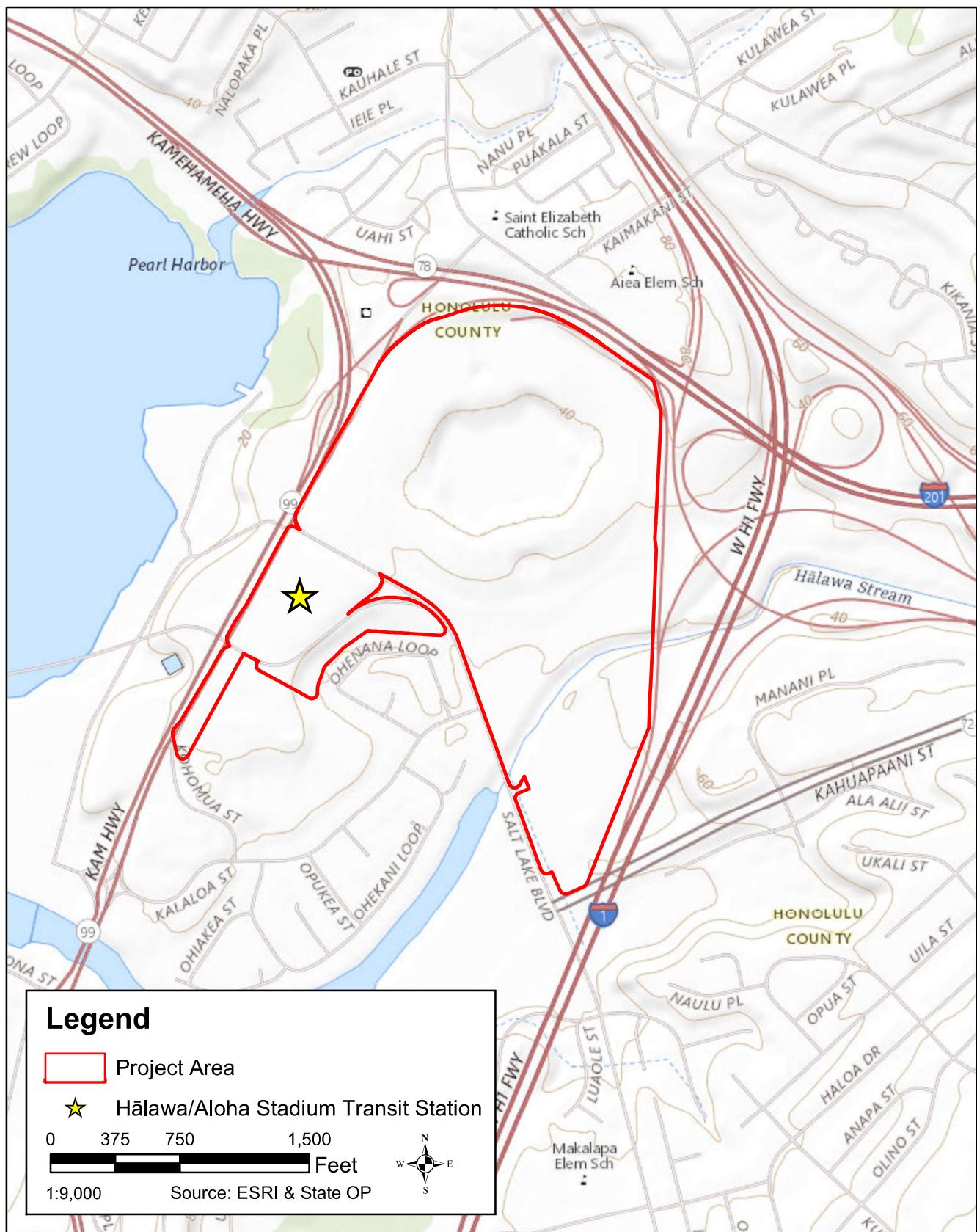


FIGURE 2-1  
Topography Map

New Aloha Stadium Entertainment District  
Hālawa, O'ahu, Hawai'i

## 2.3 Soils

According to the U.S. Department of Agriculture (USDA), Natural Resource Conservation Service, soils within the Project Site are classified as Waipahu Silty Clay (WzA), Makalapa Clay (MdB), and Honouliuli Clay (HxA) (See Figure 2-2: Soils Map).

**Waipahu Silty Clay (WzA)**, 6 to 12 percent slopes. This series consists of well-drained soils on marine terraces on the island of O'ahu. These soils are developed in alluvial fans derived from basic igneous rock. They are nearly level to moderately sloping. Elevations range from sea level to 125 feet. Runoff is medium and the erosion hazard is moderate. This type of soil is commonly used for cultivating sugarcane and urban development.

**Makalapa Clay (MdB)**, 2 to 6 percent slopes. This series consists of well-drained soils on uplands on the island of O'ahu, near Salt Lake Crater, Diamond Head, and the Mokapu Peninsula. This soil type is formed in volcanic tuff and is gently sloping to moderately steep. Elevations range from 20 to 200 feet. The permeability and runoff are slow, making the erosion hazard slight. This soil is clayey, very sticky, and very plastic. Makalapa Clay has a high shrink-swell potential. This soil is commonly used for urban development and pasture.

**Honouliuli Clay (HxA)**, 0 to 2 percent slopes. This type of soil is well-drained and underlies the coastal plains on the island of O'ahu in the 'Ewa area. This soil develops in alluvium derived from basic igneous material. They are nearly level and gently sloping. Elevations range from 15 to 125 feet. Permeability and runoff are slow, making the erosion hazard slight. This soil is clayey, viscous, and very plastic. Honouliuli Clay has a high shrink-swell potential. This type of soil is commonly used for cultivating sugarcane, truck crops, and pasture.

**Hanalei Silty Clay (HnB)**, 0 to 2 percent slopes. This soil is on stream bottoms and flood plains. Found in small areas on O'ahu, they are very deep, well-drained alluvial soils and areas of very poorly drained to poorly drained clay soils that are strongly mottled and are underlain by peat, muck, or massive marine clay. The permeability is moderate and runoff is slow and the erosion hazard is slight. This soil is commonly used for sugarcane, taro, and pasture.

**Kawaihapai Clay (KIA)**: 0 to 2 percent slopes. The Kawaihapai series consists of well drained soils that formed in alluvium derived from basic igneous rock. Kawaihapai soils are in drainage ways and on alluvial fans on the coastal plains. The permeability is moderate and runoff is considered to be slow to medium. The soil is primarily found in the islands of Molokai, Oahu and Hawaii. The series is about 7,600 acres in extent across the three islands.

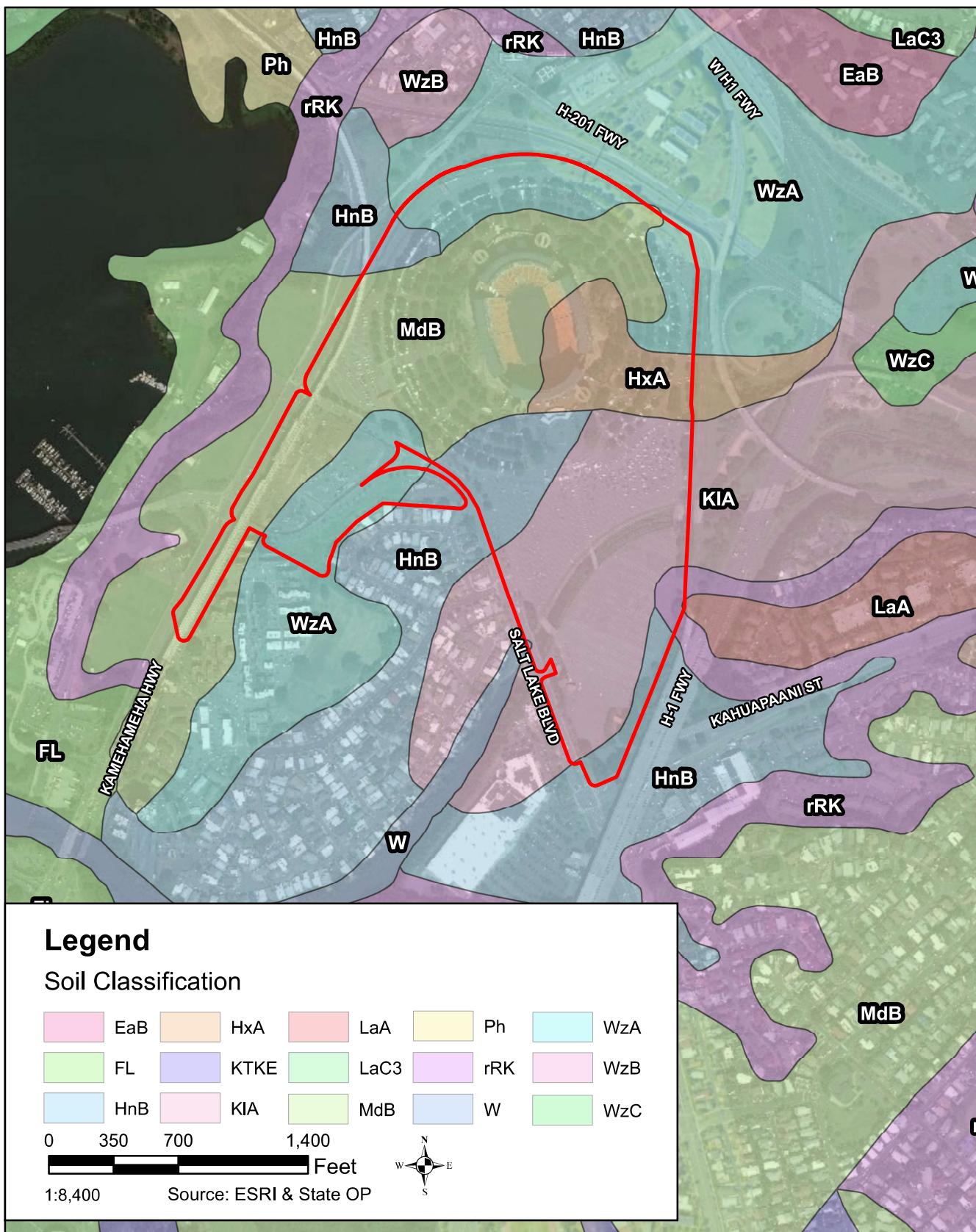


FIGURE 2-2  
Soils Map

New Aloha Stadium Entertainment District  
Hālawa, O'ahu, Hawai'i

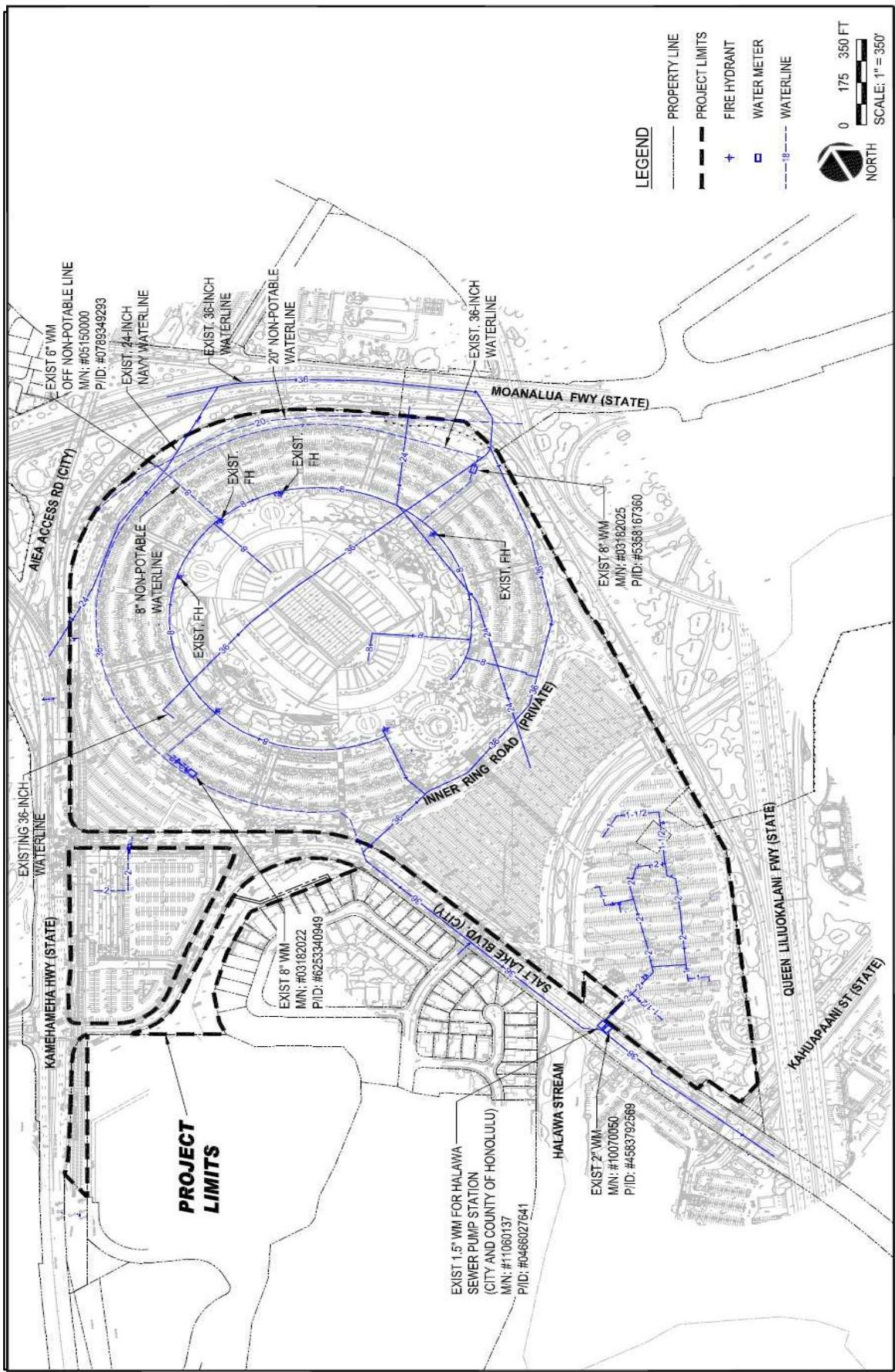
## 2.4 Water System

Potable water in Hālawa is supplied by the CCH Board of Water Supply (BWS). The CCH BWS conveys potable water to users in the Hālawa region through a system of water mains that follow the major roads in the district.

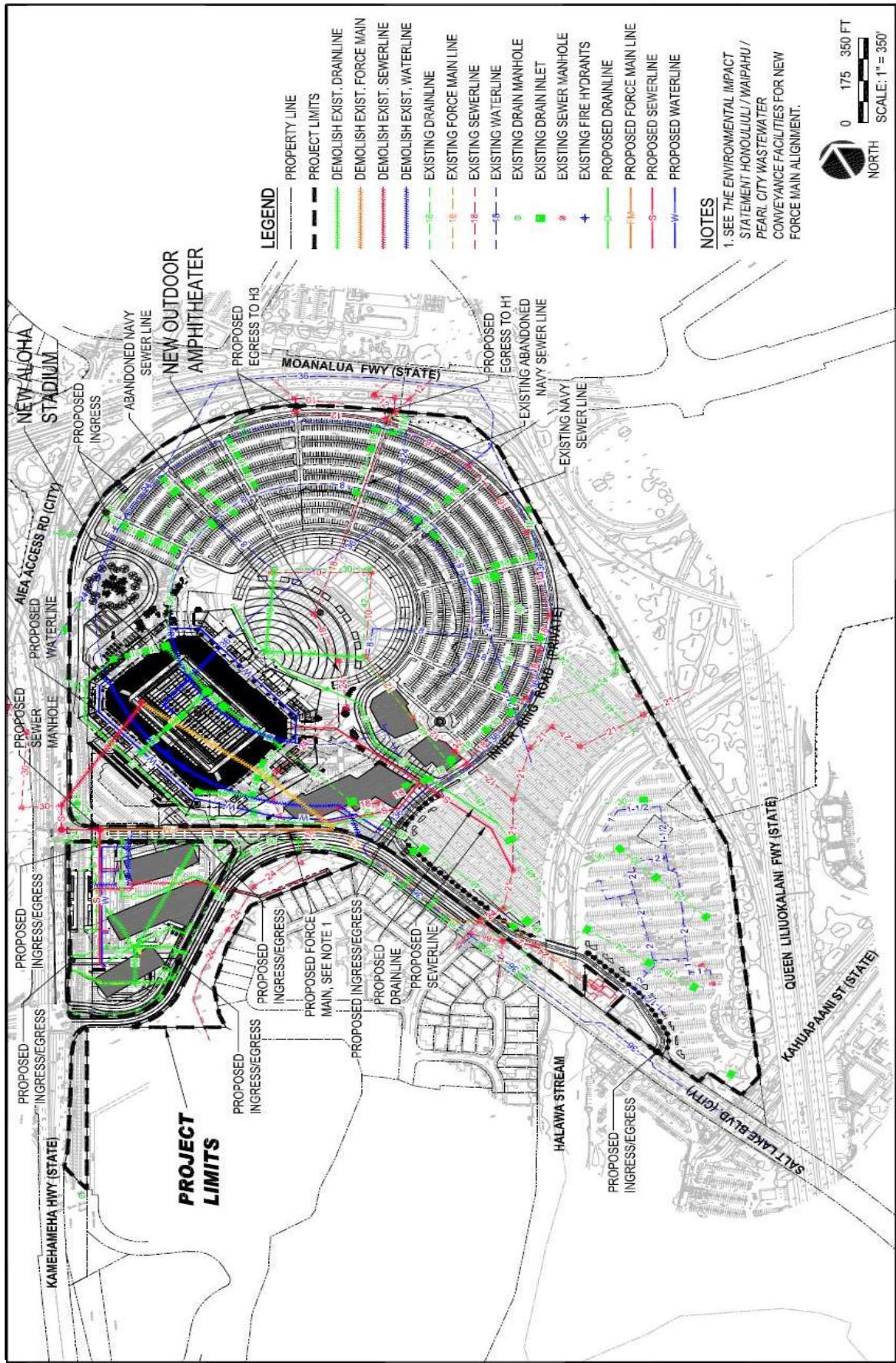
Specifically, the offsite BWS water system in the vicinity of the Project Site consists of 36-inch concrete cylinder pipes running along both Salt Lake Boulevard and the Moanalua Freeway. A looped 36-inch water line runs around the eastern and southern portion of the parking lot adjacent to the stadium connecting the 36-inch water lines that run along Moanalua Road and Salt Lake Boulevard. The looped 36-inch water line has two 8-inch laterals with 8-inch meters (M/N#03182022 and 03182025) on the east and west of the stadium that connects to a looped 8-inch water line running around the interior of the stadium. At the north corner of the stadium, an 8-inch lateral with a 6-inch meter (M/N# 05150000) connects to the 36-inch water line. Also connected to the 36-inch main at the southwest corner of the Project Site along Salt Lake Boulevard is a 1.5-inch and a 2-inch water meter. Not associated with supplying water to the stadium is a 24-inch Navy water line crossing over the northeast end of the site property along Aiea Access Road. Existing water infrastructure is shown on Figure 2-3: Existing Water System Map. Additionally, the conceptual plans outlining potential alignment of proposed site water infrastructure are shown in Figure 2-4.

**Existing Water System**

New Aloha Stadium Entertainment District  
Hālawa, Oahu, Hawai'i



**FIGURE 2-3**



**Proposed Site and Utility Improvements - Stadium Development and Initial Real Estate Development**

*New Aloha Stadium Entertainment District  
Hālawa, Oahu, Hawai'i*

## 2.5 Wastewater System

Wastewater from the Project Site, as well as the greater region of Hālawa, is collected for treatment and disposal by the CCH Department of Environmental Services' (ENV) Honouliuli Wastewater Treatment Plant (WWTP). Honouliuli WWTP is the second largest WWTP on O'ahu and has a design capacity of 51 million gallons per day with all units in service. Since the WWTP became operational in 1984, it has undergone several expansions and upgrades to address growth within the service area and additional treatment needs.

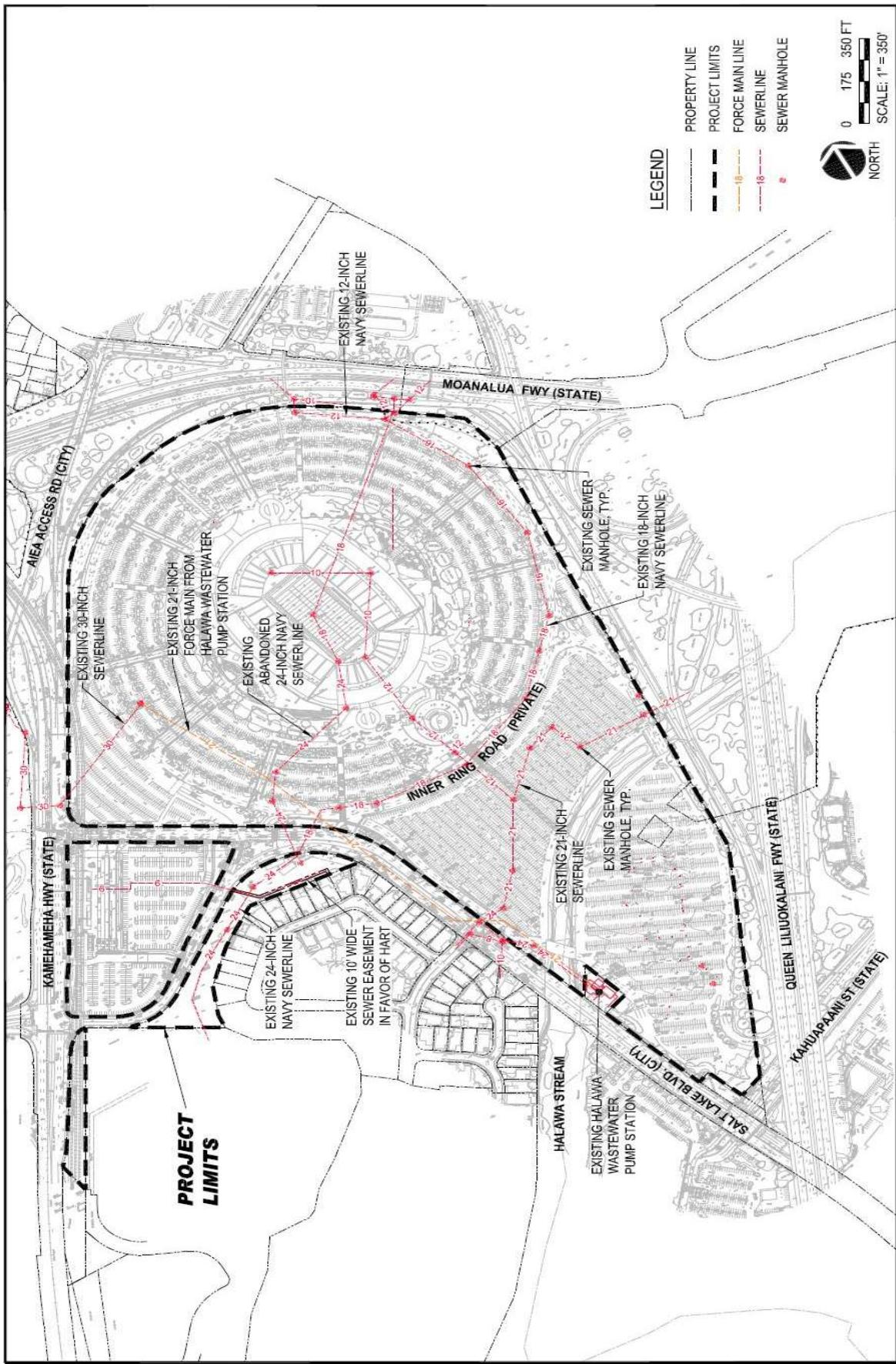
There is an existing 21-inch gravity flow sewer main running east to west across the parking lot north of Hālawa Stream with a 12-inch lateral extending from it that provides service to the stadium. This 21-inch main continues to the Hālawa pumping station at the southwest corner of the Project Site. From the Hālawa pumping station a 21-inch force main conveys wastewater uphill along Salt Lake Boulevard after which the flow is alternately conveyed by gravity and pumps, together with additional flows collected along the way, until it reaches the Honouliuli WWTP.

Another existing sewer main owned by the Navy that ranges in size from 16- to 18-inches also runs along the eastern and southern portions of the parking lot adjacent to the existing stadium. This main eventually connects into the 24-inch Navy sewer line along Salt Lake Boulevard. The Navy sewer line runs from east to west through the middle of the stadium and ranges from 12 to 24-inches. The Navy's wastewater system is independent of the City and County of Honolulu (CCH) system and does not serve the Project Site. Flows collected by the Navy's system are conveyed to the Navy's Kamehameha WWTP for treatment and disposal. Existing sanitary sewer system infrastructure is shown on Figure 2-5: Existing Sanitary Sewer System.

Currently, CCH Department of Environmental Services (ENV) is assessing a program to upgrade and/or expand the existing East Interceptor System, which includes Hālawa, to accommodate wastewater flows projected. The timeframe for completion of the City East Interceptor wastewater collection system is 2037-2040, depending on the construction option to be selected by CCH. ENV's program includes replacement, upgrades, and rehabilitation of wastewater pump stations (WWPSs), force mains, and trunk sewers to increase capacity and rehabilitate the existing conveyance system.

## Existing Sanitary Sewer System

*New Aloha Stadium Entertainment District  
Hālawa, Oahu, Hawaii*



## 2.6 Electrical Systems

Electrical power on the island of O'ahu is provided by Hawaiian Electric Company (HECO). HECO generates its electricity from oil-fueled power plants in Pearl City and Kapolei, a waste-to-energy power plant (HPOWER) in Kapolei and other renewable energy generators across the island. The HECO distribution system in the vicinity consists of aerial 12-kilo-volt (kV) primary distribution and aerial secondary distribution system conductors.

Electrical and communication services are transmitted through underground and aerial lines located in the Project Site. HECO owns approximately 3,000 miles of electrical transmission and distribution lines, of which more than 40% are underground (HECO 2019b). Although overhead lines are more vulnerable to adverse weather conditions and objects contacting lines, underground lines are more vulnerable to damage from water penetration and construction excavation.

An Electrical Infrastructure Report was prepared by Pragmatic Professional Engineers to assess the existing capacity of the electrical infrastructure for the Project Site and to determine the anticipated electrical load after development of the Proposed Action. The electrical load calculation for the re-development is based on Master Plan Option B, dated January 15, 2020, which included fourteen separate buildings.

Currently, the Project Site is served by a medium voltage 115-kV service line with a 125-amp fuse from HECO via a primary meter. The existing Project Site has the capacity for approximately 2,500,000 watts of power usage. According to an electrical study dated December 11, 2009 the peak demand of the Stadium was noted in a 1997 Electrical Power Distribution System Assessment Report to have reached approximately 2,100,000 watts (W). The existing emergency power system at the Project Site includes a 300-kilowatt (kW) diesel generator with a fuel tank, which is not base-mounted; an associated automatic transfer switch; all distribution equipment, including a main switchboard; step-down transformers; 277/480-volt panels; and 120/208-volt panels. However, the equipment for the emergency power system is near or at the end of its useful life.

## 2.7 Flora and Fauna

AECOS prepared a Natural Resources Assessment for the Proposed Action and Project Site in December 2019 which presents the results of a natural resources survey, namely flora and fauna resources, at the Project Site. Below is a brief summary of the findings of that report.

The methods used to collect flora and fauna data for the survey included a wandering (pedestrian) transect, avian point-count stations, and visual and auditory detection and observations. The Project Site is characterized as a highly altered urban environment. The Project Site itself is completely developed, currently characterized by the existing Aloha Stadium and paved surface parking lots. There are pockets of landscape plantings located throughout the Project Site and less maintained areas along the borders of the Project Site. The main parking lot is landscaped with monkeypod trees. As Hālawa Stream crosses through the Project Site on the southern end, is entirely confined within a concrete-lined channel, however, some vegetation has established in the cracks and deposited sediment within the lined channel. Hence, generally speaking, the Project Site does not provide a suitable habitat for native species, including endangered, threatened, proposed, or candidate

species. Consequently, no rare, threatened or endangered flora or fauna species have been observed to exist in the Project Site. Species most commonly frequenting the Project Site and vicinity are typical of urbanized areas and consist of common introduced flora and fauna.

Vegetation at the Project Site is comprised of landscape plantings scattered weedy growth. Multiple concentric rings surrounding the existing Aloha Stadium are defined by paved parking between islands populated by lawn and monkeypod trees (*Albizia saman*). The majority of ornamental plantings surround the stadium structure itself. Of the 95 total taxa identified, only two native species were found. Another three species were thought to be early Polynesian introductions. The total number of ornamental species is 39 (41% of the recorded species). No plants of conservation concern or enjoying statutory protection (that is, listed as threatened or endangered; HDLNR, 1998; USFWS, 2015, nd) were noted in the survey. No trees listed by the CCH, Exceptional Tree Program occur on the subject parcels (C&C, 2017).

A total of 28 species of birds were recorded at the count stations or incidentally observed during the survey. Several wading birds were observed in the Hālawa stream channel: *koloa* x mallard duck (*Anas wyvilliana* x *A. platyrhynchos* cross), *ae'o* (*Himantopus mexicanus knudseni*), 'akekeke (*Arenaria interpres*), and 'ulili (*Tringa incana*) are attracted to open water areas in the stream. The water-obligate bird survey recorded only three *koloa* x mallard duck hybrids. Moreover, no state designated Natural Area Reserves, for the recovery of Hawaiian birds, are located within five miles (Fish and Wildlife Service 2003). However, it should be noted that the Project Site is not limited to these avian species. It is possible that several special status avian species overfly and or utilize the Project Site. These may include, but not limited to, the White tern or *Manu o Kū* (*Gygis alba*), Hawaiian Petrel (*Pterodroma sandwichensis*), the Newell's Shearwater (*Puffinus newelli*), and the endemic Short-eared Owl or *pue'o* (*Asio flammeus*).

The mammalian survey results included species that were recorded through visual, auditory, or observations of animal signs. Observations determined that mammals such as dogs (heard barking) and the Indian mongoose are present at the or within the vicinity of the Project Site. No other mammals were observed, although, the Project Site is not limited to these species as it is probably that a presence of one or more of four alien Murida species currently established on the island of O'ahu potentially occupy the Project Site. These species include the roof rat (*Rattus rattus*), brown rat (*Rattus norvegicus*), Polynesian rat (*Rattus exulans hawaiiensis*), and European house mouse (*Mus musculus*) which utilize resources found at the Project Site on a seasonal or temporal basis. It is should also be noted that it is possible that the Hawaiian hoary bat overfly and or utilize the Project Site on a seasonal basis.

An aquatic fauna survey was not conducted as where Hālawa Stream crosses the Project Site, the stream is entirely confined by concrete sides and bottom. Moreover, there have been numerous previously conducted surveys that provide sufficient information on stream biota, both upstream and downstream of the Project Site. Due to the poor habitat diversity and shallow water (sheet flow over the concrete bed) of the Hālawa Stream segment at the Project Site, limits the diversity of aquatic fauna expected to reside at the Project Site.

Downstream of the Project Site, at the Kamehameha Bridge, Hālawa Stream becomes an estuary. Here, red mangrove forms a grove or mangal that occupies most of the shoreline, with some pickleweed (*Batis maritimus*) covering the ground where mangroves are not present. Tidal influence extend upstream to the concrete footings of the Salt Lake Boulevard Bridge.

Upstream of the Project Site, Hālawa Stream supports populations of native stream macrofauna. Hawaiian endemic and indigenous freshwater fish and crustaceans have an amphidromous life cycle: eggs are laid in freshwater stream reaches, and hatched larvae drift downstream and out into the ocean where they develop for a time before migrating back into freshwater stream to grow to maturity.

## 2.8 Natural Hazards

### 2.8.1 Sea level Rise

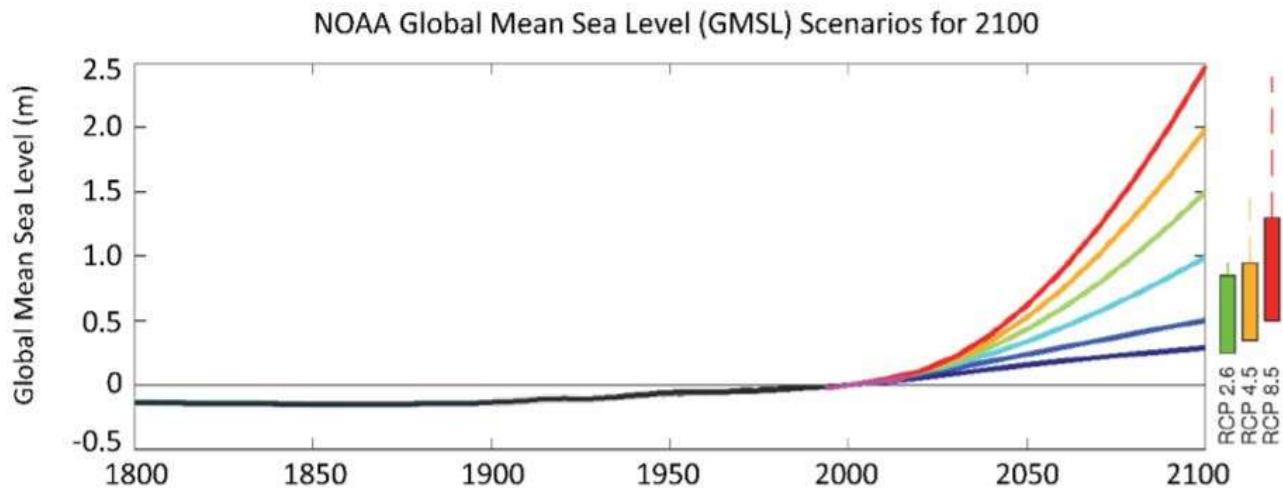
Among the impacts associated with climate change is the threat of rising sea levels. The present rate of global mean Sea Level Change (SLC) is  $+3.4 \pm 0.4$  millimeter (mm) / year (Sweet, 2017), where a positive number represents a rising sea level. SLC appears to be accelerating compared to the mean of the 20th Century. Factors contributing to the measured rise in sea level include decreasing global ice volume and warming of the ocean. Sea level, however, is highly variable. The mean historical rate of sea level change (RSLC) is  $+2.21 \pm 0.42$  mm/year based on monthly data for the period 1947 to 2017.

In 2017, the National Oceanic and Atmospheric Administration (NOAA) revised its sea level change projections through 2100 (2017 NOAA Report) taking into account up-to-date scientific research and measurements. NOAA is projecting that global sea level rise as shown by their “Extreme” scenario could be as high as about 8 feet by 2100 (See Figure 2-6: NOAA Global Mean Sea Level Rise Scenarios for 2100). NOAA’s recent report also identifies specific regions that are susceptible to a higher than average rise in sea level. Hawai‘i has thus far experienced a rate of sea level rise that is less than the global average; however, this is expected to change. Hawai‘i is in the “far field” of the effects of melting land ice. This means that those effects have been significantly less in Hawai‘i compared to areas closer to the ice melt. Over the next few decades, this effect is predicted to spread to Hawai‘i, which will then experience a sea level rise rate greater than the global average.

While the projections are based on the most current scientific models and measurements, discretion is necessary in selecting the appropriate scenario for planning and design projects. Selecting the appropriate sea level change projection is a function of many parameters, including topography, coastal setting, and criticality of infrastructure, potential for resilience, budget, and function.

An important conclusion of the regional climate assessment is that NOAA’s revised *Intermediate* rate is recommended for planning and design purposes in Hawai‘i. The *Intermediate* rate projects that sea level in Hawai‘i will rise 4.2 feet by 2100. Given the recent upwardly revised projections and the potential for future revisions, consideration may also be given to the *Intermediate-High* rate for planning and design purposes, which projects that sea level in Hawai‘i will rise 6.3 feet by 2100.

**Figure 2-6: NOAA Global Mean Sea Level Rise Scenarios for 2100**



Sea level rise has the potential to impact beaches and shorelines in Hawai'i. Impacts may include beach narrowing and beach loss, loss of land due to erosion, and infrastructure damage due to inundation and flooding. The impacts from anomalous sea level events (e.g., king tides, mesoscale eddies, storm surge) are also likely to increase. A 2015 study found that, due to increasing sea level rise, average shoreline recession (erosion) in Hawai'i is expected to be nearly twice the historical extrapolation by 2050, and nearly 2.5 times the historical extrapolation by 2100 (Anderson et al., 2015).

The Hawai'i Sea Level Rise Vulnerability and Adaptation Report, issued by the Hawai'i Climate Change Commission (HCCC) in December 2017, has provided detailed information for 3.2-foot as well as 6-foot sea level rise exposure areas (SLR-XA), which include the CCH. In response to this report, the CCH Climate Change Sea Level Rise Guidance document was issued in June 2018 and the Honolulu Mayor's Climate Change Directive was issued in July 2018. The Sea Level Rise Guidance document stated the following:

- The research finds that it is reasonable to set as a planning benchmark up to 3.2 ft. (~1 m; 3SLR-XA) of GMSL rise by mid-century as it will be an area experiencing chronic high tide flooding.
- The research finds that it is reasonable to set as a planning benchmark up to 6 ft. (1.8 m; 6SLR) of GMSL rise in the later decades of the century, especially for critical infrastructure with long expected lifespans and low risk tolerance, as it will be an area experiencing chronic high tide flooding.

The Mayor's Climate Change Directive stated the following:

- Use the Guidance, Brief, and Report in their plans, programs, and capital improvement decisions, to mitigate impacts to infrastructure and facilities subject to SLR-XA, which may include the elevation or relocation of infrastructure and critical facilities, the elevating of surfaces, structures, and utilities, and/or other adaptation measures.

Figure 2-7: (3.2 Sea Level Rise Exposure Map), highlights the areas that would be impacted by 3.2 feet of SLR which includes Hālawa Stream as it is tidally influenced.

### **2.8.2 Flood and Tsunami Hazard**

According to the Flood Insurance Rate Map (FIRM), (Community Panel Number 0332H) prepared by the Federal Emergency Management Agency (FEMA), the Project Site is designated zone X, an area of minimal flood hazard, where there is a 0.2 percent annual chance of flooding (See Figure 2-8: Flood Insurance Map). Therefore, the Proposed Action is exempt from FEMA flood requirements, as well as the requirements to secure flood insurance.

The NOAA Center for Tsunami Research conducted an analysis of the effects of distant (i.e., non-local) historic tsunami, as well as a “worst-case” scenario tsunami, upon Pearl Harbor, and the effects a proposed NOAA facility to be located on Ford Island in the center of Pearl Harbor (Tang et. al 2006). This analysis found no evidence for a damaging tsunami within Pearl Harbor, while areas on the south shore of O'ahu experienced relatively large run-ups. This assessment suggests that the Proposed Action's risk for tsunami inundation is relatively low, compared to other shoreline areas of O'ahu due to its proximity to Pearl Harbor and location in relation to Ford Island.

According to the Tsunami Evacuation Zone maps for O'ahu, the Project Site lies entirely outside of the tsunami evacuation zone and is within the tsunami safe zone.



FIGURE 2-7  
Sea Level Rise Exposure Map

New Aloha Stadium Entertainment District  
Hālawa, O'ahu, Hawai'i

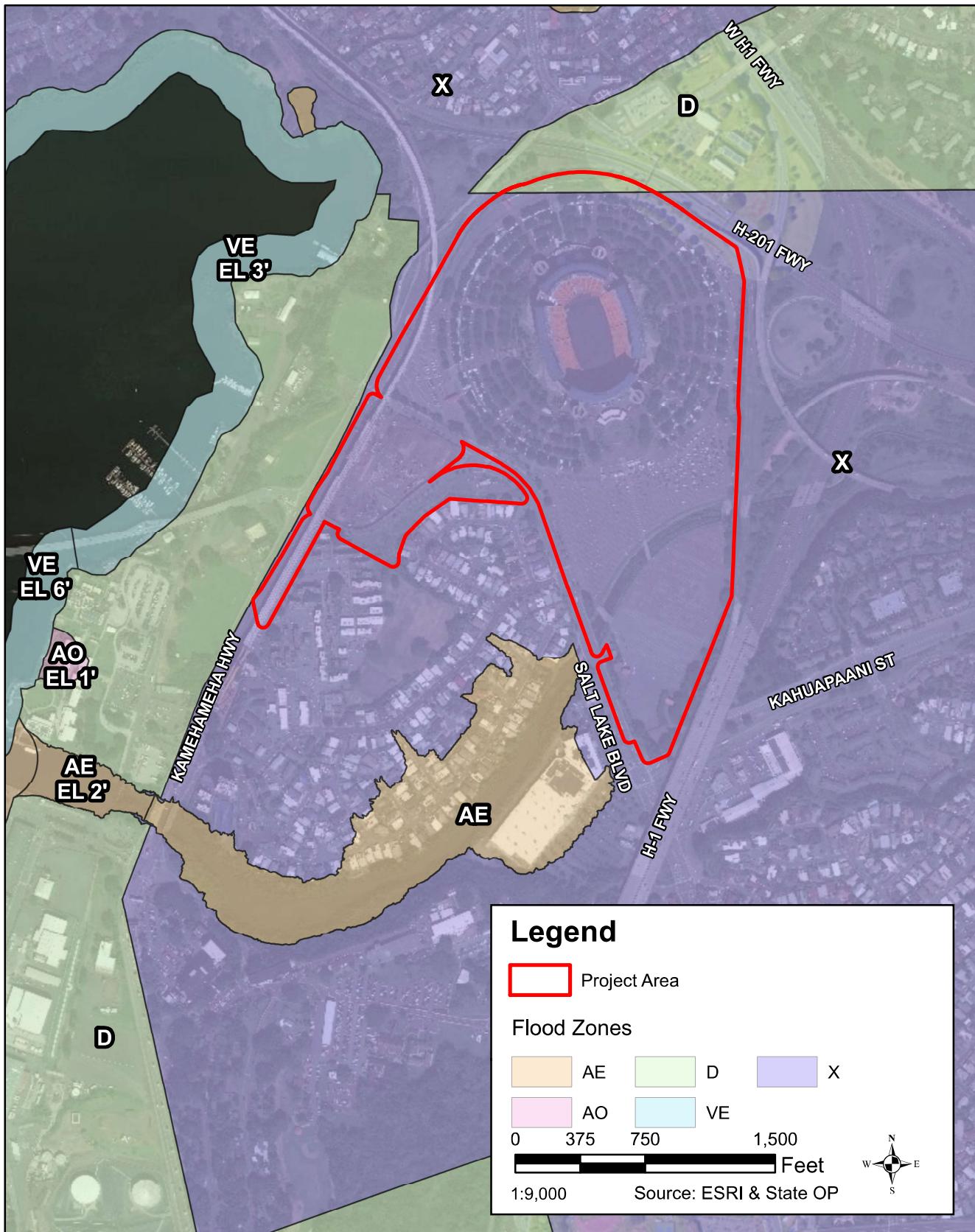


FIGURE 2-8  
Flood Insurance Rate Map

New Aloha Stadium Entertainment District  
Hālawa, O'ahu, Hawai'i

## 2.9 Hydrology

### 2.9.1 Surface Waters

The nearest surface water in the vicinity of the Project Site is Hālawa Stream. In its upper reaches, Hālawa Stream arises from two main branches that drain the very crest of the Koʻolau Mountains: the North Hālawa Stream, which drains the valley area unknown to most O'ahu residents until the opening of the H-3; and the South Hālawa Stream, which drains the long, narrow valley to the east that opens on the south side of Red Hill. Their confluence is in the general vicinity of the highway interchange between Moanalua Freeway (H-201) and H-3. In its lower reaches, Hālawa Stream crosses the southeastern part of the Project Site where it continues downstream and eventually turns westward before discharging into an estuary that opens into the East Loch of Pearl Harbor. (See Figure: 2-9 Surface Waters Map).

Hālawa Stream is classified by the Department of Land and Natural Resources (DLNR), Division of Aquatic Resources (DAR) as a perennial stream (watershed code 34002) with a total stream length of 35.4 km or 22 mi (DLNR-DAR, 2008). Seventy percent of the Hālawa watershed is in the State Conservation District while the lower thirty percent of the watershed is in the State Urban District (DLNR-DAR, 2008). Hālawa Stream is also classified by the Hawai'i Department of Health (DOH) as Class 2 inland waters. Pursuant to HAR §11-54-3, Class 2 inland waters are recognized as waters to be used for "*recreational purposes, the support and propagation of aquatic life, agricultural and industrial water supplies, shipping, and navigation. The uses to be protected in this class of waters are all uses compatible with the protection and propagation of fish, shellfish, and wildlife, and with recreation in and on these waters. These waters shall not act as receiving waters for any discharge which has not received the best degree of treatment or control compatible with the criteria established for this class.*"

Where Hālawa Stream crosses the Project Site, it is confined within a concrete-lined channel below the general site elevation. A Natural Resources Assessment conducted by AECOS, Inc. (AECOS) in conjunction with the NASED EIS process included an inventory of vegetation growing within this channel. A water-obligate avian survey was also performed; however, no specific survey of the aquatic fauna was made for the reason that the stream is entirely confined by concrete sides and bottom and numerous previous surveys provide sufficient information on stream biota, both upstream and downstream of the stadium property. The most recent survey was made for repairs to the Salt Lake Boulevard Bridge (AECOS, 2011b). Although the bridge is located just off the stadium property, the 2011 AECOS survey included the lower end of the channel within the stadium parking lot. The concrete bottom presumably ends a short distance downstream of the Salt Lake Boulevard Bridge, although the terminus is buried under sediment (2011a).

Water quality measurements and samples for lower Hālawa Stream were collected downstream from the Salt Lake Boulevard Bridge on 314 sampling events between January 2003 and February 2010 (AECOS, unpub.) as part of a construction monitoring program. Water temperatures and pH levels were generally in compliance with State of Hawai'i water

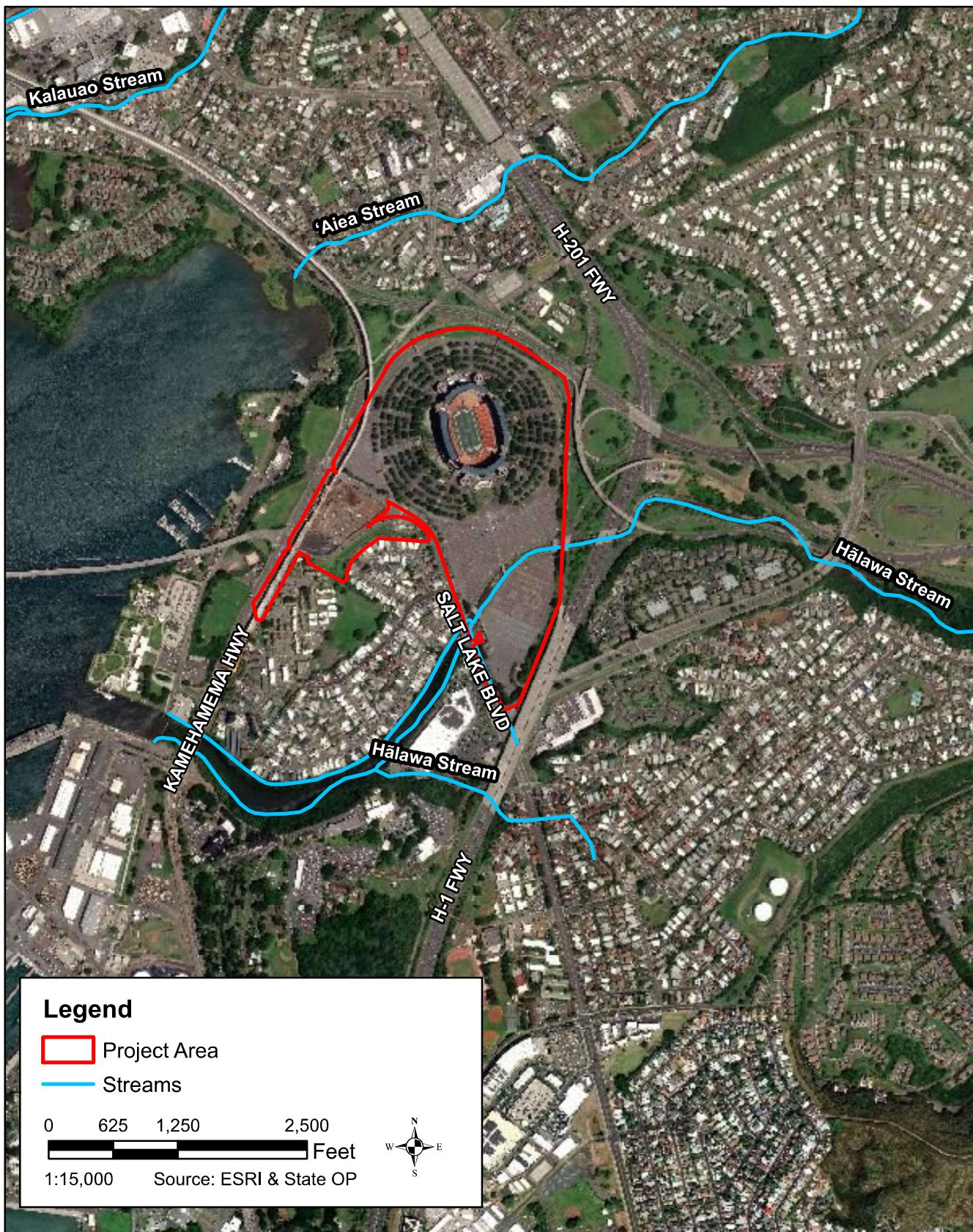


FIGURE 2-9

## Surface Water Map

New Aloha Stadium Entertainment District  
Hālawa, O'ahu, Hawai'i

quality standards (HDOH, 2009). Dissolved Oxygen (DO) saturation was in compliance with the state criterion (80% saturation) about 60% of the time. Lower DO saturation may be associated with tidal fluxes in this upper estuarine reach of Hālawa Stream. The geometric means for turbidity and total suspended solids (TSS) exceeded both “wet” and “dry” season criteria. The relatively high particulate levels (turbidity and TSS) in the lower reach of Hālawa Stream likely resulted from erosion and surface runoff during episodic events, and tidal exchange with turbid water entering from Pearl Harbor.

Three water quality sampling stations were established for the Salt Lake Boulevard Bridge Project Region. Due to low water flow, these sample locations were selected based on sufficient water level for filling sample bottles. The “Upstream” station was located within the concrete channel at the Project Site (one meter upstream of the bridge). The intermediate station, identified as “Bridge,” was located just downstream of the Salt Lake Boulevard Bridge off the right bank and just downstream from the end of the concrete streambed. The “Downstream” station was located another meter downstream of the Salt Lake Boulevard Bridge and downstream from the hardened concrete channel where the streambed is natural. Results of the water quality samples that were taken on June 15, 2011. Water temperature was warmer at the Upstream and Bridge stations than the Downstream station. Conductivity was high at the Downstream station, which is evidence that this station is tidally influenced. The water was supersaturated with oxygen at each of the stations, which is the result of photosynthesis by algae in the water or growing on the bottom. Differences in pH were probably a function of this photosynthetic activity, and the slight salinity at the Downstream station. The highest pH (9.11 pH units) occurred along with the highest DO saturation (157%) at the Upstream station. Photosynthetic activity by algae results in an uptake of carbon dioxide ( $\text{CO}_2$ ) from the water, raising the pH and increasing DO. Salinity was less than 1 ppt upstream from the bridge and at the bridge and 2 ppt at the Downstream station on June 15, 2011.

### **2.9.2 Coastal Waters**

The nearest coastal water offshore of the Project Site is ‘Aiea Bay, which is located approximately 0.5 miles to the west of the Project Site situated within the East Loch of Pearl Harbor. Pearl Harbor is a natural estuary formed by successive periods of flooding during glacial epochs. A combination of perennial and intermittent streams, as well as several springs and small dry gulches discharge into Pearl Harbor. Pearl Harbor is recognized as Hawai‘i’s largest natural estuary and possesses a rich diversity of salt-tolerant aquatic species, many of which are important to recreational and subsistence fisheries. The waters surrounding the entrance to Pearl Harbor are classified by DOH as Class A marine waters (See Figure: 2.11 Marine Water Classification). Pursuant to HAR §11-54-3, Class A marine waters are recognized as waters to be used for *“recreational purposes and aesthetic enjoyment to be protected. These waters shall not act as receiving waters for any discharge which has not received the best degree of treatment or control compatible with the criteria established for this class.”*



FIGURE 2-10  
Marine Water Classification Map

New Aloha Stadium Entertainment District  
Hālawa, O'ahu, Hawai'i

From the Kamehameha Highway Bridge, Hālawa Stream discharges into an estuary some 40 meters (130 feet) across and subject to the tide. Red mangrove forms a grove or mangal that occupies most of the shoreline, with some Pickelweed (*Batis maritimus*) covering the ground where mangroves are not present. The stream is incised some 10 meters (30 feet) in natural material, but likely represents fill. Tidal influence extends upstream to the concrete footings of the Salt Lake Boulevard Bridge. Surface salinities near the Kamehameha Highway Bridge range between 30 to 37 psu (Practical Salinity Unit - seawater is 35-36 psu), whereas salinities near Salt Lake Boulevard range from 0 psu (freshwater) in the usually weak flowing channel to 26 to 32 psu a short distance into the estuary (Englund et al., 2000).

### 2.9.3 Groundwater

The Southern O'ahu Basal Aquifer is the island's principal freshwater resource, and underlies virtually all of southern O'ahu. It consists of a lens-shaped body of freshwater that floats atop a broader lens of denser seawater within O'ahu's porous volcanic rock base, forming what is known as a basal aquifer. The fresh water lens is held in place by the island's outlying caprock, which has a lower permeability than the volcanic rock and is composed of layers of marine and terrestrial sediments and clays as well as coral reef, organic debris, and volcanic deposits. The aquifer is thickest in the central part of Southern O'ahu, thins toward the coastline, and is recharged by rainfall in mauka areas of Honolulu and the Leeward Coast.

The Project Site is located within the Pearl Harbor Aquifer Sector (302) in the Waimalu Aquifer System (30201) as identified by Commission on Water Resources Management (See Figure 2-11: Aquifer Map). Groundwater in this aquifer system occurs as basal (at sea level) and high-level (well above sea level). Caprock present in this aquifer system reduces the flow of fresh water from the basal aquifer outward to the surrounding ocean; however, this aquifer type is a basal flank meaning freshwater is in contact with seawater and the water table is in the upper surface of the saturated aquifer, with horizontally extensive lavas (Lau, 1990). Although these waters are potable, they are highly vulnerable to contamination from seawater. As a result of the existing salinity issues with wells in this aquifer system, the sustainable yield of the Waimalu Aquifer System is limited to 45 million gallons per day (mgd).

DOH established an Underground Injection Control (UIC) program to protect the quality of Hawai'i's underground sources of drinking water from chemical, physical, radioactive, and biological contamination that could originate from injection well activity. The UIC line serves as a boundary between potable and non-potable water portions of the underlying aquifers. The Project Site is located above the UIC line, indicating that the underlying aquifer is considered a drinking water source. Although, new sewage injections wells have been further prohibited effective July 5<sup>th</sup>, 2018. Hawaii revised Statutes 340E-2(e) states "The director shall promulgate regulations establishing an underground injection control program. Such program shall prohibit any underground injection which is not authorized by a permit issued by the director; provided that the director shall not issue permits for the

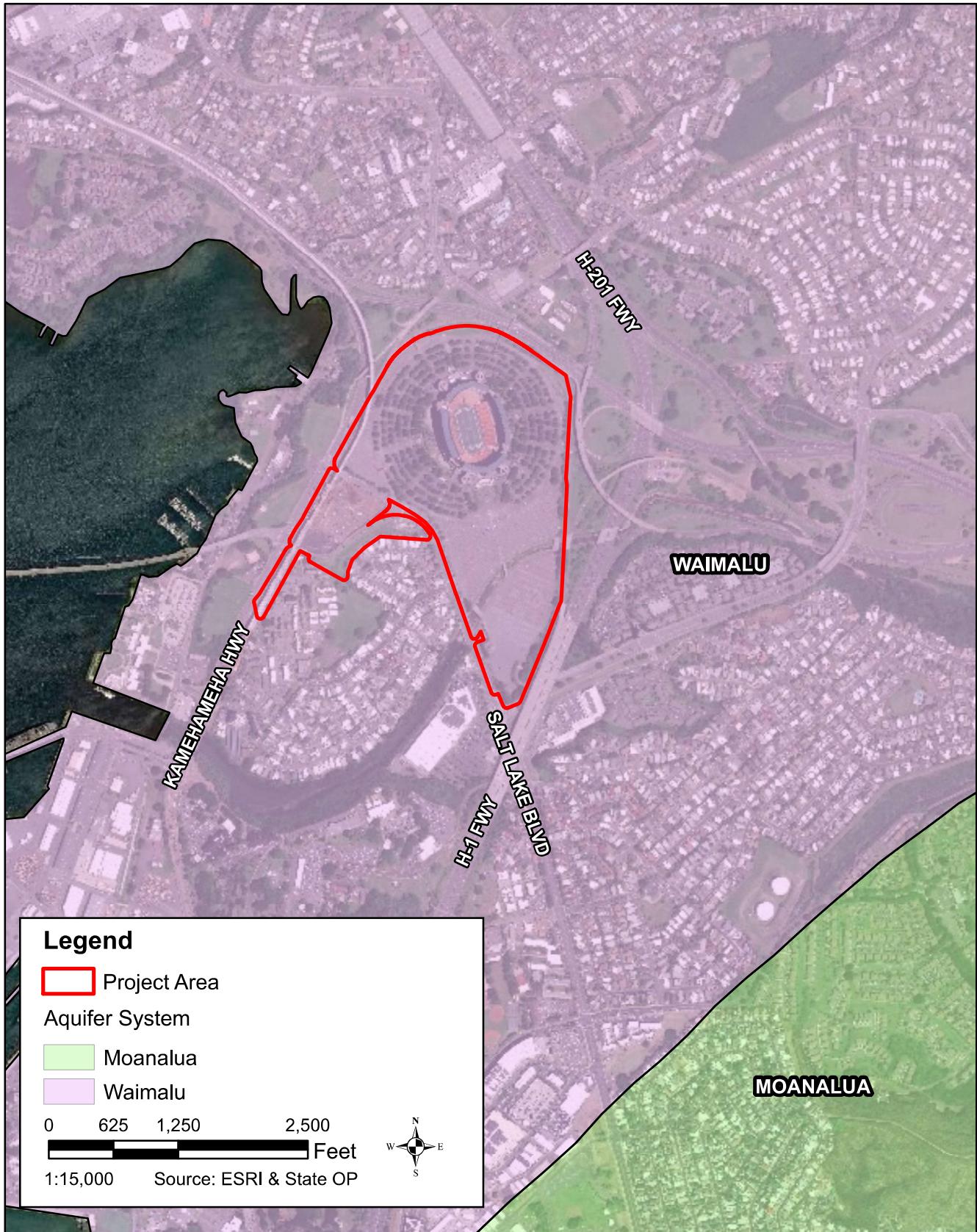


FIGURE 2-11  
Aquifer Map

New Aloha Stadium Entertainment District  
Hālawa, O'ahu, Hawai'i

construction of sewage wastewater injection wells unless alternative wastewater disposal options are not available, feasible, or practical.”

In terms of CCH regulation, the Project Site is generally outside of the CCH Board of Water Supply's (BWS) established “No Pass” line. In areas makai of the “No Pass” line, all types of disposal systems (which meet suitable treatment standards) are acceptable to the BWS. Disposal above the “No-Pass” line is subject to careful review to ensure that no threat to groundwater supplies occurs. Only a small portion on the southwest end near the future HART station is within the “No-Pass” line. To further clarify, the installation of waste disposal facilities, which may contaminate groundwater resources used or expected to be used for domestic water supplies, are prohibited in the “No Pass” line area.

## **2.10 DRAINAGE SYSTEM**

Project Site topography varies greatly in elevation throughout, as it has been significantly altered by above grade development that includes the existing Aloha Stadium, concrete walkways, and paved parking areas. The existing elevation of the playing field housed inside the existing Stadium is at 20-feet MSL while the parking lot surrounding the stadium varies from 55-feet to 30-feet MSL. The parking lot just north of Hālawa Stream generally slopes from north to south with elevations ranging from 28-feet to 16-feet mean sea level (MSL). The parking lot just south of Hālawa Stream generally slopes from east to west with elevations ranging from 26-feet to 14-feet MSL. Existing storm runoff from rainfall on or within the development area sheet-flows and is collected by onsite storm drain inlets throughout the site and discharged to Hālawa Stream. The existing topography of the Project Site divides the storm water runoff collection system into eleven (11) drainage areas(See Figure: 2-12 Existing Storm Drainage Systems).

- Storm water runoff from rainfall on or within basin E1 is collected by a series of drain inlets and is conveyed to a main drain line varying in size from 30 to 48-inches, which eventually discharges to Hālawa Stream, denoted as DP1.
- Storm water runoff from rainfall on or within basin E2 is collected by a series of drain inlets and is conveyed to a 54-inch main drain line which eventually discharges to Hālawa Stream, denoted as DP2.
- Storm water runoff from rainfall on or within basin E3 is collected by a series of drain inlets and is conveyed to a main drain line varying in size from 30- to 48-inches, which eventually discharges to Hālawa Stream, denoted as DP3.
- Storm water runoff from rainfall on or within basin E4 sheetflows offsite to the landscaped area on the ewa side of Queen Liliuokalani Freeway.
- Storm water runoff from rainfall on or within basin E5 is collected by a drain inlet and is conveyed to a 30-inch drain line which eventually discharges to Hālawa Stream, denoted as DP4.
- Storm water runoff from rainfall on or within basin E6 is collected by a series of drain inlets and is conveyed to a main drain line varying in size from 24- to 36-inches, which eventually discharges to Hālawa Stream, denoted as DP5.
- Storm water runoff from rainfall on or within basin E7 is collected by a series of drain inlets and is conveyed to a main drain line varying in size from 18- to 36-inches, which eventually discharges to Hālawa Stream, denoted as DP6.

Storm water runoff from rainfall on or within basin E8 is collected by a series of drain inlets and is conveyed to a main drain line varying in size from 18 to 30-inches, which eventually connects to an existing catch basin along Salt Lake Boulevard, denoted as DP8.

- Storm water runoff from rainfall on or within basin E9 is collected by a series of drain inlets and is conveyed to a main drain line varying in size from 18 to 30-inches which eventually connects to an existing catch basin along Salt Lake Boulevard, denoted as DP8.
- Storm water runoff from rainfall on or within basin E10 sheetflows offsite to Kamehameha Highway.
- Storm water runoff from rainfall on or within basin E11 sheetflows offsite to Salt Lake Boulevard.

The total drainage area for the Project Site was determined to be 97.08 acres and is comprised of the aforementioned eleven (11) drainage areas. The total existing storm runoff flow rate is calculated at 413.56 cfs.

## **2.11 Roadways**

The Project Site is located adjacent to Kamehameha Highway in Hālawa. The Project Site is bounded by Kamehameha Highway to the west, the H-1 Freeway to the east, the Moanalua Freeway (H201) to the north, and Salt Lake Boulevard to the south. Currently, primary access to the Project Site is provided via driveways off Kamehameha Highway and Salt Lake Boulevard and it is anticipated that these driveways will continue to provide primary access to the Project Site.

**Existing Storm Drainage System**

New Aloha Stadium Entertainment District  
Hālawa, Oahu, Hawai‘i

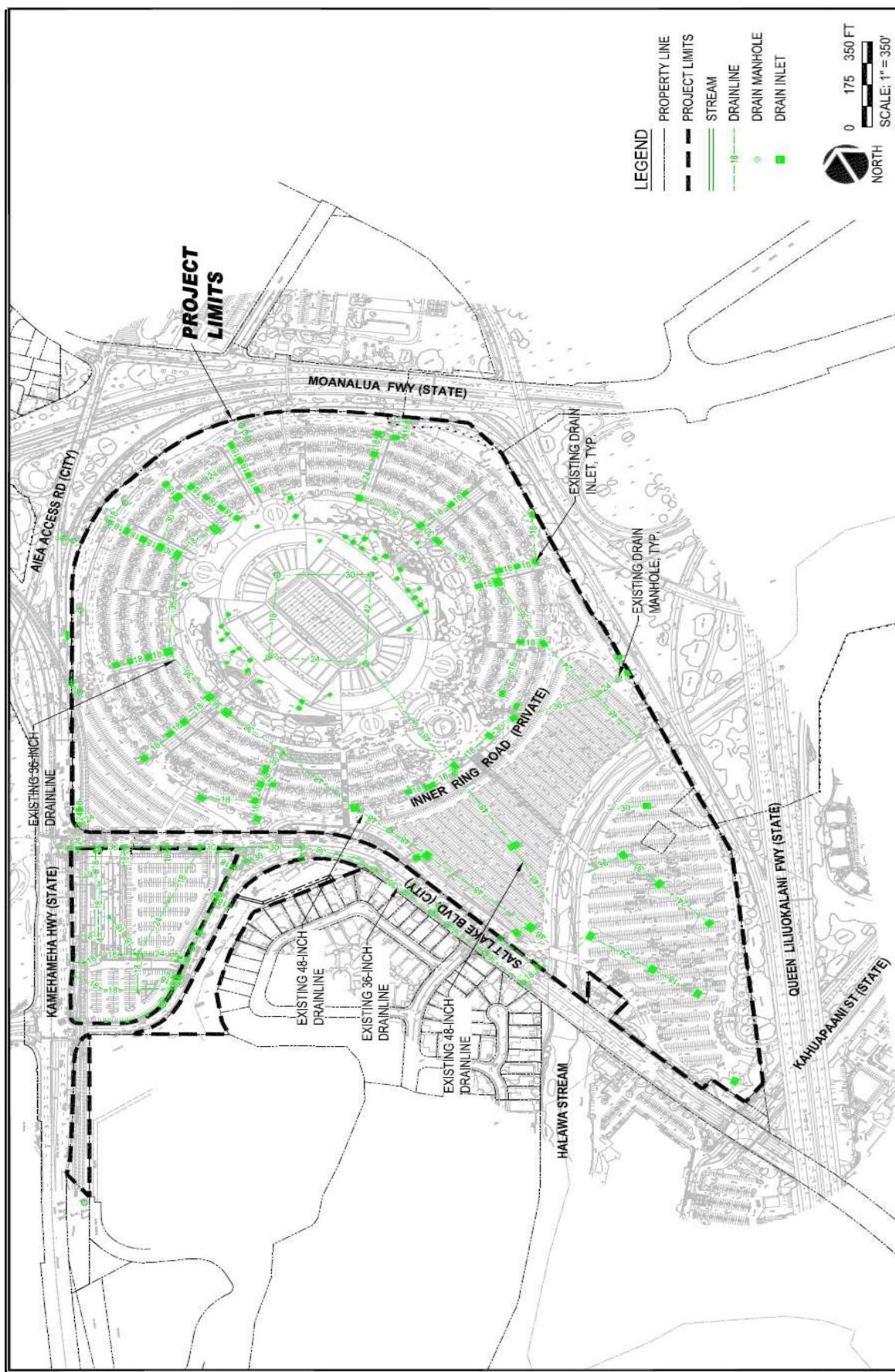


FIGURE 2-12

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### 3. CLIMATE CHANGE FRAMEWORK

#### 3.1 Current State of Climate Change

The Intergovernmental Panel on Climate Change (IPCC) is the United Nations body responsible for assessing the science related to climate. Through its comprehensive assessment reports, the IPCC determines the state of scientific, technical and socio-economic knowledge on climate change. It identifies where there is agreement in the scientific community on topics related to climate change, and where further research is needed. The IPCC most recently completed its Fifth Assessment Report in 2014 and is currently working towards completing its Sixth Assessment Report by 2022.

According to the IPCC's Fifth Assessment Report, observed changes in the climate system have been happening at unprecedented rates since the 1950's. These observed changes include global temperature rise, warming oceans, shrinking ice sheets, glacial retreat, decreased snow cover, declining arctic sea ice, sea level rise, extreme weather events, and ocean acidification. Research indicates that over two centuries of unabated greenhouse gas (GHG) emissions from anthropogenic (originating in human activity) sources is responsible for increases in global atmospheric temperatures and ocean warming.

GHGs help to regulate the temperature of our atmosphere by absorbing heat emitted from the Earth's surface. GHGs include water vapor ( $H_2O$ ), carbon dioxide ( $CO_2$ ), ozone ( $O_3$ ), methane ( $CH_4$ ), nitrous oxide ( $N_2O$ ), and chlorofluorocarbons. Although these gases occur naturally in Earth's atmosphere, excess quantities can raise global average temperatures above the range of natural variability (UH Sea Grant, 2014). Anthropogenic GHG emissions, such as burning of fossil fuels and deforestation, have driven large increases in the atmospheric concentrations of carbon dioxide, methane, and nitrous oxide since the pre-industrial era. Emissions of carbon dioxide from fossil fuel combustion and industrial processes alone have contributed about 78 percent of the world's total GHG emissions increase from 1970 to 2010, with a similar percentage contribution for the increase during the period 2000 to 2010 (IPCC, 2014).

In recent decades, observed changes in climate have caused impacts on natural and human systems throughout the world. For example, some regions have experienced an increase in extreme heavy rainfall events that have led to widespread flooding and caused billions of dollars in infrastructure and crop damage. At the other extreme, some regions have experienced significant decreases in rainfall leading to more persistent drought conditions which in turn have depleted fresh water sources, affected the ability to grow food, and resulted in greater wildfire risk. Impacts such as these and many others related to climate change are expected to continue into the future, especially if GHG emissions remain consistent with current rates. Therefore, substantial and sustained reductions in GHG emissions, together with implementation of adaptation strategies, are needed to limit climate change risks (UNFCCC, 2020).

#### 3.2 Climate Change Impacts in Hawai'i

Climate change is a global issue that affects regions differently. The Pacific Islands Regional Climate Assessment (PIRCA) developed a comprehensive report, *Climate Change and*

*Pacific Islands: Indicators and Impacts* (Keener et al., 2012), to assess climate change and its impacts on Pacific Islands. Key findings of the assessment consisted of the following:

- *Low islands, coral reefs, nearshore and coastal areas on high islands, and high elevation ecosystems are most vulnerable to climatic changes.*
- *Freshwater supplies will be more limited on many Pacific Islands, especially low islands, as the quantity and quality of water in aquifers and surface catchments change in response to warmer, drier conditions coupled with increased occurrences of salt water intrusion.*
- *Rising sea levels will increase the likelihood of coastal flooding and erosion, damaging coastal infrastructure and agriculture, negatively impacting tourism, reducing habitat for endangered species, and threatening shallow reef systems.*
- *Extreme water levels will occur when sea-level rise related to longer-term climate change combines with seasonal high tides, interannual and interdecadal sea-level variations (e.g., ENSO, Pacific Decadal Oscillation, mesoscale eddy events), and surge and/or high runup associated with storms.*
- *Higher sea-surface temperatures will increase coral bleaching, leading to a change in coral species composition, coral disease, coral death, and habitat loss.*
- *Rising ocean acidification and changing carbonate chemistry will have negative consequences for the insular and pelagic marine ecosystems; although potentially dramatic, the exact nature of the consequences is not yet clear.*
- *Distribution patterns of coastal and ocean fisheries will be altered, with potential for increased catches in some areas and decreased catches in other areas, but open-ocean fisheries being affected negatively overall in the long-term.*
- *Increasing temperatures, and in some areas reduced rainfall, will stress native Pacific Island plant and animal populations and species, especially in high-elevation ecosystems, with increased exposure to non-native biological invasions and fire, and with extinctions a likely result.*
- *Threats to traditional lifestyles of indigenous communities in the region (including destruction of coastal artifacts and structures, reduced availability of traditional food sources and subsistence fisheries, and the loss of the land base that supports Pacific Island cultures) will make it increasingly difficult for Pacific Island cultures to sustain their connection with a defined place and their unique set of customs, beliefs, and languages.*

- *Mounting threats to food and water security, infrastructure, and public health and safety will lead increasingly to human migration from low islands to high islands and continental sites.*

In addition to the PIRCA Report, the University of Hawai'i Sea Grant College Program prepared and published in 2014 “*Climate change impacts in Hawai'i - A summary of climate change and its impacts to Hawai'i's ecosystems and communities.*” This assessment provides a detailed report on climate change indicators. The report found that the State of Hawai'i similarly experiences region-specific impacts attributed to climate change, including chronic flooding during king tides, severe shoreline erosion, changes in rainfall patterns, and more intense storms. While there is little consensus about the exact nature, magnitude, and timing of these impacts, evidence indicates that there has clearly been a rise in air and sea surface temperatures, a decrease in the prevailing northeasterly trade winds, a decline in average rainfall with widely varying precipitation patterns on each island, a decrease in stream base flow, an increase in ocean acidity, and sea level rise.

### **3.3 Climate Change Regulations**

Climate change impacts are being addressed to varying degrees at all government levels. The overarching policies and guidelines currently serving as a framework for climate change regulations applicable to the project are summarized in the following sections.

#### **3.3.1 Federal Policies and Guidelines**

There is currently no comprehensive federal approach to address climate change in the United States. However, there are a number of tools that policymakers could use to help institute change and facilitate progress, such as government research and development programs, voluntary programs, traditional regulations, and market-based programs. The following are some examples of how policies related to climate change have been incorporated into the existing policy framework:

- Regulatory controls under the Clean Air Act.
- Energy policy laws requiring the Department of Energy to partner with the private sector to research, develop, and deploy clean energy technologies, and to set energy efficiency standards for appliances and equipment.
- Standards set by the Department of Transportation that improve the fuel economy of motor vehicles.
- Planning undertaken by the Department of Defense to prepare for global security consequences of climate change.

In 2016, the United States entered into a landmark environmental accord known as the Paris Agreement to address climate change and its negative impacts. The agreement is aimed at substantially reducing global greenhouse gas emissions in an effort to limit the global temperature increase in this century to 2 degrees Celsius above pre-industrial levels, while pursuing means to limit the increase to 1.5 degrees Celsius. All major emitting countries provided commitments to cut their emissions and to strengthen those commitments over

time. The Paris Agreement also allows for developed nations to assist developing nations in their climate mitigation and adaptation efforts, and it creates a framework for the transparent monitoring, reporting, and refining of countries' individual and collective climate goals. At present, 190 of the 197 signatories of the agreement have formally ratified and adopted the Paris Agreement. The United States recently withdrew from the Paris Agreement in 2020. Now as of 2021, the United States has reentered the Paris Agreement.

### **3.3.2 State Policies and Guidelines**

Act 234, Session Laws of Hawai'i 2007, established the State's policy framework and requirements to address Hawai'i's GHG emissions. The law aims to achieve emission levels at or below Hawai'i's 1990 GHG emission levels by January 1, 2020 (excluding emissions from airplanes). In 2008, the Hawai'i Clean Energy Initiative (HCEI) was launched serving as a framework of statutes and regulations supported by a diverse group of stakeholders committed to Hawai'i's clean energy future. Several years later, Act 234 went on to serve as the foundation for Hawai'i's GHG program, and in 2014, Hawai'i Administrative Rules (HAR), Chapter 11-60.1 was amended to adopt the new Hawai'i GHG program. The main requirements of the program are set forth in Subchapter 11, Greenhouse Gas Emissions. In part, the rules established a facility-level 16 percent GHG emissions cap for large existing stationary sources with potential carbon dioxide equivalent (CO<sub>2</sub>e) GHG emissions at or above 100,000 tons per year in an effort to reduce overall GHG emissions.

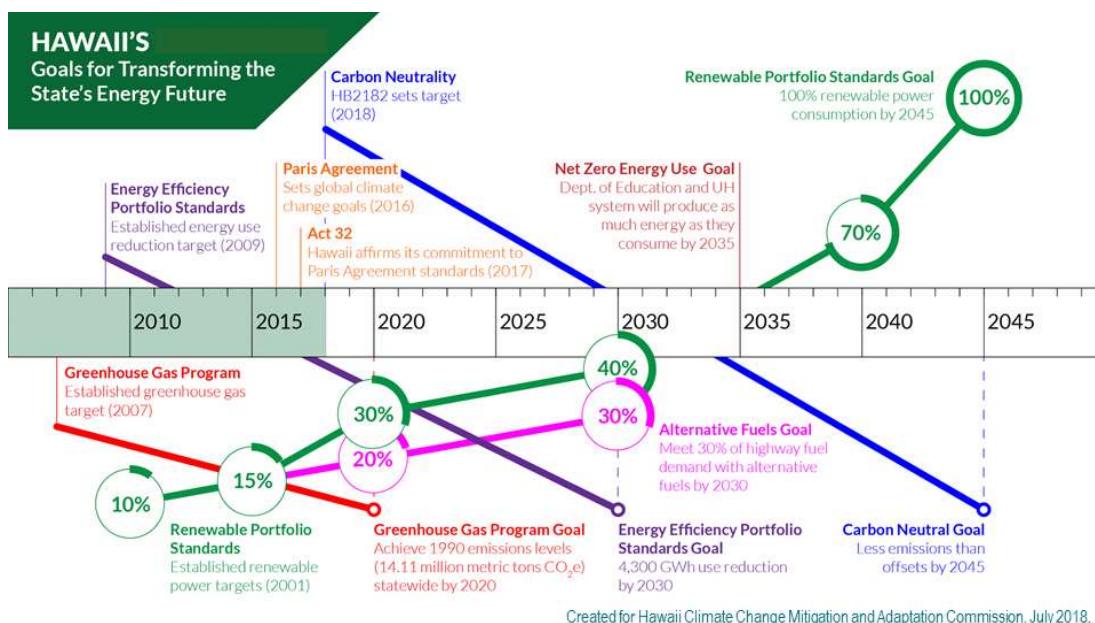
In 2014 the State of Hawaii Launch an environmentally conscious public-public initiative called "Aloha+ Challenge" to reach Hawai'i social, economic and environmental; goals by 2030. This initiative identified six priority goals and local metric work to fulfill the United Nations Sustainable Development Goals (SDGs). The six priority goals are comprised of clean energy transformation, local food production and consumption, natural resource management, Solid waste reduction, smart sustainable communities and green workforce and education. The Aloha+ challenge has made significant progress as several objectives such as percentage of renewable energy used state wide, average fuel uses per capita an percentage of solid waste diverted from landfills are on track to fulfill the state goals. Additionally, State net greenhouse gas emissions and gallons per day of water recharge, conservation and reuse are both near target.

HAR Section 11-60.1-204(k) also requires the State Department of Health (DOH) to provide reports with updated GHG emissions inventories showing progress towards achieving the statewide GHG emission limit of equal to or below 1990 GHG levels by 2020. The most recently released report is the *Hawai'i Greenhouse Gas Emissions Report for 2016* dated December 2019 prepared for DOH by ICF and the University of Hawai'i Economic Research Organization (UHERO). As of 2016, the statewide GHG emission limit of 10.84 million metric tons of carbon dioxide equivalent (MMT CO<sub>2</sub>e) has been reached, and statewide GHG projections of 8.37 MMT CO<sub>2</sub>e and 6.43 MMT CO<sub>2</sub>e for 2020 and 2025, respectively, indicate Hawai'i is on target to meet its statewide GHG emissions limit by 2020. These findings, however, will continue to be updated with future assessments.

The State of Hawai'i further demonstrated its commitment to reducing greenhouse gas emissions by enacting legislation to implement a portion of the Paris Agreement. In 2017, the State of Hawai'i signed Senate Bill 559 (Act 032) into law expanding strategies and mechanisms to reduce greenhouse emissions statewide in alignment with the principles and

goals adopted in the Paris Agreement. The State also passed House Bill 1578 (Act 033) that same year which established the Carbon Farming Task Force within the Office of Planning to identify practices in agriculture, aquaculture, and agroforestry that improve soil health, increase forest carbon, and promote carbon sequestration—the capture and long-term storage of atmospheric carbon dioxide to mitigate climate change. Another outcome of the Paris Agreement was creation of the Hawai'i Climate Change Mitigation and Adaptation Commission ("State Climate Commission"). The Commission's priorities are focused on ground transportation emissions reduction and adaptation to sea level rise, including disaster recovery and preparedness.

In 2018, the State of Hawai'i took additional action by passing House Bill 2182 which established a statewide target aiming to make Hawai'i carbon neutral, sequestering more atmospheric carbon and greenhouse gases than emitted, by 2045. The bill also set forth a commitment to achieve 100 percent renewable energy by 2045 and renamed the 2017 Carbon Farming Task Force as the Greenhouse Gas Sequestration Task Force making it permanent along with the Hawai'i Climate Change Mitigation and Adaptation Initiative. Furthermore, the Office of Planning released a feasibility report with recommendations for establishing a framework for a carbon offset program in Hawai'i pursuant to House Bill 1986. Other established targets set for the State include reducing electricity consumption by 4,300 GWh by 2030, and the counties' shared goal of 100 percent clean transportation by 2045.



**Figure 3-1: State of Hawaii Energy Goal Timeline:**  
Timeline illustrating the energy and climate change related goals established by the State of Hawai'i (Source: Hawai'i Climate Change Mitigation and Adaptation Commission, 2018).

### 3.3.3 County Policies and Guidelines

Honolulu is now signed onto the Paris climate agreement, Chicago Climate Charter and most recently is one of the 25 winning cities in the \$70 million Bloomberg Philanthropies' American City Climate Challenge. In December 2018, the City Council adopted Resolution 18-221

demonstrating strong City support for achieving a 100% renewable-powered City transportation fleet by 2035.

Identified in the CCH's "Annual Sustainability Report 2020" is the CCH's most recent commitments and efforts to move towards a sustainable and climate resilient O'ahu. These commitments initiatives and pieces of legislatives to create a carbon free economy, sustainable city operations, clean transportation, a goal of 100% renewable energy and water security. To create a carbon free economy the initiative of Fossil Fuel Streets, a pledge to transition fossil fuel-free street by procuring with the help of partnerships a bus system that is zero emissions by 2025 and ensuring major areas of the City are zero emissions. The city also a member of the Power Past Coal Alliance, whose goal to phase out existing unabated coal power generation to move towards a carbon free economy, the alliance also carries the support of the State.

In an effort to make CCH operations more sustainable, the CCH has partnered with other major cities and counties throughout the United States to advocate for national climate policies and take collective action through the "We Are Still In" initiative. Likewise, the adaptation of Resolution 17-67, furthers CCH's commitment to achieve sustainable operation by requiring the administration to report to the City Council on its establishment of the CCSR, the development of Honolulu's Resilience Strategy, and other City actions as part of the Rockefeller Foundation's 100 Resilient Cities initiative grant agreement

Two pieces of legislation were passed to promote clean transportation, Resolution 17-166 and Revised Charter 6-1703(g). Revolution 17-166 is the CCH's commitment to sustainable transportation through the purchase of zero-emission buses. Revised Charter 6-1703(g) mandates the preparation of an energy conservation and emissions reduction plan for CCH transportation systems which shall include methods to meet State greenhouse gas reductions and clean energy plans.

Acts 097 and 15 both commit the CCH to renewable energy goals. Act 097 commits the CCH to 100% renewable electricity by 2045 and Act 15 commits the CCH to achieve a 100% clean energy and carbon neutrality future island-wide by 2045.

Several pieces of legislation were passed to promote water security. Resolution 18-55 urges the administration to increase the CCH's urban tree canopy by at least 35% by 2035. Moreover, Revised Ordinance 41-13 provides for better environmental control in order to improve the quality of life of its citizens by enacting protective regulations to safeguard exceptional trees within the CCH.

Additionally, the CCH's "Ola O'ahu Resilience Strategy" was prepared with the collective input of over 140 stakeholder and input from more than 2,200 individuals. Within the "Ola O'ahu Resilience Strategy" Climate security is addressed a major priority. To keep pace with climate change and create opportunities of resilience and sustainability within the community the resilience strategy sets the overall goals that include a clean energy economy, clean ground transportation and a climate resilient future. The three goals are comprised of several actions and objections to address climate change and mitigate future impacts it may have on O'ahu and the State of Hawai'i as a whole.

## 4. IMPACTS ANALYSIS

### 4.1 General Approach

This Climate Change – Sector Resilience Assessment document examines climate change impacts from a qualitative frame view that is primarily centered on available data and metrics published by the private sector and government agencies. Consideration of climate change impacts herein include both the impacts of climate change on the Proposed Action as well as the potential impact of the Proposed Action on climate change.

Impacts of climate change on the Proposed Action were based on region specific climate change trends identified for the State of Hawai'i. These identified trends consist of the anticipated rise in air and sea temperatures, a decrease in the prevailing northeasterly trade winds, a decline in average rainfall with widely varying precipitation patterns on each island, a decrease in stream base flow, an increase in ocean acidity, and general sea level rise (UH Sea Grant, 2014). Climate change trends that were likely to affect the Proposed Action were evaluated further to identify potential impacts and appropriate mitigation measures. As such, this section discusses climate change impacts related to temperature, rainfall, flooding, sea level rise, and coastal erosion. The potential impact of the proposed project on climate change was also evaluated and is discussed qualitatively in the context of GHG emissions as consistent with established statewide energy and climate change targets.

### 4.2 Temperature

#### 4.2.1 Data

Temperature data was referenced from the *Climate Change Impacts in Hawai'i - A summary of climate change and its impacts to Hawai'i's ecosystems and communities* report prepared in 2014 by the University of Hawai'i Sea Grant College Program (UH Sea Grant).

#### 4.2.2 Observation

Global mean temperature is projected to increase by at least 2.7°F (1.5°C) by the end of the century for intermediate to high future scenarios. Locally, the rate of warming air temperature in Hawai'i has quadrupled in the last 40 years at a rate of over 0.3°F (0.17°C) per decade and is projected to continue warming with a range of +4-5°F (2.2-2.8°C) for high emissions scenarios targeted by the year 2085 (Keener et al., 2013).

Warming air temperatures in Hawai'i could cause thermal stress for plants and animals and result in changes to terrestrial ecosystems and habitats. The difference between the nightly low and daytime high temperature, an important factor for many terrestrial species, is decreasing more rapidly in Hawai'i than the global mean (Safeeq et al., 2012). Warming could cause a shift in the habitat ranges of native plants that are situated at higher elevations (Krushelnycky et al., 2011). Endemic bird species, such as the Hawaiian honeycreeper, could also decline in population due to the warming of high-elevation forests where risk of avian disease transmission was previously low (Benning et al., 2002).

Aside from impacts on plants, animals, and ecosystems, warmer temperatures could in some cases result in lower agricultural yields, increased demand for energy required to operate

cooling systems, decreased water supplies, more frequent or prolonged drought conditions that can increase risk for wildfires, and increased risk for heat-related illnesses in humans.

Much of the heat trapped in the Earth's atmosphere is absorbed by the ocean. The strongest ocean warming is projected to be felt in tropical and Northern Hemisphere subtropical regions, with increases up to 3.6°F (2.0°C) in the upper ocean above 650 ft (200 m) by the end of the century. Sea surface temperatures have warmed between 0.13°F and 0.41°F (0.07°C and 0.23°C) per decade in the Pacific for the last 40 years. This trend is projected to accelerate, warming by 2.3°F to 4.9°F (1.3°C to 2.7°C) before the end of the century. This warming can influence ocean circulation and nutrient distribution and lead to coral bleaching events. As an island, O'ahu has both a heavy economic and cultural dependency on the ocean. Consequently, warming ocean temperatures could also have potential impacts on the economy and cultural practices, in addition to ocean ecosystems and processes.

#### **4.2.3 Impacts and Mitigation Measures**

##### **Water Resources:**

The impacts of climate change such as warming of the oceans are detrimental to the marine ecosystem and the water cycle which replenishes the watersheds and recharges the aquifers, that O'ahu relies on for potable water. Although, the Proposed Action is not anticipated to be directly affected by this aspect of climate change in the short-term, it is difficult to predict how the conditions may be impacted in the long-term. Nevertheless, the District Developer(s) should take steps to promote water resources resilience to anticipate, to the extent practicable, and prepare for uncertain future climate change related impacts. These mitigation measure could include but are not limited to the following:

- Minimize use on potable water on landscaping.
- Implement water efficient landscaping.
- Implement the proper use of grey water.
- Encourage the use of water efficient irrigation systems.

##### **Public Health:**

Temperature rise related to climate change can have extreme negative impacts that include but are not limited to heat waves, which induce heat related illnesses, drought, and availability of food. Climate change amplifies the intensity, duration, and frequency of extreme heat events. The Center for Disease Control and Prevention, acknowledges that extreme heat events, or heat waves are one of the leading causes of weather-related deaths in the United States (cdc.gov, 2020). In fact, between the years of 2004 to 2018, an average of 702 related deaths (415 with heat as the underlying cause and 287 as a contributing cause) occurred in the United States annually, additionally a total of 10,527 deaths resulting from exposure to heat related conditions were recorded during that time period (cdc.gov, 2020). As it relates to the Proposed Action increase of global air and sea temperatures will continue to rise and may reach an increase at least 2.7°F by the end of the century. Furthermore, the District Developer(s) should not negate the fact it will create a carbon footprint that will contribute to overall climate change. It is recommended that the District Developer(s) should implement mitigation measures to reduce the Proposed Action's

carbon footprint and promote activities that encourage sustainability with an emphasis on public health. These mitigations measure include but are not limited to:

- Implementation of cool resting areas.
- Providing ample potable water to ensure hydration.
- Maximization of green space and use of materials that reflect heat.
- Design that minimizes user exposure to extended periods of direct sunlight.
- Reduction of GHG emissions during the construction and operation of the Proposed Action.

### **Roads:**

According to the Environmental Protection Agency, climate change is anticipated to increase the frequency and intensity of some extreme weather events especially heat waves. The change in variability of temperature could increase the risk of delays, disruptions, damages and failure to our land-based transportation systems. Higher temperatures can cause pavement to soften and expand. This can create rutting and potholes, particularly in high-traffic areas and can place stress on bridge joints. Heat waves can also limit construction activities, particularly in areas with high humidity. With these changes, it could become more costly to build and maintain roads and highways. On the other hand, certain areas may experience cost savings and improved mobility from reduced snowfall and less-frequent winter storms since warmer winters may lead to reductions in snow and ice removal, as well as salting requirements. It is more likely for Hawai'i to experience the latter of the two possibility because of the tropical climate. The Proposed Action will be an attractive location for local residents and tourist alike to spend their leisure time. The demand from events held at the Proposed Action will generate a considered amount of use to the roadways that support the Proposed Action. Heavy trafficked roadways typically see rutting and the presents of potholes, adverse impacts stemming from climate change will accelerate the deterioration of the roadways. Although, the majority of these supporting roadways are outside Project Site boundaries, the District Developer(s) should endeavor to include the following mitigation measures to protect the supporting roadway network. These mitigation measures include but are not limited to:

- Increasing greenspace to absorb heat.
- Designing roadways to withstand 100-year storm event anticipated to occur more frequently.
- Reduction of GHG emissions during the construction and operation of the Proposed Action.
- Promote the use of multimodal transportation such as the HART, the City Bus system and carpooling.

### **Airports:**

Daniel K. Inouye International Airport (HNL) is the largest airport in the State of Hawai'i. HNL is also the closest airport to the Project Site being approximately 2.78 miles away. Similar to roadway infrastructure, increased temperatures and an increase in the frequency of extreme weather events such as heat waves will generate adverse impacts to airports and air

transportation related activities. Mainly the potential for temperature increase would limit aircraft performance such as ability to take off, the need for longer runways, limited payload capacity and/or fuel uptake. Tourism is the economic engine of the Hawai'i's economy, as well as O'ahu, and the majority of the tourist come to the O'ahu via commercial plane. The District Developer(s) should implement and promote sustainable design and mitigation strategies. These mitigation strategies include but are not limited to:

- Reduction of GHG emissions during the construction and operation of the Proposed Action.

## 4.3 Rainfall

### 4.3.1 Data

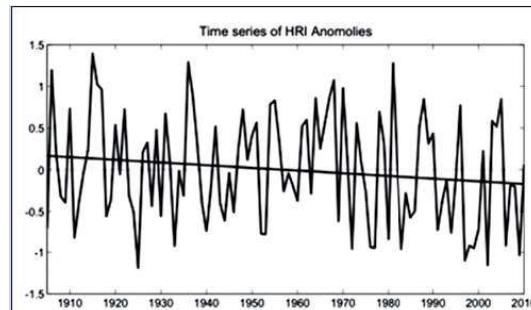
Rainfall data was obtained from *Interannual and Interdecadal Rainfall Variations in the Hawaiian Islands* by Pao-shin Chu and Huaiqun Chen. The study applied the following methods to determine rainfall within the Hawaiian Islands:

- Eleven-year or five-month running mean applied to the annual Hawaiian Rain Index (HRI) time series.
- Morlet Wavelet analysis.
- Nonparametric Mann-Whitney test.
- Measurement/ calculation of moisture divergence patterns

### 4.3.2 Observation

Rainfall in Hawai'i varies dramatically both temporally and spatially based on trade winds, topography, mid-latitude weather systems, storms and cyclones, and other climate patterns (Schroeder, 1993). Climate change, natural variability, land use, complex topography, and other factors combined present challenges to the accurate projection of future rainfall and runoff patterns. As a result, rainfall trends and projections vary from island to island, and even from valley to valley. Hence, there are varying precipitation patterns anticipated with climate change.

The overarching historical trend across the islands has been a decrease in total rainfall. Hawai'i's total annual average rainfall represented by the Hawai'i Rainfall Index, has decreased over the last century (Chu, 1995; Chen and Chu, 2005). Similarly, streamflow records show a decline in base flow over the last century by 20 to 70 percent, depending on the watershed, suggesting there could also be a declining trend in groundwater levels (Oki, 2004; Bassiouni and Oki, 2012; Giambelluca et al., 1991). Consistent with these trends, Hawai'i has experienced longer periods of drought in recent years (Chu et al., 2010). Part of the reason for these rainfall trends may be because prevailing northeasterly trade winds, which drive orographic precipitation on windward coasts, have decreased in frequency since 1973 in Hawai'i (Collins et al., 2010; Tokinaga et



**Figure 4-1: Rainfall Time Series Index:**  
Time-series of the Hawai'i Rainfall Index (HRI) showing a long-term decreasing trend over the last century (Source: Chen and Chu, 2005)

al., 2012; Garza et al., 2012). Data on individual rainfall events show that the number of high intensity rain events has decreased by 27 percent while the frequency of low intensity rain events has increased (Elison Timm et al., 2011; Chu et al., 2010). This trend varies by island though as rainfall has become less intense for the western islands (O'ahu and Kaua'i) over the last 60 years but more intense for the island of Hawai'i (east).

Projections show a potential increase in the frequency of extreme rain events, which can have implications for stormwater infrastructure, sustainable yield from aquifers, and water quality due to runoff into coastal waters. High intensity rainfall can also cause flash flooding, which is common in Hawai'i due to steep terrain and concrete stream channels, resulting in millions of dollars of flooding and infrastructure damage. It is projected that the southerly main Hawaiian Islands (Hawai'i and Maui) may become wetter towards the end of the 21st century while those in the north (Kaua'i and O'ahu) become slightly drier, although rainfall projections for Hawai'i are still quite uncertain (Keener et al., 2013). Statistical models also suggest that the summer dry months will become relatively wetter while winter wet months will become relatively drier in Hawai'i over open ocean environments (Lauer et al., 2013; Takahashi et al., 2011). It is still uncertain how this will translate over highly variable terrain in Hawai'i. It is anticipated that drier areas, especially those experiencing prolonged periods of drought, would be at greater risk for wildfires and stressed water supplies.

#### **4.3.3 Impacts and Mitigation Measures**

##### **Water Resources:**

As opposed to temperature, rainfall projections can be more difficult to predict. As it relates to water resources, climate change has resulted in a greater volatility in rainfall patterns. This volatility results in the end of two extremes, heavy periods of rainfall resulting in flooding and longer periods of drought. These two events can generate serious impacts on water resources. In the event of flooding, water resources can become contaminated with raw sewage, leaked toxic chemicals, and runoff from hazardous waste sites and factory farms. Water related infrastructure can also fail when a flooding event surpasses the capacity capabilities of drainage systems and can cause failure of sewage systems. In the event of extreme drought due to the lack of rainfall both the environment and population of a region will suffer. Freshwater drinking sources will shrink causing scarcity of potable water sources. Streams will also reduce in size and the flora and fauna that rely on them will reduce in population size. Drought will also increase water-borne diseases. The Proposed Action would be directly affected by impacts of water resources. It is recommended that the District Developer(s) promote and implement mitigation strategies that include but are not limited to:

- Sustainable design and water sustainability programs to limit the waste of potable water resources.
- Implement drainage systems that retain pollutants from the natural environment.
- Maximize square footage of green space to reduce runoff.
- Minimizing disturbance of soil during periods of heavy rain.
- The Hālawa estuary, and East Loch of Pearl Harbor would benefit in the long term from a more natural stream environment and riparian zone associated with Proposed Action's enhancements of the Hālawa Stream Channel.

##### **Public Health:**

Water resources are directly related to public health, as freshwater water is limited and the process of desalination is costly and requires a vast amount of energy to operate. When it comes to the effects of climate change on rainfall the major impacts are increased flooding and drought as mentioned. Increased flood events due to extreme rainfall will damage communities in flood prone areas as well as displace people from their homes. Flooding also increases the potential for drowning. During major flood events food and medical supplies is difficult to access as conditions for getting them pose the risk of injury or loss of life. The Proposed Action is located in flood zone X, this zone is characterized as an area of minimal flooding, where there is a 0.2 percent annual chance of flooding. It is recommended that the District Developer(s) implement mitigation measures to support resiliency of public health. The following mitigation measures include but are not limited to:

- Create design schemes that protect the users of the Proposed Action from exposure to the elements.

#### **Roads:**

Exposure to flooding events will shorten the life expectancy of highways and roads. The stress from flood waters may cause damage requiring more frequent maintenance, repairs, and rebuilding. Road infrastructure in low-lying areas are particularly sensitive to more frequent flooding. Although, Project Site is located outside critical flooding areas, it is recommended that project roads be constructed to tolerate flood events induced by extreme rainfall events. It is anticipated that the Proposed Action will not directly or indirectly result in significant impacts on rainfall patterns for the region, as GHG emissions generated by the Proposed Actions are anticipated to be negligible. However, it is recommended that the District Developer(s) implement mitigation measures to prevent from future possible adverse impacts. The following mitigation measures include but are not limited to:

- Onsite drainage system improvements that include concrete curbs and gutters, catch basins, manholes, underground drain lines, and stormwater quality treatment systems.

#### **Airports:**

Likewise, the (HNL) is susceptible to flooding. In the event of extreme rainfall, the flooding of runways has the potential prohibit the take-off and landing of plane resulting in the delay or cancellation of air travel until conditions are determined to be safe. The flooding could also result in the damage of the runway itself and other aviation related infrastructure and utilities. This would result in a substantial loss of revenue and increase of maintenance and maintenance costs. Considering the Project Site is approximately 2.78 miles from the nearest airport, the effects of rainfall at the airport will not directly affect the construction or operation of the Proposed Action.

- Reduction of GHG emissions of the Proposed Action that contribute to global GHG emissions.

## 4.4 Flooding

### 4.4.1 Data

According to the Flood Insurance Rate Map (FIRM), (Community Panel Number 0332H) prepared by the Federal Emergency Management Agency (FEMA), the Project Site is designated zone X, an area of minimal flood hazard, where there is a 0.2 percent annual chance of flooding. Therefore, the Proposed Action is exempt from FEMA flood requirements, as well as the requirements to secure flood insurance.

### 4.4.2 Observation

The nearest coastal water offshore of the Project Site is 'Aiea Bay, which is located approximately 0.5 miles to the west of the Project Site situated within the East Loch of Pearl Harbor. Pearl Harbor is a natural estuary formed by successive periods of flooding during glacial epochs. A combination of perennial and intermittent streams, as well as several springs and small dry gulches discharge into Pearl Harbor. The Project Site is located within the Pearl Harbor Aquifer Sector (302) in the Waimalu Aquifer System (30201) as identified by Commission on Water Resources Management. The nearest surface water in the vicinity of the Project Site is Hālawa Stream. Hālawa Stream is classified by the Department of Land and Natural Resources (DLNR), Division of Aquatic Resources (DAR) as a perennial stream (watershed code 34002) with a total stream length of 35.4 km or 22 mi (DLNR-DAR, 2008).

### 4.4.3 Impacts and Mitigation Measures

#### Water Resources:

Due to the location of the Proposed Action is unlikely that flooding will generate adverse impacts on the water resources in the proximity of the Project Site as it relates to the construction and operation of the Proposed Action. However, flooding triggered by SLR, hurricanes and other storm events are known to impact the island of O'ahu. It is recommended that the District Developer(s) take into consideration the occurrence of these events to happen more frequently as climate change evolves. In consideration of these flood events the following mitigation measures should include but are not limited:

- Any potential stream improvements within the Project Site would be sized and designed to accommodate large storm events in accordance with prevailing regulations.
- On a project-wide basis, all site drainage improvements, including excavation, drilling, and grading, should be done in accordance with applicable regulations and should be coordinated with the appropriate agencies during permitting and construction in order to ensure that the Proposed Action will not result in significant impacts regarding flood hazards.

#### Public Health:

Serious flooding events can be detrimental to the communities of O'ahu and the State of Hawai'i in general. Flooding can lead to destruction of homes, contamination of water, loss of power and in some events loss of life. As the Project Site is located within flood zone X, the

threat of flooding is low. It is recommended that the District Developer(s) implement mitigation measures to prevent adverse impacts of significant flooding events.

- Implement design and strategies that go align regulatory standards to ensure flooding will not affect public health within the Project Site.
- Maximize preamble square footage surfaces of the Project Site.

### **Roadways:**

Flooding can have the potential to wreak havoc on roadway infrastructure. The Project Site is located outside the flood zone XA and it is not anticipated that flooding would generate adverse impacts to roadways within the Project Site. As such mitigation measures come as a recommendation. The following mitigation measures should include but are not limited to:

- Construction roadways with the capacity to handle flooding events that more frequently.

### **Airport:**

The location of the HNL makes it extremely prone to flooding. However, the Airport is approximately 2.78 miles from the Project Site and it is not anticipated that construction or operation of the Proposed Action will increase the risk of flooding at the airport. With that in mind it is recommended that the District Developer(s) implement migration strategies during and after construction, such as:

Reduction of GHG emissions generated from construction and operation of the Proposed Action that contribute to cumulative global GHG emissions.

## **4.5 Sea Level Rise**

### **4.5.1 Data**

Data for SLR was referenced from the *Hawai'i Sea Level Rise Vulnerability and Adaptation Report* (2018) that was based on data from the Intergovernmental Panel on Climate Change's (IPCC) *Climate Change Synthesis Report Summary for Policymakers, Fifth Assessment Report* published in 2014. The following methods were used in the State report to determine the potential future exposure of each island to multiple coastal hazards as a result of sea level rise:

- Modeling for four future sea level rise scenarios: 0.5 feet, 1.1 feet, 2.0 feet and 3.2 feet based on the upper end of the IPCC Fifth Assessment Report representative concentration pathway 8.5, or "business as usual" sea level rise scenario.
- Projection of the SLR exposure area (SLR-XA) to determine the vulnerability of Hawaiian Islands to sea level rise.

### **4.5.2 Observation**

SLR increasingly threatens the future of shorelines and infrastructure located along the shoreline due to heightened impacts from coastal flooding, king tides, and storm surge. SLR also brings the water table closer to the surface, which can impact drainage during high tides

and periods of heavy rainfall. If GHG emissions are maintained at its current rate of increase, the IPCC predicts up to 3.2 feet of global SLR by the year 2100 (IPCC, 2014). However, recent observations and projections show that this magnitude of SLR could occur even sooner than that.

Over the next 30 to 70 years, homes and businesses in coastal areas will be severely impacted by SLR. Of the 9,400 acres of land located within the SLR-XA, approximately a third of those lands are designated for urban land uses. 3.2 feet of SLR was chosen to define SLR-XA to depict hazards that may occur in the mid to latter half of this century. With 3.2 feet of SLR, nearly 300 structures would be chronically flooded and more than 11 miles of major coastal roads would become impassable jeopardizing critical access to and from many communities. O'ahu has lost more than 5 miles of beaches to coastal erosion fronting seawalls and other shoreline armoring. Many more miles of beach could be lost with SLR, if widespread armoring is allowed.

#### **4.5.3 Impacts and Mitigation Measures**

The Project Site will not be subject to inundation pursuant to a 3.2-foot rise in sea level, as the site is not located near or within the SLR-XA areas (See Figure 2-8: Sea level Rise Exposure Map). Furthermore, it is anticipated that the Proposed Action will not directly or indirectly result in significant impacts on SLR, as GHG emissions generated by the Proposed Action are anticipated to be negligible.

#### **Water Resources:**

SLR poses similar impacts as flooding and extreme rainfall. However, opposed to flooding induced by heavy rainfall and extreme storm events, SLR has the potential for permanent flooding leaving vulnerable areas uninhabitable. SLR can increase the salinity of both surface waters and groundwater's through saltwater intrusion. SLR can also push saltwater upstream in coastal areas threatening the supply of surface water. Major sewage treatment facilities are on low-lying coastal lands, and similar facilities might need to relocate or build protective structures as SLR and storm surges increase. As the Project Site is located outside of SLR-XA areas, it is unlikely that impacts related to SLR will directly impact the Proposed Action's operation through its useful life. It is recommended that District Developer(s) implement appropriate measures to mitigate the impact of construction and operational activities towards the contribution to GHG emissions that drive climate change. The following recommended mitigation measures include but are not limited to:

- Incentivizing flood risk management.
- Promoting collaboration and accountability for adaptation.
- Protect nearshore water quality and communities from SLR impacts.

#### **Public Health:**

People living and working within the SLR-XA would be displaced when homes, condominiums, and businesses become flooded due to SLR. The potential number of people displaced is calculated by assigning an estimated occupancy for each type of structure in the SLR-XA. The potential number of displaced people island-wide could rise from 2,000 residents with 1.1 feet of sea level rise, to over 13,000 residents with 3.2 feet of sea level

rise. The people displaced would include a range of income levels and living arrangements. In addition, approximately 46% of the occupied housing units on O'ahu are occupied by renters (U.S. Census Bureau 2015b), so both homeowners and renters would be affected. To avoid the increase of potential impacts related to SLR, the District Developer(s) should include but not be limited to the following mitigation measures:

- Increased flood resiliency for Project Site designs.
- Prioritize smart urban development outside the SLR-XA and limit exposure with the SLR-XA.
- Preserve Native Hawaiian culture and communities with vulnerable to SLR.

#### **Roadways:**

SLR could have significant adverse impacts on roadways and transportation infrastructure. An estimated 5.5 miles of major roads would be flooded in the SLR-XA with 1.1 feet of sea level rise, increasing to over 17 miles with 3.2 feet of sea level rise. Portions of many coastal roads, such as Kamehameha Highway in the vicinity of the community of Ka'a'awa, would become chronically flooded and eroded away. Kamehameha Highway, in the vicinity of Ka'a'awa, is already one of the most vulnerable coastal highways in Hawai'i. It is ironic that Hawaiians referred to this area as He kai 'a'ai ko Ka'a'awa, a sea that wears away the land. Wide-spread damage of coastal highways would result in the loss of commerce, loss of access to emergency services, and increased traffic on other roads and highways, some of which serve as the only access in and out of many communities. Electric and telecommunication transmission lines commonly follow roads and those located underground in the SLR-XA may be impacted by sea level rise resulting in service disruptions. It is recommended that the District Developer(s) include but not be limited to the following mitigation measures:

- Building roadways within the Project Site to follow design standards that mitigate the potential impacts of SLR.
- Develop design standard to increase flood resiliency for existing and new development with the SLR-XA that cannot be relocated.

#### **Airports:**

The primary transportation arteries for the entry of people and goods to the State, HNL and Honolulu Harbor, would become increasingly exposed to chronic flooding from SLR. HNL is the busiest airport in the State, serves more than 19-million passengers a year and receives more than 228,000 tons of cargo (based on the amount of incoming cargo in 2014) (State of Hawai'i 2015). Interruption of interisland and transoceanic shipping and travel would impact residents, visitors, and all forms of economic activity. Mitigation measures implemented by the District Developer(s) will not directly impact the operation of the airport due to the Project Site's relative location to the airport. However, the District Developer(s) should implement but not be limited to the following mitigation measure:

- Reduction of GHG emissions generated from construction and operation of the Proposed Action that contribute to global GHG emissions.

## 4.6 Coastal Erosion

### 4.6.1 Data

Data for coastal erosion was referenced from U.S. Geological Survey's (USGS) 2011 assessment, *National Assessment of Shoreline Change: Historical Shoreline Change within the Hawaiian Island*. In the USGS assessment the following methods were implemented to evaluate shoreline erosion:

- Comparison and mapping of historical shorelines.
- Historical comparison of aerial photographs of the low water mark.
- Use of ArcGIS with DSAS version 4, to calculate change rates and rate uncertainties at regularly spaced transects (measurement locations) along the shore using the Single Transect method (ST). ST relies on various methods (for example, end point rate, least squares, weighted least squares) to fit a trend line to the time series of historical shoreline positions at a given transect.

### 4.6.2 Observation

O'ahu's beaches have experienced the conservable amount of erosion. The average long-term erosion rate for all transects is  $-0.17 \pm 0.01$  m/yr and the average short-term rate is  $-0.15 \pm 0.01$  m/yr. A study of historical shoreline changes in Hawai'i by the U.S. Geological Survey and the University of Hawai'i (Fletcher et al. 2012) found that 60% of O'ahu beaches are chronically eroding. Over the past century, shoreline hardening was the typical response when beachfront property was threatened by erosion or flooding. As a result, approximately 20 miles of O'ahu beaches are backed by seawalls and other shoreline hardening structures. Over 5 miles of beach fronting those structures has already been completely eroded away with waves now breaking directly against the structures.

### 4.6.3 Impacts and Mitigation Measures

Coastal erosion is a naturally occurring ocean process. Due to climate change, the effects of major storms, drought, destabilization of soil, and SLR have led to an accelerated rate of coastal erosion. The Proposed Action will not result in direct, indirect, or cumulative impacts related to coastal erosion due to its location away from the shoreline.

#### Water Resources:

As coastal erosion progress, it is anticipated that saltwater intrusion will be a growing threat to inland freshwater resources. Additionally, as coastal erosion removes the topsoil from the ground, toxins such as pesticides and fertilizers can be introduced to local waterways creating an adverse impact on overall water quality. It is recommended that the District Developer(s) implement but not be limited to the following mitigation measures:

- Promote Programs that support habitat maintenance and restoration.
- Implement landscaping that is resilient to coastal erosion.
- Minimize the use of harmful pesticides and fertilizers throughout the Project Site Landscaping.

### **Public Health:**

The impacts of coastal erosion on public health are similar to SLR. Coastal erosion leads to the loss of lands near the coast. Homes, business and parks located on the shores of Hawai'i that have begun to see the adverse impacts of coastal erosion and with SLR expected to continue the process of coastal erosion will follow at an accelerated pace. As the Proposed Action is not coastally dependent there are coastal erosion does not directly impact public health of the users of the Project Site. The Proposed Action may indirectly affect coastal erosion through its contribution to GHG emissions. With this in mind, it is recommended that the District Developer(s) undertake efforts to reduce GHG emissions generated from construction and operation of the Proposed Action that contribute to global GHG emissions.

### **Roadways:**

As mentioned previous the State of Hawai'i and specifically the island of O'ahu has built a considerable amount of roadways near the coastline that are within the flood zone XA. As mentioned SLR is expected to continue to progress, and these areas will continue become increasing more vulnerable to coastal erosion. Coastal erosion could result in significant cost to repair damaged or construct new roadways. However, the roadways within the Proposed Action are not anticipated to experience adverse impacts from Coastal Erosion. Nonetheless, it is recommended that the District Developer(s) should implement designs and strategies that will promote sustainability.

### **Airport:**

HNL's reef runway was the worlds' first major runway built entirely offshore. The Airport runways range from an elevation of 7.5ft to 11.8 ft above sea-level. Due to the airport's proximity to the coastline and topography of the coastal erosion possess as a notable threat to future operations of the airport. However, it is not anticipated the Proposed Action will directly impact current or future operation of the Airport. That being said, it is recommended that District Developer(s) should implement BMPs with a focus on sustainability to reduce its contribution to GHG emissions.

## **4.7 Greenhouse Gas Emissions**

### **4.7.1 Data**

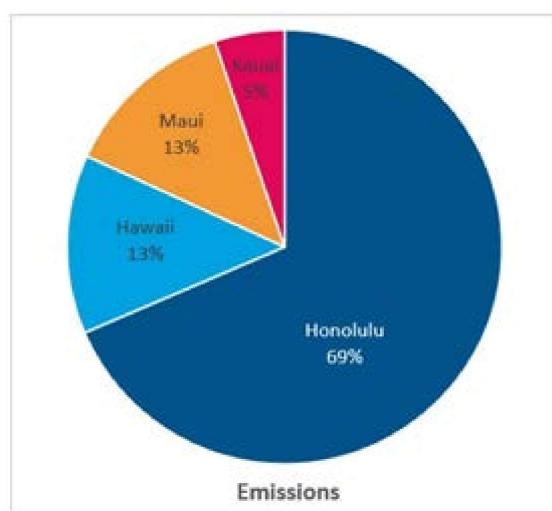
The *Hawai'i Greenhouse Gas Emissions Report for 2016* was used to determine emission trends for the County of Honolulu and as a basis to determine the potential impacts of the Proposed on climate change. This emissions report presents the emission estimates for the State of Hawai'i for 1990, 2007, and 2015; inventories estimates for 2016; and outlines emission projections for 2020 and 2025. Emission estimates presented in the report include anthropogenic GHG emissions and sinks – natural systems that absorb and store carbon dioxide from the atmosphere – from the following four sectors: Energy, Industrial Processes and Product Use (IPPU), Agriculture, Forestry, and Other Land Use (AFOLU), and Waste. Estimates and projections from the energy sector includes emissions resulting from stationary combustion (generated by the burning of fossil fuels to generate energy), transportation, and incineration of waste, and oil and natural gas systems.

Data needed to quantitatively evaluate GHG emissions at the project-level is not currently available. Therefore, a qualitative analysis was performed to determine the potential impact of the project on GHG concentrations in the atmosphere.

#### 4.7.2 Observation

The *Hawai'i Greenhouse Gas Emissions Report for 2016* estimates that emissions for City and County of Honolulu in 2016 accounted for 12.39 MMT CO<sub>2</sub>e, or 69 percent, of the total GHG emissions for the State, which was estimated at 19.59 MMT CO<sub>2</sub>e (ICF and UHERO, 2019). In 2016, emissions from the “Energy” sector accounted for the greatest share of the emissions in the State of Hawai'i at 16.94 MMT CO<sub>2</sub>e, or 83 percent. As a whole, total emissions for the State are projected to decrease by the years 2020 and 2025. Stationary combustion emissions from the commercial sector are projected to slightly increase in 2020 and 2025. However, it is expected these increases would be offset by even greater reductions in emissions projected from the energy industries due to gained efficiencies in energy production (ICF and UHERO, 2019). Emissions from the transportation sector are also projected to increase.

Emission levels are impacted by several factors, such as the overall level of economic activity, the type of energy and technology used, and land use decisions. The *Hawai'i Greenhouse Gas Emissions Report for 2016* determined a baseline projection for future emissions to the years 2020 and 2025 by relying heavily on projections of economic activities as well as an understanding of policies and programs that impact the intensity of GHG emissions. Due to the level uncertainty associated with these estimates, several alternative emissions scenarios were also developed in addition to a baseline projection. These alternatives considered changes related to world oil prices, development of renewable energy infrastructure, and adoption of ground transportation technology. Under most scenarios, the total emissions for the State were projected to be below 1990 emission levels. However, future scenarios where low oil prices, delays in the development of renewable energy infrastructure, and low adoption rate of ground transportation technology are considered, total emissions for the State were projected to be above 1990 emission levels.



**Figure 4-2: 2016 GHG Emissions by County (ICF and UHERO, 2019)**

#### **4.7.2 Impacts and Mitigation Measures**

Greenhouse gases of primary concern in land use development projects are carbon dioxide, methane, and nitrous oxide associated with the burning of fossil fuels for energy, transportation, or to operate heavy machinery. Other GHG are less of a concern because construction and operational activities associated with land use development projects are not likely to generate substantial quantities of these GHG. The proposed project is anticipated to generate GHG emissions during both construction and operation resulting in direct, indirect, and cumulative impacts to concentrations of GHG in the atmosphere.

Direct impacts during construction are anticipated to result primarily from exhaust emissions from the operation of construction equipment on-site. Indirect impacts during construction are expected to result from temporary increases in traffic from construction workers commuting to and from the site, temporary increases in traffic from roadway lane closures, and any "upstream" emissions that may be released through extraction or production of materials to build the project. Indirect impacts during operations are anticipated to result primarily from the burning of fossil fuels to generate energy for the operation of the Project Site and for vehicles transporting to and from the Project Site, including vehicles servicing the Project site. Long-term operational emissions also include those related to maintenance activities.

#### **Water Resources:**

GHG emissions are anticipated to have an adverse impact on the future of regional water resources. The oceans absorption of GHG emissions are believed to be the main cause of global sea temperature rise and an increase of ocean acidity. Global temperature shifts contribute to sea level rise as the forces of global warming melts polar ice caps. Additionally, the rise of ocean acidity is extremely harmful to the marine ecosystems as it prevents corals and shellfish from building their skeletons. The preservation of coral reefs is extremely important as they produce approximately half the earth's oxygen. The Proposed Action is anticipated to generate GHG during the construction and operation of the Proposed Action. Although, the level of GHG emission from the construction and Proposed Action are negligible it is recommended that the District Developer(s) undertake efforts to reduce GHG emissions generated from construction and operation of the Proposed Action that contribute to global GHG emissions.

#### **Public Health:**

The increase of GHG can be directly related to human activity. The release of GHG emissions to the atmosphere have been steadily increasing since the turn of the century. Since then, the effects of GHG emissions on climate change are beginning to be more visibly seen as climate conditions indicators discussed above such as temperature, rainfall, flooding, SLR, and coastal erosion are becoming more prevalent. If changes are not made to

reduce or limit global GHG emissions the earth climate maybe become so extreme that it will be inhabitable for human life. It is recommended that the District Developer(s) undertake efforts to reduce GHG emissions generated from construction and operation of the Proposed Action that contribute to global GHG emissions.

### **Roadways:**

Traffic increases are anticipated to significantly affect the level of service of surrounding roadways. An increase of GHG emissionns is expected with an increase of traffic to the Project Site via fossil fuel burning auotmobiles. However, these increases are anticipated to be negligible relative to overall emissions. It is recommned that thr Proposed Acrion take a good faith effort to implement migation measures to reduce the amount of GHG emissions gnerated in the construction oand operation of the site. These measures may include but ae not limited to:

- Perform on-site material hauling with trucks equipped with on-road engines (if determined to be less emissive than the off-road engines).
- Develop programs that encourage guests to be green and promote alternative transportation options.
- Move heavy construction equipment and workers to and from construction areas during periods of low traffic volume.

### **Airports:**

The construction and operation of the Proposed Action is not anticipated to have a direct impact on GHG emissions to the extent that it would disrupt operation of HNL. However, as the Proposed Action is anticipated to generate GHG emission it will contribute to cumulative GHG levels in the atmosphere and have. This may indirectly impact operation of the HNL. Even though, these increases are anticipated to be negligible relative to overall emissions. Nonetheless, Other recommended mitigation measures that could be implemented to ensure emissions are minimized to the maximum extent practicable include the following:

- Improve fuel efficiency from construction equipment by minimizing idle time either by shutting equipment off when not in use or reducing the time of idling
- Maintain all construction equipment in proper working condition according to manufacturer's specifications. The equipment must be checked by a certified mechanic and determined to be running in proper condition before it is operated.
- Use equipment with high-efficiency technologies (e.g. repowered engines, electric drive trains).
- Install high-efficiency equipment and energy-saving technologies throughout the facility.

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## 5. CONCLUSION

Observed changes in the climate system have progressed at unprecedented rates on a global level since the pre-industrial era. Research indicates that two centuries of unabated GHG emissions from anthropogenic sources is largely responsible for increases in global atmospheric temperatures and ocean warming. The dire consequences of climate change impacts on natural and human systems around the world has made the need to address climate change a key priority. The State of Hawai'i has adopted several policies and established clear energy goals as part of its commitment to reducing GHG emissions. These goals include achieving emissions levels at or below 1990 GHG emissions levels by 2020, carbon neutrality by 2045, 100 percent renewable energy by 2045, and 100 percent clean transportation by 2045.

This climate change assessment for the Proposed Action was conducted to identify the potential direct, indirect, and cumulative impacts that may be associated with the construction and development of the NASED on resilience, in general, across various sectors. This assessment considers how climate change would impact the Proposed Action as well as how the Proposed Action would impact climate change. Climate change impacts were based on region specific trends identified for the State of Hawai'i from a qualitative frame view that is primarily centered on available data and metrics. Region specific climate change trends likely to affect the project or be affected by the project include a rise in air temperature and variations in rainfall patterns. Other region specific climate change trends such as flooding, sea level rise and coastal erosion are not anticipated to affect or be affected by the project due to the location of the project site outside of areas of vulnerability. Cumulatively, the Proposed Action is anticipated to generate GHG emissions that will contribute to the overall concentration of GHG in the atmosphere. Various design strategies and mitigation measures have been incorporated into the Proposed Action that will minimize potential impacts. Additional mitigation measures and best management practices are recommended to further minimize these impacts.

### Temperature:

The Project Site is located in an urban area and, by contrast to existing conditions, could potentially increase the amount of greenspace and permeable surfaces at the site. Landscaping is being incorporated into the project that should mitigate urban heat island effects by providing trees and vegetative cover intended to absorb heat and provide shade to cool the surrounding landscape. As such, the Proposed Action will not result in significant impacts to air temperatures in the vicinity of the project.

In the long-term, increases in regional air temperatures attributed to climate change are likely to have some effect on the project and may indirectly increase GHG emissions from consequential increase in energy demands as cooling systems are required to be operated more frequently or for longer durations due to rising air temperatures. Potential impacts would be mitigated by installing photovoltaic solar panels that would minimize and offset the long-term demand on electrical utilities, incorporating green building objectives that will help to passively cool the building as much as possible thereby minimizing the need for supplemental cooling, and using high-efficiency cooling systems.

**Rainfall:**

Variations in rainfall patterns is another impact of climate change that will likely affect the project. Although total average rainfall is projected to decrease overall for Hawai'i, rainfall trends and projections vary from island to island. In general, projections show a potential increase in the frequency of high intensity rainfall events with rainfall intensity trends being mixed for O'ahu. Therefore, spatial or temporal changes in rainfall patterns in connection with climate change are not anticipated to impact the Proposed Action. Furthermore, it is anticipated that the Proposed Action will not directly or indirectly result in significant impacts on rainfall patterns for the region, as GHG emissions generated by the Proposed Action are anticipated to be negligible.

**Greenhouse Gases:**

Greenhouse gases of primary concern in the consideration of land use development projects are carbon dioxide, methane, and nitrous oxide. GHG emission estimates for CCH in 2016 accounted for 12.39 MMT CO<sub>2</sub>e, or 69 percent, of the total GHG emissions for the State. Stationary combustion emissions from the commercial sector are projected to slightly increase in 2020 and 2025. However, it is expected these increases would be offset by even greater reductions in emissions projected from the energy industries due to gained efficiencies in energy production. Overall, total emissions for the State are projected to decrease by the years 2020 and 2025.

It is anticipated that the Proposed Action individually will not result in a significant impact on GHG concentrations in the atmosphere. In the short-term, increases in GHG emissions are anticipated to be negligible due to the scale and scope of the project and the temporary nature of construction activities. In the long-term, the district Developer(s) should will incorporate green building objectives and implement best management practices to ensure emissions are minimized. Traffic increases are not anticipated to significantly affect the level of service of surrounding roadways. Cumulatively, the project will contribute to the total GHG emissions for the State. However, these increases are anticipated to be negligible relative to overall emissions. Moreover, increases in the commercial sector have already been anticipated in emission inventories for the State and are expected to be offset by even greater reductions in emissions produced by the energy industries. Other recommended mitigation measures that could be implemented to ensure emissions are minimized to the maximum extent practicable include the following:

**During Construction**

- Improve fuel efficiency from construction equipment by minimizing idle time either by shutting equipment off when not in use or reducing the time of idling.
- Provide clear signage that posts this requirement for workers at the entrances to the site.
- Maintain all construction equipment in proper working condition according to manufacturer's specifications. The equipment must be checked by a certified mechanic and determined to be running in proper condition before it is operated.

- Train equipment operators in proper use of equipment.
- Use appropriately sized equipment for the job.
- Use equipment with high-efficiency technologies (e.g. repowered engines, electric drive trains).
- Perform on-site material hauling with trucks equipped with on-road engines (if determined to be less emissive than the off-road engines).
- Reduce electricity use in the construction office or trailer by using compact fluorescent or LED bulbs, powering off computers every day, and replacing heating and cooling units with more efficient ones.
- Recycle or salvage non-hazardous construction and demolition debris.
- Use locally sourced or recycled materials for construction materials.
- Avoid road closures during peak traffic hours.
- Move heavy construction equipment and workers to and from construction areas during periods of low traffic volume.

#### During Operations

- Install high-efficiency equipment and energy-saving technologies throughout the facility.
- Implement waste reduction strategies such as reduce, reuse, recycle, and composting.
- Ensure structures and facilities are properly maintained.
- Develop programs that encourage patrons to be green and promote alternative transportation options.

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# **Appendix O:**

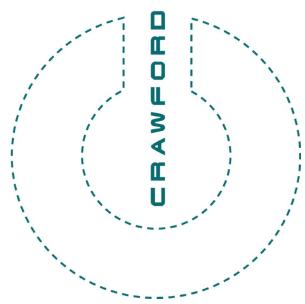
Aloha Stadium:  
Planning for a New Stadium &  
Site Redevelopment



# ALOHA STADIUM

Planning For A New Stadium & Site Redevelopment  
D.A.G.S. Job No. 12-10-0862  
Phase I

**Final**



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WT PARTNERSHIP

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# 1. EXECUTIVE SUMMARY

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## EXECUTIVE SUMMARY

At the request of the State of Hawaii DAGS, the Aloha Stadium: Planning for a New Stadium & Site Redevelopment Team (henceforth the Development Design Team) has undertaken a study analyzing the relative merits and drawbacks of the current Halawa site against a range alternative site options.

The study considers a wide range of measures, including site access, transit connections, regional demographic and development opportunities and incentives. Based on a high-level survey, six potential sites were analyzed in detail:

- a. The Halawa Site (existing Aloha Stadium site)
- b. The University of Hawaii at Manoa
- c. The University of Hawaii at West Oahu
- d. The Ala Wai Golf Course
- e. Kapiolani Regional Park
- f. The Kalaeloa Airport

This *Aloha Stadium: Planning for a New Stadium & Site Redevelopment* report is a catalogue of the process of selecting the sites chosen for evaluation, a repository of the information used to evaluate the sites, a record of the interaction with DAGS and the Stadium Authority and a summary of the numerical ranking of sites in conclusion.

The study has concluded and it is the recommendation of the Development Design Team that the Halawa Site is the most appropriate, viable and development-ready site for a new 35,000 seat stadium and ancillary surrounding development.

This report and its resulting recommendation sets the stage for the ongoing master planning effort and preliminary economic analysis of the Halawa site for a new Stadium & Site Redevelopment. The key element of the next portion of this current phase of work is to undertake preliminary master planning for the Halawa site. The alternative site analysis work that this report now concludes will feed into the requirements for the Environmental Impact Study (EIS) which mandates that alternative sites be considered for a new stadium, not simply an analysis of the current or preferred site as a foregone conclusion.

The EIS and associated analyses will be undertaken by the Development Design Team in a subsequent phase at the conclusion of this current work effort.





## **2. REFERENCE DATA MAPS OF HONOLULU**

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### ***REFERENCE DATA MAPS OF HONOLULU***

Reference data maps were developed from various data sources, including the US Census Bureau, the County of Honolulu and the State of Hawaii. They were generated using QGIS software and broken into the following categories for evaluation:

- Population Density
- Land Ownership
- Hazard Zones
- Incentive Zones
- Income & Employment
- Transportation

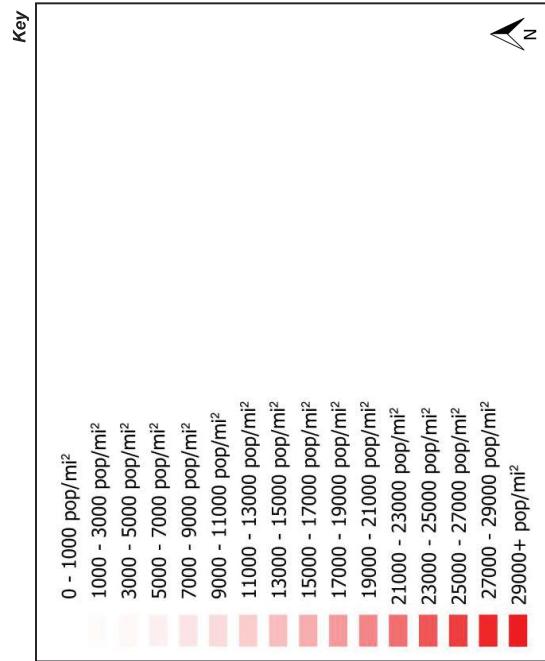
These categories form a basis for evaluation of each of the proposed sites individually and comparatively. The reference maps are confined to the south side of the island, specifically centers on downtown Honolulu, Waikiki and Oahu. The reference maps served as a base for initial site selection.

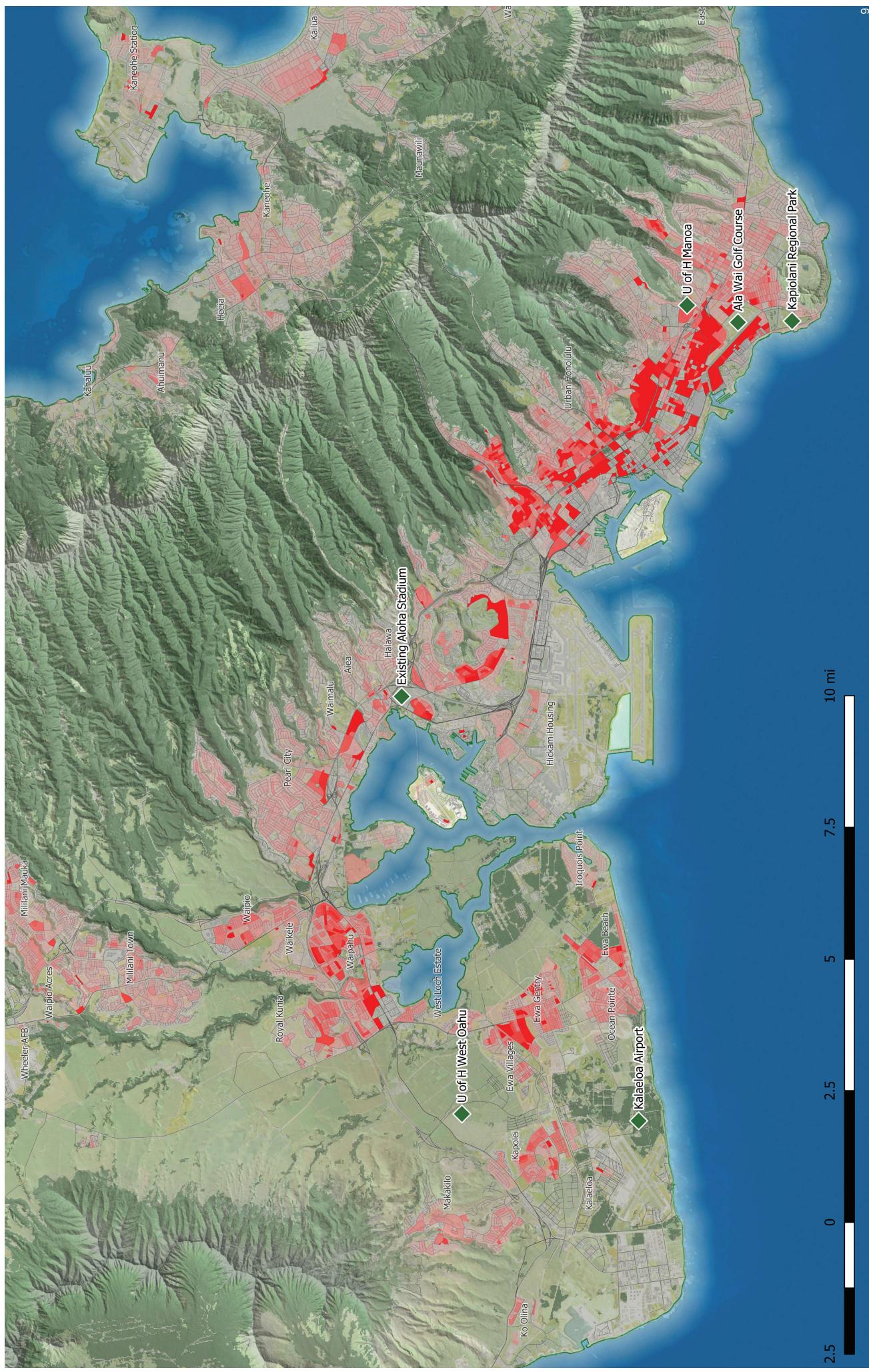


## *Population Density*

Population density is shown as it currently exists in the referenced areas. It does not take into account future growth. The areas of the most dense population are located between the airport and Waikiki, north of downtown Honolulu.

Population density can be used in different ways for evaluation. Areas of dense population can be seen as good locations for development, with many user groups located nearby, while areas of sparse population could be seen as prime spots for future growth.

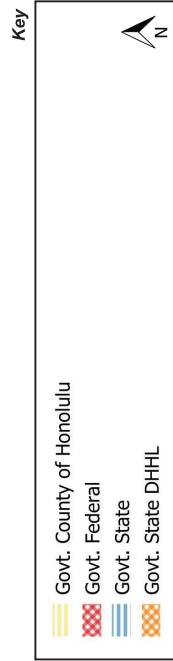


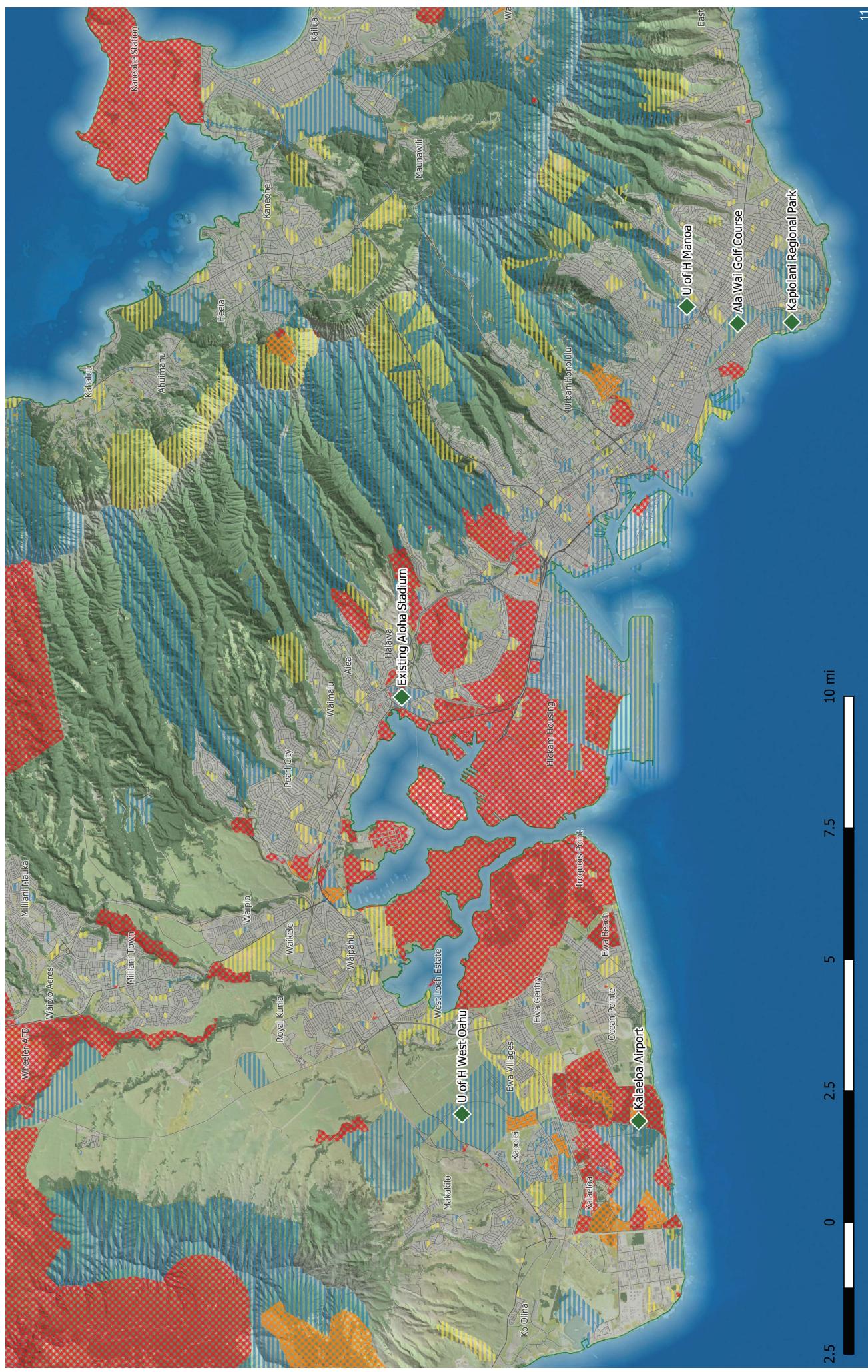


## *Land Ownership*

Existing land ownership for this project is a significant factor in site selection. Land that is already owned/controlled by the State of Hawaii will be much easier to utilize vs. land that would need to be purchased/acquired.

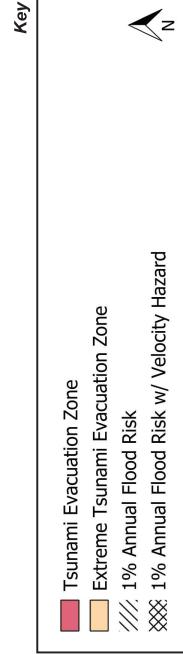
The design team also wanted to be careful to not consider any land that is to be preserved as natural preserves.

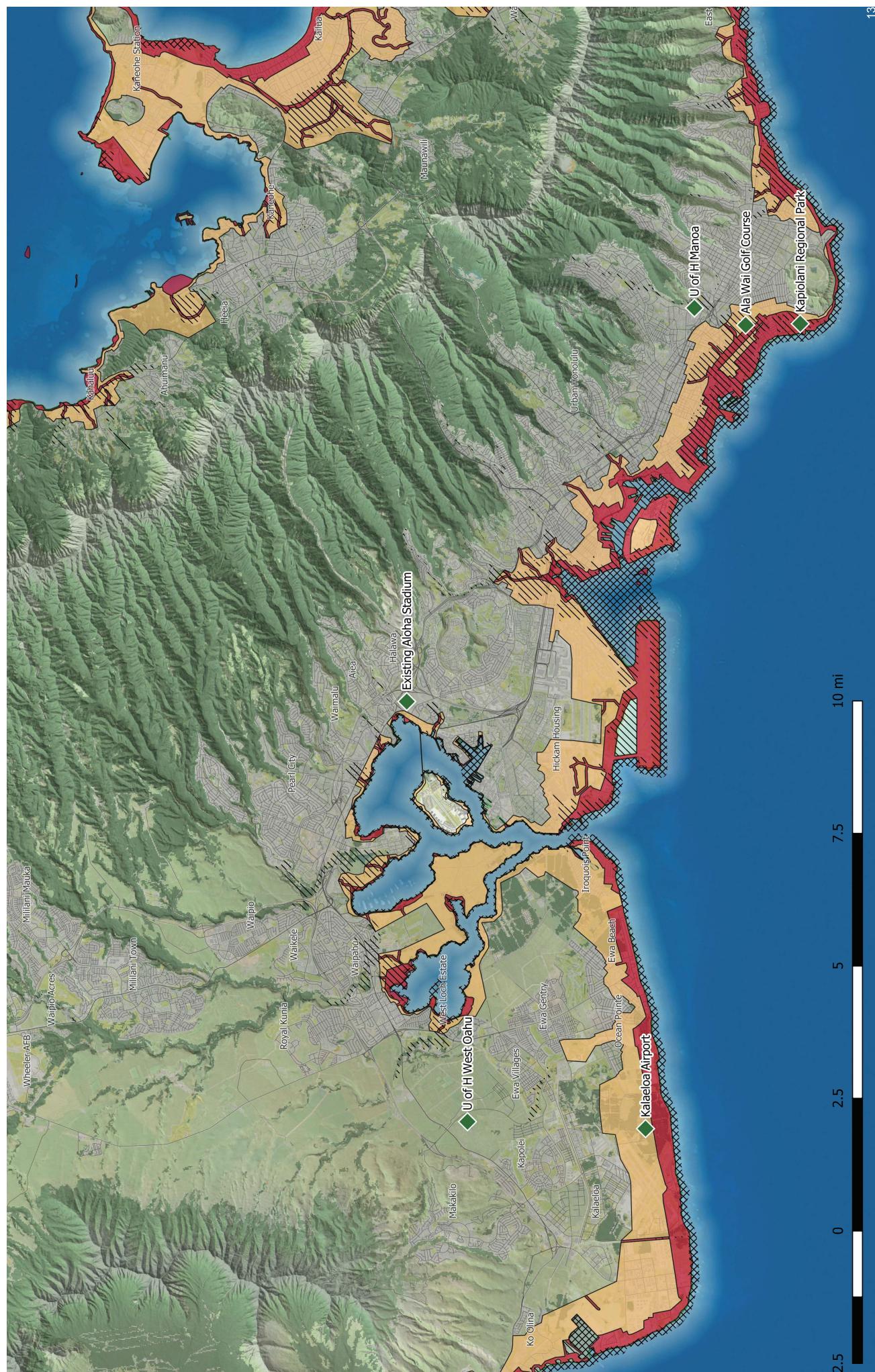




## Hazard Zones

Oahu's position as an island in the Pacific leaves it open to several hazards unique to the State of Hawaii, and not the rest of the mainland. These hazards were taken into consideration when selecting a site. The shoreline of Oahu and inward up to  $\frac{1}{2}$ -mile in certain areas falls into a tsunami hazard zone and extreme tsunami hazard zone. Additionally these areas fall under flood risk in extreme weather. An additional consideration was research into a general sea level rise due to changes in climate. These hazards all play a part in considering whether or not to locate a potential development in these areas, but don't completely rule out sites near the ocean. Hazards can be addressed, land can be elevated and potential hazard zones can become viable.





## *Development Incentive Zones*

There are two geographically-defined incentive programs covering portions of Oahu, which could help to offset development costs on covered sites. Enterprise Zones and Opportunity Zones.

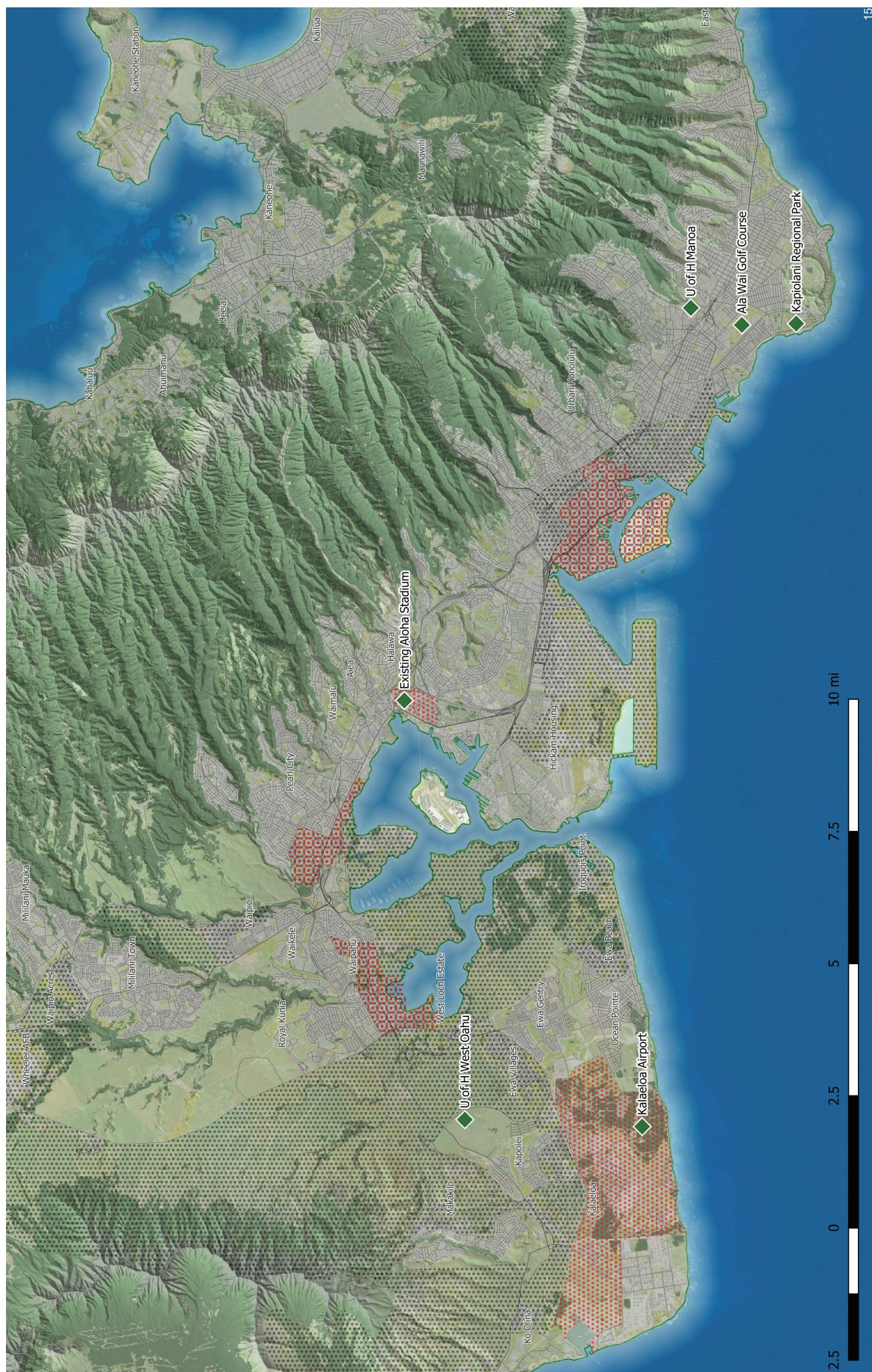
The Enterprise Zones were created by the State of Hawaii to help stimulate certain types of business activity and increase employment in targeted areas of the state. It is intended to bring business and opportunity to less affluent areas.

The Opportunity Zones were created by the Federal Tax Cuts and Jobs Act in order to provide incentives for investors to reinvest unrealized capital gains into Opportunity Funds in exchange for temporary tax deferral and other benefits. The Opportunity Funds will then be used to provide investment capital in certain low income communities.

Key

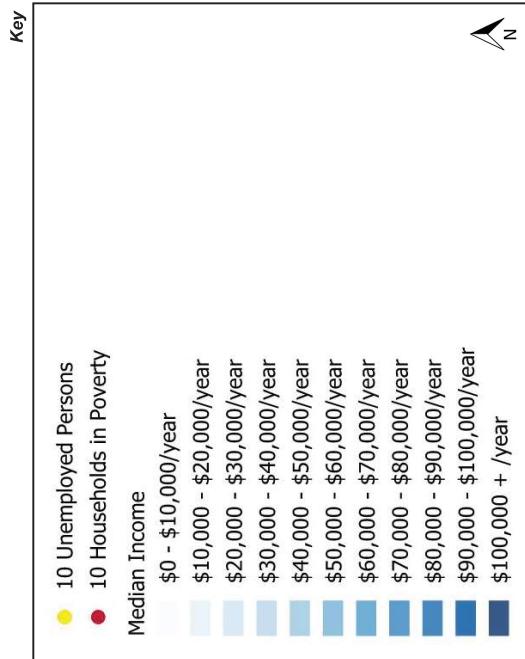


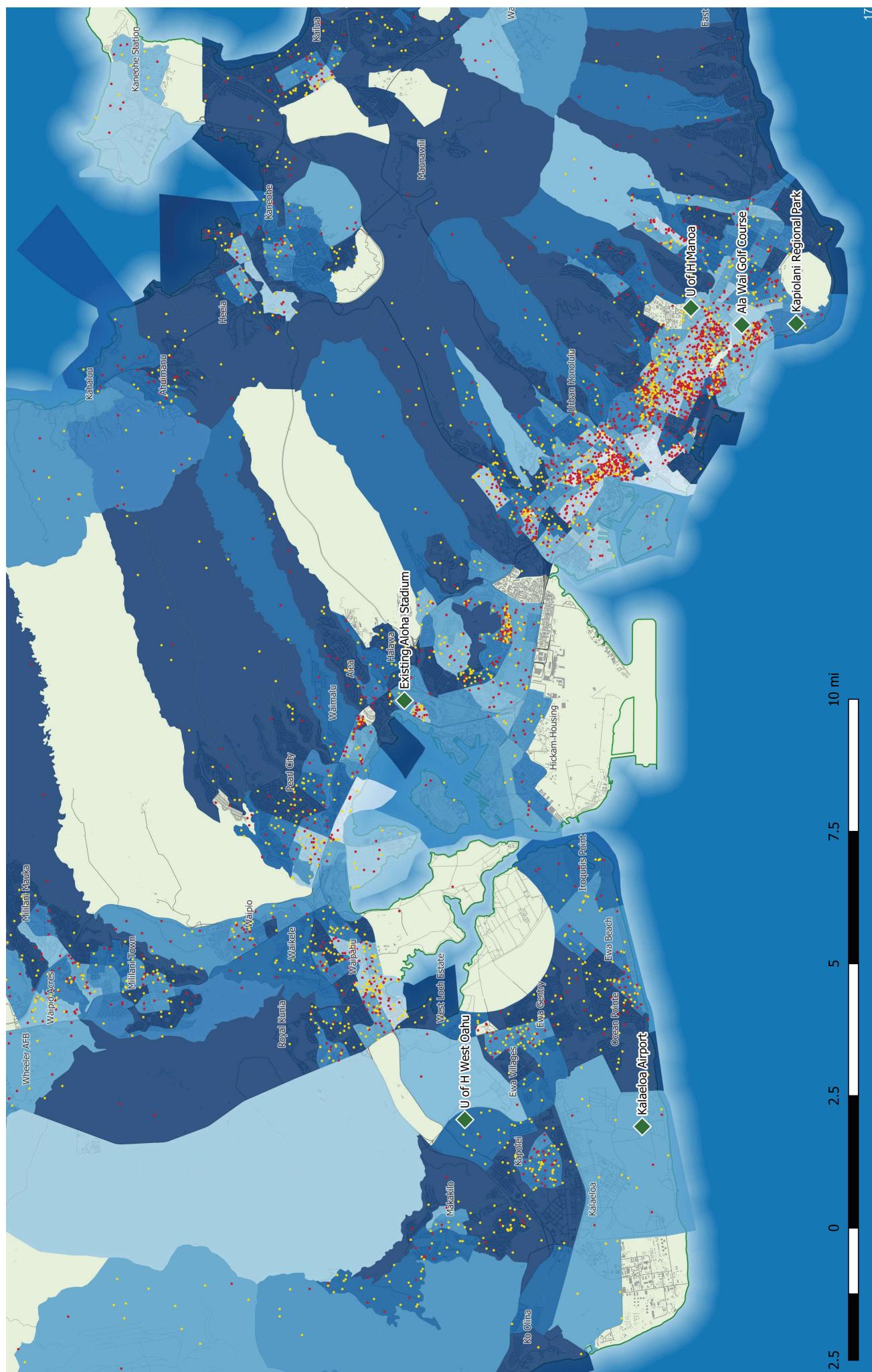
Enterprise Zones (State)  
Opportunity Zones (Federal)



## *Income & Employment*

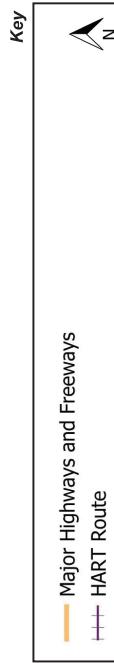
Income and employment were both considerations in determining locations for this potential project development. Areas of high income are seen as areas with significant potential disposable income to be used at events and in the commercial areas. More important, areas of low income and low employment are seen as locations that could significantly benefit from this development with job opportunities that could be created in the immediate area.





## ***Major Transit Routes***

The density of Honolulu offers challenges to certain particular areas for development. Transportation infrastructure would need to be built or improved in order to meet the demand of a stadium development. Searching for sites with existing highway access for visitors and close proximity to the harbor and airport, for shipping of event materials was an important consideration in locating site possibilities. Additionally, the HART line, currently under construction was a major consideration as it has the capability of bringing large numbers of visitors to stadium events without increasing demand on already busy highways, and can reduce parking requirements for a stadium.





## *Map of Initial 18 Sites for Analysis*

01. AALA PARK

02. ALA MOANA

03. ALA WAI GOLF COURSE

04. HALAWA

05. HONOLULU STADIUM PARK

06. KALAELOA UNDER RUNWAY

07. KALAELOA

08. KAALOI GULCH

09. KAPIOLANI REGIONAL PARK

10. KAPOLEI

11. KAWANUI PARK

12. KOKO HEAD RANGE

13. UNIVERSITY OF HAWAII AT MANOA

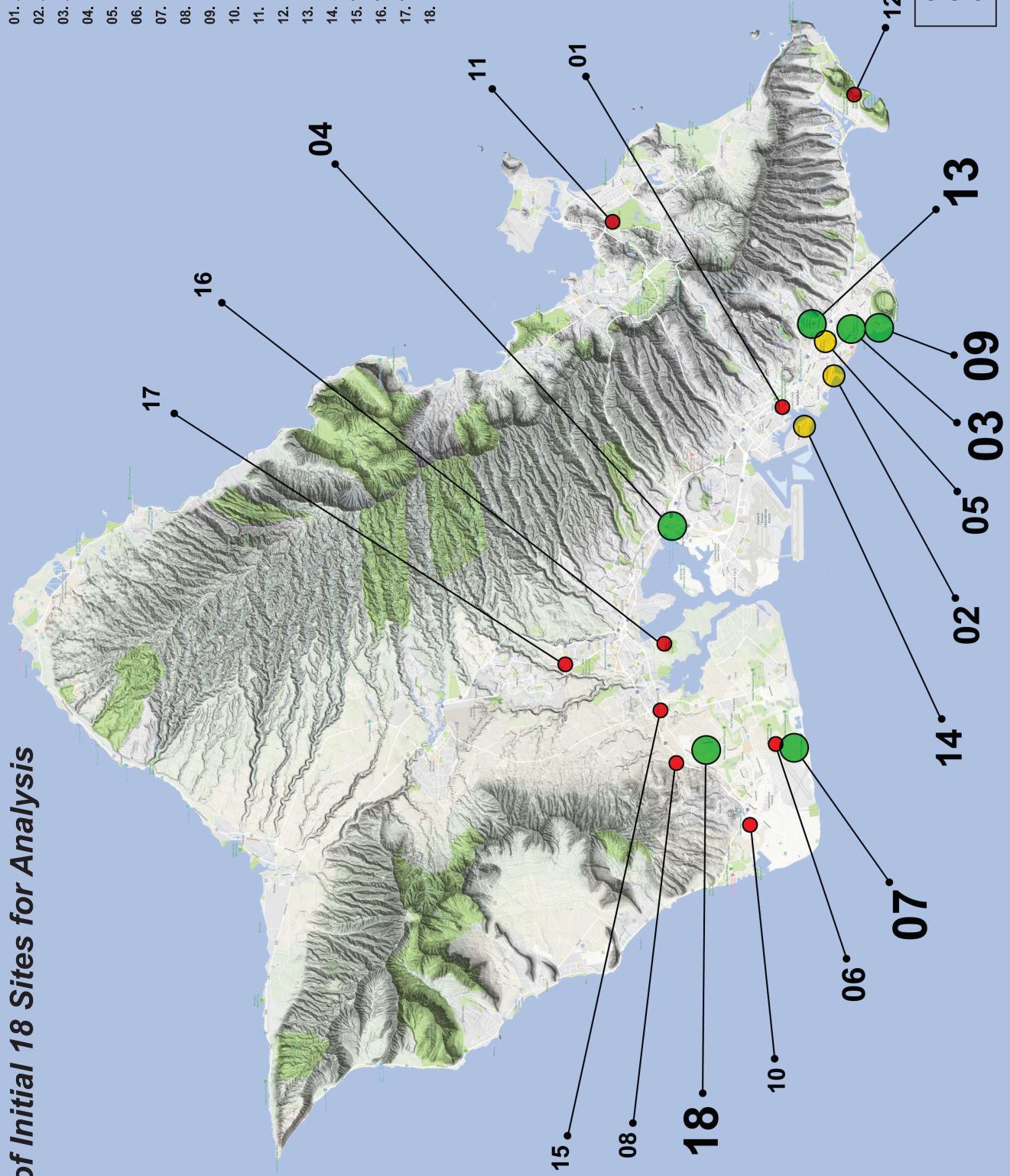
14. SAND ISLAND

15. WAIPAHU

16. WAPIO PENINSULA

17. WAPIO

18. UNIVERSITY OF HAWAII AT WEST OAHU



### **3. SITE SELECTION PROCESS**

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#### **SITE SELECTION PROCESS**

In order to meet the requirements set by the State of Hawaii DAGS to evaluate additional sites around Honolulu, along with the existing Halawa Site for its viability in locating the new Aloha Stadium Development, the Development Design Team began the process of selection with a clean slate. In order to give a fair evaluation of every possible site and treat all sites equally, Oahu was evaluated with no preconceived notions about where is the best location. The team embarked on the process treating all possible locations equally.

The first step in the process of selecting a site was to analyze all available data pertaining to the Island of Oahu. Reference maps were overlaid with data showing population density, open land, hazard zones, development and incentive zones, relative income areas, transportation maps and maps showing land ownership. These maps were then analyzed for possible locations.

Initial criteria in finding these locations was to find possible sites in areas that had enough open land to construct the Stadium Authority's desired stadium capacity footprint and also to find land that would be fairly easily acquirable, meaning that it should already be owned or controlled by the State of Hawaii. This initial search led the team to eighteen (18) potential sites around Oahu and Honolulu.

The initial site selection process was then a quick review of these 18 sites, to narrow the field down to a more reasonable number of sites for evaluation. Looking more closely at these sites, the Development Design Team eliminated half (9) of the sites due to remoteness of location and poor access, projected difficulties in acquiring the sites, complex terrain for construction or in simple comparisons to other sites that were located nearby.

Next the analysis was a slightly more in-depth review of the particular sites chosen. This was called the "desktop review." Sites were seen as potential sites for development and simple stadium diagrams were laid out on the sites to check for viability. After this process, 3 additional sites were eliminated from the process: The Sand Island Site, the Ala Moana Site and the Honolulu Stadium Park Site.

This process of elimination left the Development Design Team with 6 sites for full evaluation:

1. Halawa
2. University of Hawaii at Manoa
3. University of Hawaii at West Oahu
4. Ala Wai Golf Course
5. Kapiolani Regional Park
6. Kalaeloa Airport

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- Conversation 3 presented the 6 sites to the Client Group for their initial thoughts and comments.
- Conversation 4 dealt specifically with the future Aloha Stadium itself, and was used in further determining the size and types of events that might be held there in the future, as well as initial ideas on what vision the Client Group might have for its aesthetic.
- Conversation 5 was a wrap-up conversation and a time to let the Client Group imagine what the completed project would mean to the State of Hawaii and City of Honolulu.

- At the end of this process, the Development Design Team reached its conclusion on which site to recommend to the State of Hawaii DAGS and the Stadium Authority.

- Full evaluation of the six (6) sites included the following:
- The creation of an evaluation Isochrone to gather specific data pertaining to each of the individual sites.
  - An in-person visit by the Development Design Team to each of the sites to photograph and catalog the existing conditions, conduct a visual inspection of the site and put forth initial thoughts on development pros and cons.
  - Development diagrams and test fits, to understand how the stadium and potential other development pieces could fit on the site.
  - The creation of an evaluation matrix (outlined subsequently in this book) broken into four (4) categories and multiple sub-categories that were discussed and ranked and debated amongst the Development Design Team to reach a numerical ranking of each of the sites.

During the course of the site evaluation process, the Development Design Team prepared a workbook and met with DAGS and with the Stadium Authority (Client Group) to review the progress and collaborate on the site analysis. The workbooks were distributed to the Client Group and filled out individually by each of the members. They were used to promote conversation about the project in 5 ways:

- Conversation 1 sought to identify what the key elements that make Hawaii such a unique and special place and to help determine what is important to the people of Hawaii. This background information is critical in evaluating site options.
- Conversation 2 sought to define the site evaluation criteria. The Development Design Team prepared a preliminary site evaluation matrix, which was reviewed and modified to the final version contained in this book, using input from the Client Group.

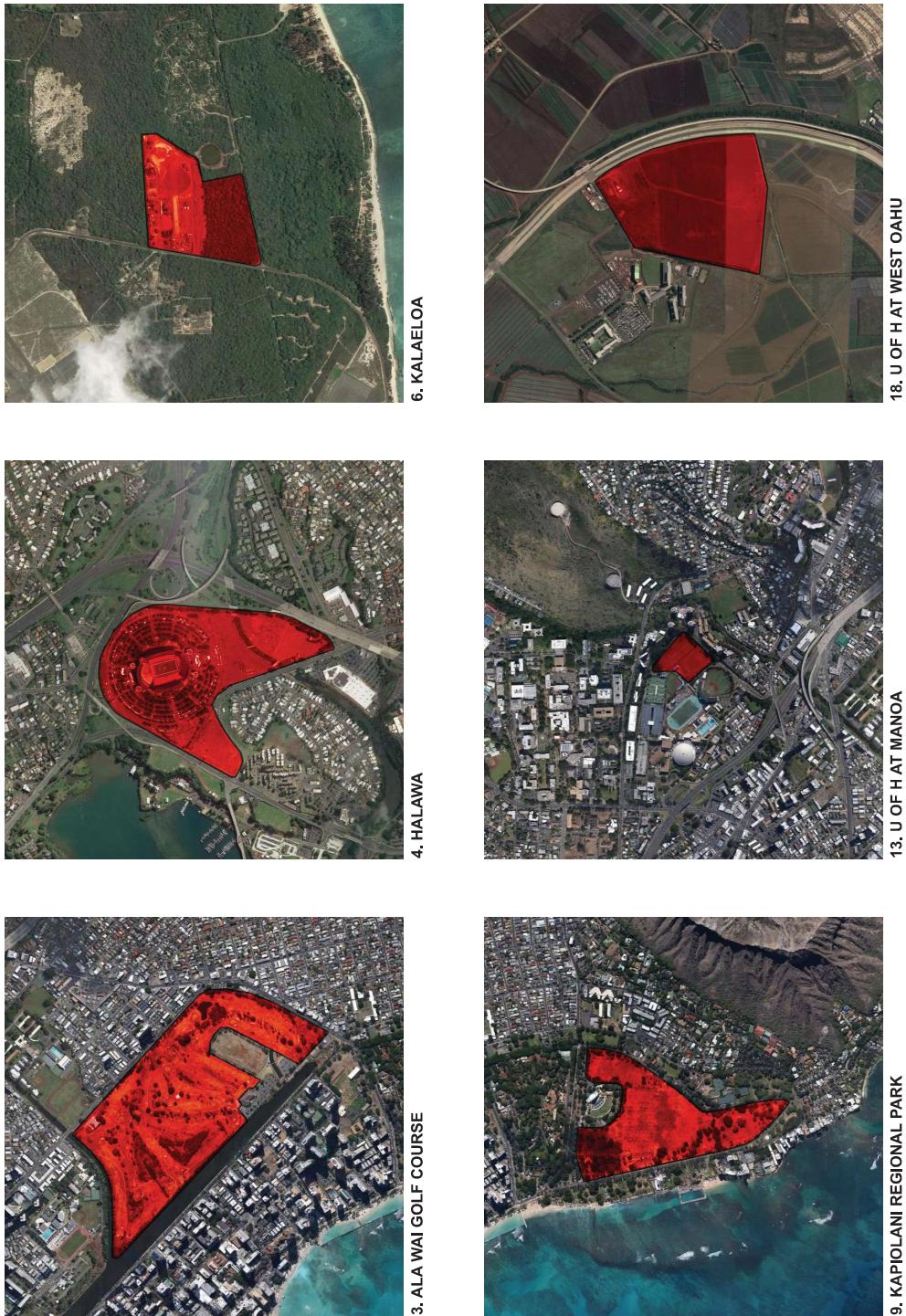
## 18 INITIAL SITE LOCATIONS



## 9 DESKTOP REVIEWS



## 6 SITES FOR EVALUATION





## *Desktop Reviews of Sites Excluded From Final Group*



### **2. ALA MOANA**

Ala Moana Park is located between downtown Honolulu and Waikiki, just to the south of the Ala Moana Shopping Center. It is a recreational park and public beach offering swimming, picnicking, tennis courts, a yacht club and walking/biking trails. A stadium development could fit nicely in the area right near the public beach and the Magic Island Lagoon, but would likely divide the park in two. The location, in conjunction with the Ala Moana Shopping Center, is the eastern terminus for the HART line. Parking could also be shared with the Ala Moana Shopping Center.

While the Ala Moana location seems like it could be ideal for a stadium, it would eliminate a significant and highly used parkland from the City of Honolulu. The site is squarely located in multiple tsunami and seal level rise hazard zones. Additionally, the City of Honolulu has already embarked on numerous additions and improvements to the park, due to be completed by 2025.



### **5. HONOLULU STADIUM PARK**

Honolulu Stadium Park is located on King Street in the Mo‘ili‘ili district of Honolulu. The park was the original home of the Honolulu stadium which opened in 1926, featured 25,000 seats and hosted numerous events and concerts before it was finally demolished in 1976 after the completion of Aloha Stadium. The location is now a neighborhood park featuring walking paths, play areas and picnic areas. The Park is a short walk from the University of Hawaii at Manoa, and was once home to Rainbow Warriors football team.

While the idea of rebuilding a stadium on the site of the original Honolulu Stadium would be interesting, the site as it exists is far too small for the stadium requirements and would necessitate the purchasing and demolition of numerous homes, businesses and other buildings to create the necessary space. It also has no parking available and is not near any of the proposed HART stations.



### **14. SAND ISLAND**

Sand Island is an industrial area owned by the State of Hawaii. Portions of the island have been converted in to a beach front camping and recreation area. While much of the remainder is given over to private use, the property is held by the state. The 73 contiguous acres of the island not given include the Honolulu Harbor, the Coast Guard and the city wastewater treatment plant which are bounded by Sand Island Parkway.

While Sand Island is geographically proximate to urban Honolulu, it is quite isolated from a transportation perspective. Only the Lt. John R. Statley Bridge connects Sand Island back to the city and H1 via the Sand Island Access Road. This bottleneck greatly reduces the coverage of the Sand Island 10-minute isochrones, meaning that only 173,100 residents of Oahu live within a 10-minute drive of the site. Combined with complete lack of bus and HART access, this makes Sand Island one of the least accessible sites in the study (second only to Kaelaoa) and with very few options to remediate the issue without negatively impacting harbor operations.



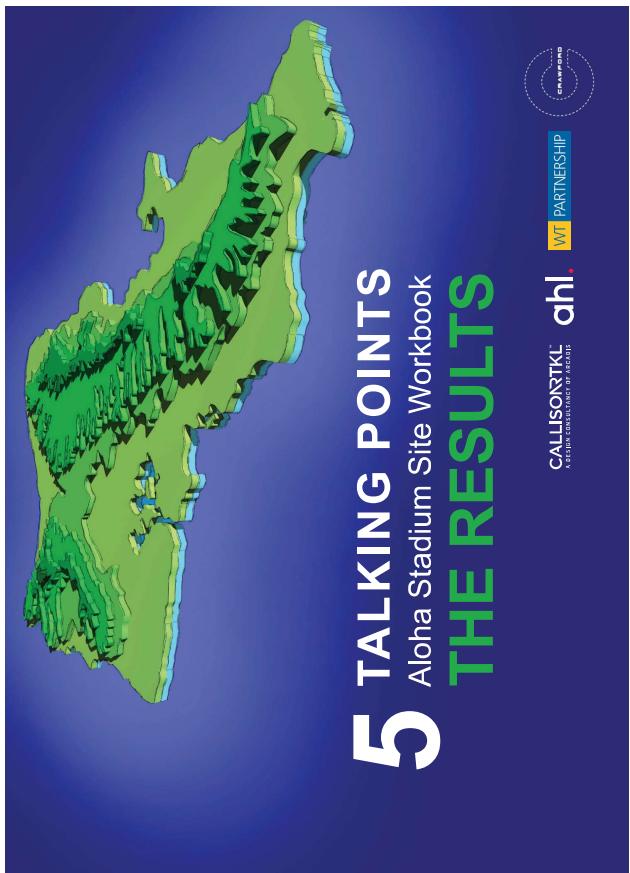


## The Workbook

For this effort, the Client Group, comprised of representatives from DAGS and the Stadium Authority, were requested to respond to a pre-prepared workbook designed to prompt opinions about the nature and history of Hawaii, the goals of the project, the criteria used in evaluating the potential sites and the memories of and future uses of the stadium.

The following section is a consolidation of the Client Group's responses to that workbook. Everyone's opinions have been catalogued on each page and used by the Design Development Team both in preparation of the analysis matrices and the understanding of the importance of the project and the evaluation of each of the sites.

The responses and comments are written in green throughout the book. It is important to note that the collected comments are those of the Client Group only and not the Design Development Team. These comments and opinions were then used by the Design Development Team along with their own opinions in the site selection process.



**5 TALKING POINTS**  
Aloha Stadium Site Workbook  
**THE RESULTS**

CALLISONTKL<sup>®</sup> A STUDIO CONSOLIDATED BY ALACRIS

ahl. WT PARTNERSHIP

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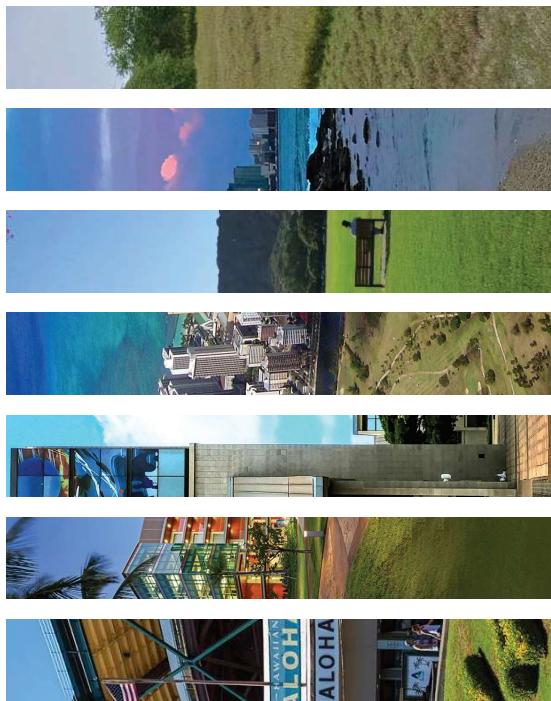
1 HAWAII & THE PROJECT

2 SITE EVALUATION CRITERIA

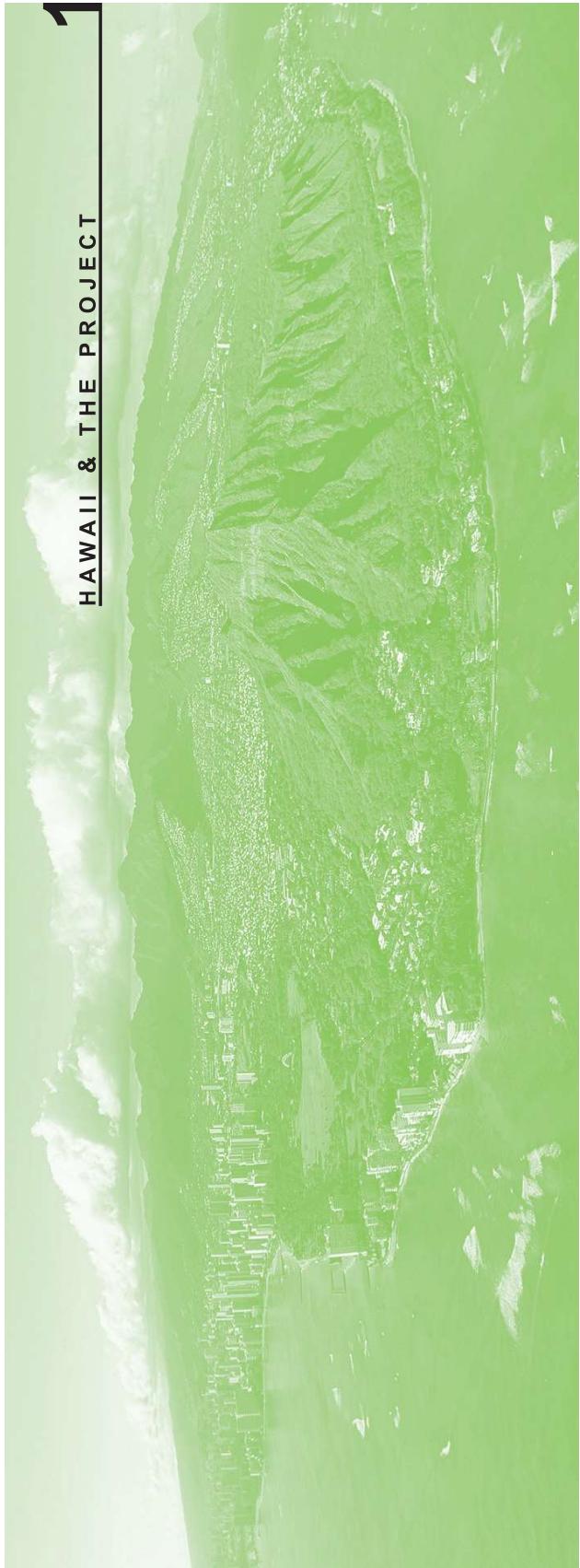
3 THE SITES

4 THE STADIUM

5 CONCLUSION



## HAWAII & THE PROJECT



### Questions About the Project

1. *What, in your opinion, is the ultimate goal for this project?*

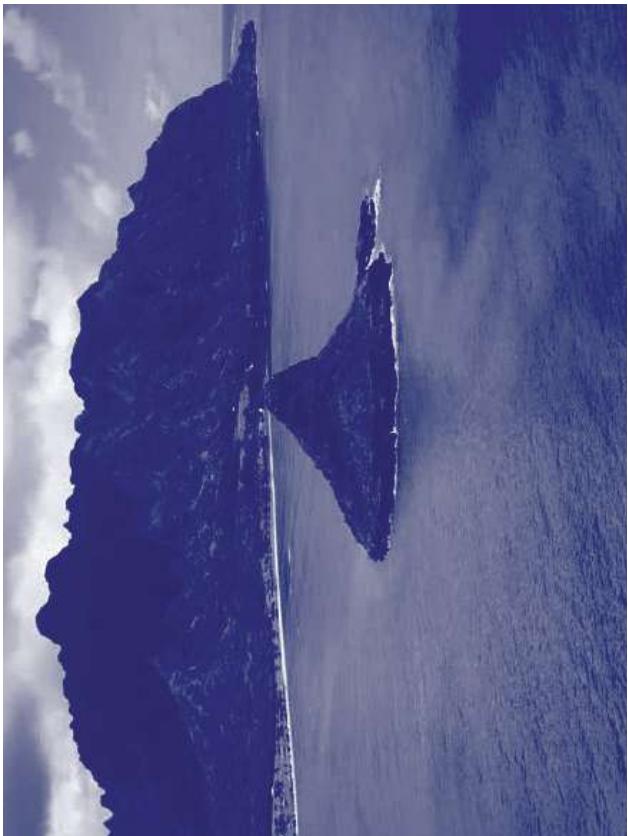
- » Provide a stadium facility at best value to the taxpayer
- » A self-sustaining, centralized entertainment center that would be a highlighted location with consideration given to transportation, revenue generating opportunities, other entertainment venues, island-wide
- » To provide a new destination facility for sports/entertainment to serve the community of the state of Hawaii. The facility should be sustainable and feasible
- » To decide a "location", to decide to "build new" or remodel existing structure
- » Provide safe, viable sports/entertainment facility for use by the people of Hawaii
- » Two major anchor tenants (transit station/new stadium) on property with ancillary development in between. Create a sport/entertainment facility that is also for the community.
- » New stadium
- » A stadium with vibrant surrounding uses that will be a gathering place for recreational uses including sports, entertainment, shopping and other uses that can generate revenue to sustain the use and promote TOD



### Questions About the Project

2. What, if anything, can this project provide that the State of Hawaii doesn't already have?

- » Reduced maintenance costs + versatile facility
- » A large enough venue to accommodate mid-larger scale events that would not compete with other existing venues
- » A facility that can host multiple sports events while being flexible & have the capacity to also be active and host events 365 days a year. What it includes a broad definition of activities.
- » A workable, safe, money maker project
- » Safe, modern & economic facility
- » Major destination for all who visit the state of Hawaii
- » State of the art venue that can host various events
- » A multi-use stadium property which will be source of pride for the community and garner more entertainment uses



### Questions About the Project

3. At the end of this project, how will you measure success?

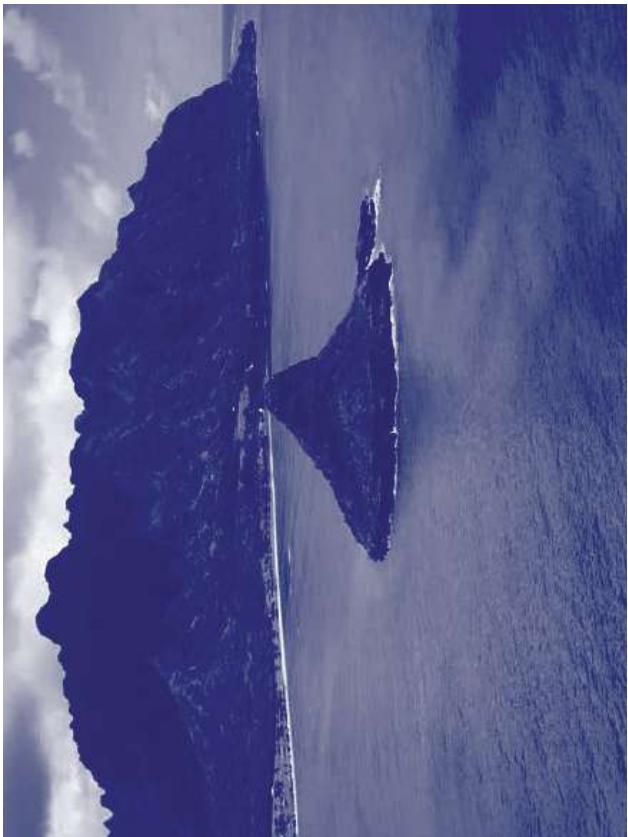
- » Self-sustaining venue that is operational year-round
- » We would have feasible plans to implement sustainable development of the ultimate goal facility
- » Usage of project, monies spent to get the project doing, time spent to get the project going
- » Popularity for use by Hawaii, economically viable
- » Completion of a new facility/stadium
- » Stadium that has events throughout the year that will generate revenue for the state
- » Similar to question #2, new multi-use stadium that will take into account future uses in a central location



#### Questions About the Project

##### 4. What is something uniquely Hawaiian that you would like to see reflected in this project?

- » The open, Aloha Airport and sense of welcome, with respect for all local cultures and partnerships of the environment
- » Hawaii in Name, Hawaiian sports + entertainment HOF
- » Architecture should reflect Hawaiian culture / environment
- » View and connection of water and Pearl Harbor in a place central to the island. Also tribute to Native Hawaiian culture



#### Questions About the Project

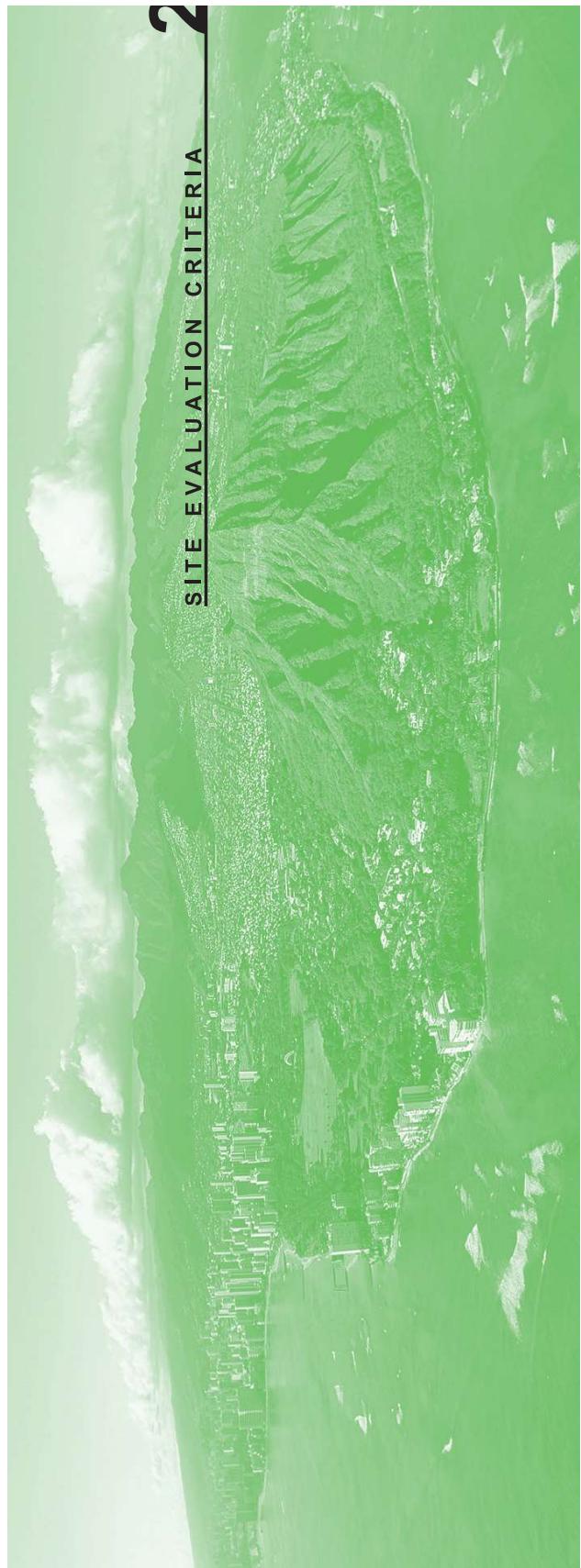
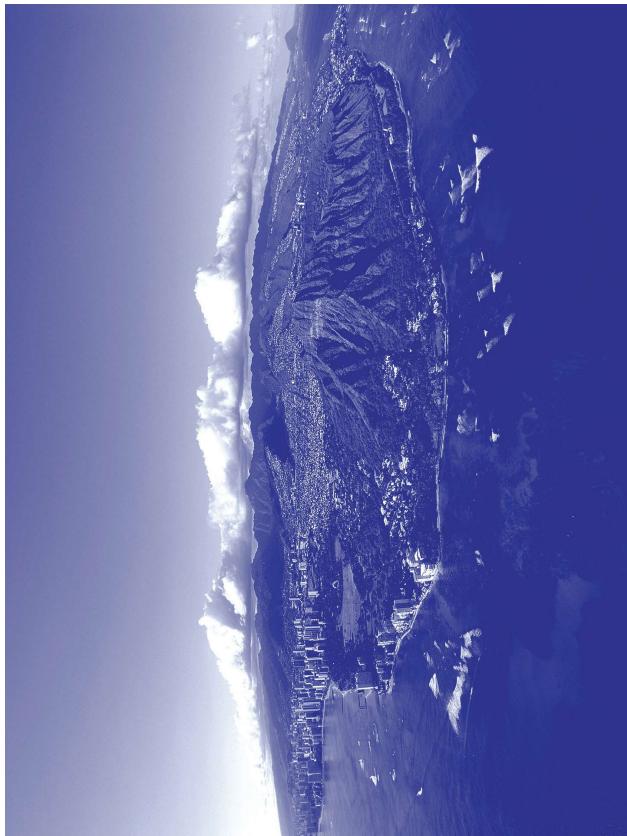
##### 5. Mauka or Makai?

- » In between. Hawaii's "Ahupua'a" flow Mauka to Makai.
- » Both
- » Represent both
- » Makai
- » Closer to Makai



**Questions About Hawaii**

*Mark 3 that best describe a vision of Hawaii in your mind.*



## Proximity

What elements are most important for the site to have nearby?  
(Check 3. Add if necessary.)



## Land & Environment

What site features are most important for building development?  
(Mark 3. Add if necessary.)

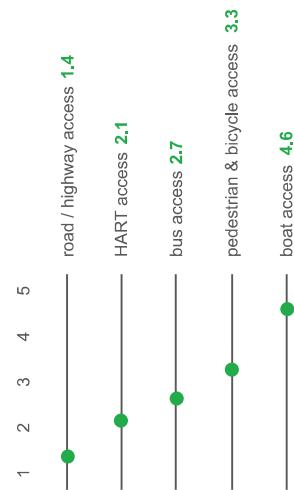
9	7	4	2	2
environmentally sound	ample land area	hazard-free	gentle slope	some tree cover

Other:  
» accessible transportation to/from  
» water/sewer availability  
» access to trade winds (natural  
ventilation since no A/C)  
» low barriers to development



### Transit & Infrastructure

Rate the importance of the following site access methods:  
(Rate them 1–5, with 1 being the most important).

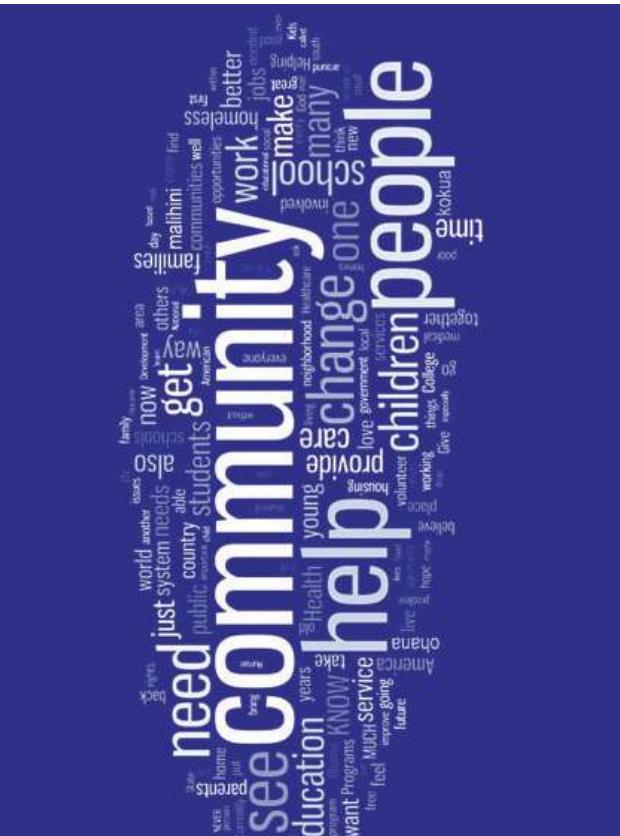


### Community & Demographics

Which communities or groups should benefit most from this development?  
(Mark 1. Add if necessary.)

- 3** impoverished communities
- 3** student communities
- 2** tourist communities
- 1** business communities
- wealthy communities
- Other:

  - > accessible transportation to/from water/sewer availability
  - > access to trade winds (natural ventilation since no A/C)
  - > low barriers to development

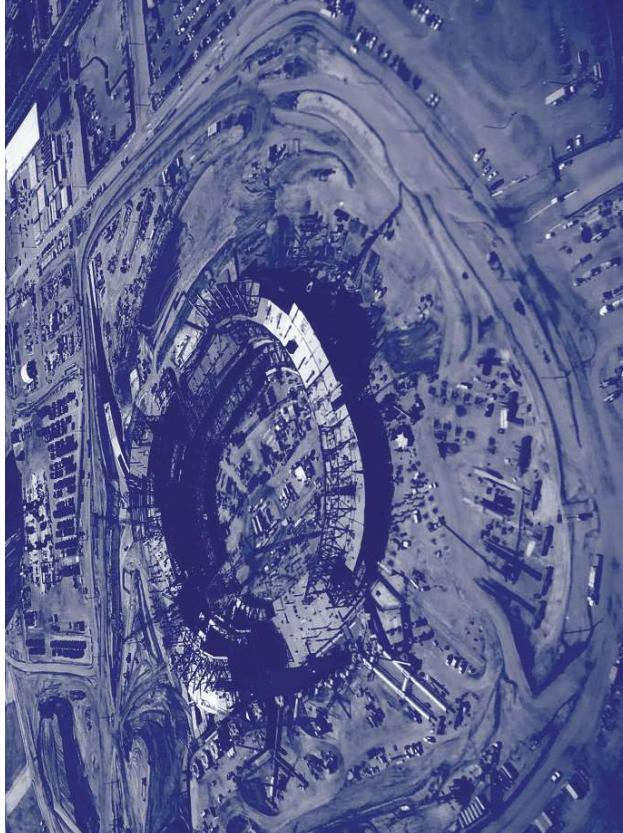


### Development Costs

What element of developing the site could have the biggest negative impact on choosing a site?

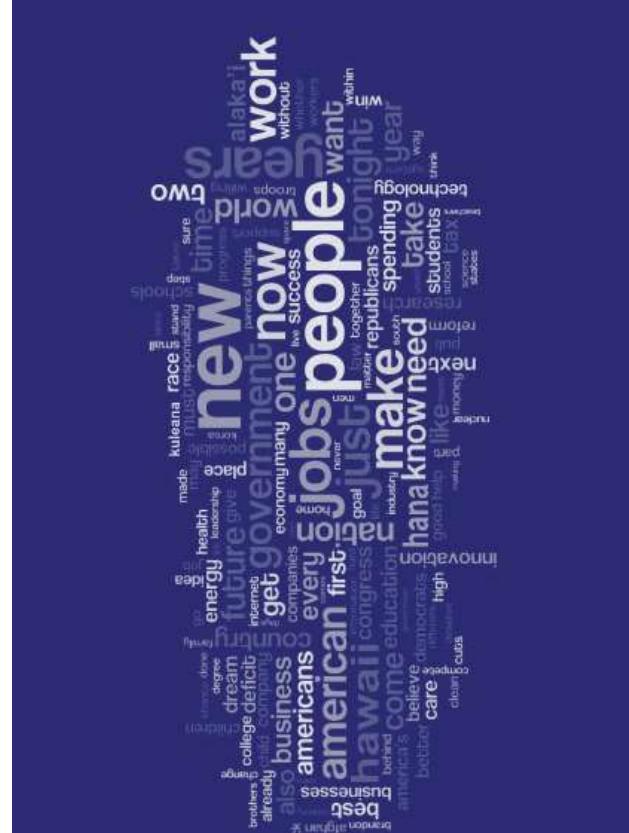


- infrastructure costs
- complexity
- existing zoning
  - lack of development incentives
  - land acquisition
- Other:
  - » community/impact (noise, traffic, lights, environmental issues)
  - » community opposition, timing to complete project

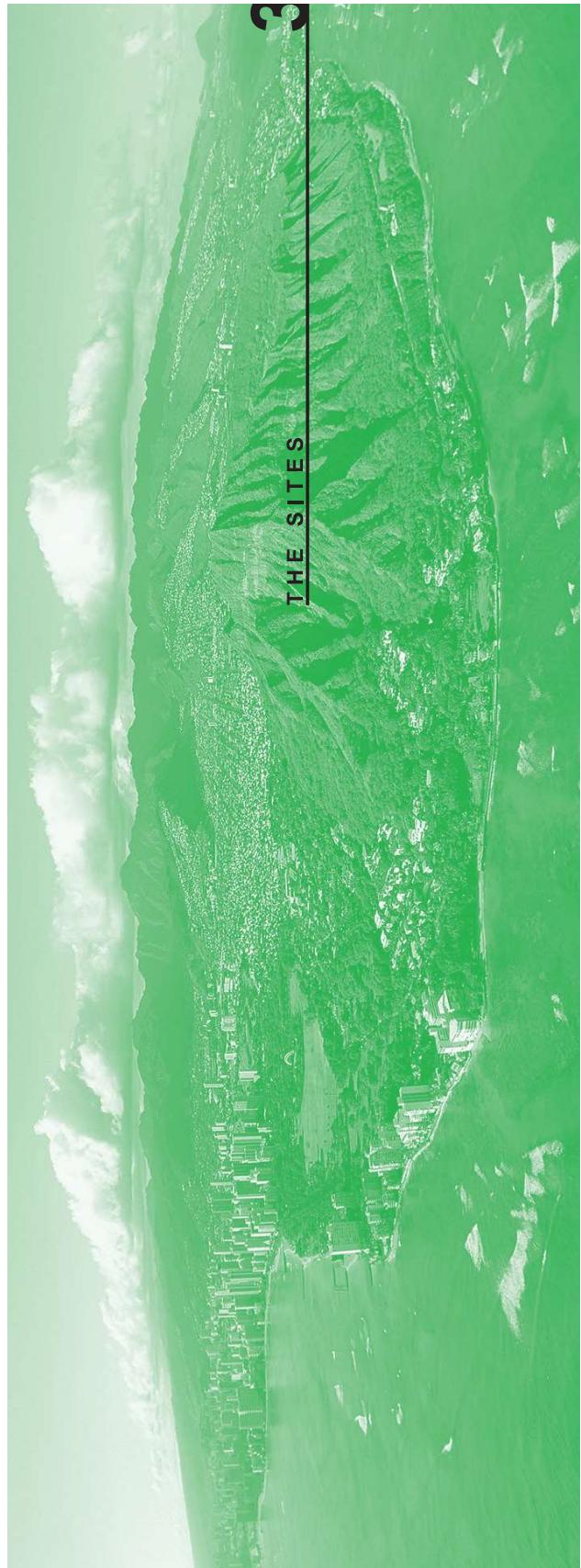
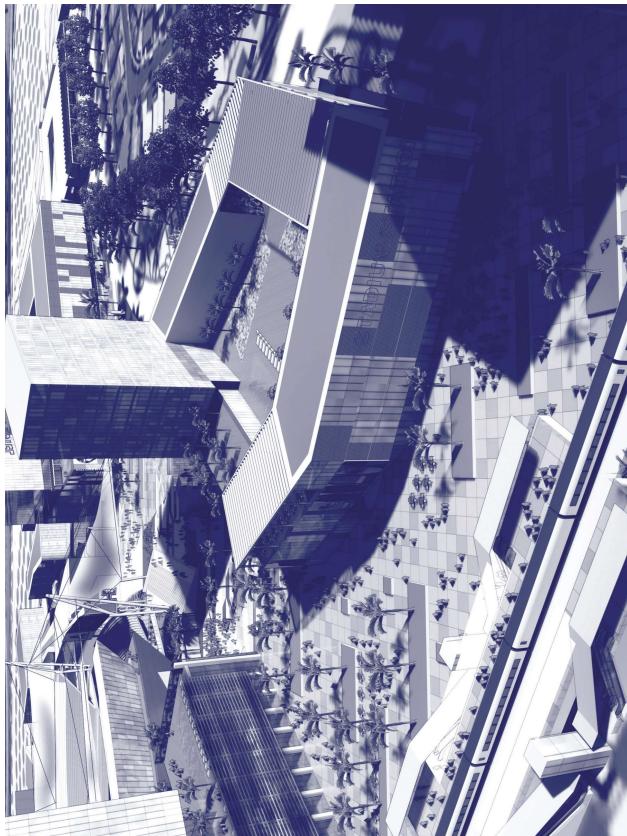


### Community Reception

How important is it that the stadium receives support in the form of the following?  
(Rate them 1–5, with 1 being the most important).



Amenities		
<i>In addition to the stadium, what amenities would you like to see most as part of this development? (Mark as many as you want. Add if necessary.)</i>		
<b>8</b>		car parking
<b>7</b>		hotel
<b>7</b>		retail
<b>7</b>		restaurants
<b>5</b>		great flexible plaza
<b>4</b>		offices
<b>4</b>		exhibition space
<b>6</b>		outdoor entertainment venue
<b>6</b>		community marketplace
<b>7</b>		black box performance venue
<b>7</b>		map meet
<b>2</b>	<ul style="list-style-type: none"> <li>• children play area</li> <li>• ability to tailgate</li> </ul>	



## Halawa



### Pro

- » centrally located
- » centralized location, rail transit station
- » lots of space, transportation access means (3 highways / 1 rail), proximity to Pearl Harbor, central location for whole island
- » people are used to the present site
- » proper zoning, adequate water/sewer, transit stop, highway confluence (west, east, windward), share parking with other development, large open + cleared area, close to airport
- » Site is centrally located.
- » large site accessible (transporation)
- » central location, TOD/rail, size of property for development related to stadium entertainment
- » central location with access to all major freeways, large site
- » existing, known to public

### Con

- » opportunity lost
- » need improved freeway on/off ramps
- » traffic mess, falling apart
- » facility stadium has to operate during construction
- » roadways in/out
- » lack infrastructure to maximize development
- » student accessibility (UH)

## University Of Hawaii Manoa



### Pro

- » student life, participation
- » close to Waikiki
- » close to Waikiki, students @ Manoa
- » mostly benefits the U of H
- » close to school
- » campus
- » close to other venues
- » close to students
- » near university
- » student access, close to Waikiki, amenities (restaurants close by)

### Con

- » community opportunity
- » space limitations, not conducive to all areas of island
- » land-locked, bad freeway access, no near time plans for trail, bad traffic during events
- » bad traffic mess, can they (U of H) afford + maintain the project
- » lack of water/sewer, lack of road access, disturbance of existing residents, no HART
- » lack of property to expand sports complex, partially developed already
- » traffic in/out, small site, limitation of surface streets
- » long time to development, zoning, roadways in/out, lack of development in surrounding area
- » size restricted, infrastructure (transportation) traffic
- » »

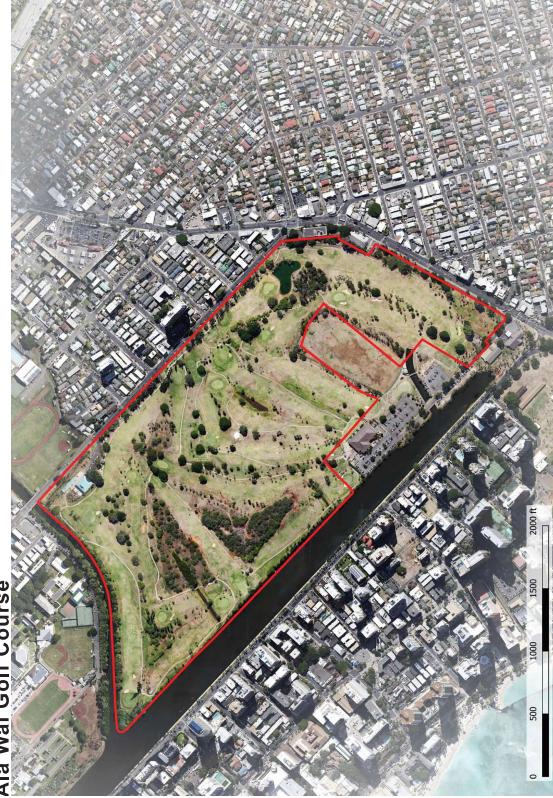
### University Of Hawaii, West Oahu



### University Of Hawaii, West Oahu

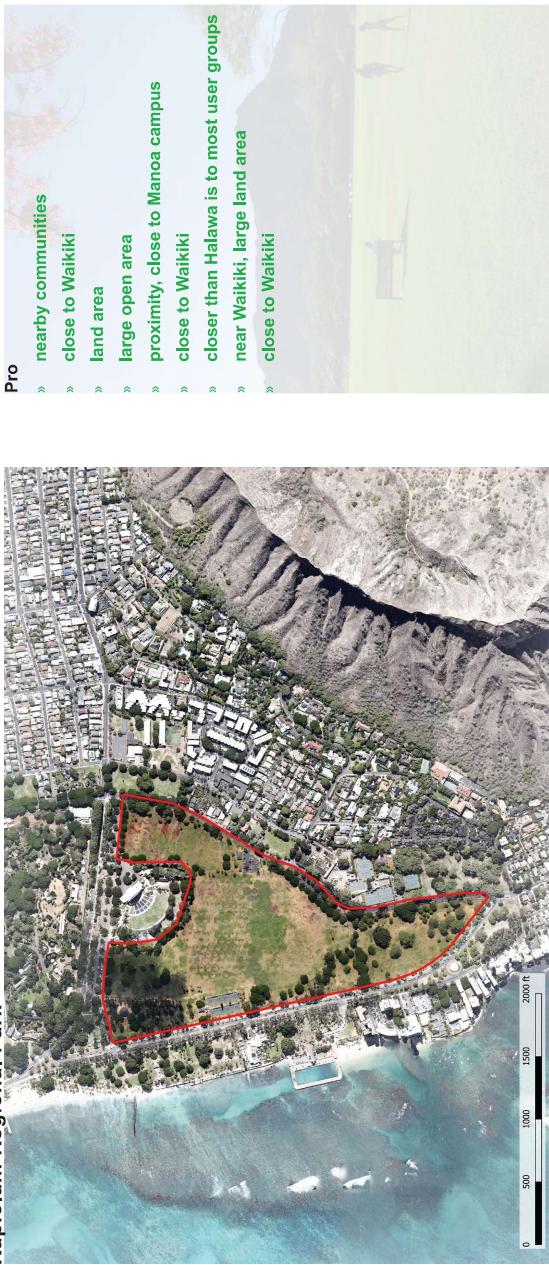
Pro	Con
» student participation	» away from current population center
» vast land area	» not centrally located
» potential large land area, near rail land available?	» windward/east Honolulu residents will not travel here
» large land area, transit	» too far for many parts of the island where people live
» large size site to development, on campus, multiple HART stops	» lack of water/sewer
» undeveloped so lots of potential roadway in/out, lots of land	» one way in one way out
» large land area	» distance from population (far)
» future growth of population	» far from most users groups
	» infrastructure, away from population center / isolated to one side of island
	» distance from Waikiki

### Ala Wai Golf Course



Pro	Con
» nearby communities, close to UH	» golfers lose
» close to Waikiki	» flood zone potential
» land area	» (access, disruption to community), flooding, displaces golfers
» land available, convenient for access	» near the water with possible entertainment in future
» close to populated area	» road access, water/sewer lack, flooding, popular golf course, no HART
» lodging + hotels, community support (near Waikiki)	» will be evacuation zone, re-zoning
» close to Waikiki	» traffic in/out, surface streets, distance to H1
» pretty view, more room for development	» same issue with UH, too close to Waikiki, expensive land
» large area, near Waikiki / commercial center	» site access limited, sea level rise?
» existing amenities, restaurants and entertainment	» existing use Golf Course

### Kapiolani Regional Park



#### Pro

- » nearby communities
- » close to Waikiki
- » land area
- » large open area
- » proximity, close to Manoa campus
- » close to Waikiki
- » closer than Halawa is to most user groups
- » near Waikiki, large land area
- » close to Waikiki

#### Con

- » community opposition
- » does not have ingress/egress to accommodate stadium
- » access & potential for future access, much beloved greenspace, sea level rise
- » takes away from current events, green space will be "less"
- » bad access, no HART, the Trust does not allow profit
- » access
- » traffic in/out, far from H1
- » not a good idea, takes away from a much loved park, should not be an option
- » limited access, sea level rise?
- » restriction in operations of stadium (noise)

### Sand Island



#### Pro

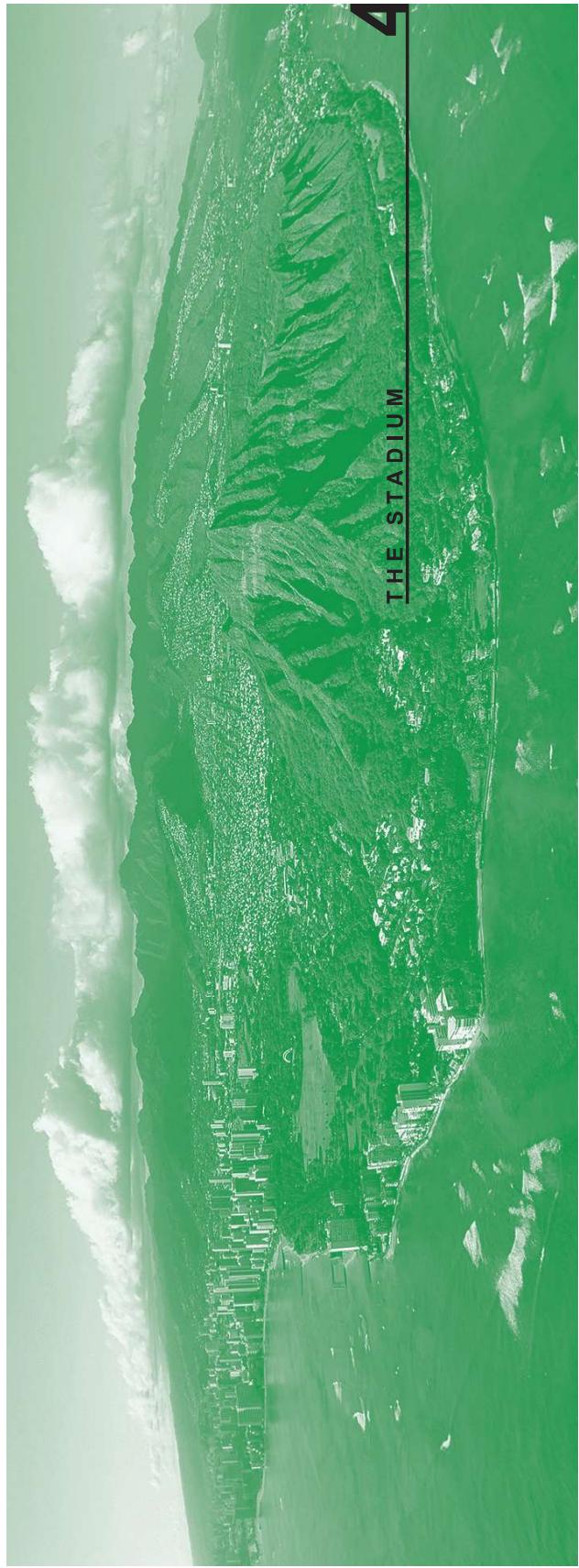
- » spur improvement of the area
- » location is centrally located
- » large area
- » not residential
- » industrial land
- » large land area
- » available land

#### Con

- » access
- » limited ingress/egress
- » industrial area, displaces businesses, more suited for harbor function, no future rail access
- » bad, traffic access is BADI, near water so possible encroachments
- » remote, no HART, water/sewer?, better used as shipping seaport, flooding?
- » road access transportation, ingress/egress challenges, will be in evocative zone
- » one access in/out
- » far from everything and difficult in/out, not a viable option
- » displacement of industrial infrastructure, sea level rise?, constricted site access
- » rising sea levels

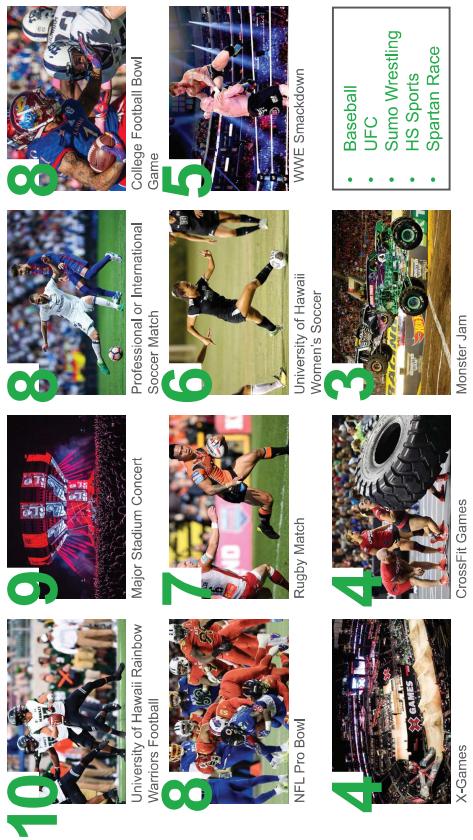


Pro	Con
» abundant land	» far from current population center
» land area is sufficient to meet needs	» not centrally located
» land area	» remote, may be restricted by air development requirements, access by rail, windward/east Honolulu will not travel here
» large area	» too far!
» growing community	» water/sewer, floody, flight path restriction, no HART
» far from Honolulu	» infrastructure – for most
» land available	» vicinity to airport, development restrictions
» land area	» too far, roadways in/out, not on rail line, not a viable option
» land area	» infrastructure, FAA height restrictions?
»	» infrastructure



## Stadium Events

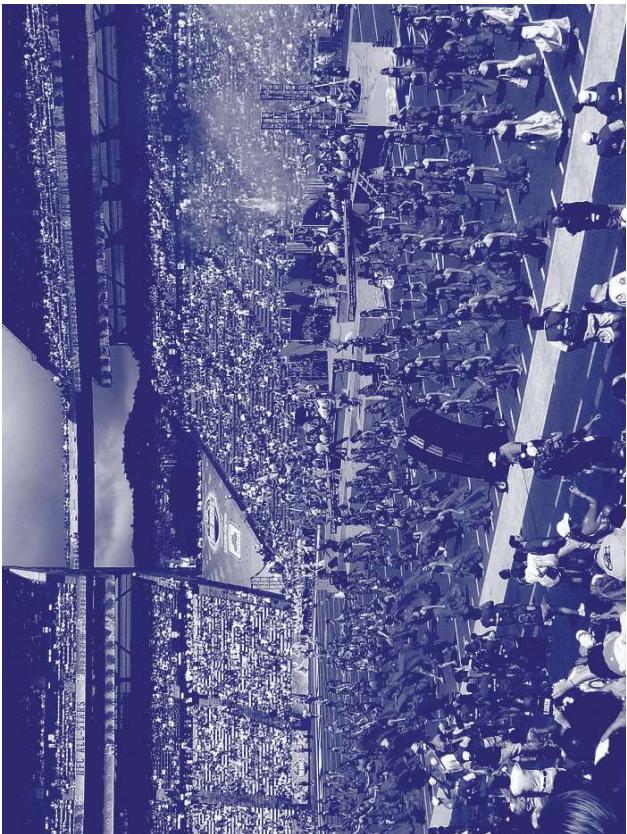
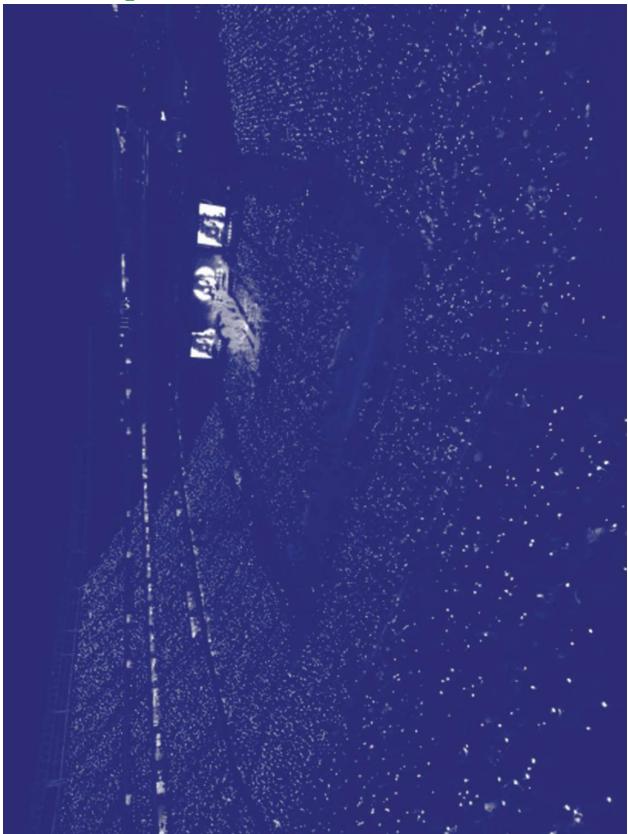
What events would you most like to see in a new stadium? (Mark as many as you want.)

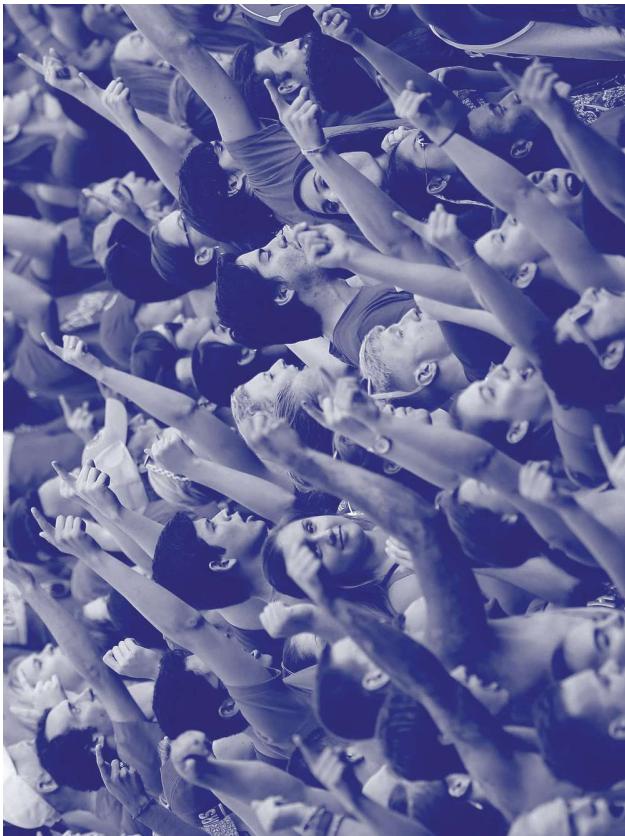
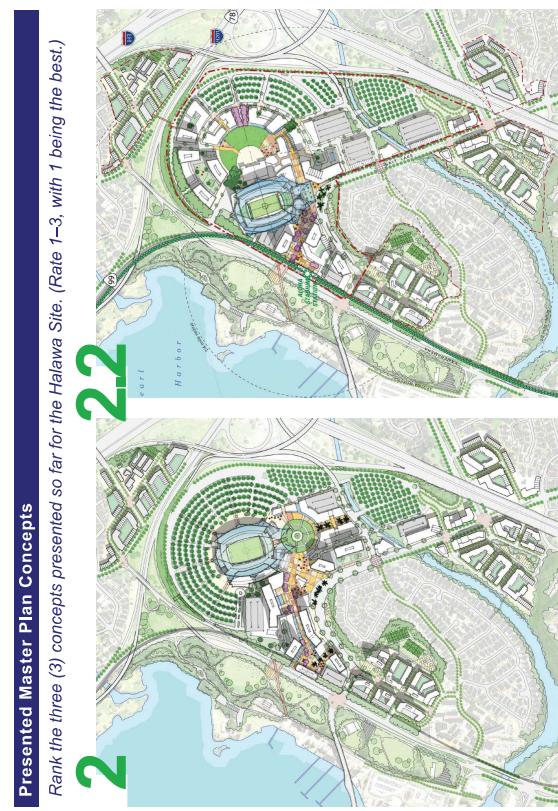
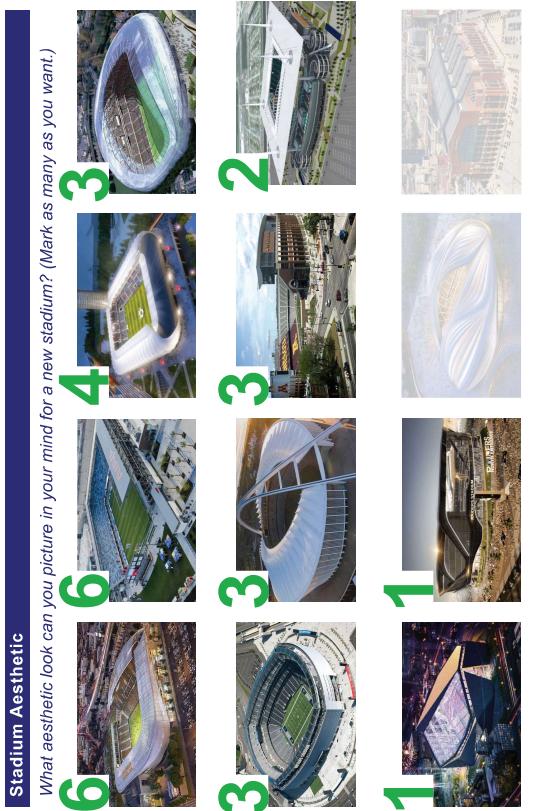


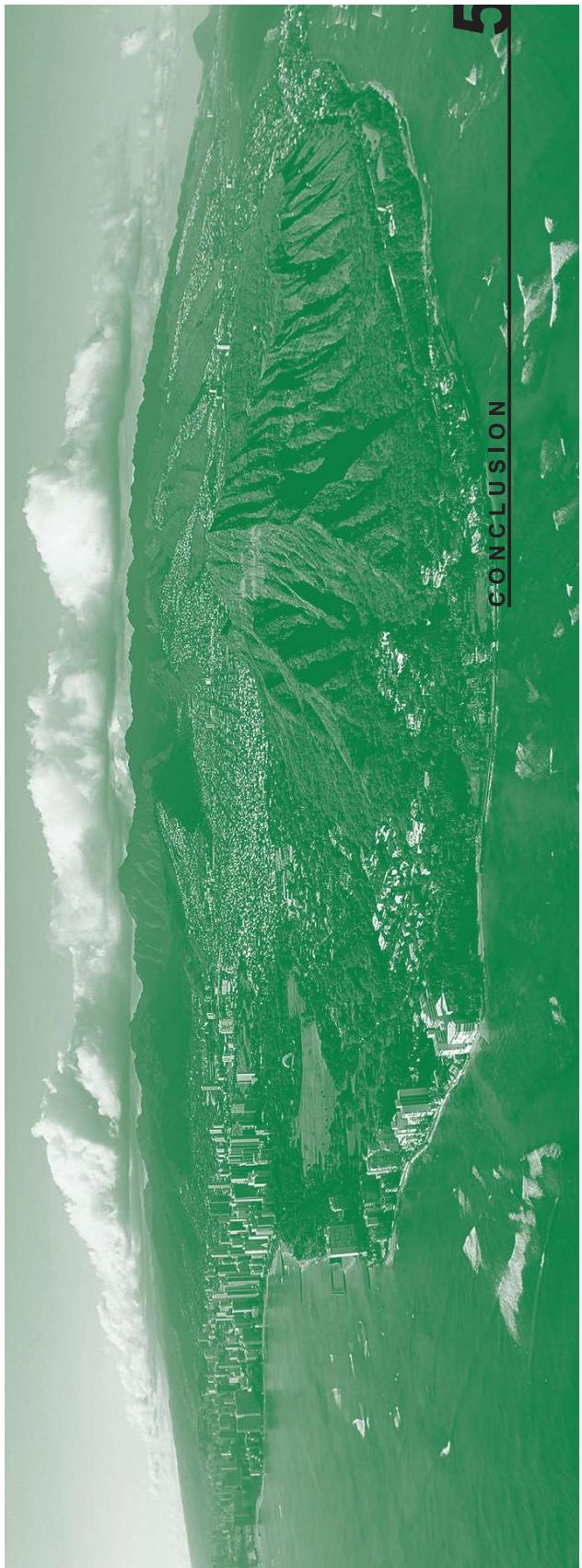
## Existing Stadium

What do you like best about the current stadium?

- » It is a fair and reasonable location to serve all of Oahu: near to Waikiki, West Oahu, East Oahu, Windward Oahu
- » location, openness, history (memories of past events), access / centralized flexibility
- » convenient but traffic problems
- » road access to most parts of the Island, good site lines
- » centrally located site and a major gathering place, creating enjoyable and memorable moments
- » nice open feel, accessible to both east + west side, ability to tailgate @ UH games
- » location and available resources
- » "the wave"







## CONCLUSION

5



### Future Thoughts

The front page of the Honolulu Star-Advertiser is featuring this project on opening day.  
What does the headline say?

"We did it" for Hawaii



Finally! A New Stadium

Long-awaited Aloha Entertainment  
Hub Opens at Minimal Cost to  
Hawaii Taxpayers





## 4. SUMMARY OF SITE EVALUATION

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<p><b>EVALUATION CRITERIA</b></p> <p>The selected sites are to be evaluated for suitability based on a range of metrics grouped into five headings:</p> <ul style="list-style-type: none"> <li><b>Site, Infrastructure and Environment</b> – What are the intrinsic physical qualities of the site – how big is it, does it have transit access, how close is it to major landmarks and amenities on the Oahu, and how vulnerable is it to natural disasters?</li> <li><b>Development Costs</b> – How is the site zoned, what legal or logistical challenges might complicate development, and what financial incentives are available?</li> <li><b>Community</b> – How will the project be received by its potential neighbors, what cultural benefits can it bring to the area, and what sorts of political head- or tailwinds would it face?</li> <li><b>Economic Impact</b> – How might development on the site bring economic opportunity to the neighborhoods around it?</li> <li><b>Intuitive Site Qualities</b> – Are there any advantages or drawbacks to the site that have not been quantified in any of the other categories?</li> </ul>	<ul style="list-style-type: none"> <li><b>Proximity to Emergency Services</b> <ul style="list-style-type: none"> <li>Events drawing large attendance frequently require the assistance of public services for crowd control, on-site medical care, and emergency needs.</li> <li>Proximity to these services is crucial in minimizing the risks involved in hosting such events. 1 point for each service under 5 miles distant from site.</li> </ul> </li> <li><b>Proximity to Honolulu Harbor</b> <ul style="list-style-type: none"> <li>As the island's container shipping terminal, convenient access to and from Honolulu Harbor will be important for traveling shows and other, similar events. 1 point deducted per 10 miles of road distance.</li> </ul> </li> <li><b>Proximity to Waikiki</b> <ul style="list-style-type: none"> <li>Although it is not the only place hotels are found on Oahu, about 27,700 of the roughly 31,700 hotel rooms on the island (87%) are located in Waikiki. While a larger development could easily include additional hotel rooms on site, during any event drawing significant out-of-state attendance more rooms will be needed than can be feasibly accommodated on site. Access to Waikiki is therefore an important metric in considering site options. 1 point deducted per 10 miles of road distance.</li> </ul> </li> <li><b>Ability to Accommodate Stadium Program</b> <ul style="list-style-type: none"> <li>At a minimum, a viable site must be large enough to accommodate the stadium proper, support facilities, and the required event-day parking.</li> </ul> </li> <li><b>Flood/Tsunami Hazard Avoidance</b> <ul style="list-style-type: none"> <li>Most of the sites under consideration sit close to the coastline, making flooding and tsunami risks the primary natural hazards to consider. FEMA flood hazard zones are used to make risk assessments for weather- and tide- related risks; for tsunami hazards, Honolulu divides the coast into areas threatened into a "Tsunami Warning Zone" for typical hazards and an "Extreme Tsunami Warning Zone" that would only be endangered in the case of an extraordinary event. Particularly due to the challenges involved in facilitating a timely evacuation from a stadium in the event of a locally-generated tsunami, an ideal site would be protected from both flooding and tsunami risks. However, protective measures and provisions for sheltering in place could mitigate these risks.</li> </ul> </li> <li><b>HART Access</b> <ul style="list-style-type: none"> <li>The HART is an elevated-guideway rapid transit system currently under construction, that at completion will provide a high-capacity rapid transit link connecting urban Honolulu with Daniel K. Inouye International Airport, various tourist attractions, and West Oahu. A site with connectivity to the system could benefit dramatically from these connections, enabling visitors to the development to easily reach the site from far-flung parts of the island and massively reducing the need to develop on-site parking facilities, freeing up acreage for developable building area and visitor amenities.</li> </ul> </li> <li><b>Proximity to Daniel K. Inouye International Airport</b> <ul style="list-style-type: none"> <li>Though the new stadium development will largely serve the needs of the University of Hawaii and local residents, access to the site for visiting teams, shows, and fans must be considered. As the primary mode of interstate travel to and from Honolulu, Inouye International Airport represents a critical connection point for those users. The time and distance to the airport, as well as the range of transit options available to visitors traveling to and from it, must be considered. 1 point deducted per 10 miles of road distance.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li><b>Bus Access</b> <ul style="list-style-type: none"> <li>Providing good access to mass transit broadens the potential customer and employee base for any mixed-use development, while also reducing the need for on-site parking and road lanes to accommodate personal vehicles for daily and event traffic.</li> </ul> </li> </ul>	<p><b>DEVELOPMENT COSTS</b></p> <ul style="list-style-type: none"> <li><b>Existing Zoning</b> <ul style="list-style-type: none"> <li>What zone or zones are currently applied to the site by the County of Honolulu.</li> </ul> </li> <li><b>P3 Potential or other Development Possibilities</b> <ul style="list-style-type: none"> <li>How suitable the site is for additional development beyond the core stadium program; this development may help to defray the cost of building the stadium itself, and provide additional new job opportunities and amenities for the people of Oahu.</li> </ul> </li> <li><b>Ceded Lands Encumbrance</b> <ul style="list-style-type: none"> <li>Roughly 1.8 million acres of land on the Hawaiian Islands was formally ceded to the United States by the Republic of Hawaii on annexation. These lands were formerly known as Crown and Government Lands by the Kingdom of Hawaii, and due to the Kingdom's overthrow by the Republic, the State of Hawaii has since acknowledged that this transfer was immoral and unlawful. However, the status and boundaries of these lands is not fully understood, and due to legal limitations on their sale and transfer without consideration for Native Hawaiians, their presence on any site represents a significant potential risk for any public or private development.</li> </ul> </li> <li><b>Infrastructure Costs</b> <ul style="list-style-type: none"> <li>The cost of extending or improving roads, transit and pedestrian links, utilities, and other supporting elements to the site.</li> </ul> </li> <li><b>Land Acquisition</b> <ul style="list-style-type: none"> <li>The cost of acquiring land for development can be a major component of total costs. In this case, all sites are held by the State of Hawaii, although one is held by the Department of Hawaiian Homelands.</li> </ul> </li> <li><b>Development Incentives</b> <ul style="list-style-type: none"> <li>Hawaii and the County of Honolulu have a partnership program called "Hawaii Enterprise Zones" that offers tax incentives to promote job creation and business activity in geographically-targeted parts of the island. Additionally, the State of Hawaii has designated several "Opportunity Zones" under the 2017 Tax Cuts and Jobs Act that could potentially provide development incentives to a P3 development partner (though this program is not fully fleshed-out at this time). Sites in these zones may be more desirable for P3 development.</li> </ul> </li> <li><b>Complexity</b> <ul style="list-style-type: none"> <li>Any confounding factors not encompassed in the metrics above that may add to the challenge of creating a viable development at a given site.</li> </ul> </li> </ul>
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## SITE DECISION MATRIX

### *Site Analysis and Scoring Rubric*

Category	Subtotal	Criteria	Value	
Site, Infrastructure, and Environment	30	Total Acreage	5	
		HART Access	5	
		Proximity to Daniel K. Inouye International Airport	3	
		Proximity to Emergency Services	3	
		Proximity to Honolulu Harbor	2	
		Proximity to Waikiki	2	
		Ability to Accommodate Stadium Program	2	
		Avoids Flood/Tsunami Hazards	2	
		Avoids Sea Level Rise Hazard	2	
		Avoids Wetlands Impact	2	
Development Costs	20	Suitability for Emergency Shelter Bus Access	1	
		Existing Zoning	4	
		P3 Potential or other Development Possibilities	4	
		Ceded Lands Encumbrance	3	
		Infrastructure Costs	3	
Community	30	Land Acquisition	2	
		Development Incentives	2	
		Complexity	2	
		Community Acceptance	10	
Economic Impact	20	Positive Cultural Impact	10	
		Political Viability	10	
		Employment Demand in Vicinity	6	
		Households Experiencing Poverty in Vicinity	6	
Intuitive Site Qualities	0	Population in Proximity	6	
		Per-Capita Income in Vicinity	2	
Unique Site Improvement Opportunities - positive*		5		
Anticipated Site Difficulties - negative**		-5		
			<b>100</b>	

\* discretionary points added (up to 5)

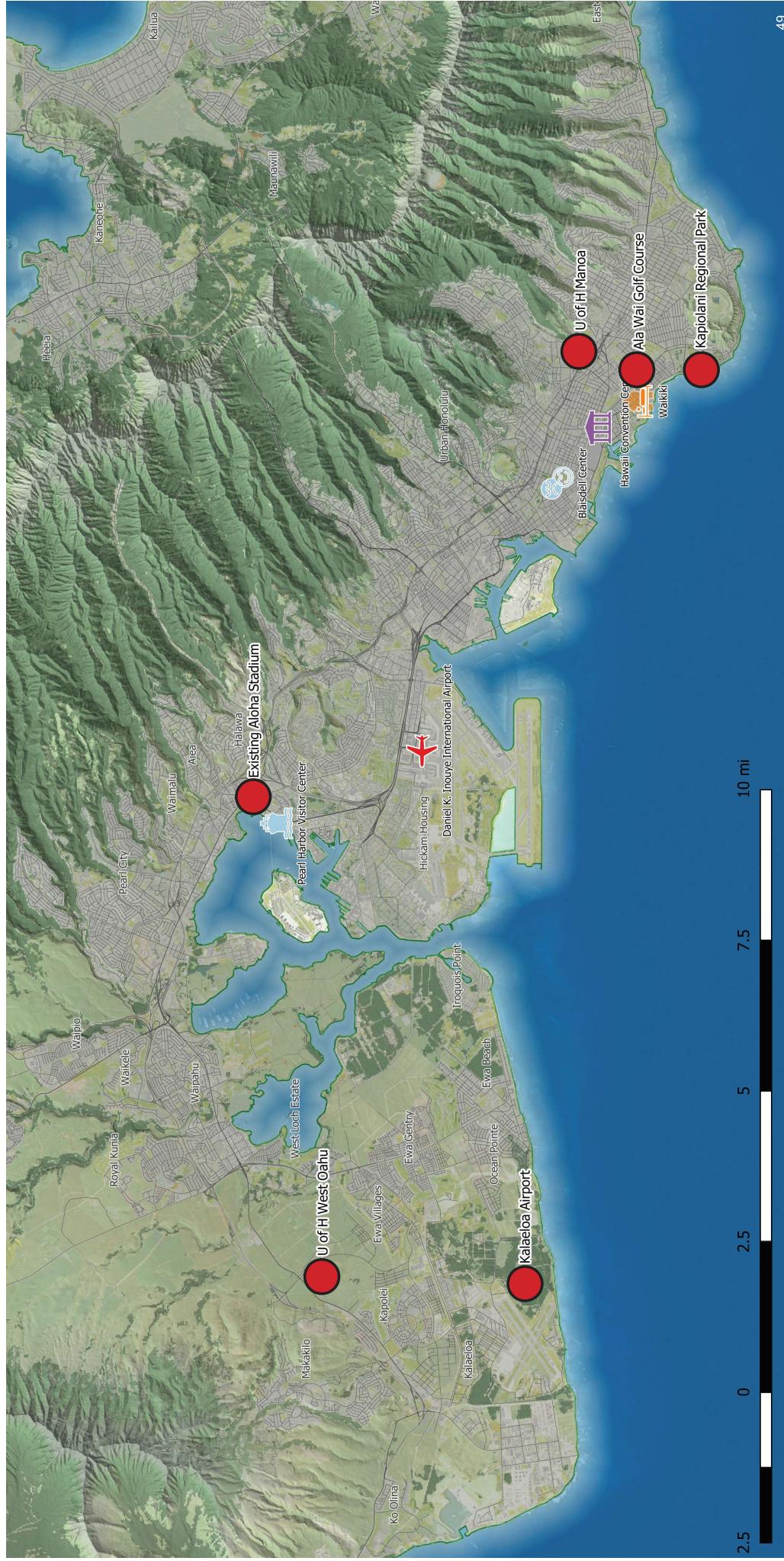
\*\* discretionary points taken away (up to 5)

- COMMUNITY RECEPTION**
- **Community Acceptance**
    - A measure of how supportive the neighborhoods and institutions in the vicinity of the site are of bringing the development into their community.
  - **Positive Cultural Impact**
    - A measure of how the development may provide new cultural and entertainment benefits to the neighborhoods around the site.
- ECONOMIC IMPACT**
- **Employment Demand in Proximity**
    - A measure of how the differing sites may be affected by current or future political decisions, and the direction of growth in the community.
- INTUITIVE SITE QUALITIES**
- **Per-Capita Income in Proximity**
    - The ability of the project to lift household incomes in an area varied based on the average income in proximity. Lower average incomes in an area are indicative of a greater need for better employment opportunities. Based on 2016 American Community Survey (ACS) data.
  - **Unique Site Improvement Opportunities**
    - All of the sites will have a unique quality about them and a different ability to be developed that cannot be quantified specifically. This category allows for the alternative sites to gain points based on those intuitive qualities through discussion and historical knowledge.
  - **Anticipated Site Difficulties**
    - Some of the sites may have impediments to development that are neither easily identifiable, nor able to be placed easily in the evaluation rubric. This category provides opportunity to adjust the individual site scores based on discussion and collected knowledge of the Client and Development Design Team.
  - **Households Experiencing Poverty in Proximity**
    - While not a direct measure of employment shortfalls, households in poverty may benefit from the availability of additional jobs that could permit householders to pick up additional part-time work, move from underemployment to full employment, or bring an additional member of the household into the workforce. Based on 2016 American Community Survey (ACS) data and travel time data provided by the Open Route Service; 1 point awarded per 3,000 households below the Federal poverty line.
  - **Population in Proximity**
    - This figure represents the number of people and households that live within a nominal 10-minute drive time of the proposed site. In addition to being a critical indicator of the potential user-base of any development, the range of the 10-minute drive time also serves as a good proxy indicator for how accessible by road a given site is. Ideally this figure should be as large as possible, indicating that a significant proportion of the island's population can easily utilize the amenities of the development. Based on 2010 US Census data and travel time data provided by the Open Route Service; 1 point award per 50,000 residents.



## 5. PROPOSED SITES FOR ANALYSIS

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## 5A. HALAWA SITE

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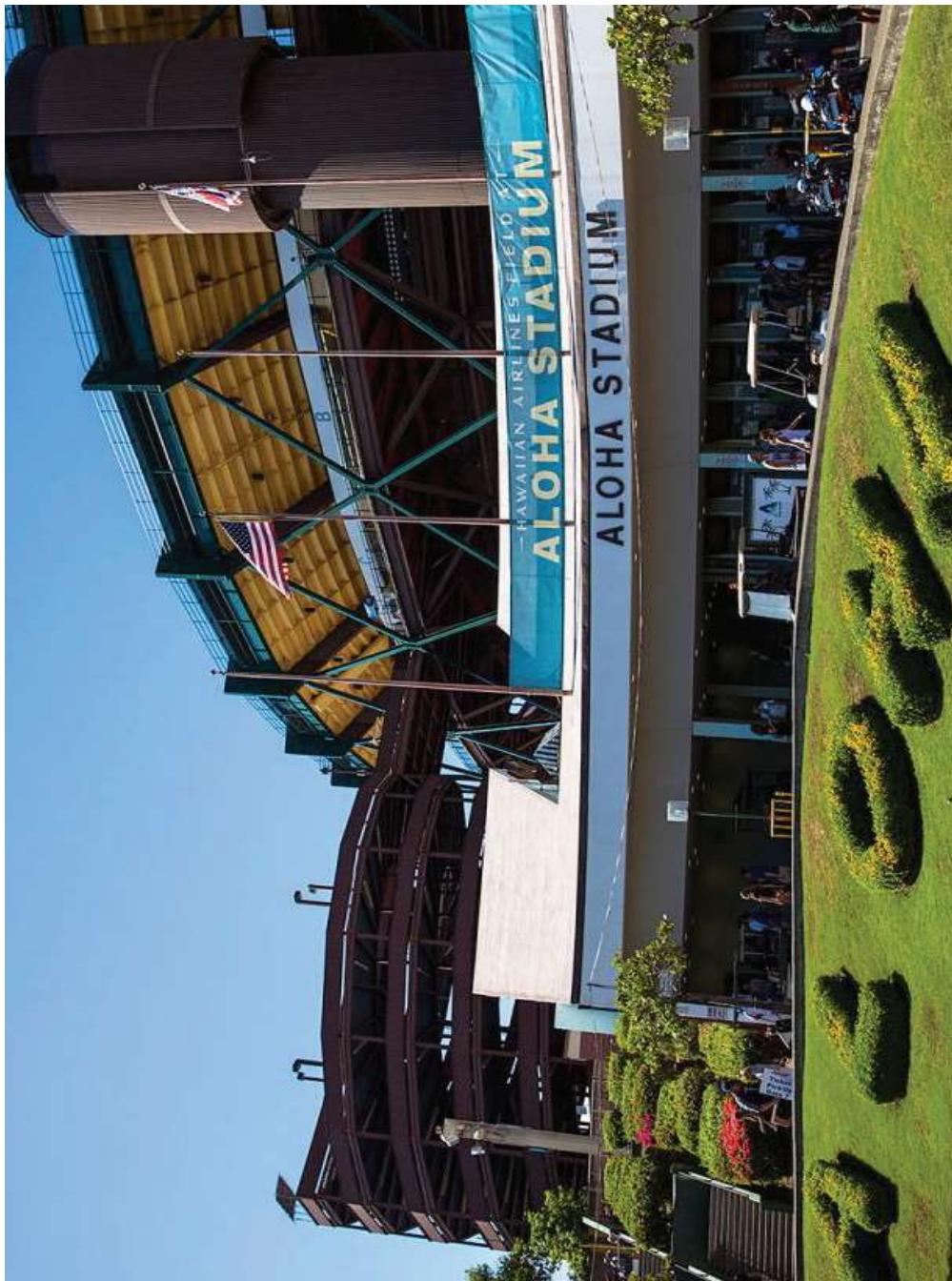
### *Halawa (Existing Aloha Stadium Site)*

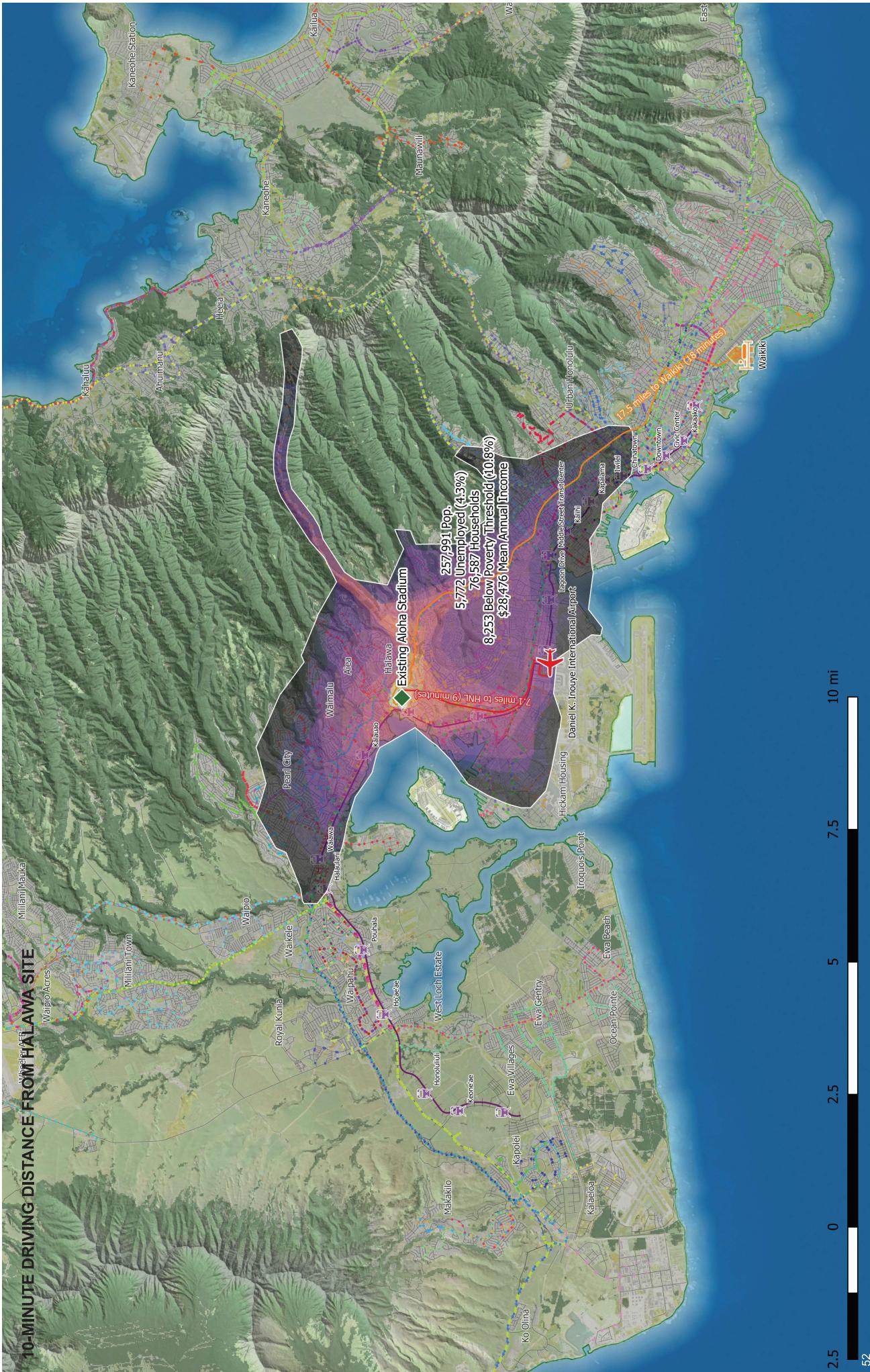
The existing Aloha Stadium is situated on 97 acres of land immediately adjacent to the highways H1, H201, and Salt Lake Boulevard, on the Diamond Head side of Pearl Harbor. Currently, the site consists of the stadium proper and its surrounding surface parking lots. Halawa Stream cuts through the south end of the site, and a portion of its channel is considered wetland. The future Halawa Aloha Stadium stop on the HART will be at the ewa side of the site, and is expected to be complete in 2020. In addition to the rail stop, 20 bus stops are present in a ¼ mile radius from the site perimeter. Emergency services are moderately close to the site, with only police services (dispatched from Pearl City Police Station) more than five miles distant. As a developed site, utilities are already present, though additional capacity will likely be required to support more intensive development.

Roughly 258,000 residents of Oahu live within a nominal 10-minute drive, and those residents earn on average about \$28,500 per year. This puts the site in the middle of the pack demographically, but with good connectivity to areas beyond the 10-minute driving isochrone thanks to its transit links.

The existing Aloha Stadium was constructed in 1975, and has reached the end of its useful life. The steel superstructure of the facility has undergone rapid corrosion as a result of corrosion protection and its proximity to seawater. The demolition and construction of a replacement facility on the site, while not depriving the Rainbow Warriors of a venue, would be one of the larger challenges of redeveloping the site -- though not an insurmountable one by any means.

This site also has been thoroughly studied for redevelopment, and a wealth of analysis is available to build a development plan from with minimal additional study.







Total Site Size:	97 acres
Total Tree Cover:	0.0 acres (0.0%)
Designated Wetlands:	1.5 acres (1.6%)
Site Slope:	
• Mean:	3.7-deg
• Max:	19.8-deg
• Std Dev:	3.3-deg
Bus Stops Nearby:	20
HART Stops Nearby:	1

The “10-Minute Driving Map” represents an isochronal diagram highlighting a distance around each one of the potential sites. This isochrones map show the distance that one could travel to or from the site in a 10-minute period of time, with no traffic. This catchment area is used to collect all of the data points and rubric information included in the site analysis matrixes. This is shown consistent for all the sites.

The “Vicinity Map” shows the bounds of an area that is a 15-minute (1/4-mile) walk from the site perimeter. This area provides additional information about the facilities and infrastructure immediately adjacent to the site. This is shown consistent for all the sites.



## **Halawa Site**

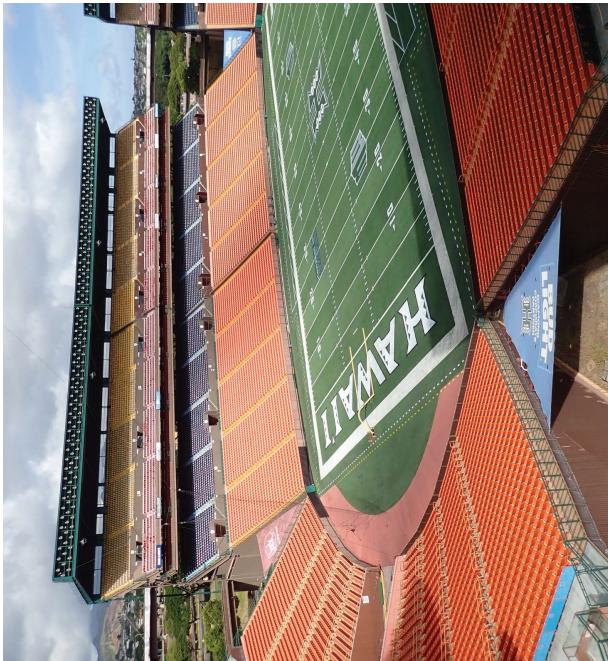
### **General Description**

Located at the intersection of H1, H3 and H201, the Halawa Site is the existing location of Aloha Stadium. The 50,000 seat venue opened in 1975 and has been the home of the University of Hawaii Football team, the Swap Meet and host of many major concerts and events over the last 45 years.

<b>Pros</b>	<b>Cons</b>
<ul style="list-style-type: none"><li>• Planned HART station is already under construction on the east side of the site.</li><li>• Existing stadium infrastructure in place.</li><li>• Ample site area for new stadium along with additional ancillary development.</li><li>• Close to the harbor and the airport for visitor access and event shipping / management.</li><li>• Close to Pearl Harbor.</li><li>• Access to the site from the rest of the island is very good, via highway.</li><li>• Tradition of site as the stadium venue for the last 45 years is already in place; public approval could potentially be easier than at other sites which might require changes to existing uses.</li><li>• Equidistant between Waikiki / Downtown and West Oahu.</li><li>• Since the site is mainly covered in car parking only, preparation of the site for development would not be difficult.</li></ul>	<ul style="list-style-type: none"><li>• Existing stadium needs to be addressed; either removed or renovated in place.</li><li>• Concerns over the accommodation of the Swap Meet.</li><li>• Not close to any of the University Campuses.</li><li>• Not great pedestrian access.</li></ul>

### **Summary Observations(s)**

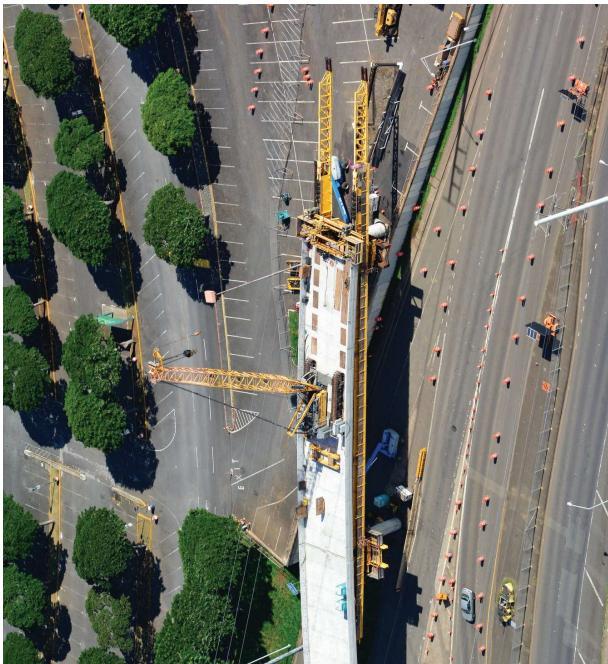
The site appears to be the most ready for immediate development. Master Plan studies for this site have already been conducted and it is more than sufficient for significant development. The site has the benefit of continuing the history of use as a stadium / event site along with the ability to grow and provide additional development for the surrounding areas.



Aloha Stadium Bowl



Existing entry and public art



Construction of HART Station



Swap meet



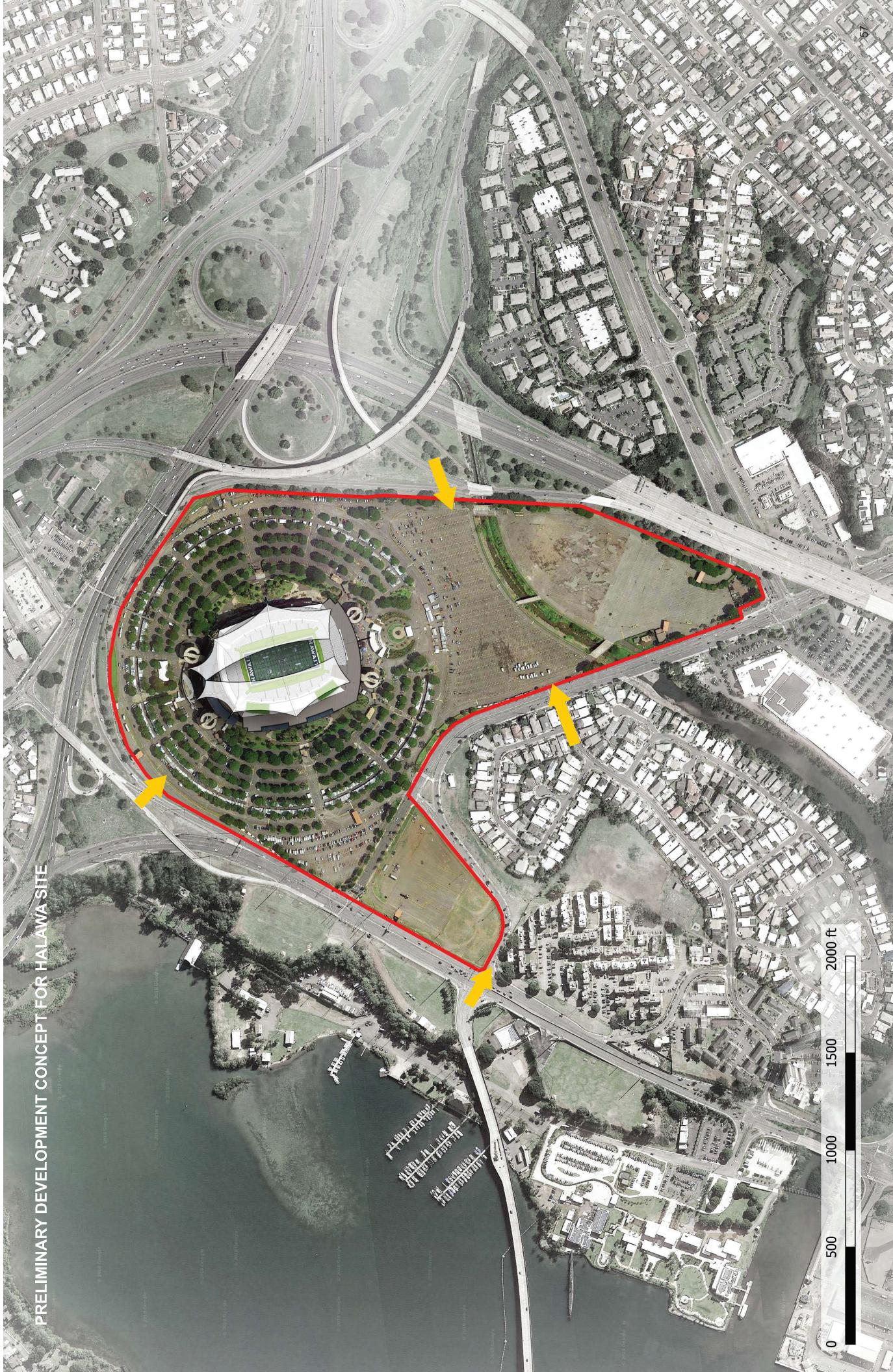
Pedestrian bridge to Halema'a site

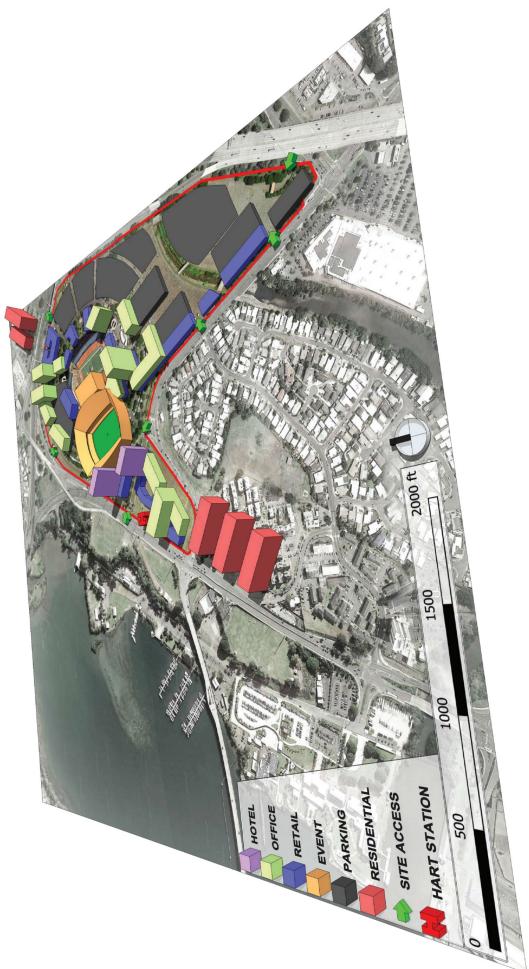


Aloha Stadium parking lot



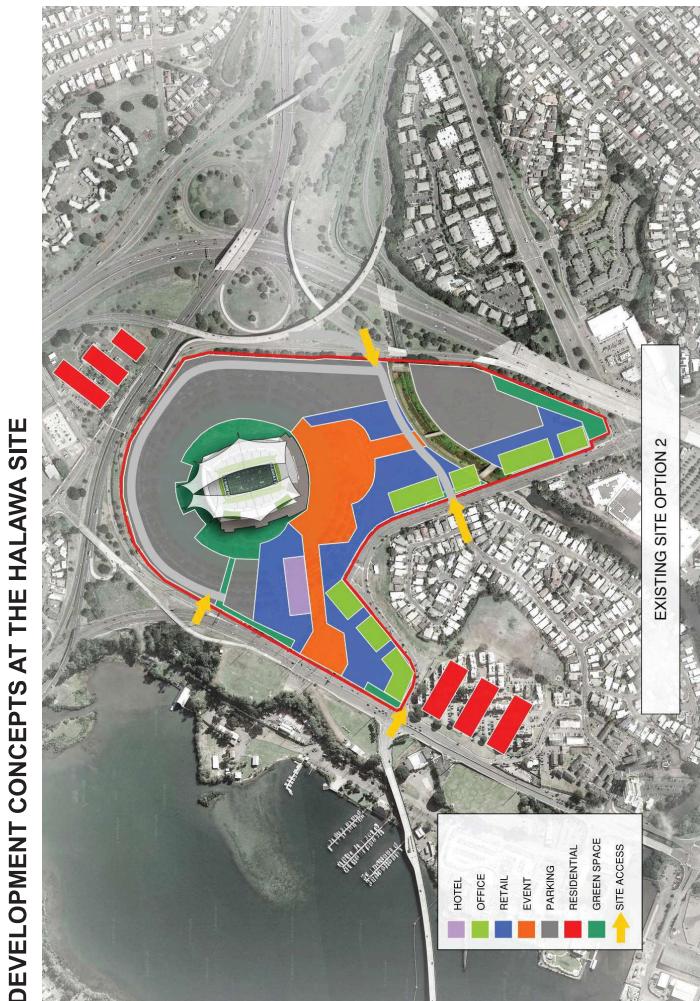
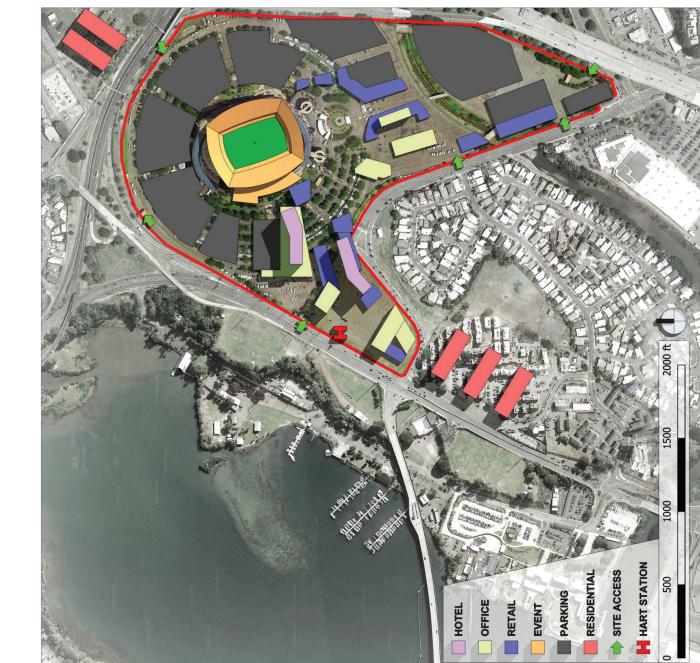
PRELIMINARY DEVELOPMENT CONCEPT FOR HALAWA SITE





DEVELOPMENT CONCEPTS AT THE HALAWA SITE





DEVELOPMENT CONCEPTS AT THE HALAWA SITE





## HALAWA SITE ANALYSIS

Site Analysis and Scoring:		Halawa Site		Notes	Score	Subtotal
Category	Criteria	Indicators				
Site, Infrastructure, and Environment	Total Acreage	97 acres on existing site and adjacent lots along Salt Lake Blvd.			5 / 5	
	HART Access	1 dedicated HART station on perimeter of site	Aloha stadium station is eastern terminus of HART Phase I project		5 / 5	
	Proximity to Daniel K. Inouye International Airport	7.1 miles (9 minutes) to/from airport	Kaielaia Airport not considered due to limited cargo handling facilities		3 / 3	
	Proximity to Emergency Services	3.0 miles from Aeia Fire Station; <b>6.4 miles</b> from Pearl City Police Station; <b>3.2 miles</b> from Pali Momi Medical Center	Barber's Point Harbor not considered due to lack of container facilities		3 / 3	
	Proximity to Honolulu Harbor	7.1 miles (15 minutes) to/from harbor	87% (~28000) of hotel rooms on Oahu are in Waikiki		2 / 2	
	Proximity to Waikiki	17.5 miles (18 minutes) to/from Waikiki	Per NOAA Pacific Tsunami Warning Center and FEMA flood risk maps		2 / 2	
	Ability to Accommodate Stadium Program	Outside Tsunami Evacuation Zones and 1% Annual Flood Risk Zones	Per NOAA circa 2100 worst-case scenario projections (3.2ft)		2 / 2	
	Avoids Flood/Tsunami Hazards	Halawa Stream channel affected, but majority of site well above future sea levels			1 / 2	
	Avoids Sea Level Rise Hazard	1.5 acres designated wetlands (1.6% of total) along Halawa Stream			1 / 2	
	Avoids Wetlands Impact	Good road and transit access, outside flood/tsunami risk zones; high coastal exposure			1 / 1	
Bus Access	Bus Access	20 bus stops within 1/4 mile radius of site			1 / 1	
	Existing Zoning	R-5 Residential District	Not likely to be an impediment due to existing use as a stadium		3 / 4	
	P3 Potential or Other Development Possibilities	Good placement, site area, and transit access for commercial development			4 / 4	
	Ceded Lands Encumbrance	Some ceded lands at site edges			2 / 3	
	Infrastructure Costs	Utilities on site for existing Aloha Stadium facilities			3 / 3	
	Land Acquisition	Owned by State of Hawaii			2 / 2	
	Development Incentives	Site covered by Aloha Stadium Federal Opportunity Zone			2 / 2	
	Complexity	Flarge, flat, easily-accessed site; existing stadium could create complications			1 / 2	
	Community Acceptance	Existing stadium site - community is accustomed to use			9 / 10	
	Positive Cultural Impact				7 / 10	
Economic Impact	Political Viability				8 / 10	
	Employment Demand in Vicinity	5,772 unemployed persons in 10-min. drive distance (4.3% of pop.)	Potential to bring new employment opportunities to area		6 / 6	
	Households Experiencing Poverty in Vicinity	8,253 households in poverty in 10-min. drive distance (10.8% of total)			3 / 6	
	Population in Proximity	257,991 persons in 76,587 households in 10-min. drive distance			6 / 6	
	Per-Capita Income in Vicinity	\$28,476	Relatively low incomes relative to other sites could reduce commercial viability		2 / 2	
Intuitive Site Qualities	Unique Site Improvement Opportunities - positive				3 / 5	
	Anticipated Site Difficulties - negative				-1 / -5	
						<b>Total Score: 87 / 100</b>



## **5B. UNIVERSITY OF HAWAII AT MANOA SITE**

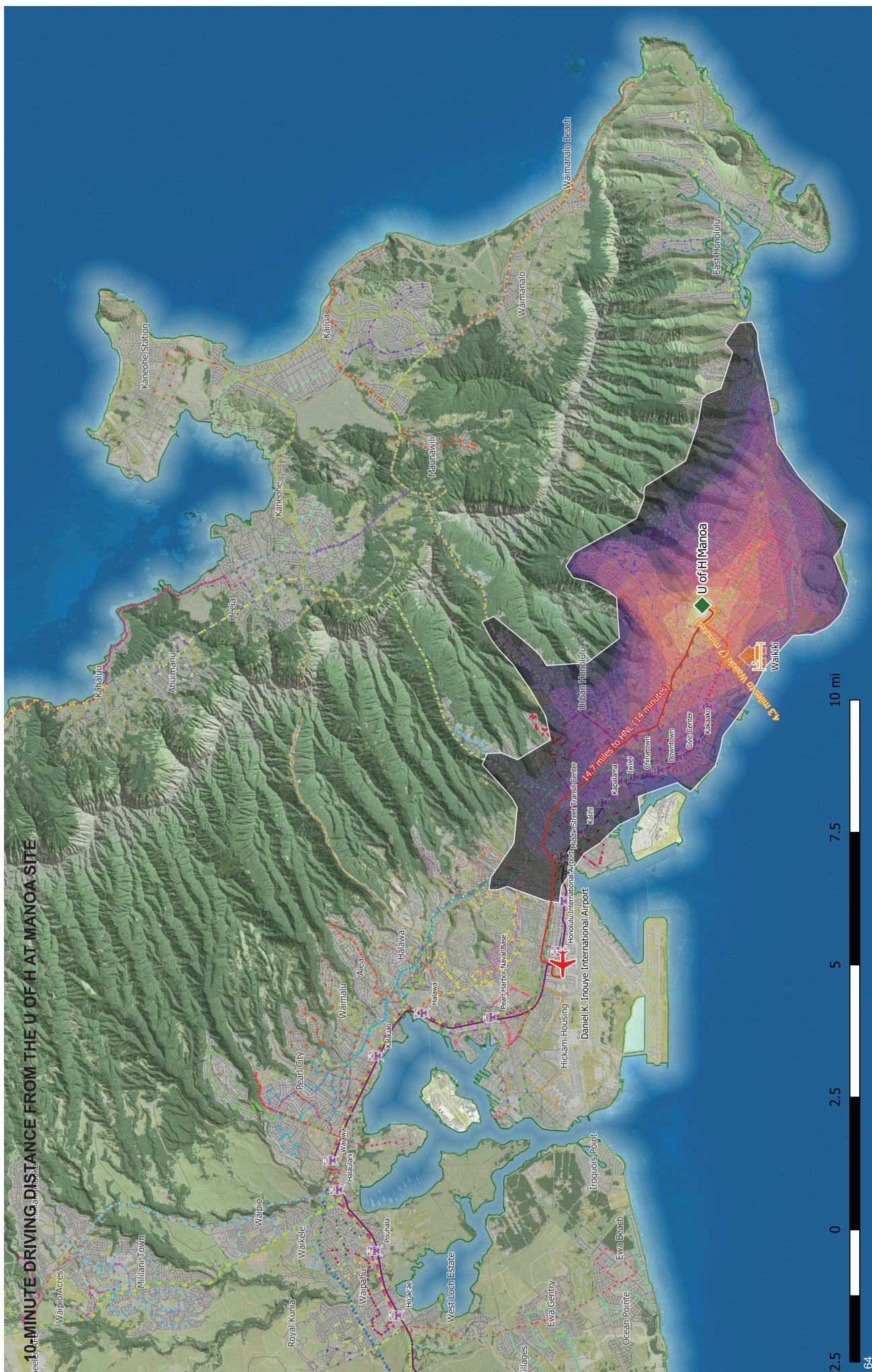
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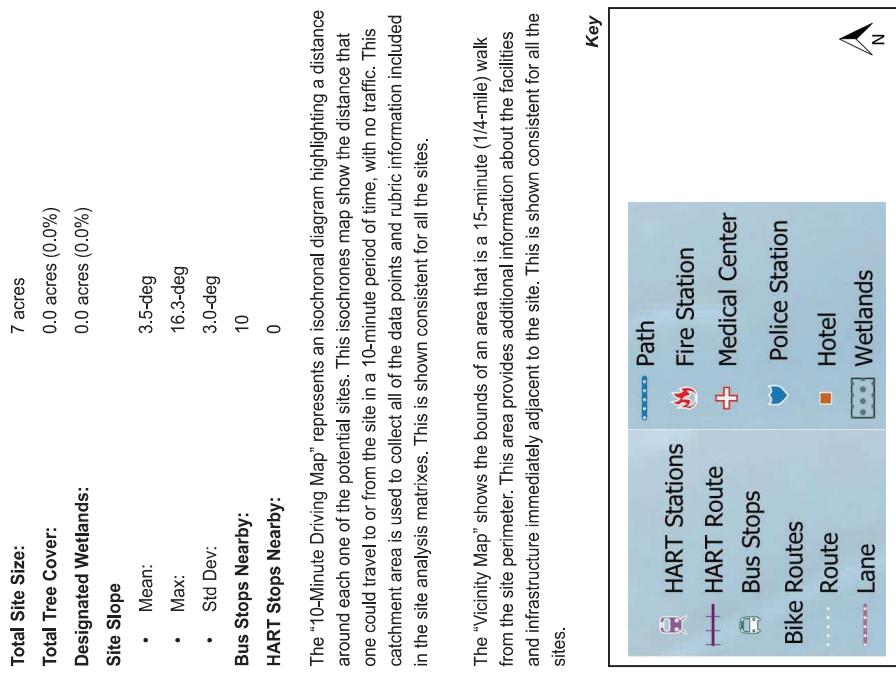
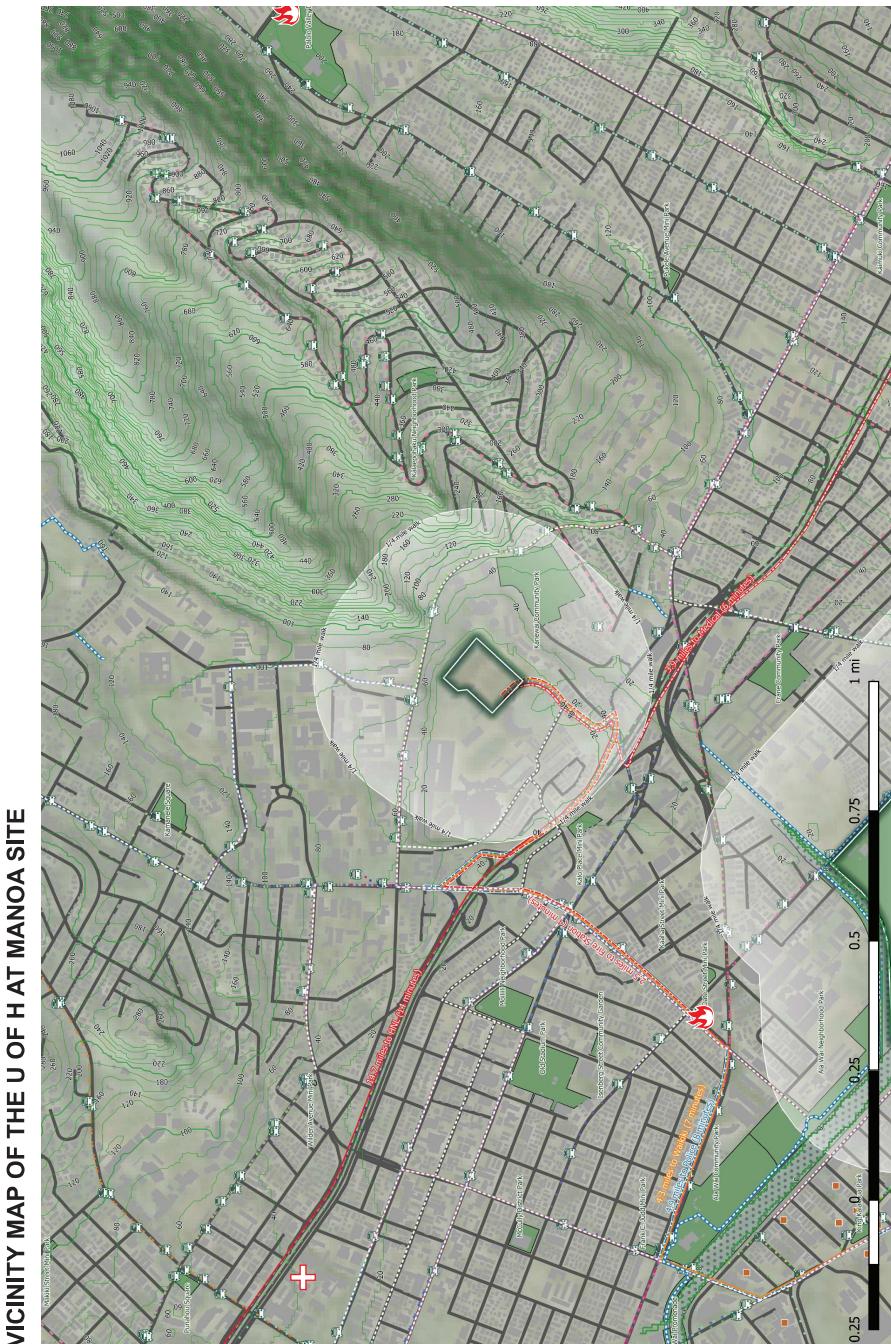
### ***University of Hawaii at Manoa***

During the primary campaign, both Governor Ige and his opponent, Representative Hanabusa, expressed a desire to locate the replacement for Aloha Stadium on a University of Hawaii campus at Manoa or West Oahu, depending on the preference of the university. In accordance with this desire, the team has studied the Manoa campus and located a potential site, though it comes with caveats.

The Manoa campus of the University of Hawaii is situated maulka of H1, against the base of Kalaupahoaka Ridge and hemmed in by surrounding neighborhoods. The campus is heavily developed already, with minimal areas of contiguous free space. Cooke Field the current practice fields for the Rainbow Warriors football team represents the only potential location with the ability to support a football stadium of the necessary size. It is likely that utilizing this site effectively would also require the demolition of the Rainbow Wahine softball stadium, as well as partially or completely removing the adjacent tennis facilities. This site would also preclude the possibility of mixed-use development using the stadium as an anchor. However, the Manoa campus is centrally located in urban Honolulu (with 325,000 residents within a 10 minute drive), is walkable for students, and can leverage existing campus parking structures for game-day and event parking.







## ***University of Hawaii at Manoa Site***

### **General Description**

The site is in the athletic district of the University of Hawaii, Manoa Campus. It is situated in a natural bowl on the site with student housing to the east (up the hill) and the rest of the athletic campus to the east. The campus is approximately 10 miles from Aloha Stadium at the current Halawa Site.

Pros	Cons
<ul style="list-style-type: none"><li>• U of H Manoa is the home to the Rainbow Warriors football team already;</li><li>• One of the major users of the proposed stadium.</li><li>• The majority of the student population who will want to watch the games is on campus; their parking requirements would be negated.</li><li>• The natural bowl could work to create a stadium form that fits neatly into campus.</li><li>• Some parking for the stadium already exists in the form of on campus parking garages.</li><li>• The setting for an on campus stadium would have views to Diamond Head, Waikiki and Downtown.</li></ul>	<ul style="list-style-type: none"><li>• The site is very tight and would likely necessitate a reduction in seating capacity from the proposed 35,000 seat stadium. Reduction in seats could have an impact on the events that would come to the stadium and its revenue generation potential.</li><li>• Construction on the tight site would be disruptive to campus.</li><li>• The closest HART station is 1.8 miles away at the Ala Moana Center.</li><li>• There is no room for ancillary development around the site.</li><li>• There would be no room for future stadium expansion.</li><li>• Site access from the freeway is poor.</li></ul>

### **Summary Observations(s)**

The siting of a new stadium on the University of Hawaii, Manoa campus could potentially be done so that it fits in seamlessly with the established campus and create an intimate football/soccer venue for the campus itself. Saturday afternoon football games on university campuses across the country are a staple of American collegiate culture.



football practice field, Les Murakami Stadium in the background



practice field with residential towers overlooking



tennis & softball facilities, Diamond Head & Waikiki in the back



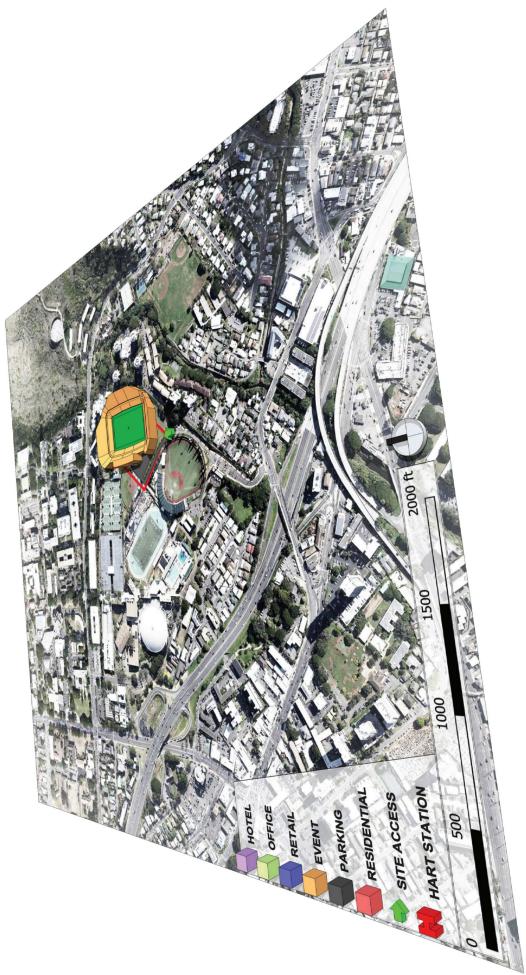
view of Waikiki from above the football/practice field



student pedestrian path thru Athletic District



ALOHA STADIUM | ALTERNATIVE SITE EVALUATION



DEVELOPMENT CONCEPTS AT THE U OF H MANOA SITE





PRELIMINARY DEVELOPMENT CONCEPT FOR THE UH MANOA SITE



## UNIVERSITY OF HAWAII AT MANOA SITE ANALYSIS

### Site Analysis and Scoring:

#### *University of Hawaii - Manoa*

Category	Criteria	Indicators	Notes	Score	Subtotal
Site, Infrastructure, and Environment	Total Acreage	Approximately 7 acres on existing practice fields		1 / 5	
	HART Access	no pedestrian access to HART	2.3 miles to Ala Moana station Kaiuloa Airport not considered due to limited cargo handling facilities	1 / 5 2 / 3	
	Proximity to Daniel K. Inouye International Airport	14.7 miles (14 minutes) to/from airport	Barber's Point Harbor not considered due to lack of container facilities	3 / 3	
	Proximity to Emergency Services	2.5 miles to Fire Station 29 McCully/Moiliili; 4.9 miles to Waikiki Police Substation; 3.9 miles to Leahi Hospital	87% (~28000) of hotel rooms on Oahu are in Waikiki	2 / 2	
	Proximity to Honolulu Harbor	8.7 miles (20 minutes) to/from harbor	Per NOAA Pacific Tsunami Warning Center and FEMA flood risk maps	0 / 2	
	Proximity to Waikiki	4.3 miles (7 minutes) to/from Waikiki	Per NOAA circa 2100 worst-case scenario projections (3.2ft)	2 / 2	
	Ability to Accommodate Stadium Program	Reductions to program or demolition of existing facilities probably needed to make site viable	Per NOAA circa 2100 worst-case scenario projections (3.2ft)	2 / 2	
	Avoids Flood/Tsunami Hazards	Outside Tsunami Evacuation Zones and 1% Annual Flood Risk Zones	2 / 2		
	Avoids Sea Level Rise Hazard	Not endangered by sea level rise	2 / 2		
	Avoids Wetlands Impact	no designated wetlands	2 / 2		
	Suitability for Emergency Shelter	Outside flood/tsunami risk zones; no coastal exposure; good road access/marginal transit access; minimal room for additional facilities	2 / 1		
	Bus Access	10 bus stops within 1/4 mile radius of site		1 / 1	
	Existing Zoning	R-5 Residential District	Not likely to be an impediment due to existing campus use	3 / 4	
Development Costs	P3 Potential or other Development Possibilities	No on-site capacity for ancillary development		0 / 4	
	Ceded Lands Encumbrance	Unknown		3 / 3	
	Infrastructure Costs	Ability to tie into campus facilities and utilities for infrastructure needs; nearby campus parking structures		3 / 3	
	Land Acquisition	Owned by State of Hawaii		2 / 2	
	Development Incentives	No state or federal development incentives		0 / 2	
	Complexity	Extremely tight site likely to complicate design and construction		0 / 2	
	Community Acceptance	Potential community pushback from relocation of existing practice fields to other parkland in area		5 / 10	
Economic Impact	Positive Cultural Impact	Placement of stadium on campus could improve student attendance and enable new campus programming		7 / 10	
	Political Viability	Site has been supported by Governor Ige		4 / 10	
	Employment Demand in Vicinity	7,074 unemployed persons in 10-min. drive distance (4.0% of pop.)	Minimal opportunity for ancillary development drastically limits potential economic impacts	3 / 6	
	Households Experiencing Poverty in Vicinity	14,669 households in poverty in 10-min. drive distance (11.0% of total)		3 / 6	
Intuitive Site Qualities	Population in Proximity	325,042 persons in 120,221 households in 10-min. drive distance		3 / 6	
	Per-Capita Income in Vicinity	\$36,118		1 / 2	
	Unique Site Improvement Opportunities - positive	Potential new campus amenity		2 / 5	
Anticipated Site Difficulties	Anticipated Site Difficulties - negative	Site is prohibitively small and difficult to fit program on - functionality of stadium may be compromised		-4 / -5	
	Total Score:	<b>55 / 100</b>			



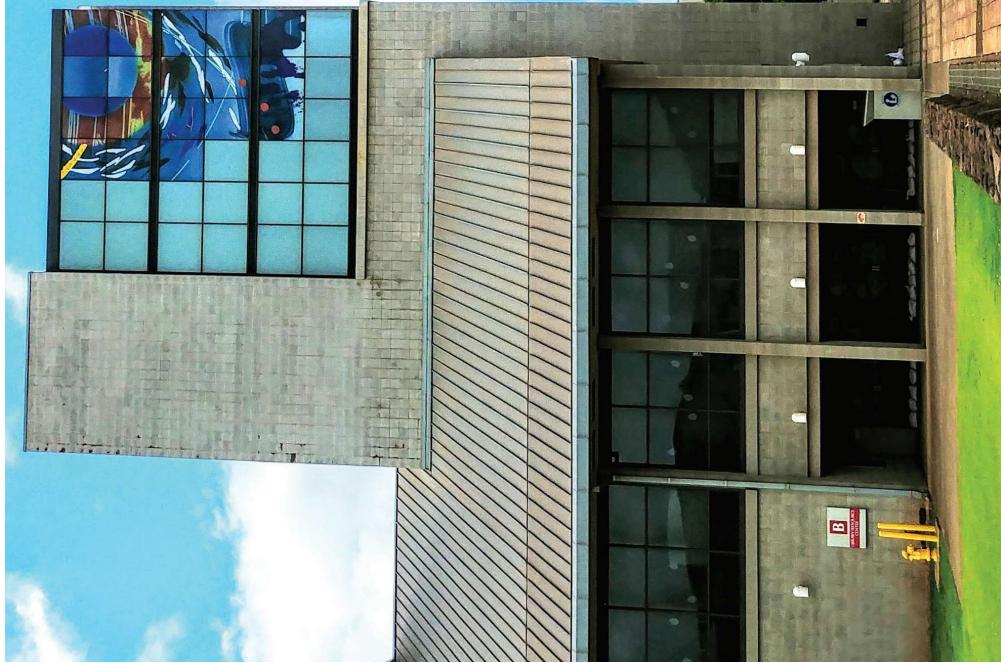
## **5C. UNIVERSITY OF HAWAII AT WEST OAHU SITE**

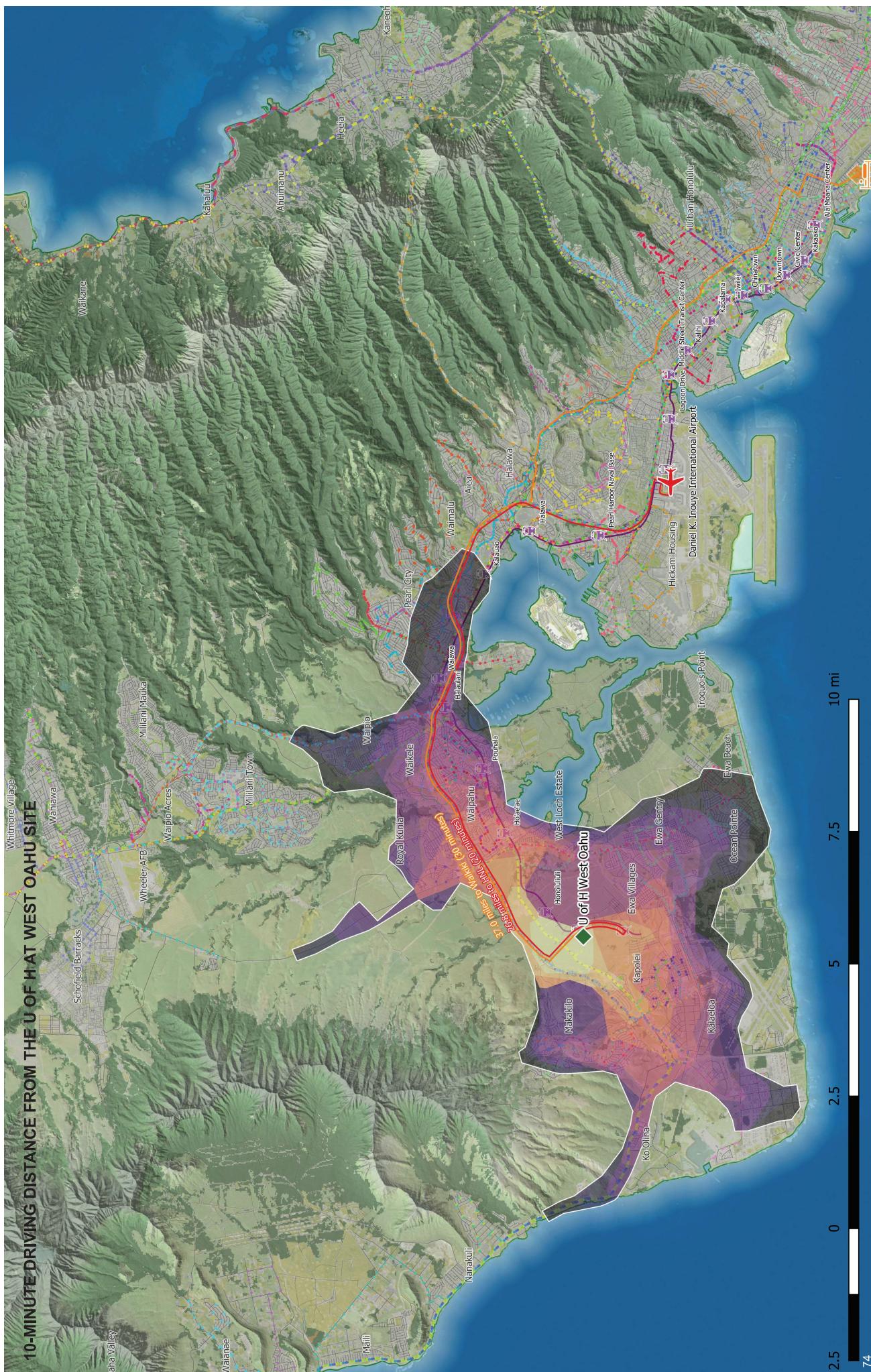
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### ***University of Hawaii at West Oahu***

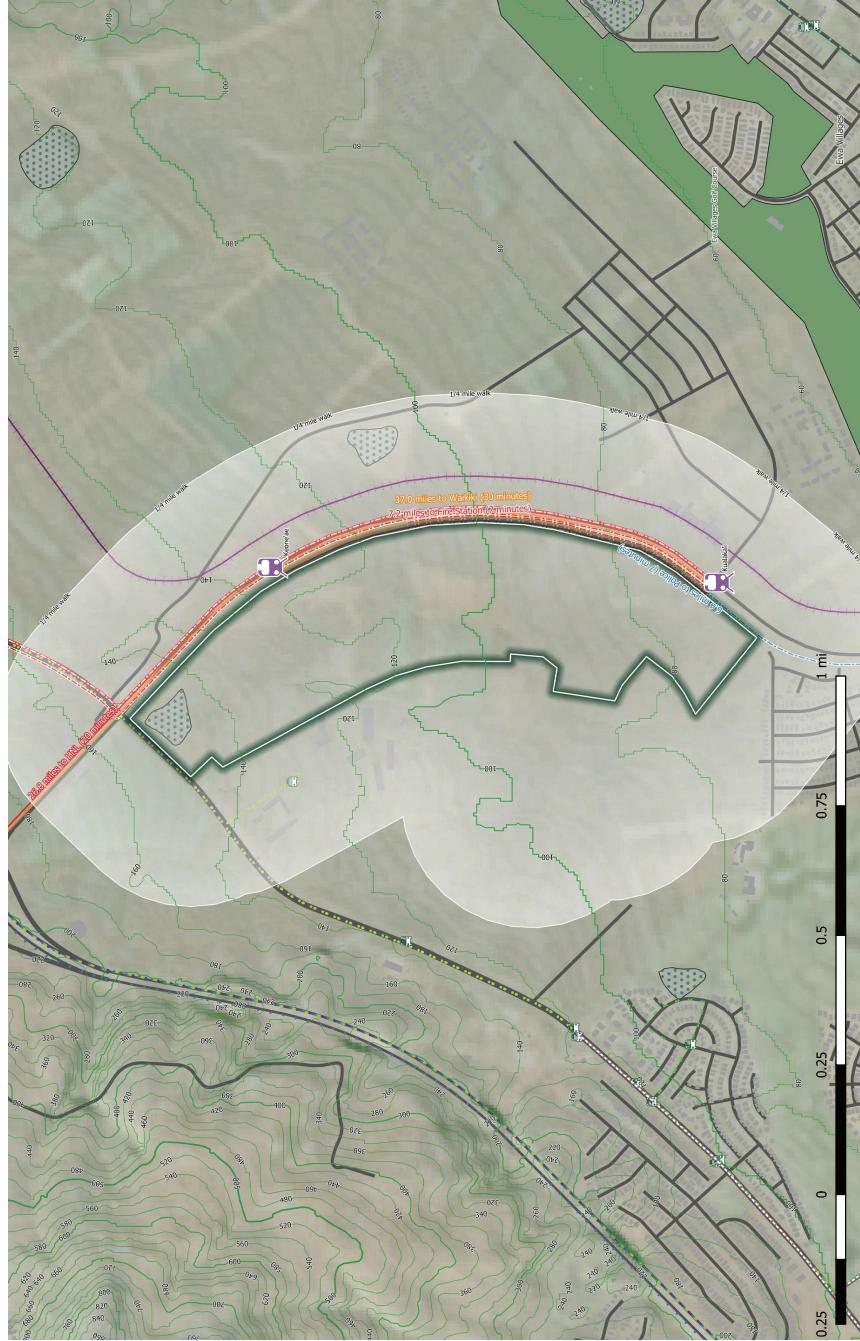
The West Oahu campus is the other site mentioned by Governor Ige, and presents almost the exact opposite pros and cons of the Manoa campus. Situated on farmland between H1 and Kapolei, the West Oahu site offers the most developable acreage of any of the options studied at 187 acres. It is also the only site with adjacency to multiple HART stops, with the Kualakai tend station adjoining its southern tip and the Keone‘ae station near its northern extent. Bus connections are weaker, with only a single bus line serving the area. Despite good transit connections, however, the West Oahu location is somewhat remote to urban Honolulu, which is reflected in long commute times from Daniel K. Inouye International and hotels in Waikiki, as well as a middling 231,000 residents within 10 minutes of the site, averaging \$28,900 in annual income per capita.

Emergency services are reasonably close to the site, with nominal drive times to police, fire, and medical services well under 10 minutes, and existing zoning is amenable to mixed-use development.





### VICINITY MAP OF THE U OF HAT WEST OAHU SITE



The "10-Minute Driving Map" represents an isochronal diagram highlighting a distance around each one of the potential sites. This isochrones map show the distance that one could travel to or from the site in a 10-minute period of time, with no traffic. This catchment area is used to collect all of the data points and rubric information included in the site analysis matrixes. This is shown consistent for all the sites.

The "Vicinity Map" shows the bounds of an area that is a 15-minute (1/4-mile) walk from the site perimeter. This area provides additional information about the facilities and infrastructure immediately adjacent to the site. This is shown consistent for all the sites.



### Total Site Size:

187 acres  
 1.5 acres (0.8%)  
 3.3 acres (1.8%)

### Designated Wetlands:

Site Slope

- Mean: 1.8-deg
- Max: 15.1-deg
- Std Dev: 2.4-deg

### Bus Stops Nearby:

2

### HART Stops Nearby:

3

## ***University of Hawaii at West Oahu Site***

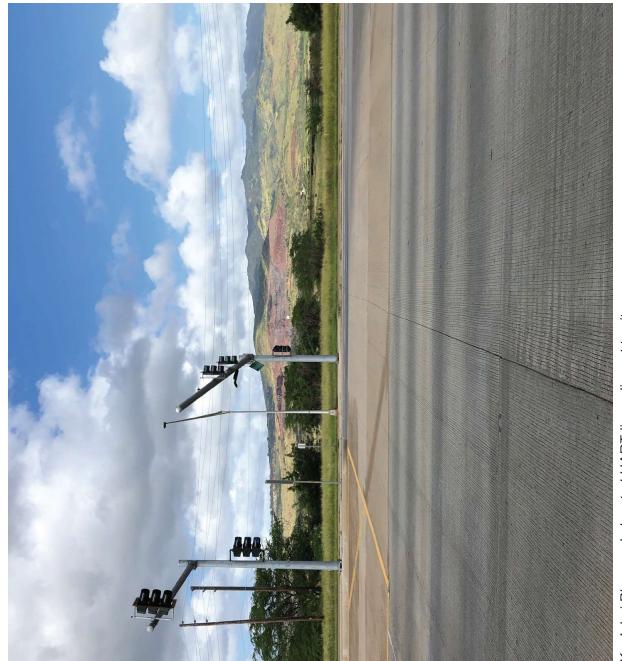
### **General Description**

The site accommodates the current and future needs of the University's expanding student population serving the higher education needs of the surrounding population centers. The site comprises a large and predominantly physically unencumbered land area. The campus is approximately 12.5 miles from Aloha Stadium in Halawa.

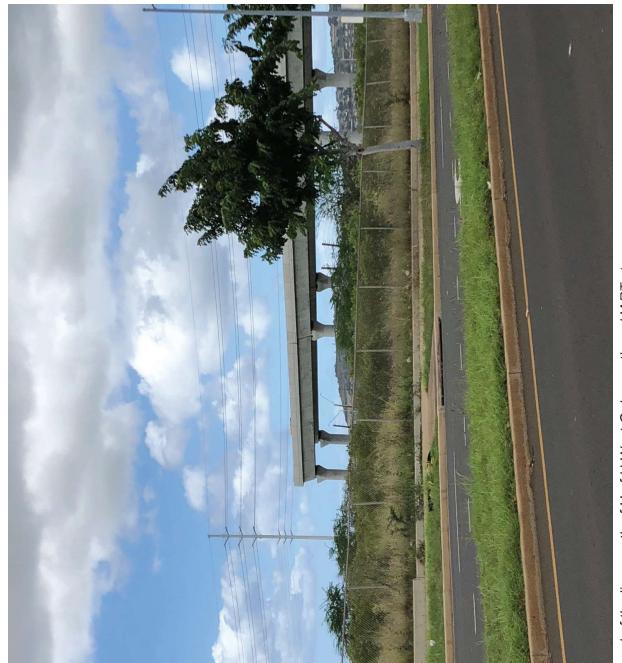
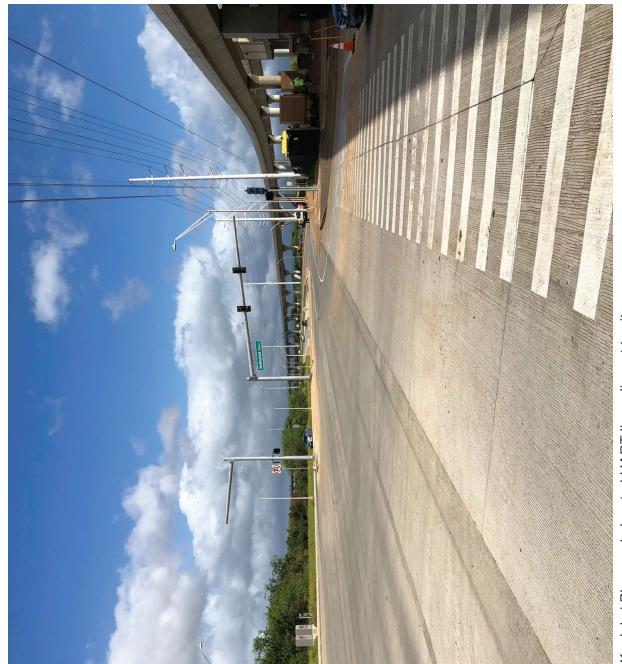
<b>Pros</b>	<b>Cons</b>
<ul style="list-style-type: none"><li>• Ample site area comprising flat, easily developable land, affording multiple site locations for a new stadium.</li><li>• Well connected to the freeway (H1).</li><li>• Two HART stations serve the site connecting the location with other destinations.</li><li>• Population centers nearby provide a potential ample labor pool.</li><li>• Ample site area for car parking and additional/ancillary development potential.</li><li>• Site has some, telegenic/aesthetic quality, including mountain views to the northwest and probable distant water views to the south from elevated positions within a new stadium.</li></ul>	<ul style="list-style-type: none"><li>• The University's master plan doesn't include a site for a new stadium.</li><li>• Distant from U of H (Manoa) football fans.</li></ul>

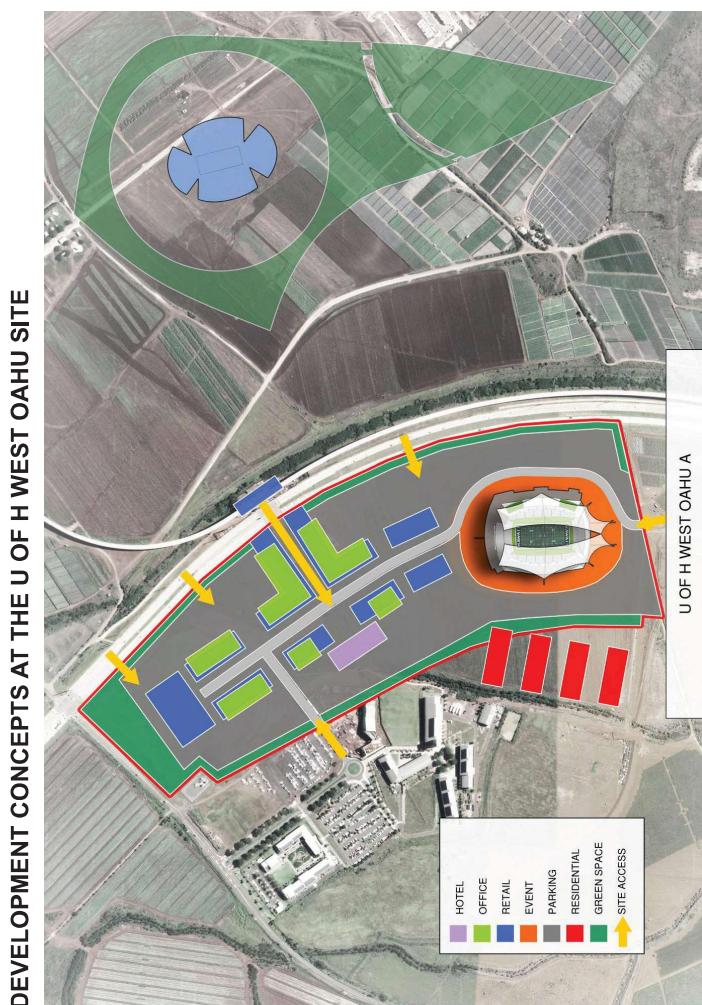
### **Summary Observations(s)**

Good potential for a new stadium but may lack necessary endorsement from U of H West Oahu decision-makers and other influencers.



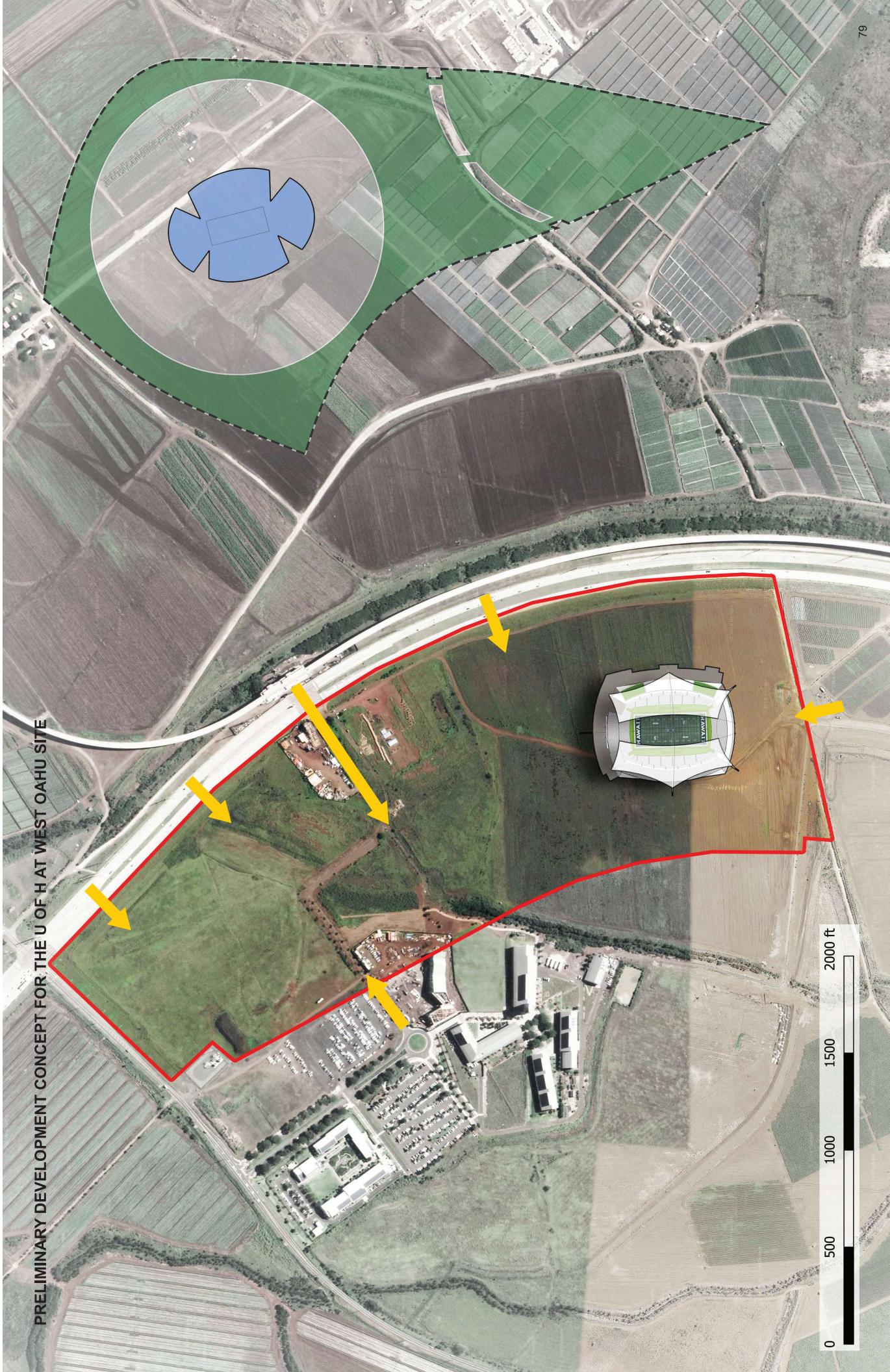
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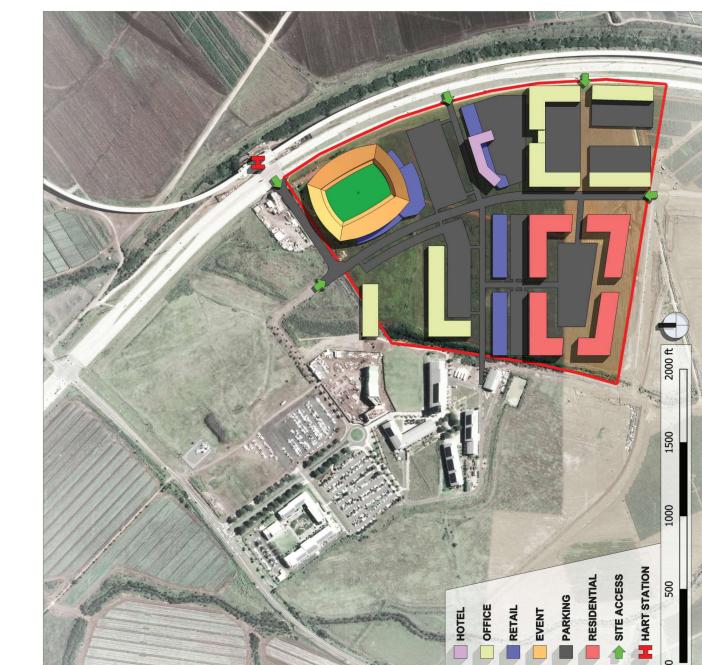
DEVELOPMENT CONCEPTS AT THE U OF H WEST OAHU SITE





PRELIMINARY DEVELOPMENT CONCEPT FOR THE U OF H AT WEST OAHU SITE

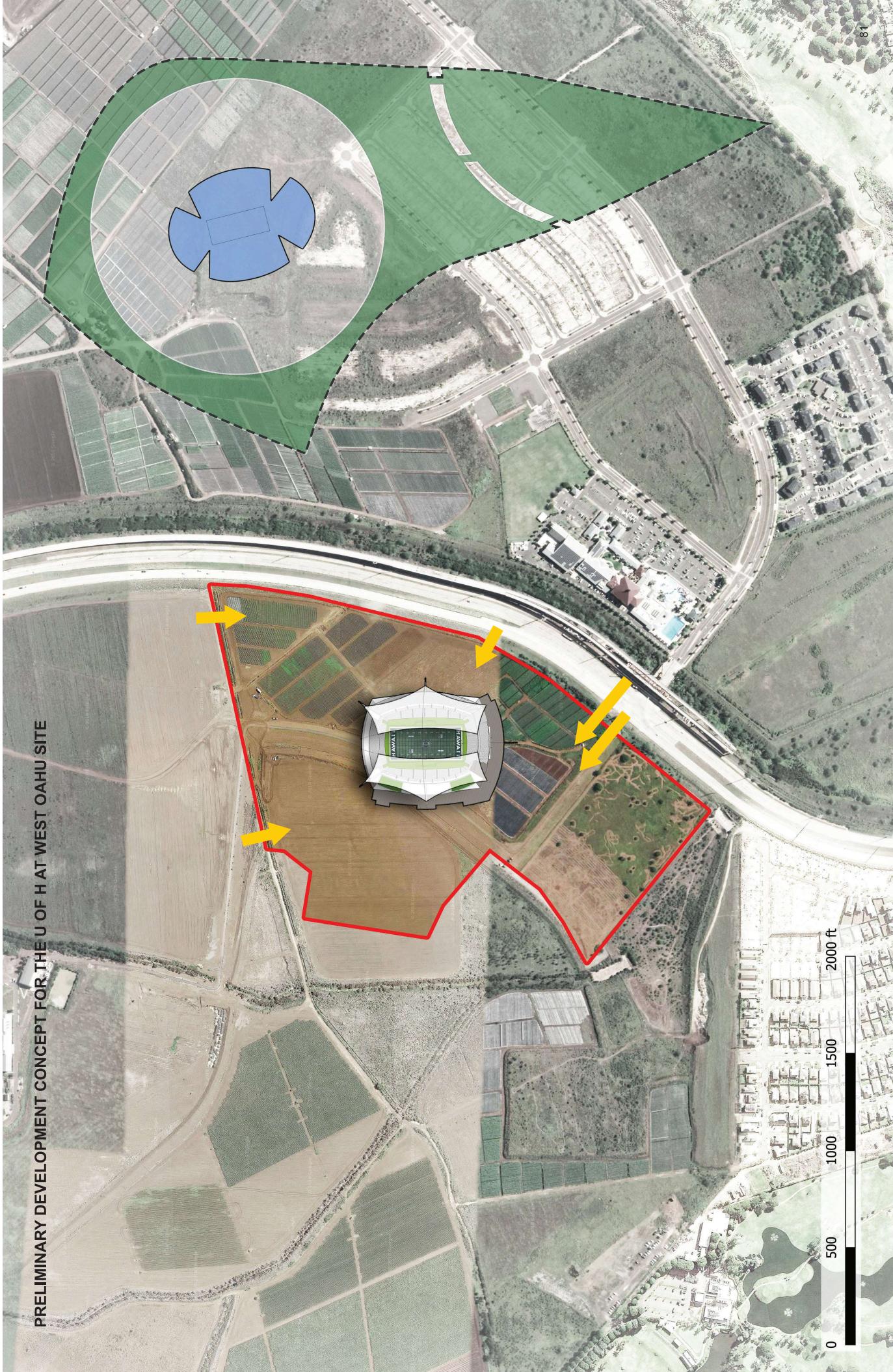
0 500 1000 1500 2000 ft



DEVELOPMENT CONCEPTS AT THE U OF H WEST OAHU SITE



PRELIMINARY DEVELOPMENT CONCEPT FOR THE U OF H AT WEST OAHU SITE





## UNIVERSITY OF HAWAII AT WEST OAHU SITE ANALYSIS

Site Analysis and Scoring:		University of Hawaii - West Oahu		Score	Subtotal
Category	Criteria	Indicators	Notes		
Site, Infrastructure, and Environment	Total Acreage	Up to 187 acres along Kualakai Parkway (approximately <b>83</b> acres used for site plan study)	Need to coordinate development with existing West Oahu campus master plan	5 / 5	
	HART Access	2 HART stations along Kualakai Parkway	Kaleaeloa Airport not considered due to limited cargo handling facilities	5 / 5	
	Proximity to Daniel K. Inouye International Airport	26.8 miles (20 minutes) to/from airport	Barber's Point Harbor not considered due to lack of container facilities	1 / 3	
	Proximity to Emergency Services	7.2 miles to Fire Station 12 Waipahu; <b>6.4</b> miles to Kapolei Police Station; <b>7.1</b> miles to The Queen's Medical Center - West Oahu	87% (~28000) of hotel rooms on Oahu are in Waikiki	0 / 3	
	Proximity to Honolulu Harbor	19.3 miles (29 minutes) to/from harbor	Per NOAA Pacific Tsunami Warning Center and FEMA flood risk maps	1 / 2	
	Proximity to Waikiki	37.0 miles (30 minutes) to/from Waikiki	Per NOAA circa 2100 worst-case scenario projections (3.2ft)	0 / 2	
	Ability to Accommodate Stadium Program	Outside Tsunami Evacuation Zones and 1% Annual Flood Risk Zones	Per NOAA Pacific Tsunami Warning Center and FEMA flood risk maps	2 / 2	
	Avoids Flood/Tsunami Hazards	Not endangered by sea level rise	Per NOAA circa 2100 worst-case scenario projections (3.2ft)	2 / 2	
	Avoids Sea Level Rise Hazard	3.3 acres designated wetlands (1.8% of total) at north end of site	Outside flood/tsunami risk zones; no coastal exposure; good road and transit access	1 / 2	
	Avoids Wetlands Impact	3 bus stops within 1/4 mile radius of site	3 bus stops within 1/4 mile radius of site	1 / 1	
Development Costs	Existing Zoning	159 acres BNX-3 /Community Business Mixed Use District; <b>28</b> acres R-3.5 Residential District	Lack of adjacent residential areas could limit commercial appeal	4 / 4	
	P3 Potential or other Development Possibilities	Plentiful land to support ancillary commercial development and/or P3 development of additional facilities for West Oahu campus	Unknown	4 / 4	
	Ceded Lands Encumbrance	Some existing infrastructure in place to support West Oahu campus; modest surface parking lots on campus to west of site	Owned by State of Hawaii	2 / 3	
	Infrastructure Costs	No state or federal development incentives	Greenfield site with good access	2 / 3	
	Land Acquisition	Chance to build amenities complementing emerging Kapolei community south of site	Brings stadium to campus, but places it relatively remote from most students and fans; no sports focus on West Oahu campus	2 / 2	
	Development Incentives	Greenfield site with good access	6 / 10		
	Complexity	Change to build amenities complementing emerging Kapolei community south of site	5 / 10		
	Community Acceptance	Brings stadium to campus, but places it relatively remote from most students and fans; no sports focus on West Oahu campus	5 / 10		
Economic Impact	Positive Cultural Impact	6,177 unemployed persons in 10-min. drive distance (4.9% of pop.)	Less opportunity to improve household incomes than with other sites	4 / 6	
	Political Viability	3,614 households in poverty in 10-min. drive distance (5.8% of total)	14 / 20		
	Employment Demand in Vicinity	231,132 persons in 62,617 households in 10-min. drive distance		5 / 6	
	Households Experiencing Poverty in Vicinity	\$28,868		2 / 2	
	Population in Proximity	P3 development could jumpstart new opportunities for U of H - West Oahu campus			
Intuitive Site Qualities	Per-Capita Income in Vicinity			3 / 5	
	Unique Site Improvement Opportunities - positive			-1 / -5	
Total Score:		<b>69 / 100</b>			



## **5D. ALA WAI GOLF COURSE SITE**

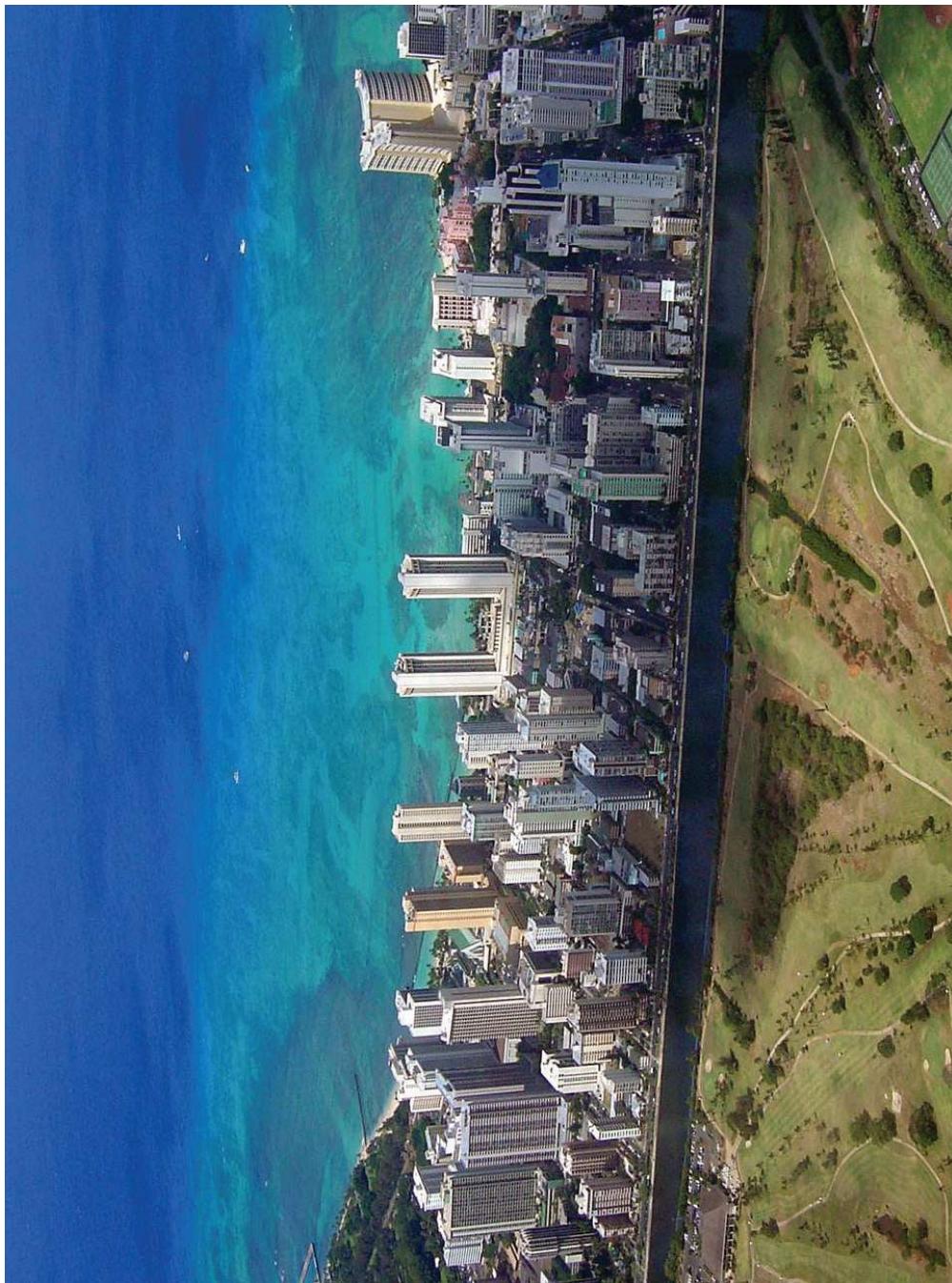
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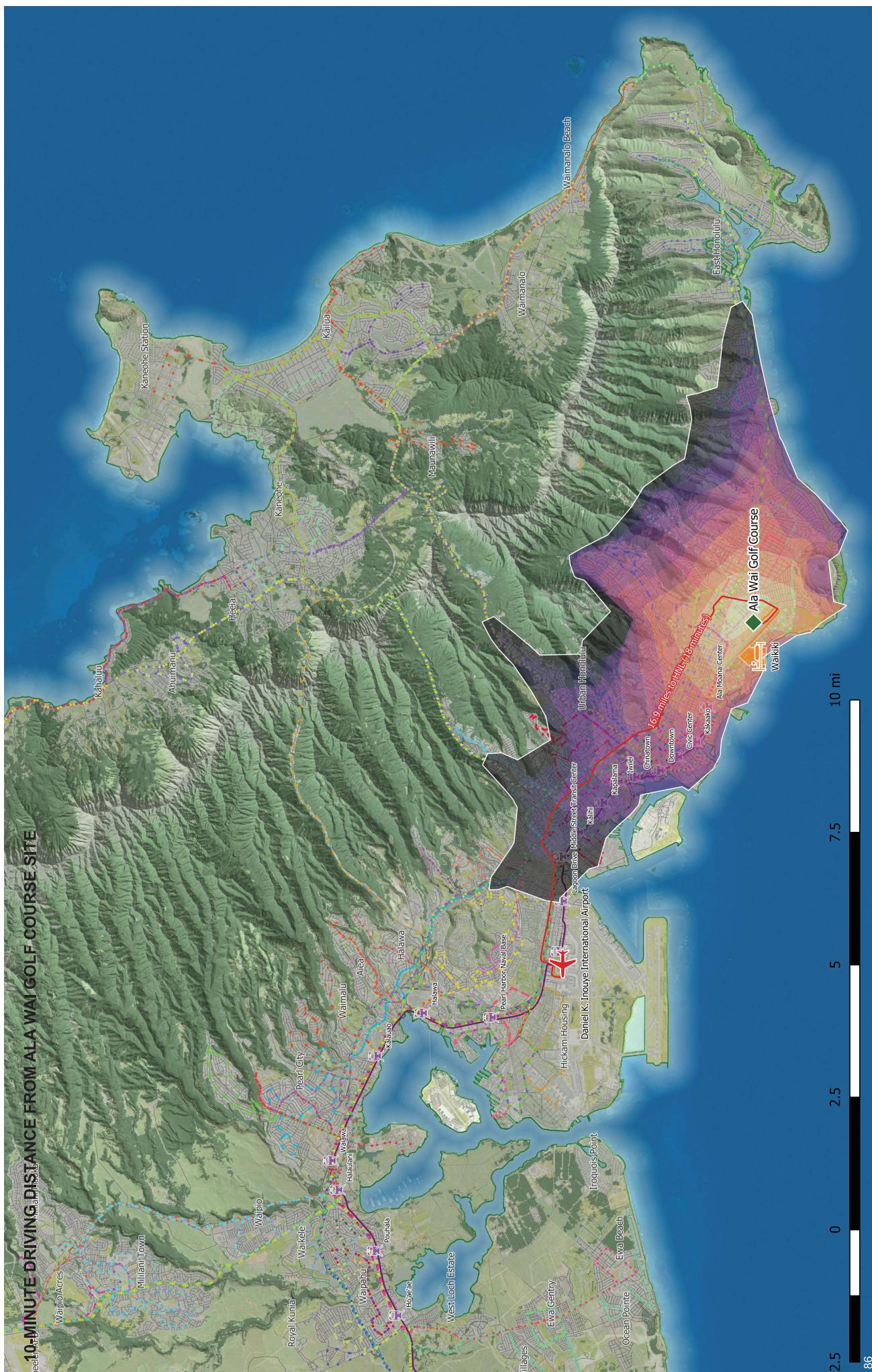
### **Ala Wai Golf Course**

As an alternative to the Manoa campus site, the team studied the existing Ala Wai municipal golf course, just north of Waikiki, as a potential development site. While the course is currently very heavily used, it is considered a somewhat dated amenity. The driving range has been recently replaced with a TopGolf franchise; as such, this area was removed from the area to be redeveloped. Nevertheless, the remaining 128 acres represents the second-largest potential site under consideration, and its proximity to Waikiki (directly across Ala Wai Canal) means that it can rely on the hotels and amenities of the district to support any development (though road and/or pedestrian connections across the canal would likely have to be built to fully connect the areas). Additionally, emergency services are close by, only 3-6 minutes and not more than 3 miles away. Bus connections are abundant, with 48 stops in a quarter mile radius, but the closest HART station will be Ala Moana Center, which at 1.7 miles distant is well out of pedestrian range. While separated from the Manoa campus by H1, the site is close enough to campus to be feasibly served by event-day shuttles.

Demographically, the site is one of the most amenable, with 326,000 residents in a 10-minute driving range, and an average per-capita income of about \$36,100 per year. The central placement of the site also means that it could bring job opportunities closest to the largest number of unemployed persons and households in poverty of any site.

The site is currently owned by the state, though currently zoned P-2 General Preservation District. Given the popularity of the existing golf course, rezoning for new development may be contentious. No geographically-defined state or federal incentives are in place for the site. Significant portions of the site are covered by flood risk zones, and due to the proximity of Ala Wai Canal, a portion of the site is covered by a Tsunami Evacuation zone. The Extreme Tsunami Evacuation Zone covers the entirety of the site.







Total Site Size:

128 acres

Total Tree Cover:  
1.3 acres (1.0%)  
1.6 acres (1.3%)

Designated Wetlands:

Site Slope:

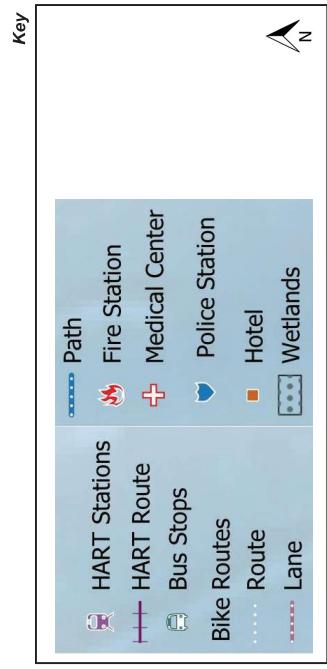
- Mean: 0.5-deg
- Max: 5.6-deg
- Std Dev: 1.5-deg

Bus Stops Nearby:

0

The "10-Minute Driving Map" represents an isochronal diagram highlighting a distance around each one of the potential sites. This isochrones map show the distance that one could travel to or from the site in a 10-minute period of time, with no traffic. This catchment area is used to collect all of the data points and rubric information included in the site analysis matrixes. This is shown consistent for all the sites.

The "Vicinity Map" shows the bounds of an area that is a 15-minute (1/4-mile) walk from the site perimeter. This area provides additional information about the facilities and infrastructure immediately adjacent to the site. This is shown consistent for all the sites.



## **Ala Wai Golf Course Site**

### **General Description**

The Ala Wai Golf Course is located immediately north-east of Waikiki, across the Ala Wai Canal. The site has a significant amount of open land that is used by members and recreational golfers. It is several blocks from the H1 highway interchange at King Street.

Pros	Cons
<ul style="list-style-type: none"><li>• Ala Wai's close proximity to Waikiki, an established center of tourism and visitors to the potential stadium development.</li><li>• Close proximity to downtown Honolulu, the Blaisdell Center, Ala Moana Center, and the convention center allows opportunity for synergy between businesses and development.</li><li>• Many visitors could walk from the hotels in the area, minimizing parking requirements.</li><li>• Fairly close to the University of Hawaii, Manoa Campus, less than a mile for student population to attend Rainbow Warrior games or other events.</li><li>• Siting of a stadium at this location would create stunning views to Diamond Head. Additionally, aerial views of the stadium in this location would add to the already iconic images of Honolulu.</li><li>• New development could work with the already planned Top Golf facility.</li><li>• Enough land exists that green space could be preserved in this area promoting continued use by the general public while allowing for ancillary development.</li></ul>	<ul style="list-style-type: none"><li>• Nearest HART station is 1.7 miles away at Ala Moana Center.</li><li>• Density of Waikiki already creates traffic and some overcrowding issues.</li><li>• Would likely run into opposition from existing golf course members and other stakeholders, as the golf course is a well-known course and has historically been one of the busiest golf courses on the island.</li></ul>

### **Summary Observation(s)**

The undeveloped land (large acreage controlled by one owner) at such close proximity to Waikiki sets up a unique opportunity to significantly increase the amount of tourist development in one of the most desirable locations in the world. Not only would a stadium venue fit easily on this site, but a large amount of development (hotels, retail, etc.) complimenting and adding to Waikiki would result as well.



Ala Wai Clubhouse



Ala Wai Golf Course



Ala Wai Parking lot, looking towards Waikiki and Downtown



canal between Ala Wai and Waikiki



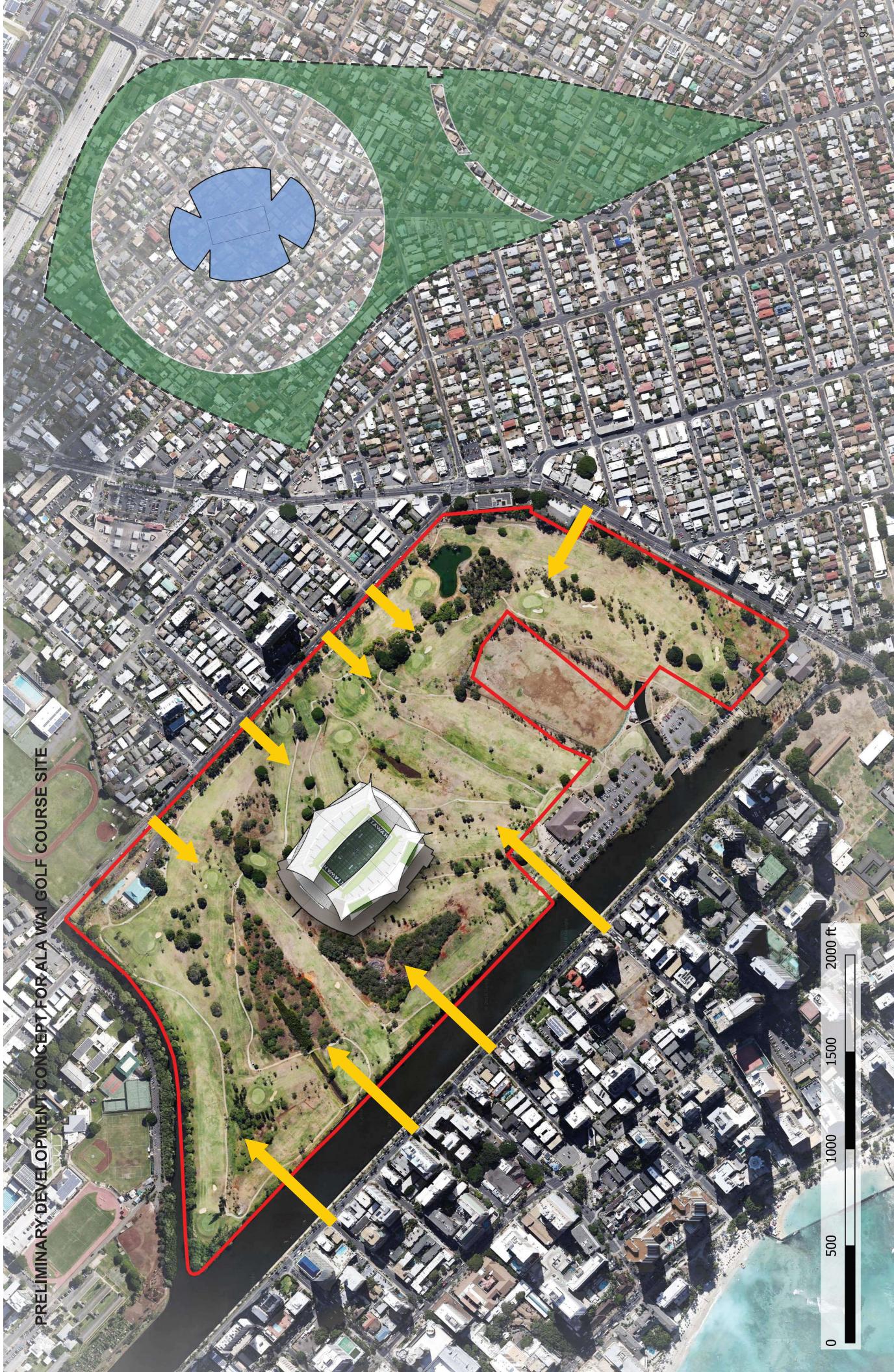
view of Diamond Head from Ala Wai



Ala Wai Driving Range

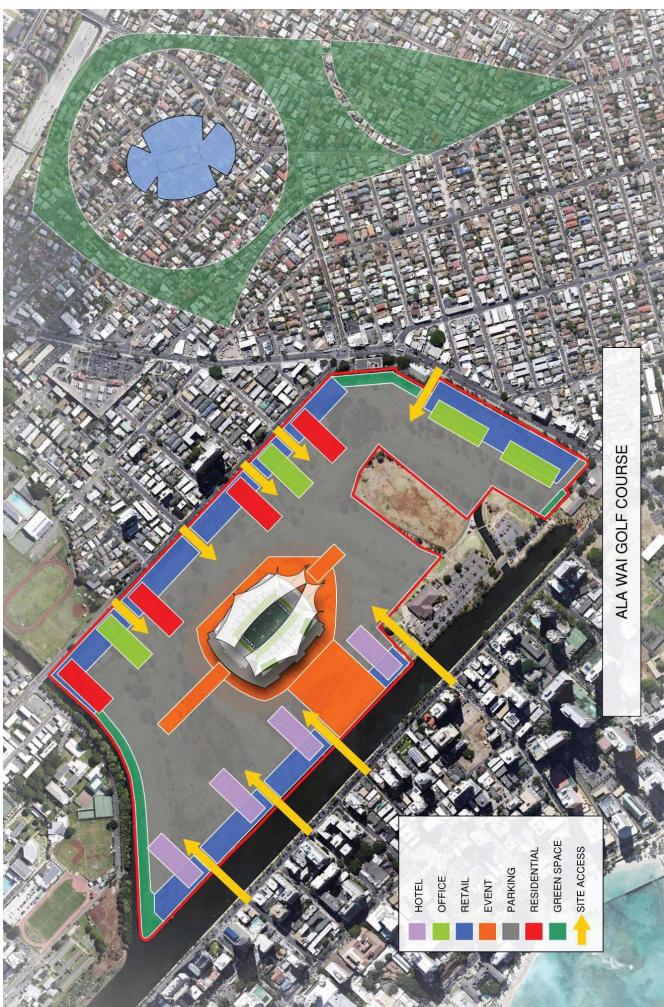
**ALOHA STADIUM | ALTERNATIVE SITE EVALUATION**

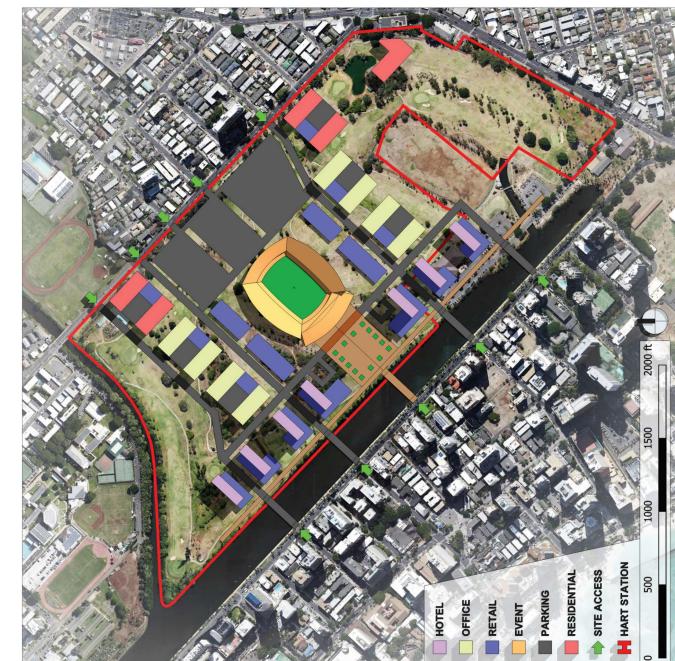




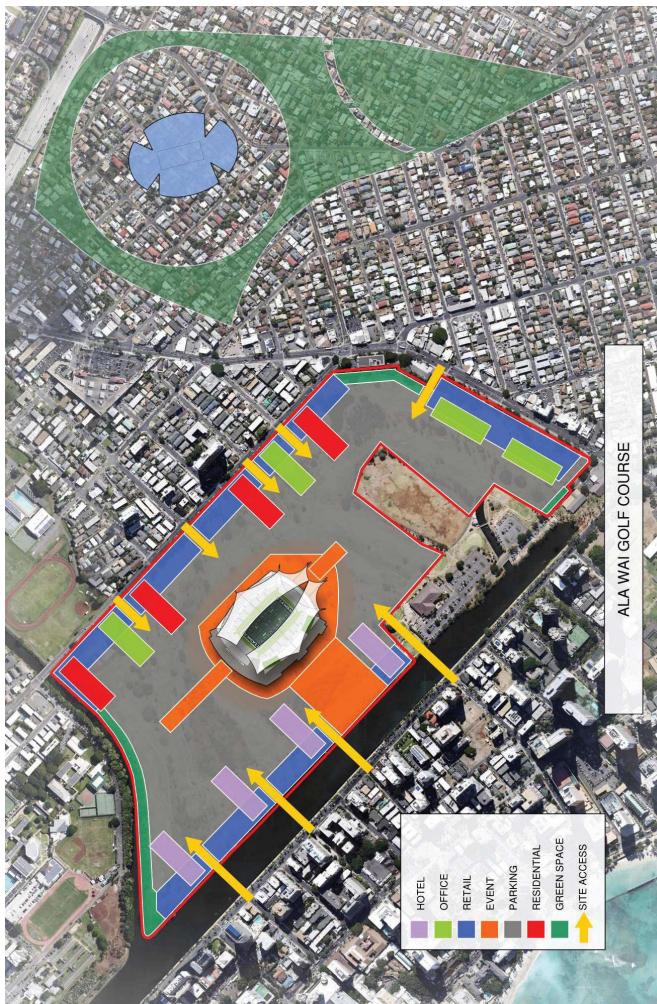


DEVELOPMENT CONCEPTS AT THE ALA WAI GOLF COURSE SITE





DEVELOPMENT CONCEPTS AT THE ALA WAI GOLF COURSE SITE





## ALA WAI GOLF COURSE SITE ANALYSIS

Site Analysis and Scoring:		Ala Wai Golf Course		Notes	Score	Subtotal
Category	Criteria	Indicators				
Site, Infrastructure, and Environment	Total Acreage	128 acres on existing Ala Wai Golf Course property		Excludes driving range/TopGolf facility 1.7 miles to Ala Moana Center Station Kaielaia Airport not considered due to limited cargo handling facilities	5 / 5	
	HART Access	no pedestrian HART access			1 / 5	
	Proximity to Daniel K. Inouye International Airport	16.9 miles (18 minutes) to/from airport			2 / 3	
	Proximity to Emergency Services	0.8 miles to Fire Station 07 Waikiki; <b>3.1 miles</b> to Waikiki Police Substation; <b>2.5 miles</b> to Leahi Hospital			3 / 3	
	Proximity to Honolulu Harbor	9.9 miles (22 minutes) to/from harbor		Barber's Point Harbor not considered due to lack of container facilities Could be incorporated into Waikiki area with bridges over canal	2 / 2	
	Proximity to Waikiki	3.1 miles (6 minutes) to/from Waikiki			2 / 2	
	Ability to Accommodate Stadium Program	Within flood zone AE (1% annual flood risk); 100% of site covered by Tsunami/Extreme Tsunami Evacuation Zone		Manoa Stream/floodway zone; 500' from Ala Wai Canal in Tsunami Evac Zone Per NOAA circa 2100 worst-case scenario projections (3.2ft)	0 / 2	
	Avoids Flood/Tsunami Hazards	Approximately 30% of site along Ala Wai Canal directly threatened by sea level rise			0 / 2	
	Avoids Sea Level Rise Hazard	1.6 acres designated wetlands (1.3% of total) along Ala Wai Canal			1 / 2	
	Avoids Wetlands Impact	Good road access; Site at risk in flooding or tsunami scenario			0 / 1	
Development Costs	Bus Access	48 bus stops within 1/4 mile radius of site			1 / 1	
	Existing Zoning	P-2 General Preservation District		Conversion from existing use could be a challenge	1 / 4	
	P3 Potential or other Development Possibilities	Large site within urban Honolulu, with direct adjacency to Waikiki tourist areas			4 / 4	
	Ceded Lands Encumbrance	Unknown			2 / 3	
	Infrastructure Costs	Minimal existing public parking and no major services currently on site			1 / 3	
	Land Acquisition	<b>Owned by State of Hawaii</b>		Course operated by Honolulu Dept. of Enterprise Services	2 / 2	
	Development Incentives	No state or federal development incentives			0 / 2	
	Complexity	Developing site responsibly would require interventions to protect against flooding, tsunami risk, and sea level rise			1 / 2	
	Community Acceptance	Existing Ala Wai golf course is an extremely popular public amenity			3 / 10	
	Positive Cultural Impact				8 / 10	
Economic Impact	Political Viability				2 / 10	
	Employment Demand in Vicinity	<b>7,044 unemployed persons</b> in 10-min. drive distance (4.0% of pop.)		Site presents opportunity to do "the most good for the most people" in terms of offering employment to disadvantaged Hawaiians	6 / 6	
	Households Experiencing Poverty in Vicinity	14,669 households in poverty in 10-min. drive distance (11.2% of total)			5 / 6	
	Population in Proximity	326,174 persons in 120,565 households in 10-min. drive distance			6 / 6	
	Per-Capita Income in Vicinity	\$36,114			0 / 2	
Intuitive Site Qualities	Unique Site Improvement Opportunities - positive				4 / 5	
	Anticipated Site Difficulties - negative				-1 / -5	
					<b>3</b>	
				<b>Total Score:</b>	<b>63 / 100</b>	



## **5E. KAPIOLANI REGIONAL PARK SITE**

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### **Kapiolani Regional Park**

The team selected Kapiolani Regional Park as an additional alternative to the nearby Manoa Campus site. Kapiolani offers less developable land and poorer connections to transit and major roads, but would not necessitate the elimination of a public amenity as popular as Ala Wai Golf Course in order to convert the site. Excluding the Waikiki Shell Amphitheater, the site offers 69 developable acres in close proximity to Waikiki. Access to Waikiki is complicated by one-way streets, but emergency services are very close to site, 5 minutes or less. Due to the distance of the park from H1 and lack of links into the city grid due to one-way streets in Waikiki and Diamond Head adjacent to the site, access is the poorest here of any urban Honolulu site – only ~243,000 residents live within a 10 minute driving radius. However, those residents have a relatively high ~\$38,200 average per capita income.







**Total Site Size:** 69 acres  
**Total Tree Cover:** 0.1 acres (0.2%)  
**Designated Wetlands:** 0.0 acres (0.0%)

**Site Slope:**

- Mean: 0.4-deg
- Max: 5.6-deg
- Std Dev: 1.4-deg

**Bus Stops Nearby:** 20  
**HART Stops Nearby:** 0

The "10-Minute Driving Map" represents an isochronal diagram highlighting a distance around each one of the potential sites. This isochrones map show the distance that one could travel to or from the site in a 10-minute period of time, with no traffic. This catchment area is used to collect all of the data points and rubric information included in the site analysis matrixes. This is shown consistent for all the sites.

The "Vicinity Map" shows the bounds of an area that is a 15-minute (1/4-mile) walk from the site perimeter. This area provides additional information about the facilities and infrastructure immediately adjacent to the site. This is shown consistent for all the sites.



## *Kapiolani Regional Park Site*

### **General Description**

Kapiolani Park is a large public park situated at the east end of Waikiki and at the foot of Diamond Head. It is a large, open, flat park with a few recreation fields and minimal tree cover in the center and is used by the general public for recreation and relaxation.

Pros	Cons
<ul style="list-style-type: none"><li>• Close proximity to Waikiki, Diamond Head and the beach.</li><li>• Close to the zoo, the aquarium and the Waikiki shell (outdoor amphitheater venue).</li><li>• Creates an anchor at the south-east end of Waikiki without creating congestion in the heart of Waikiki.</li><li>• Siting of a stadium at this location would create a stunning venue at the foot of Diamond Head.</li><li>• Aerial views of the stadium in this location would add to the already iconic images of Honolulu.</li><li>• Many visitors could walk from the hotels in the area, minimizing parking requirements.</li><li>• Flat, open site already used by many for recreational purposes, which could be preserved and enhanced.</li></ul>	<ul style="list-style-type: none"><li>• Nearest HART station is 3.0 miles away at Ala Moana Center.</li><li>• Density of Waikiki already creates traffic and some overcrowding issues.</li><li>• Availability of the land is in question, based on possible deed restrictions and the proposed use. Potential that no additional for-profit development could be added on the site.</li><li>• Opposition from many who use the park for recreation, picnicking, field sports, etc.</li><li>• Loss of public green space in a dense area.</li></ul>

### **Summary Observation(s)**

The existing park is set up nicely to create a public venue that could work hand-in-hand with the Waikiki shell and maintain the outdoor recreation areas that are already in use by the public.



picnicking at Kapiolani. Waikiki in the background



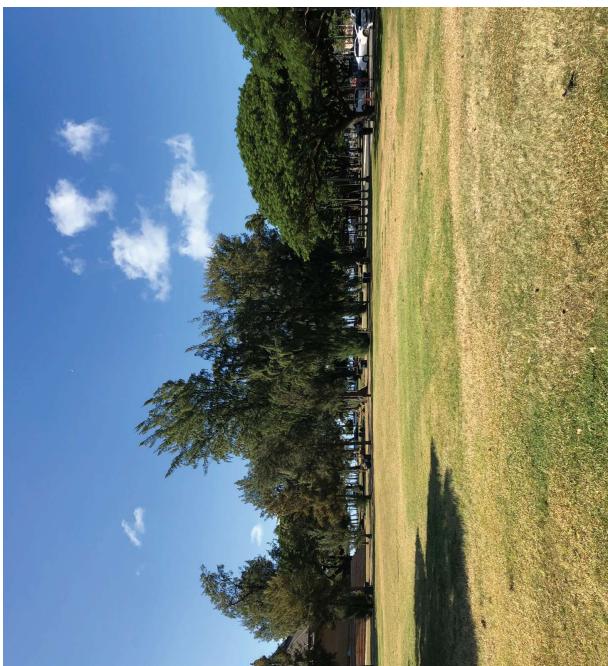
Waikiki Shell Outdoor Amphitheater



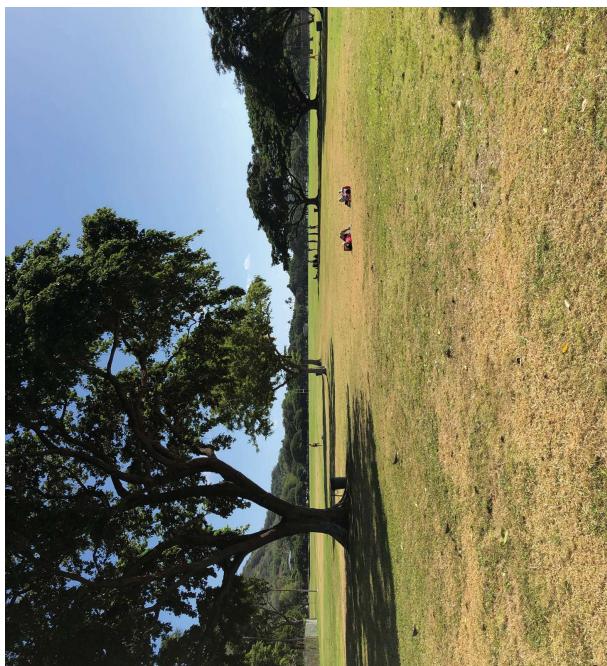
outdoor bleachers and venue



View of Diamond Head from Kapiolani

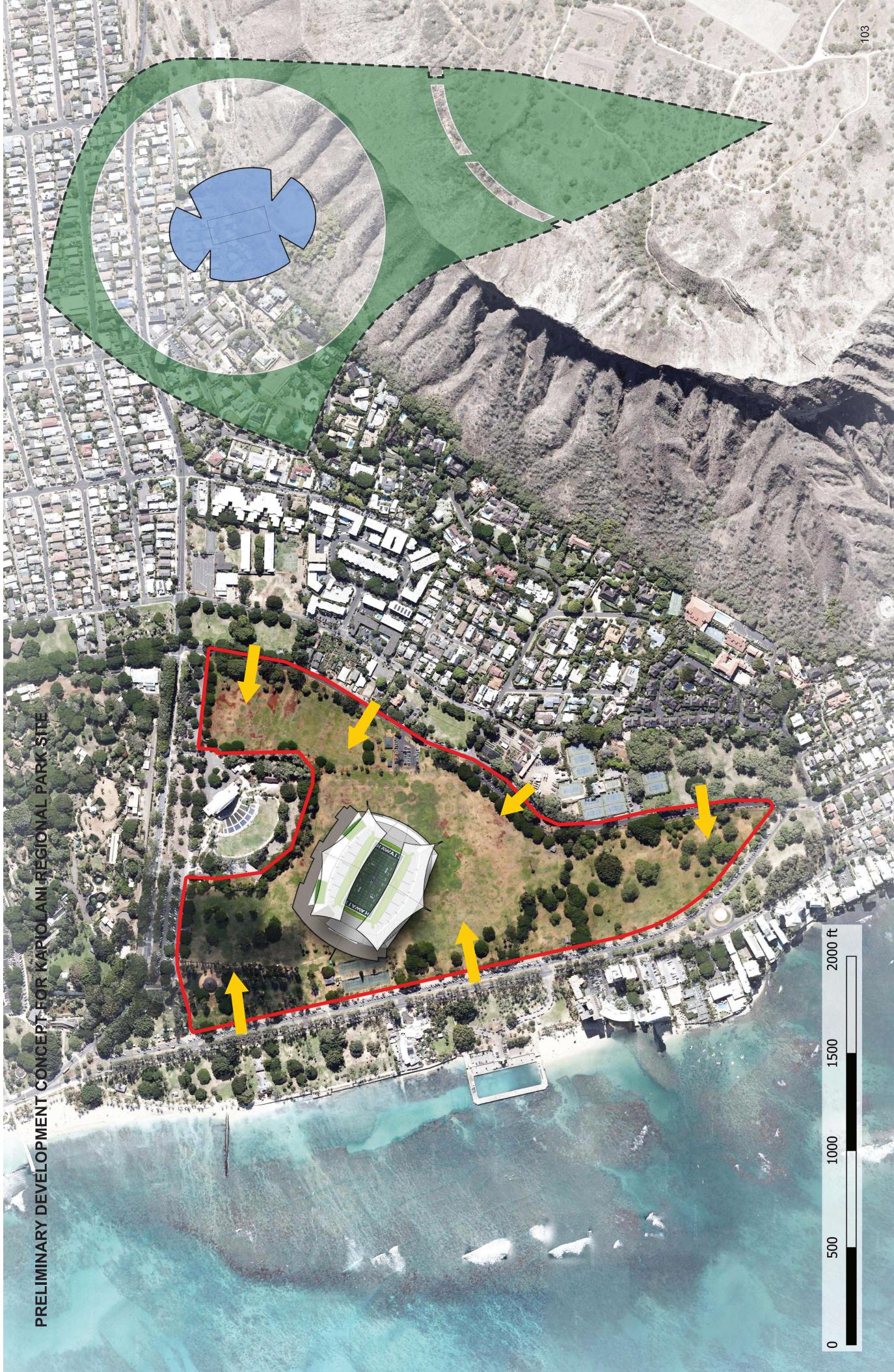


open park area at Kapiolani



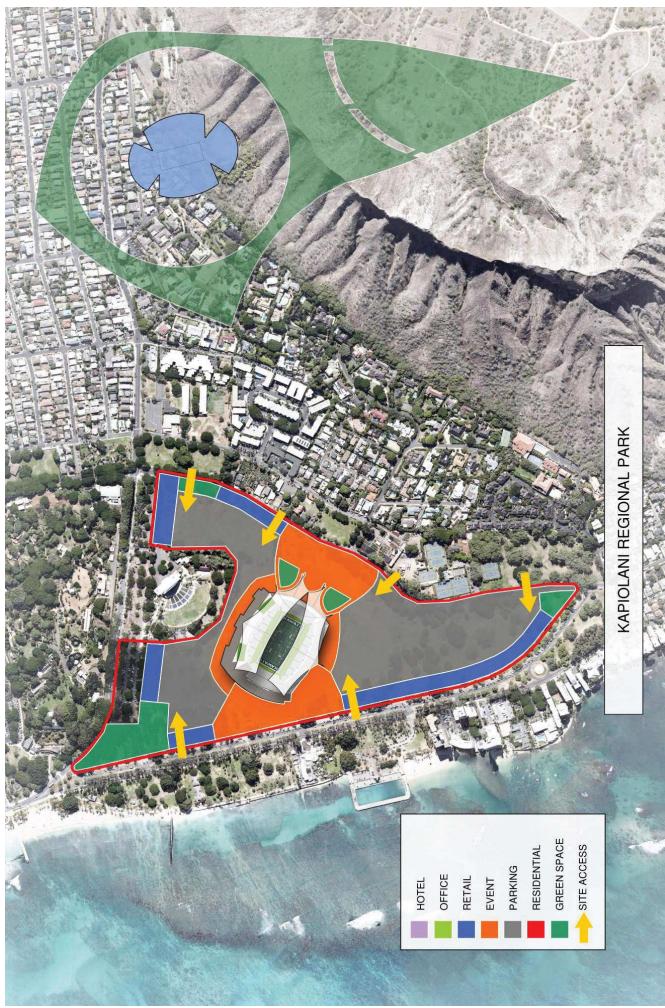
open park area at Kapiolani





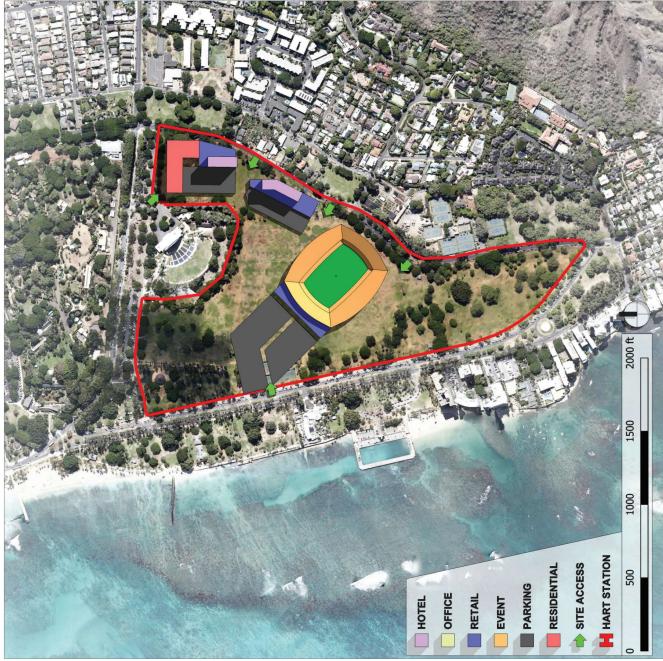


DEVELOPMENT CONCEPTS AT THE KAPIOLANI REGIONAL PARK SITE





DEVELOPMENT CONCEPTS AT THE KAPIOLANI REGIONAL PARK SITE





## KAPIOLANI REGIONAL PARK SITE ANALYSIS

Site Analysis and Scoring:		Kapiolani Regional Park		Notes	Score	Subtotal
Category	Criteria	Indicators				
Site, Infrastructure, and Environment	Total Acreage	69 acres at existing Kapiolani Regional Park		2.7 miles to Ala Moana Center Station Kaiuloa Airport not considered due to limited cargo handling facilities	4 / 5	
	HART Access	no pedestrian HART access			0 / 5	
	Proximity to Daniel K. Inouye International Airport	18.2 miles (18 minutes) to/from airport			2 / 3	
	Proximity to Emergency Services	0.9 miles to Fire Station 07 Waikiki; <b>3.3</b> miles to Waikiki Police Substation; <b>2.3</b> miles to Leahi Hospital			3 / 3	
	Proximity to Honolulu Harbor	10.6 miles (22 minutes) to/from harbor		Barber's Point Harbor not considered due to lack of container facilities	1 / 2	
	Proximity to Waikiki	4.9 miles (6 minutes) to/from Waikiki		87% (~28000) of hotel rooms on Oahu are in Waikiki	2 / 2	
	Ability to Accommodate Stadium Program	Within flood zone AE (1% annual flood risk); 100% of site covered by Tsunami Evacuation Zone		81-91 calculated BFE Per NOAA circa 2100 worst-case scenario projections (3.2ft)	2 / 2	
	Avoids Flood/Tsunami Hazards	Not endangered by sea level rise no designated wetlands			0 / 2	
	Avoids Sea Level Rise Hazard	Site at risk in flooding or tsunami scenario			2 / 2	
	Avoids Wetlands Impact				0 / 1	
Community	Suitability for Emergency Shelter				1 / 1	
	Bus Access	20 bus stops within 1/4 mile radius of site				
	Existing Zoning	P-2 General Preservation District			1 / 4	
	P3 Potential or other Development Possibilities	Mid-sized site within urban Honolulu, with direct adjacency to Waikiki tourist areas			4 / 4	
	Ceded Lands Encumbrance	Unknown			2 / 3	
	Infrastructure Costs	Minimal existing public parking and no major services currently on site			0 / 3	
	Land Acquisition	Owned by State of Hawaii			10 / 20	
	Development Incentives	No state or federal development incentives			2 / 2	
	Complexity	Existing road access complicated by one-way traffic flows around Waikiki and nearby residential neighborhoods			0 / 2	
	Community Acceptance				1 / 2	
Economic Impact	Positive Cultural Impact				2 / 10	
	Political Viability				6 / 10	
	Employment Demand in Vicinity	5,243 unemployed persons in 10-min. drive distance (3.9% of pop.)			1 / 10	
	Households Experiencing Poverty in Vicinity	12,653 households in poverty in 10-min. drive distance (11.6% of total)			6 / 6	
	Population in Proximity	243,095 persons in 100,620 households in 10-min. drive distance			5 / 6	
Intuitive Site Qualities	Per-Capita Income in Vicinity	\$38,238			0 / 2	
	Unique Site Improvement Opportunities - positive				4 / 5	
	Anticipated Site Difficulties - negative				-2 / -5	
					<b>2</b>	
					<b>56 / 100</b>	Total Score:



## **5F. KALAELOA AIRPORT SITE**

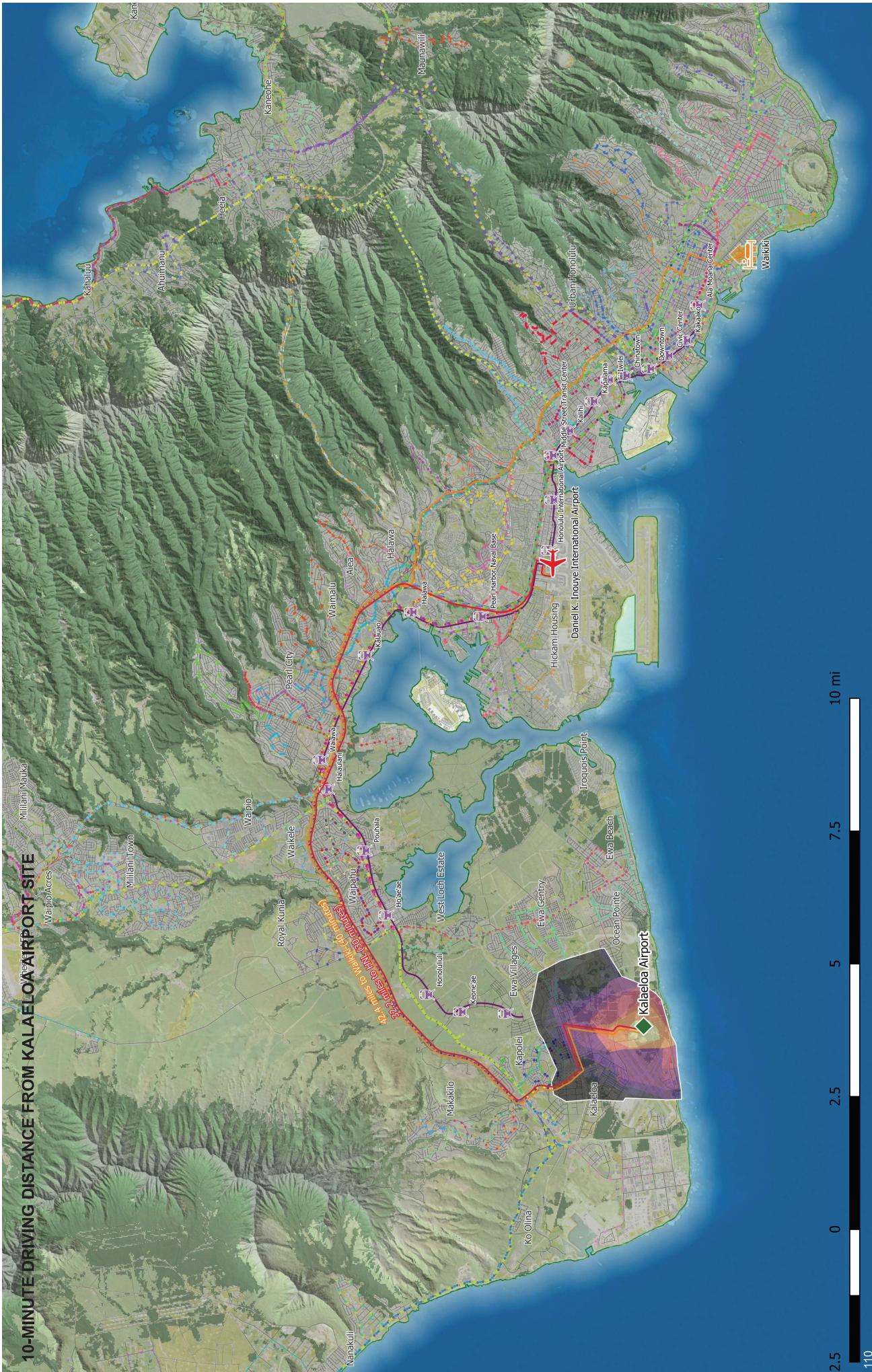
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### **Kalaeloa Airport**

The land on and around Kalaeloa Airport, on the west end of Oahu, represents a large swath of underdeveloped area in proximity to the fast-growing community of Kapolei. While there are a number of potential sites in the area, the team selected Lot C (previously studied for an OCCC detention facility) as a representative option. There are 50 acres on Lot C, which is currently held by the Department of Hawaiian Homelands.

The principal and overwhelming drawback of the Kalaeloa site is its remoteness. Only the suburban Kapolei neighborhoods lay within its 10-minute travel isochrone, covering a mere ~29,400 residents. Mass transit is sparse in the vicinity as well, with no existing bus lines serving the Lot C site or any other potential options. The closest HART station, Kuakai, is 4 miles away. Significant access improvements between the site and H1 would be required to support event-day traffic flows. The site is also the farthest – geographically and temporally – from Daniel K. Inouye International (32 miles and ~30 minutes) and Waikiki (~22 miles and ~40 minutes), with travel times likely to be much higher due to event-day traffic and/or commuter congestion.





**Total Site Size:**50 acres  
25.5 acres (51.3%)  
0.0 acres (0.0%)**Designated Wetlands:**

Site Slope

- Mean: 1.1-deg
- Max: 5.6-deg
- Std Dev: 1.9-deg

**Bus Stops Nearby:**

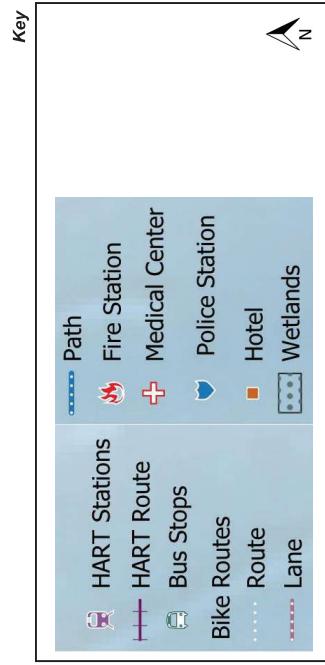
0

**HART Stops Nearby:**

0

The "10-Minute Driving Map" represents an isochronal diagram highlighting a distance around each one of the potential sites. This isochrones map show the distance that one could travel to or from the site in a 10-minute period of time, with no traffic. This catchment area is used to collect all of the data points and rubric information included in the site analysis matrixes. This is shown consistent for all the sites.

The "Vicinity Map" shows the bounds of an area that is a 15-minute (1/4-mile) walk from the site perimeter. This area provides additional information about the facilities and infrastructure immediately adjacent to the site. This is shown consistent for all the sites.



## *Kalaaoa Airport Site*

### **General Description**

Located on the south west of the island is Oahu's second airport which was originally operated by the Navy for marine patrol aircraft. Taken over in 1999 it now operates as a joint civil-military regional airport of the state of Hawaii serving the needs for commercial air transportation and other aviation demands. The airport is approximately 16 miles from Aloha Stadium in Halawa.

Pros	Cons
<ul style="list-style-type: none"><li>• Commercial airport provides fly-in-fly-out connectivity for visiting teams, fans (inter-island, national and international), and touring events.</li><li>• Connection potential to the H1 freeway.</li><li>• Ample site area comprising flat, easily developable land with low scrub-like vegetative cover affording alternative site locations for a stadium.</li><li>• Ample site area for car parking and additional/ancillary development potential.</li><li>• Commercial center nearby in Kapolei (Costco, Home Depot, Target, restaurants, etc.).</li><li>• Surrounding population centers provide a potential labor pool.</li><li>• HART line is nearby (approximately 3-miles over land) connecting the location with other destinations; and the HART line could easily be extended closer to the airport</li><li>• Ko Olina Resort is nearby providing high-end, luxury accommodation for visitors.</li><li>• Investment in the airport could be an economic stimulus for the area.</li><li>• Site has unique, telegenic/aesthetic qualities, including water views to the south and west from the stadium.</li></ul>	<ul style="list-style-type: none"><li>• The site is the most distant from Honolulu's more typical places of interest.</li><li>• Infrastructure is under-capacity (such as pipe and wire services); roads and intersections (for site access) need improving, etc.</li><li>• Flight path restrictions.</li><li>• Lacks commercial visibility/presence.</li><li>• Last HART station is approximately 4-miles driving distance.</li><li>• Airport and supporting facilities may need to be upgraded.</li><li>• Most distant from U of H (Manoa) football fans.</li></ul>

### **Summary Observation(s)**

The site is a surprisingly well-endowed location that could be suitable for a new stadium location.



nearby Ko Olina Resort Development



nearby Ko Olina Resort Development



potential site



potential site



White Plains Beach near Kalihiwai



typical vegetation and tree cover

**ALOHA STADIUM | ALTERNATIVE SITE EVALUATION**

### DEVELOPMENT CONCEPTS AT THE KALAELOA AIRPORT SITE







## KALAELOA AIRPORT SITE ANALYSIS

Site Analysis and Scoring:		Kaleaoa		Notes	Score	Subtotal
Category	Criteria	Indicators				
Site, Infrastructure, and Environment	Total Acreage	50 acres on DHHL property east of Kalaeloa Airport		4.0 miles to Kualakai Station Kalaeloa Airport not considered due to limited cargo handling facilities	5 / 5	1 / 5
	HART Access	no pedestrian HART access			0 / 3	
	Proximity to Daniel K. Inouye International Airport	32.2 miles (30 minutes) to/from airport			0 / 3	
	Proximity to Emergency Services	7.2 miles to Fire Station 40 Kapolei; <b>6.6 miles</b> to Kapolei District Station; <b>11.0 miles</b> to The Queen's Medical Center - West Oahu			0 / 3	
	Proximity to Honolulu Harbor	24.2 miles (43 minutes) to/from harbor		Barber's Point Harbor not considered due to lack of container facilities	0 / 2	
	Proximity to Waikiki	42.4 miles (40 minutes) to/from Waikiki		87% (~28000) of hotel rooms on Oahu are in Waikiki	0 / 2	
	Ability to Accommodate Stadium Program	100% of site covered by Extreme Tsunami Evacuation Zone		Per NOAA circa 2100 worst-case scenario projections (3.2ft)	2 / 2	
	Avoids Flood/Tsunami Hazards	Not endangered by sea level rise			1 / 2	
	Avoids Sea Level Rise Hazard	No designated wetlands			2 / 2	
	Avoids Wetlands Impact	Site at risk in tsunami scenario; limited road and no transit access			0 / 1	
Development Costs	Bus Access	0 bus stops within 1/4 mile radius of site			0 / 1	
	Existing Zoning	F-1 Federal and Military Preservation District			3 / 4	
	P3 Potential or other Development Possibilities	Remote site with limited appeal for commercial development			2 / 4	
	Ceded Lands Encumbrance	Unknown			2 / 3	
	Infrastructure Costs	Significant road improvement and utility construction needs anticipated			0 / 3	
	Land Acquisition	Owned by State of Hawaii - Department of Hawaiian Homelands			2 / 2	
	Development Incentives	Site covered by federal Kalaeloa Opportunity Zone			2 / 2	
	Complexity	Flat site with no prior development			2 / 2	
	Community Acceptance				7 / 10	
	Positive Cultural Impact				7 / 10	
Economic Impact	Political Viability				5 / 10	
	Employment Demand in Vicinity	940 unemployed persons in 10-min. drive distance (5.8% of pop.)			0 / 6	
	Households Experiencing Poverty in Vicinity	268 households in poverty in 10-min. drive distance (3.6% of total)			0 / 6	
	Population in Proximity	29,368 persons in 7,427 households in 10-min. drive distance			0 / 6	
	Per-Capita Income in Vicinity	\$28,948			2 / 2	
Intuitive Site Qualities	Unique Site Improvement Opportunities - positive				4 / 5	
	Anticipated Site Difficulties - negative	Remoteness and inaccessibility of site make it difficult to imagine it supporting anything other than a stadium and associated parking			2 / 5	
					<b>49 / 100</b>	
					Total Score:	



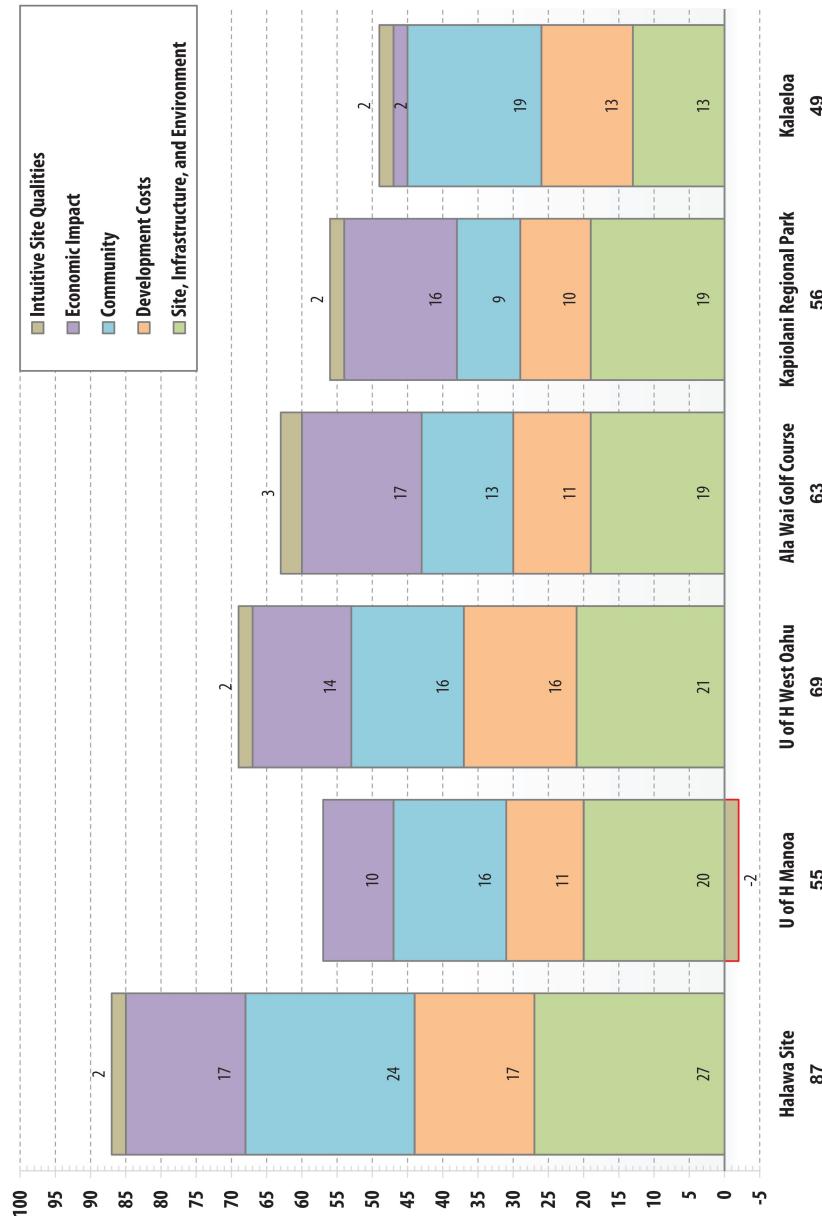
## 6. SUMMARY AND RECOMMENDATION

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### SUMMARY AND RECOMMENDATION

The recommendation from this report is that the Halawa Site is the best site for the construction of a new stadium and any ancillary development around it. The findings are conclusive in the fact that the site rated the highest, or equal highest, in all categories.

The Halawa Site is the most ready for development. It has the transportation infrastructure in place in terms of visitor access and will only get better with the addition of the rail stop. It has the land available to create additional program on site, enhancing its value to residents and increasing its desirability for developers. It is a site already used for the specific purpose of a stadium, and thus likely to be accepted by the community, at least from a use stand point. Its construction will not take away any beloved parks, landmarks or other uses. It is an opportunity to take something that is already highly used and accepted by the community, and to make it even better.





## 7. APPENDIX

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### APPENDIX

During the course preparing the site analysis study, the Design Development Team prepared some additional collateral information to assist in the site selection itself.

#### 1. The University of Hawaii Manoa Stadium Study

The site at the University of Hawaii Manoa is smaller than the other five (5) sites.

Since it is too small to fit the Stadium Authority's requirement for 35,000 seats, it was necessary to evaluate the site itself and understand approximately what size stadium could fit on the site. This was then taken into consideration in the evaluation of the Manoa site.

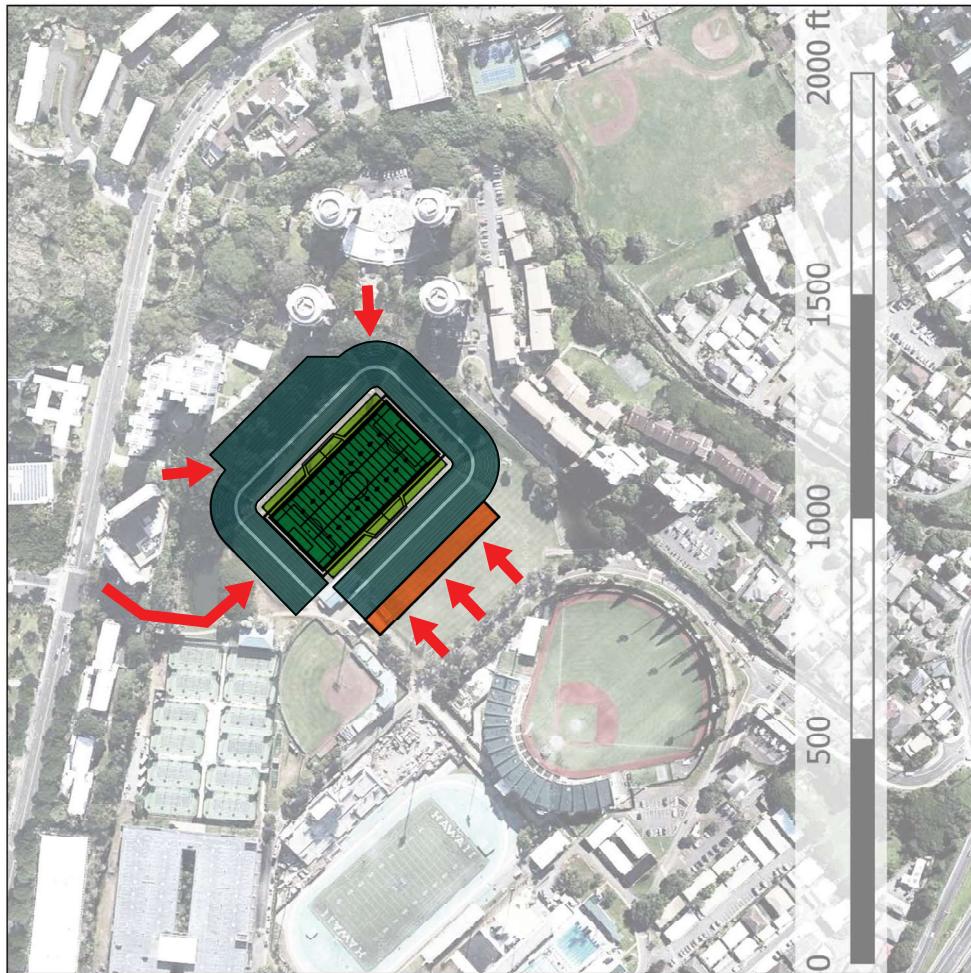
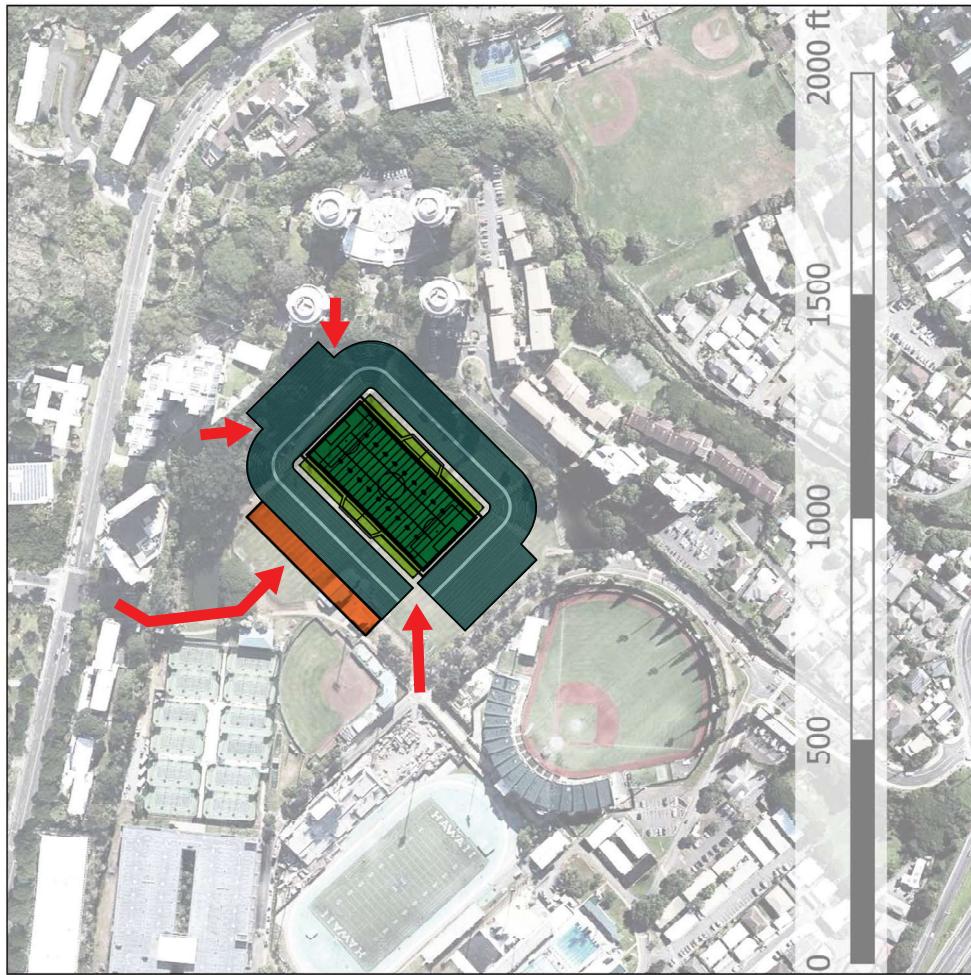
#### 2. The Halawa Site Concepts A and B

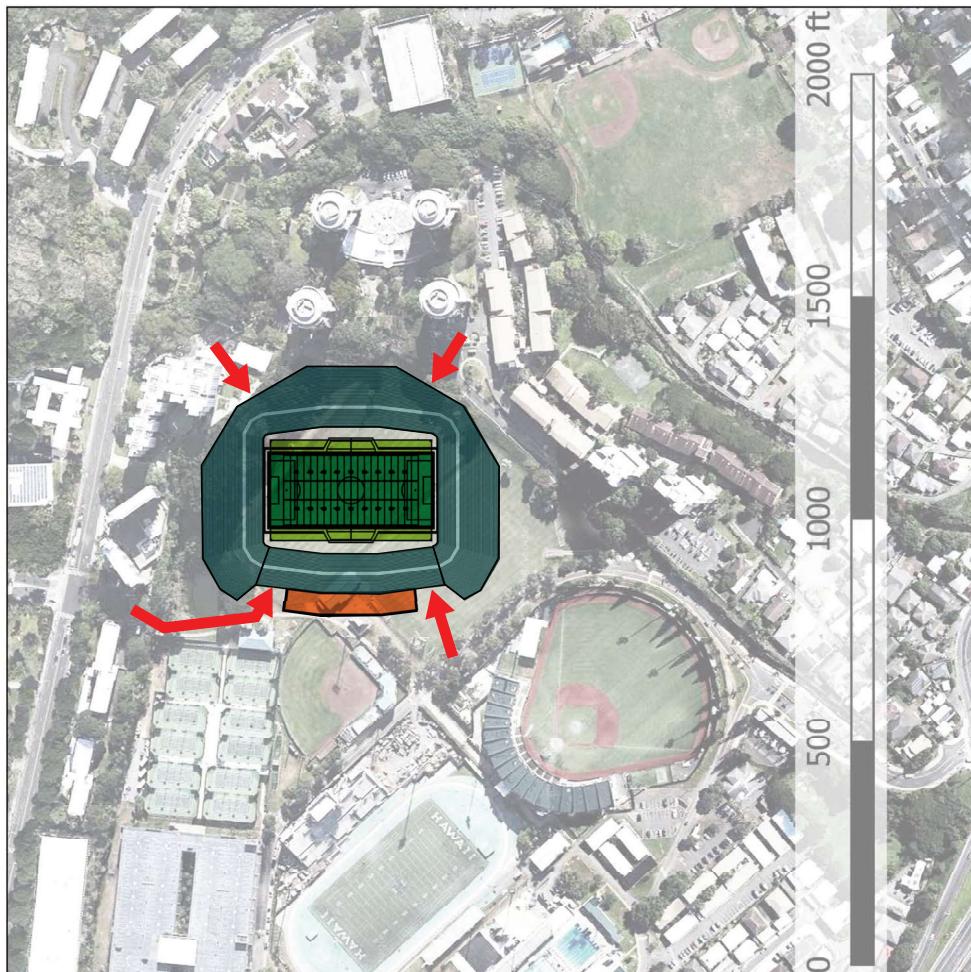
As part of the interview process, the Design Development Team created two master plan concepts as examples for the Client Group to review. These two examples are catalogued in the appendix for reference only.

#### 3. The Stadium Program

In order to determine a footprint for stadium to be used in the evaluation of each of the sites, a detailed program was created based on the Stadium Authority's requirement for 35,000 seats. This program is in progress and will be updated thru the course of the site master plan development.





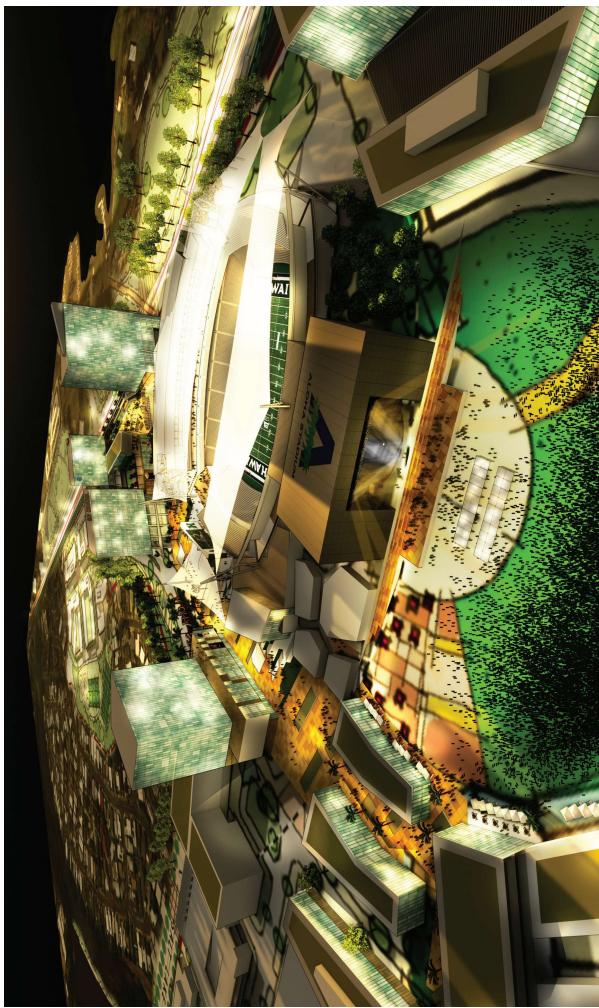


#### *The University of Hawaii at Manoa*

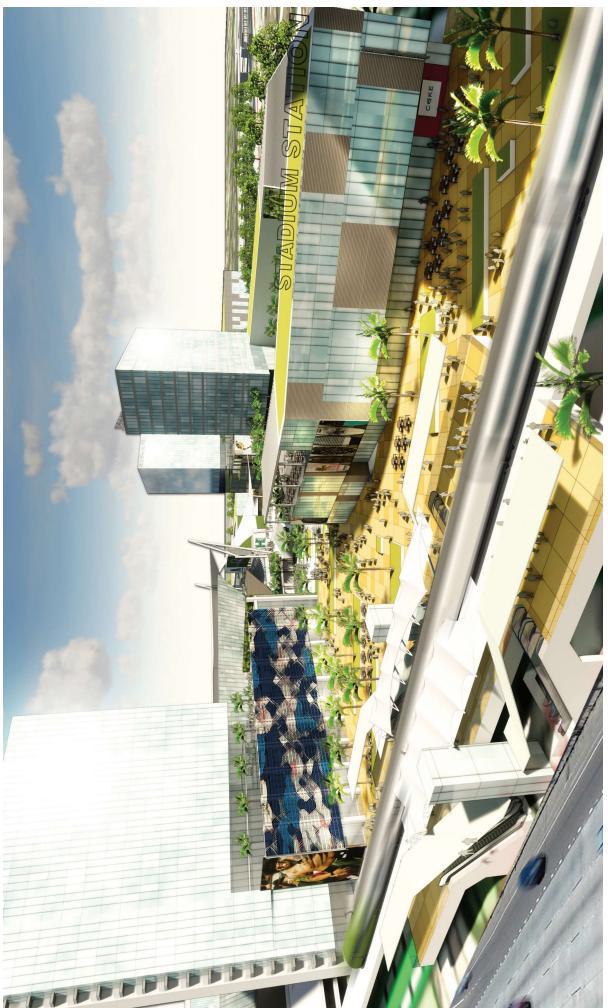
The potential site for a new stadium at the University of Hawaii Manoa is the existing practice fields on campus. To the south of the site is the Les Murakami baseball stadium; to the west of the site is the Rainbow Wahine softball stadium and tennis courts; and to the north and east of the site are campus student housing buildings. In order to fit a stadium on campus at this location, it would likely need to be smaller than the 35,000 seats required by the Stadium Authority and would need to be nestled into the existing hillside and campus fabric. Several stadium configurations were considered, with the largest having a seating capacity of approximately 28,000. Anything larger than this, starts to encroach upon the softball and tennis complex.



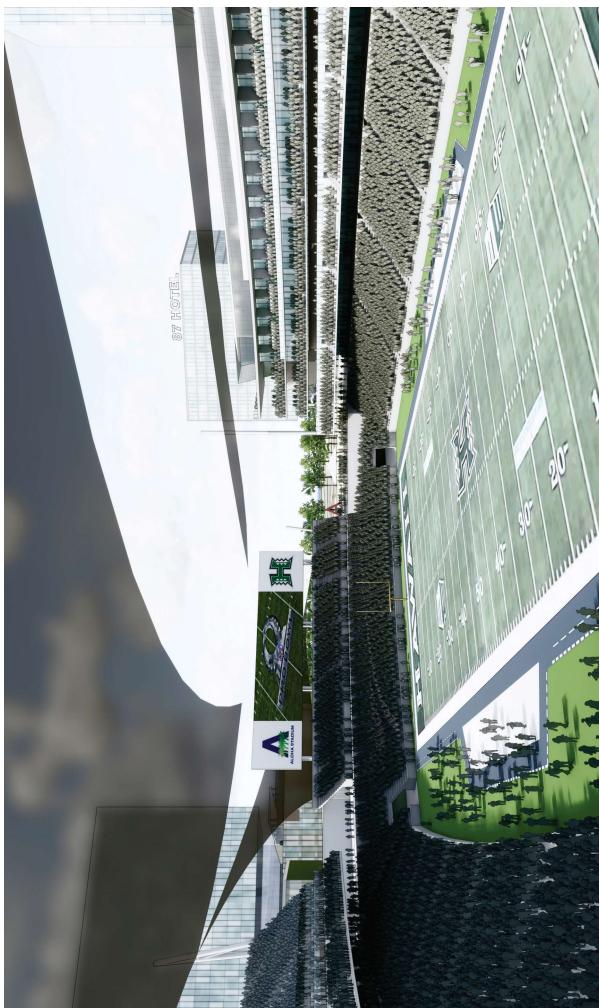
Proposed Stadium Entry



Proposed Outdoor Concert Venue

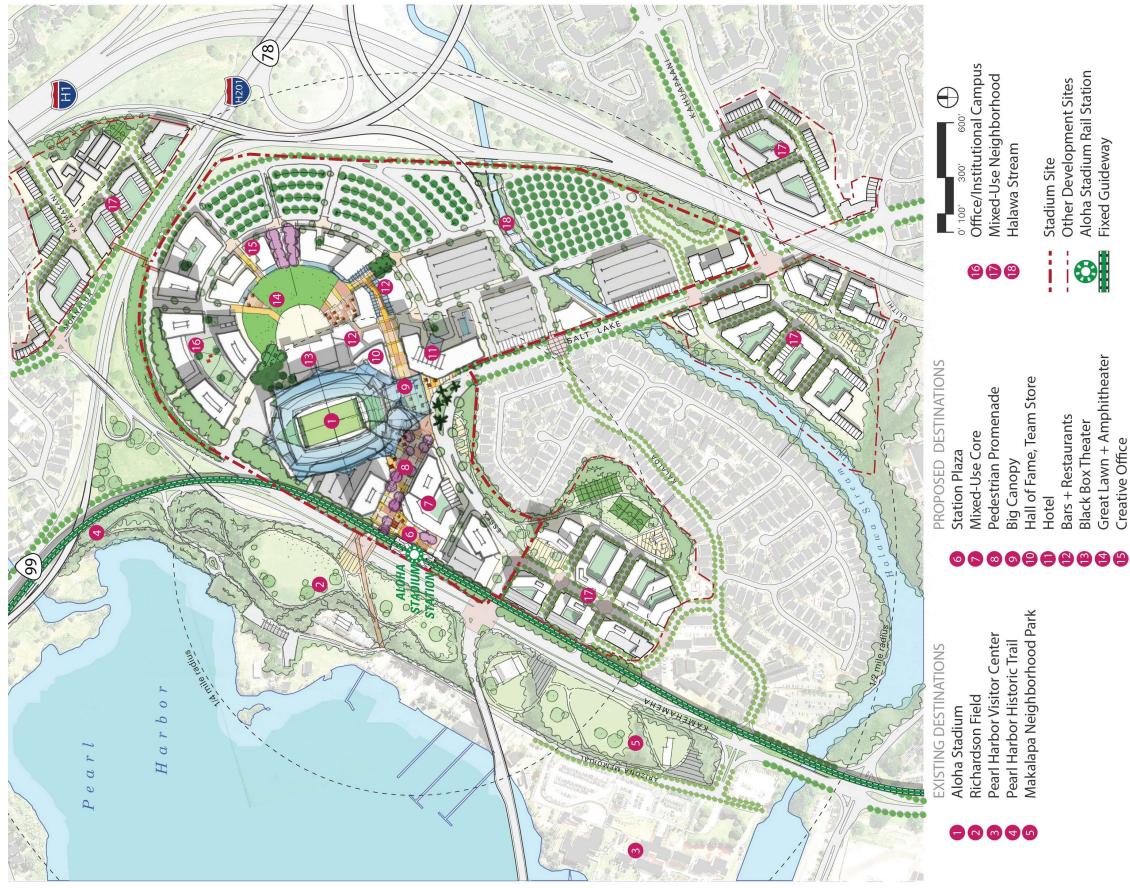


Proposed TOD Plaza



Proposed New Stadium Bowl

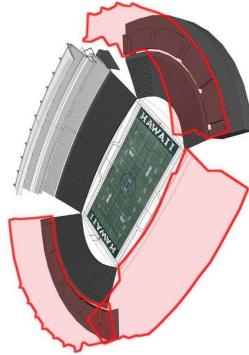
## PROPOSED SITE PLANS A - FROM INTERVIEW



The site master plan concepts prepared for the interview process show a new stadium along with ancillary development to create a new multi-use district at the Halawa site. The site is organized around two anchors: the new stadium and the HART station (TOD transit oriented development). The layout of the concepts seeks to create a pedestrian zone leading from the HART station to the stadium lined with amenities: retail, commercial, hotel, residential and office opportunities. Further development across the site would be public gathering areas, additional entertainment venue opportunities, the Swap Meet, mixed use neighborhoods, institutional campus buildings and parks. The master plan concepts are intended to be a guide for future development and will progress and change as they are studied for need and financial feasibility thru the development process.



**0**  
Existing Stadium  
Running Timeline: Start month 0



**1**  
Demolish Eastern sideline lower bowl and upper deck,  
Demolish North and South end zone upper decks.  
Running Timeline: Month 1-3



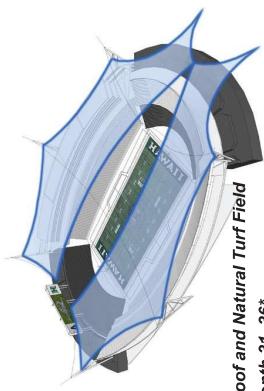
**3**  
Demolish West Sideline lower bowl and upper deck  
Running Timeline: Month 13-15



**4**  
Build new West Sideline lower bowl  
and upper deck (including press box)  
Running Timeline: Months 16-24

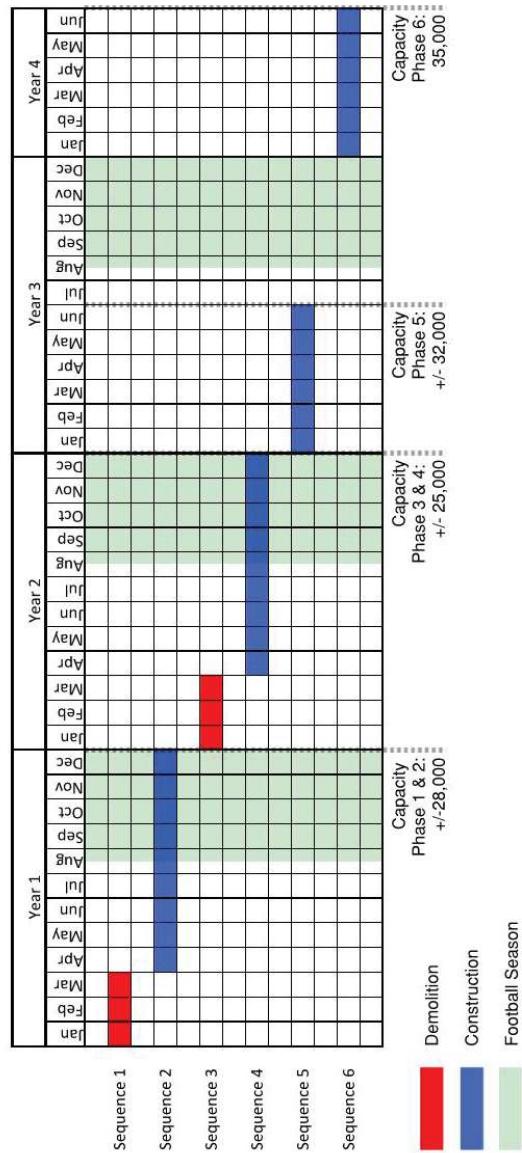


**5**  
Build new North End Zone upper deck  
Install new South End Zone scoreboard  
Running Timeline: Month 25-30



**6**  
Install new Canopy Roof and Natural Turf Field  
Running Timeline: Month 31-36\*

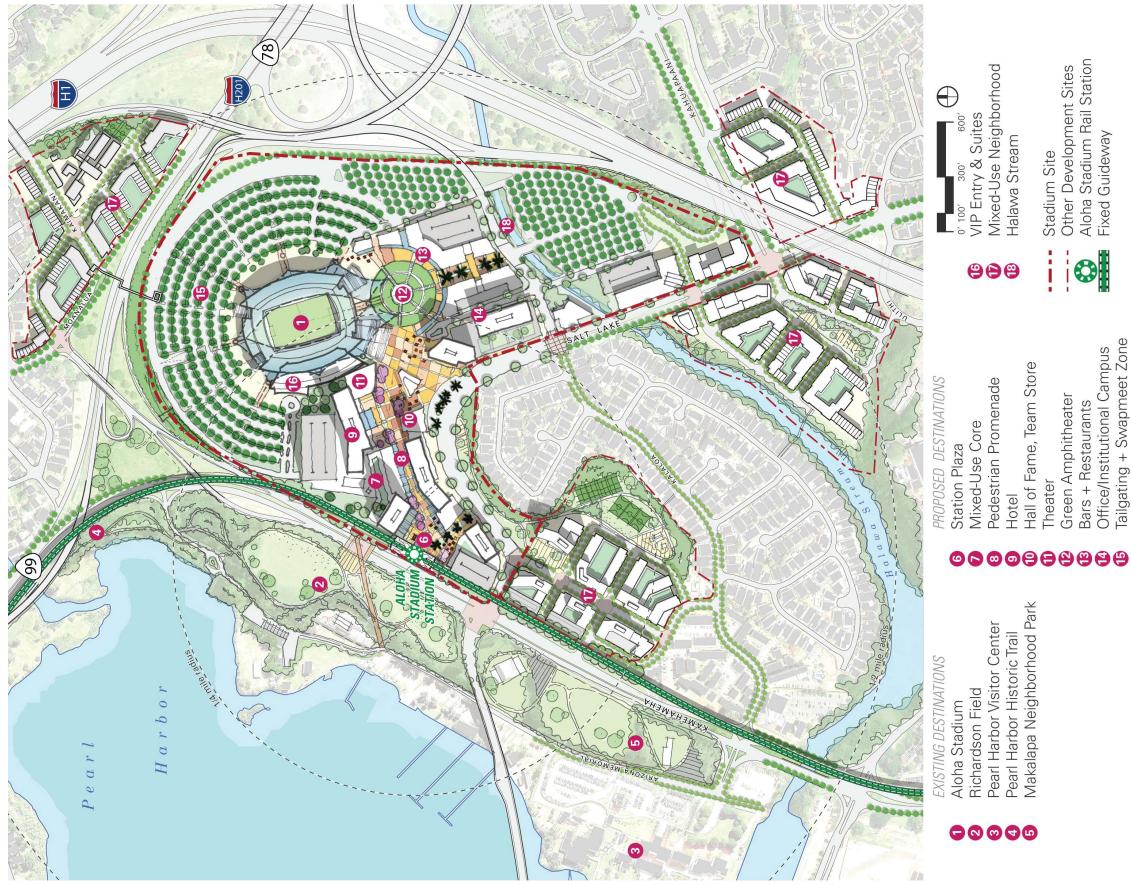
\* The installation of the new field and canopy roof can happen at such a time that the third football season during the duration of construction can occur without construction happening at the same time. (see timeline)



**2**  
Build new East Sideline lower bowl and upper deck  
Running Timeline: Months 4-12

# Possible Sequencing For Constructing a New Stadium in Place

## PROPOSED SITE PLANS B - FROM INTERVIEW



An alternative to constructing a new stadium elsewhere on the site would be to build a new stadium in sequences in place. The four quadrants lend the stadium to a potential for a sequential demolition and rebuild. Through the process, it would be critical to maintain a minimum attendance capacity coincident with the average attendance of U of H football games. The process could be done in the manner displayed to the left.

Several advantages to this method would be as follows:

1. It stands to reason that the original location of the stadium is the "correct" location for the stadium on this site. It is the largest portion of the site with the most accessible land around the perimeter.
  2. It gives an opportunity for the stadium to start generating revenue earlier than other options / locations because portions of the stadium could be completed and usable more quickly.
  3. It eliminates the need / cost for maintaining the existing stadium sooner as large portions of the existing stadium would be demolished very early in the process.
- Drawbacks to this scheme would be as follows:
1. Operations during construction would be more difficult.
  2. The size of events during construction would be limited to the capacity available during that sequence.



## DRAFT PROGRAM FOR PROPOSED NEW STADIUM

Proposed New Aloha Stadium  
Program - Tabular Format  
IN PROGRESS

### DRAFT PROGRAM FOR PROPOSED NEW STADIUM

Copyright 2019 Crawford Architects

SECOND DRAFT  
3 January 2019

inputted program quantities and units  
multipliers (lengths or areas or percentages)  
calculated values

At the direction of the Stadium Authority, the program for the new stadium is based on 35,000 seats, which includes general purpose seating, various suites, club seating and loge seating. The stadium is to be designed around a field that can host soccer, football and rugby as well as other stadium events that would fit on an event surface of that size: outdoor concerts, X-games, tournaments, car and truck shows, etc. The stadium is not currently intended to be set up with a permanent tenant (home team), but instead would be able to house multiple teams thru different athletic season. It is likely that the University of Hawaii Rainbow Warriors football team would play here, and their game-day locker room would be set up on a semi-permanent basis. As the development of the project moves forward past the site selection phase, the development of the stadium program will be ongoing to meet the needs to the City of Honolulu and State of Hawaii.

Description	Capacity	Minimum Seat Width (in)	Minimum Tread Width (in)	Remarks
Total Seating Capacity	<b>35,000</b>	19.0	33.0	
General Seating	<b>30,428</b>	19.0	33.0	Assume self rising chair with seat backs
Special Designation Seating - Standing	<b>2,000</b>	19.0	33.0	Soccer - Standing Room - assume bench
Club Seating	<b>750</b>	22.0	36.0	
On Field Club Seating	<b>350</b>	22.0	36.0	
Lope	<b>250</b>	24.0	84.0	
Community Suite	<b>500</b>	24.0	48.0	
Executive Suite	<b>100</b>	24.0	48.0	
Super Suite (Enclosed)	<b>250</b>	22.0	48.0	
General Seating - Retractable	-	19.0	33.0	
Accessible   Wheelchair Accessible   Companion	<b>186</b>	36.0	96.0	Enhanced sightlines distributed in each category
		19.0	96.0	Enhanced sightlines distributed in each category
Description	Minimum Width (ft)	Minimum Length (ft)	Target Area (gsf)	Remarks
Soccer Pitch	<b>225.00</b>	<b>360.00</b>	81,000.00	
Football Field	<b>160.00</b>	<b>360.00</b>	57,600.00	
Rugby Pitch Min (68m x 114m)	<b>223.00</b>	<b>374.00</b>	83,402.00	
ref Rugby Pitch Max (70m x 144m)	<b>230.00</b>	<b>472.00</b>	108,560.00	For reference only
ref Cricket Field (circle or oval) b/w 137m and 150m	<b>450.00</b>	<b>450.00</b>	202,500.00	For reference only - smallest field shown
ref Australian Rules Football (110-155m x 135-185m)	<b>360.00</b>	<b>443.00</b>	159,480.00	For reference only - smallest field shown
Event Floor (Overall Area - to be confirmed)	<b>265.00</b>	<b>412.00</b>	109,180.00	Event floor width and length determined using soccer field plus minimum sideline and endline runoffs
Description	Requirements			Remarks
Minimum Sightline clearance	C60 or 2-1/4 inches			
Minimum Front Row Height	48 inches			
Focal Points - Soccer	Corner Kick   Top of Ball & Sideline			
Focal Points - Football	Side Lines and Endzone Lines			Maximum 20% in-goal obstructed - unobstructed 'zero sightline' to Dead Ball Line
Description	Sideline (ft)	Behind Goal (ft)	Security (ft)	
Minimum Runoffs - Soccer	<b>20.00</b>	<b>20.00</b>	-	Area between pitch / sideline & 1st row of stadium
Minimum Runoffs - Football Field	<b>51.00</b>	<b>26.00</b>	-	Area between football field / sideline & 1st row of stadium

Description	Unit per Patron	Width (in)	Number Required	Remarks
Turnstiles   Points of Entry	<b>1,000</b>	60.0	35	
Points of Sale - Food Service - General Seating	<b>250</b>	72.0	131	Assume Electronic Scanning
Points of Sale - Food Service - Club   Loge	<b>200</b>	72.0	11	Cafeteria Style
Points of Sale - Retail   Novelties	<b>600</b>	72.0	55	Cafeteria Style
				Belly up
Description	Men	Women	Total	Remarks
General Seating	<b>210</b>	<b>363</b>	<b>574</b>	<i>Includes unisex and family restrooms</i>
Water Closets	44	262	306	
Urinals	90	-	90	
Lavatories	76	101	177	
Special Designation Seating - Standing	<b>21</b>	<b>32</b>	<b>53</b>	
Water Closets	5	25	30	
Urinals	11	-	11	
Lavatories	5	7	12	
Club Seating (1200 Seats)	<b>12</b>	<b>12</b>	<b>24</b>	<i>Verify fixture count for club lounge - meeting mode</i>
Water Closets	3	9	13	
Urinals	7	-	7	
Lavatories	2	3	4	
Loge   Suite	<b>10</b>	<b>17</b>	<b>28</b>	
Water Closets	2	14	16	
Urinals	5	-	5	
Lavatories	3	4	6	

Preliminary Program				
Description	NET AREA (ft <sup>2</sup> )	Factor - Gross Area	Required Area (ft <sup>2</sup> gross) TARGET	Remarks
Seating Bowl	149,816.92	1.35	202,252.84	Target Area to be confirmed
General Seating   Concourse Areas	76,229.77	1.58	120,443.03	Concourse Circulation + Stairs & Ramps - to be confirmed
Club Seating   Concourse Areas	34,503.75	1.25	43,254.69	
Loge   Suite Level	43,940.00	1.25	53,800.00	
Food & Beverage   Production Kitchen & Commissary	10,075.00	1.32	13,299.00	
Retail   Hall of Fame	13,185.00	1.25	16,481.25	
Media   Broadcast   Press Box	9,360.00	1.25	11,700.00	
Administrative   Ticket Offices	6,350.00	1.25	7,937.50	
Soccer Locker Area	17,790.00	1.25	22,237.50	
Football Locker Area	31,400.00	1.25	39,250.00	
Game Day Support Area	6,650.00	1.25	8,362.50	
Technology   Video Display	9,395.00	1.25	11,743.75	
Facility   Operations - in Stadium	36,455.00	1.35	49,214.25	
Maintenance   Warehouse   Groundkeeper	11,070.00	1.25	13,837.50	
Sub Total	455,460.43		613,813.81	0

Description	Unit	Unit Area (ft <sup>2</sup> )	Required Area (ft <sup>2</sup> )	Remarks
Plaza - Main Entrance	-	-	-	tbd
Plaza - VIP   Suite   Club Entry	-	-	-	tbd
Plaza - Staff Entry	-	-	-	
General Parking	6,958	355.00	2,470,208.33	
Suite Parking	192	355.00	68,041.67	Based on 2.5 people per car & 60 / 40 modal split
Loge   Club Parking	250	355.00	88,750.00	
Season Ticket Holder Parking	1,000	355.00	355,000.00	
Motor Coach Parking - General Public	20	430.00	8,600.00	
Referee   Officials	21	375.00	7,875.00	
Team - Motor Coach Parking	8	430.00	3,440.00	
Stadium Staff Parking	50	355.00	17,750.00	
Media Parking	75	355.00	26,625.00	
Accessible   Handicap Parking	42	970.00	40,740.00	
TV Truck Parking - Semi	7	590.00	4,130.00	Provide 'pedestal' for termination
TV Truck Parking - Std Truck   Van	10	430.00	4,300.00	Provide 'pedestal' for termination + SW view to sky
Building Footprint - Stadium + Field	1,25	371,654.35	464,567.94	to be verified
Sub Total		3,560,927.94	0	
Sub Total - In Acres		81.73		

Summary of Enclosed Areas by Category - Stadium

Description	Unit	Unit Area (ft <sup>2</sup> )	Required Area (ft <sup>2</sup> )	Remarks
General Seating		30,128	4,35	132,488.58
On Field Club Seating	350	5.50	1,925.00	
Club Seating	750	5.50	4,125.00	
Loge	250	14.00	3,500.00	
Community Suite	500	8.00	4,000.00	
Executive Suite	100	8.00	800.00	
Executive Suite (Enclosed)	250	7.33	1,833.33	
General Seating - Retractable	-	4.35	-	
Camera Positions in Bowl - Midfield	1	195.00	195.00	
Camera Positions in Bowl - Hash	2	110.00	220.00	
Camera Position in Bowl - Behind Goal	1	290.00	290.00	
Camera Positions at Field	4	110.00	440.00	
<b>Sub Total</b>		<b>149,316.92</b>	<b>0</b>	

Description	Unit	Unit Area (ft <sup>2</sup> )	Required Area (ft <sup>2</sup> )	Remarks
Entry / Turnstiles	35	40.00	1,400.00	
Information	2	385.00	770.00	
Promotional Storage	3	345.00	1,035.00	
Concession - Food Prep & Display	131	120.00	15,240.00	<i>Cafeteria Style</i>
Concession - Queuing & Serving Area	131	30.00	3,936.00	<i>Cafeteria Style</i>
Satellite Reg. Cooler / Storage	8	150.00	1,200.00	
Novelty Stand	55	95.00	5,193.33	<i>Belly Up</i>
Novelty Stand Queuing	55	20.00	1,093.33	
Portable Kiosks	10	300.00	3,000.00	<i>Provide power &amp; data at each location</i>
Toilets - Men	231	45.00	10,403.40	
Toilets - Women	395	45.00	17,779.70	
Toilets - Family	6	80.00	480.00	
First Aid / Fan Assist - Main Room	1	430.00	430.00	
First Aid / Fan Assist - Satellite Rooms	3	160.00	480.00	<i>Adjacent to family toilet rooms</i>
Mother's Rooms	6	80.00	480.00	<i>Adjacent to toilets</i>
Satellite Janitorial	4	120.00	480.00	
Pub Bar	1	12,325.00	12,325.00	
Concourse Circulation Upper Level	-	-	-	
Concourse Circulation Lower Level	-	-	-	
<b>Sub Total</b>		<b>76,229.77</b>	<b>0</b>	

Description	Unit	Unit Area (ft <sup>2</sup> )	Required Area (ft <sup>2</sup> )	Remarks
Vestibule   Entry	<b>1</b>	215.00	215.00	
Lobby	<b>1</b>	645.00	645.00	
Information   Concierge	<b>1</b>	130.00	130.00	
Club Lounge	<b>750</b>	20.00	15,000.00	
Bar	<b>400</b>	15.00	6,000.00	<i>Cafeteria Style</i>
Concession - Food Prep & Display	<b>5</b>	120.00	600.00	<i>Cafeteria Style</i>
Concession - Queuing & Serving Area	<b>5</b>	30.00	150.00	
Buffet   Action   Serving Stations	<b>3</b>	260.00	780.00	
Servent Station (Waiter   Waitress)	<b>2</b>	150.00	300.00	
Pantry - Staging	<b>1</b>	385.00	385.00	
Storage - Tables & Chairs	<b>1</b>	325.00	325.00	
Toilets - Men	<b>12</b>	45.00	534.38	
Toilets - Women	<b>12</b>	45.00	534.38	
Toilets - Family	<b>2</b>	80.00	160.00	
Satellite Janitorial	<b>1</b>	120.00	120.00	
On Field Club Lounge			<b>8,725.00</b>	
Club Seating   Concourse Areas				
Buffet   Action   Serving Stations	<b>1</b>	215.00	215.00	
Server Station (Waiter   Waitress)	<b>2</b>	150.00	300.00	
Pantry - Staging	<b>1</b>	385.00	385.00	
Storage - Tables & Chairs	<b>1</b>	325.00	325.00	
Toilets - Men	<b>1</b>	150.00	150.00	
Toilets - Women	<b>1</b>	150.00	150.00	
Toilets - Family	<b>1</b>	80.00	80.00	
Satellite Janitorial	<b>1</b>	120.00	120.00	
<b>Sub Total</b>			<b>34,603.75</b>	<b>0</b>

Description	Unit	Unit Area (ft <sup>2</sup> )	Required Area (ft <sup>2</sup> )	Remarks
Vestibule   Entry		260.00	260.00	
Lobby	1	860.00	860.00	
Information   Concierge	1	130.00	130.00	
Meeting Rooms   Business Center	2	260.00	520.00	
Loge Box   Public Lounge Areas	250	15.00	3,750.00	<i>With in Club/lounge</i>
Community Suite   Private Lounge	42	300.00	12,500.00	
Community Public lounge Areas	42	195.00	8,125.00	
Executive Suite Lounge	6	450.00	2,812.50	
Super Suite with Private Bar In-Suite	250	20.00	5,000.00	<i>Media Level</i>
Exterior Terrace	-	-	-	<i>Media Level</i>
General Bar - Community Areas   Suite & Loge	400	15.00	6,000.00	
Buffet   Action-Serving Stations @ Community Area	2	270.00	540.00	
Server Station (Waiter   Waitress)	2	150.00	300.00	
Pantry - Staging	2	195.00	390.00	
Storage - Tables & Chairs	1	215.00	215.00	
Toilets - Men	10	45.00	453.75	
Toilets - Women	17	45.00	783.75	
Toilets - Family	2	80.00	160.00	
Satellite Janitorial	2	120.00	240.00	<i>Adjacent to toilets</i>
<b>Sub Total</b>			<b>43,040.00</b>	<b>0</b>

Loge | Suite Level

Description	Unit	Unit Area (ft <sup>2</sup> )	Required Area (ft <sup>2</sup> )	Remarks
Loading Dock Holding Area - Secure Production Kitchen & Commissary	<b>1</b>	540.00	<b>540.00</b>	<b>6,110.00</b>
Cooking Area	<b>1</b>	645.00		Adjacent to Freight Elevator
Food Prep	<b>1</b>	560.00		
Slicing Stations	<b>1</b>	300.00		
Baking Area	<b>1</b>	410.00		
Walkin Coolers	<b>4</b>	150.00		
Walkin Freezers	<b>2</b>	235.00		
Dish Wash	<b>1</b>	390.00		
Staging Area - Cart Storage	<b>1</b>	580.00		Staging area for carts to distribute food to concessions and pantries
Office - Head Chef	<b>1</b>	150.00		
Secure Liquor Storage	<b>1</b>	515.00		Access to Loading Dock & or Service Elevator
Dry Goods Storage	<b>1</b>	970.00		Access to Loading Dock, Palette Warehouse and/or Service Elevator
Linen Storage	<b>2</b>	215.00		
Trash Room	<b>1</b>	260.00		
Recycling	<b>1</b>	260.00		
Direction of Food Service Operations				
Administrative Assistant	<b>1</b>	170.00	<b>170.00</b>	
Secure Vestibule - Cash Room	<b>1</b>	130.00	<b>130.00</b>	
Cash Counting & Safe	<b>1</b>	150.00	<b>150.00</b>	
General Storage	<b>1</b>	110.00	<b>110.00</b>	
Chair   Table Storage	<b>1</b>	690.00	<b>690.00</b>	
Staff Meeting / Break Room	<b>1</b>	345.00	<b>345.00</b>	
Men's Locker Room	<b>1</b>	260.00	<b>260.00</b>	
Women's Locker	<b>1</b>	300.00	<b>300.00</b>	
Toilets	<b>2</b>	300.00	<b>300.00</b>	
Conference / Consultation Room	<b>16</b>	195.00	<b>3,120.00</b>	
Copy Room / Work Room	<b>1</b>	20.00	<b>20.00</b>	
Satellite Janitorial	<b>1</b>	130.00	<b>130.00</b>	
<b>Sub Total</b>			<b>10,075.00</b>	<b>0</b>

Description	Unit	Unit Area (ft <sup>2</sup> )	Required Area (ft <sup>2</sup> )	Remarks
Main Team Store	<b>1</b>	1,075.00	1,075.00	
Retail Offices	<b>2</b>	150.00	300.00	
Retail Storage   Warehouse	<b>1</b>	2,420.00	2,420.00	
Portable Cart Storage	<b>1</b>	430.00	430.00	
Satellite Stores	<b>3</b>	485.00	1,455.00	
Hall of Fame			<b>7,375.00</b>	
Exhibit(s)	<b>1</b>	3,230.00		
Auditorium	<b>100</b>	20.00		
Meeting Rooms   For Hire	<b>3</b>	255.00		
Offices	<b>2</b>	150.00		
Storage	<b>1</b>	795.00		
Curatorial   Work Room	<b>1</b>	345.00		
Satellite Janitorial	<b>1</b>	130.00	130.00	
			<b>Sub Total</b>	<b>13,485.00</b>
Retail   Hall of Fame				
Description	Unit	Unit Area (ft <sup>2</sup> )	Required Area (ft <sup>2</sup> )	Remarks
Vestibule   Entry	<b>1</b>	195.00	195.00	
Lobby	<b>1</b>	300.00	300.00	
Media Check In   Credentials	<b>1</b>	235.00	235.00	
Interview   Large Conference Room	<b>72</b>	20.00	1,440.00	<i>pipe rail   lighting grid - cameras @ raised platform</i>
Media Lounge at Field	<b>20</b>	20.00	400.00	
Field Toilet	<b>2</b>	80.00	160.00	
Press Box			<b>6,530.00</b>	
Writing Press	<b>60</b>	30.00		<i>View of Field</i>
Copy   Work Room	<b>1</b>	150.00		<i>View of Field - Mid-Field</i>
Host TV Broadcast Booth	<b>1</b>	410.00		<i>View of Field - Mid-Field</i>
Terminal Room	<b>1</b>	235.00		<i>View of Field</i>
Camera Position - Midfield	<b>1</b>	325.00		<i>View of Field</i>
Camera Position - Hash	<b>2</b>	110.00		<i>View of Field</i>
Radio	<b>4</b>	150.00		<i>View of Field</i>
Internet	<b>2</b>	170.00		<i>View of Field</i>
Officials   Instant Replay	<b>1</b>	195.00		<i>View of Field</i>
Coaches	<b>2</b>	170.00		<i>View of Field</i>
Security Booth	<b>1</b>	170.00		<i>View of Field</i>
Scoreboard   PA Control	<b>1</b>	250.00		
Toilets	<b>1</b>	150.00		
Lounge   Dining   Work Area	<b>42</b>	20.00		
Satellite Janitorial	<b>1</b>	110.00		
Pantry	<b>1</b>	195.00		
Storage	<b>1</b>	300.00	300.00	
			<b>Sub Total</b>	<b>9,360.00</b>
Media   Broadcast   Press Box				

Description	Unit	Unit Area (ft <sup>2</sup> )	Required Area (ft <sup>2</sup> )	Remarks
Vestibule   Entry	1	170.00	170.00	
Lobby	1	390.00	390.00	
Reception	1	150.00	150.00	
Director	1	300.00	300.00	
Assistant Director	1	235.00	235.00	
Conference	Board Room	30	20.00	600.00
COO	1	235.00	235.00	
CFO	1	235.00	235.00	
Finance   Accounting   Payroll	1	170.00	170.00	
Public Relations   Community Affairs	1	170.00	170.00	
Suites   Hospitality	1	170.00	170.00	
Special Events	1	170.00	170.00	
Flex Offices - Future Staff	3	150.00	450.00	
Ticket Office			2,450.00	
Ticket Windows	8	45.00		
Will Call	4	45.00		
Vestibule   Entry	1	150.00		
Customer Service - Indoor	1	215.00		
Vault   Counting Room	1	300.00		
Copy   Work Room	1	170.00		
Server Room	1	150.00		
Director of Ticket Office	1	235.00		
Assistant Director	1	170.00		
Satellite Windows	2	260.00		
Break Room	1	195.00		
Toilets	2	170.00		
Copy   Work room	1	195.00	195.00	
Server Room	1	150.00	150.00	
Satellite Janitorial	1	110.00	110.00	
<b>Sub Total</b>			<b>6,350.00</b>	<b>0</b>

Description	Unit	Unit Area (ft <sup>2</sup> )	Required Area (ft <sup>2</sup> )	Remarks
Secure Entry - Check in Soccer Locker Room 1 (typical)	1	400.00	400.00	
Player's Lounge	24	15.00	3,520.00	<i>Close proximity to General Manager Office</i>
Main Locker Room	24	60.00		<i>Four equal soccer locker rooms</i>
Shower	8	20.00		
Drying Area	4	15.00		
Lavatories - Grooming	4	50.00		
Toilets	12	50.00		
Game Day Equipment & Storage	1	240.00		
Head Coach Office & Dressing	1	160.00		
Asst. Coach Locker Room	6	20.00		
Assistant Coach Toilet & Grooming	2	50.00		
Assistant Coach Shower & Drying Area	2	40.00	1,595.00	<i>One training room shared by two locker rooms</i>
Soccer Training/Hydrotherapy Room 1 (typical)				
Treatment Tables	4	80.00		
Taping Tables	3	70.00		
Counter w/ Secure Storage below	8	10.00		
Bio Hazard Holding Area	1	60.00		
Rehabilitation	1	200.00		
Head Athletic Trainer	1	100.00		
Asst. Athletic Trainers	2	100.00		
Exam Rooms	1	100.00		
Concussion Room	1	60.00		
Recovery Room	1	60.00		
Tape and Crate Storage	1	60.00		
Hydrotherapy Work Area	1	15.00		
Stainless Steel Extremity Tubs	2	60.00		
Ice Maker	2	5.00		
Satellite Janitorial	1	120.00	120.00	
Soccer Locker Room 2			3,520.00	
Soccer Locker Room 3			3,520.00	
Soccer Locker Room 4			3,520.00	
Soccer Training/Hydrotherapy Room 2			1,595.00	
<b>Sub Total</b>			<b>17,790.00</b>	<b>0</b>

Soccer Locker Area

Description	Unit	Unit Area (ft <sup>2</sup> )	Required Area (ft <sup>2</sup> )	Remarks
Secure Entry - Check In				
Football Locker Rooms 1 (typical)	1	400.00	400.00	
Player's Lounge	110	7.50	6,307.50	
Main Locker Room	110	30.00		
Shower	18	20.00		
Drying Area	9	15.00		
Lavatories - Grooming	9	50.00		
Toilets	8	50.00		
Urinals	16	20.00		
Game Day Equipment & Storage	1	300.00		
Head Coach Office & Dressing	1	160.00		
Assistant Coach Lockers	12	20.00		
Assistant Coach Toilet & Grooming	4	50.00		
Assistant Coach Shower & Drying Area	4	40.00		
Football Training/Hydrotherapy Rooms 1 (typical)			2,825.00	One training room shared by two locker rooms
Treatment Tables	12	80.00		
Taping Tables	8	70.00		
Counter w/ Secure Storage Below	12	10.00		
Bio Hazard Holding Area	1	60.00		
Rehabilitation		200.00		
Head Athletic Trainer	1	100.00		
Asst. Athletic Trainers	4	100.00		
Exam Rooms	1	100.00		
Concussion Room	1	60.00		
Recovery Room		60.00		
Tape and Crate Storage	1	60.00		
Hydrotherapy Work Area	1	15.00		
Stainless Steel Extremity Ubs	2	60.00		
Ice Marker	2	5.00		
Satellite Janitorial	1	120.00	120.00	
Football Locker Room 2			6,307.50	
Football Locker Room 3			6,307.50	
Football Locker Room 4			6,307.50	
Football Training/Hydrotherapy Room 2			2,825.00	
<b>Sub Total</b>			<b>31,400.00</b>	<b>0</b>

Description	Unit	Unit Area (ft <sup>2</sup> )	Required Area (ft <sup>2</sup> )	Remarks
Chain Gang			360.00	
	Locker Room	6	30.00	
	Toilet & Grooming	2	50.00	
	Shower + Drying Area	2	40.00	
Mascot			190.00	
	Locker Room	2	50.00	
	Toilet & Grooming	1	50.00	
	Shower + Drying Area	1	40.00	
Cheerleaders - Suite 1			860.00	
	Locker Room	20	15.00	
	Toilet & Grooming	4	50.00	
	Shower + Drying Area	4	40.00	
	Lounge	1	200.00	
Cheerleaders - Suite 2			860.00	
	Locker Room	20	15.00	
	Toilet & Grooming	4	50.00	
	Shower + Drying Area	4	40.00	
	Lounge	1	200.00	
Officials - Men			550.00	
	Locker Room	10	30.00	
	Toilet & Grooming	3	50.00	
	Shower + Drying Area	3	25.00	
Officials - Women			220.00	
	Locker Room	4	30.00	
	Toilet & Grooming	1	50.00	
	Shower + Drying Area	1	25.00	
General Staff - Men			1,610.00	
	Locker Room	30	30.00	
	Toilet & Grooming	6	50.00	
	Shower + Drying Area	6	25.00	
	Lounge	1	250.00	
General Staff - Women			1,640.00	
	Locker Room	30	30.00	
	Toilet & Grooming	6	50.00	
	Shower + Drying Area	6	40.00	
	Lounge	1	200.00	
Band			400.00	
	Sub Total		6,690.00	0

Game Day Support Areas

Description	Unit	Unit Area (ft <sup>2</sup> )	Required Area (ft <sup>2</sup> )	Remarks
Head in Gear   Equipment Terminal Broadcast   Video Display	<b>1</b>	260.00	<b>260.00</b>	
Shared Work Space - Edit Suite	<b>1</b>	1,615.00	<b>3,765.00</b>	
Equipment Storage	<b>1</b>	375.00		
Equipment Work Room	<b>1</b>	270.00		
Coaching Video Server   Equipment Director, Video	<b>1</b>	325.00		
Video Assistants	<b>2</b>	150.00		
Secure Video Storage	<b>1</b>	300.00		
Server	<b>1</b>	410.00		
<b>On Field Technology</b>		<b>1,335.00</b>		
On Field Technology Equipment   Server Room	<b>1</b>	300.00		
Equipment Storage	<b>1</b>	215.00		
Equipment Work Room	<b>1</b>	260.00		
Coaching Video Server   Equipment	<b>1</b>	260.00		
Coaching Video Storage at Fields WiFi Equipment   Server Room	<b>1</b>	300.00		
325.00		<b>325.00</b>		
Show Power	<b>1</b>	215.00		
Show Sound	<b>1</b>	215.00		
Promoter   Show Offices	<b>2</b>	150.00		
Field Lighting Control	<b>1</b>	325.00		
Stadium - Reinforced Sound	<b>1</b>	280.00		
Telecommunications   IT   Data	<b>1</b>	260.00		
Distributed TV	<b>1</b>	260.00		
IT Offices   Support			<b>1,555.00</b>	
Director, Cyber Security	<b>1</b>	235.00		
Director, Information Technology	<b>1</b>	235.00		
IT Specialists	<b>2</b>	110.00		
IT Helpdesk Support Technology	<b>1</b>	110.00		
IT Workroom	<b>1</b>	260.00		
Expansion   Flex Space	<b>2</b>	150.00		
IT Storage	<b>1</b>	195.00		
Toilets	<b>2</b>	150.00		
<b>Sub Total</b>			<b>9,395.00</b>	<b>0</b>

Description	Unit	Unit Area (ft <sup>2</sup> )	Required Area (ft <sup>2</sup> )	Remarks
Stage Performer's Green Room Area			1,560.00	
Secure VIP Entry - Check In	1	200.00		
Shared Lounge / Roadie / Staff Area	1	400.00		
VIP Dressing   Green Room	4	240.00		
Director of Operations & Facilities	1	170.00	170.00	
Operations Coordinator	1	110.00	110.00	
Facilities Manager	1	150.00	150.00	
Facilities Assistants	2	110.00	220.00	
Facilities Workstations	2	110.00	220.00	
Passenger Elevators	8	110.00	880.00	
Service Elevator	1	170.00	170.00	
Elevator Machine Rooms	9	130.00	1,170.00	
Main Janitorial Room   Storage	1	325.00	325.00	
Generators	2	-		<i>Exterior Pad Mounted</i>
Transformers	3	-		<i>Exterior Pad Mounted</i>
Main Electrical	1	375.00	375.00	
Emergency Power	1	430.00	430.00	
Satellite Electrical	9	160.00	1,440.00	
Main Telecom   Data	1	270.00	270.00	
Satellite   Telecom   Data	8	85.00	680.00	
Water Supply	1	325.00	325.00	
Fire Pump	1	215.00	215.00	
Gas Access	1	260.00	260.00	
Boiler/ Mechanical	1	860.00	860.00	
HVAC (RTU)	4	645.00	2,580.00	<i>Consider Rooftop Units w/ screen enclosure</i>
Break Room	1	1,615.00	1,615.00	
Security   Video Surveillance Control Room	1	1,615.00	1,615.00	
Fire Control	1	2,155.00	2,155.00	
Satellite Annunciator Panel	1	170.00	170.00	<i>Near Lobby</i>
Loading Dock	4	200.00	800.00	
Indoor Marshalling	1	15,000.00	15,000.00	
Staff Entrance & Check In	1	2,690.00	2,690.00	
<b>Sub Total</b>			<b>36,455.00</b>	<b>0</b>

Facility | Operations - In Stadium

Description	Unit	Unit Area (ft <sup>2</sup> )	Required Area (ft <sup>2</sup> )	Remarks
Maintenance Shop	1	800.00	800.00	
Maintenance Shop Storage	1	550.00	550.00	
Warehouse Storage	1	4,000.00	4,000.00	
Field Equipment	1	1,075.00	1,075.00	
Groundskeeper			4,645.00	
Head Groundskeeper / Turf Manager	1	150.00		
Turf Assistant	1	80.00		
Turf Technician	1	80.00		
Work Shop	1	645.00		
Work Shop Storage	2	430.00		
Turf Groundskeeper Storage	1	325.00		
Turf - Sub Air Ventilation System Storage	1	215.00		
Pesticide Storage	1	130.00		
Sand Storage	-	-		
Garage	1	1,615.00		Space for 5-6 utility vehicles
Break Room	1	130.00		
Locker Room, Toilets, Showers	1	200.00		
Water Supply	1	215.00		
Sub Total			11,070.00	0
Preliminary Program				
Maintenance   Warehouse   Groundskeeper				







# NEW ALOHA STADIUM ENTERTAINMENT DISTRICT

PROGRAMMATIC FINAL ENVIRONMENTAL IMPACT STATEMENT

WILSON OKAMOTO CORPORATION | CRAWFORD ARCHITECTS