CHAPTER 3:
NATURAL ENVIRONMENT



Much of the background information on the natural environment is from the numerous studies and reports that have been completed for the project area. These studies include the *Kawai Nui Marsh Master Plan* (DLNR, 1994); *Kawai Nui Marsh Aquatic Plant Study*, a comprehensive botanical and habitat survey prepared for the U.S. Army Corps of Engineers in 2006 (Oceanit Laboratories, 2006); *Studies Relevant to Restoration Efforts in Kawai Nui Marsh*, prepared for ʻAhahui Malama I Ka Lokahi (Guinther et al, 2006), and others as cited.

Climate

Hawaiʻi's climate is relatively moderate throughout the island chain, although some variations occur due to the mountainous topography associated with each island. Annual and daily variation in temperature depends on elevation above sea level, distance inland, and exposure to the trade winds. On Oʻahu, the Koʻolau and Waiʻanae mountain ranges are oriented almost perpendicular to the trade winds, which account for much of the variation in local climatology. Oʻahu's temperatures have small seasonal variation such that the temperature range averages only 7 degrees between the warmest months (August and September) and the coolest months (January and February) and about 12 degrees between day and night.

The Kawainui-Hāmākua project area is located in Kailua, in the windward lowlands, a climatic region that is characterized as being moderately rainy with frequent trade wind showers. Temperatures are nearly uniform and mild compared to other regions on the island. Historic data from a recording station in Kailua is available for a 111-year period (January 1905 to June 2016). During this time, annual temperatures in Kailua ranged from an average minimum of 63.5 degrees to an average high of 76.2 degrees. Annual rainfall averages about 118.5 per year, with March being the wettest month, with an average of 12.81 inches. The driest month is June with an average of 6.75 inches of precipitation (Western Regional Climate Center (WRCC), URL= http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?hi2679, accessed 12/6/2016).

Winds are predominantly "trade winds" from the east-northeast except for occasional periods when "Kona" storms generate strong winds from the south, or when the trade winds are weak and land breeze to sea breeze circulations develop. Wind speeds typically vary between 5 and 15 miles per hour providing relatively good ventilation much of the time. Lower velocities (less than 10 mph) occur frequently when the usual northeasterly trade winds tend to fall giving way to light, variable wind conditions through the winter and on into early spring.

3.1 GEOLOGY, TOPOGRAPHY AND SOILS

3.1.1 Geology

3.1.1.1 Existing Conditions

Geologic History

The Island of Oʻahu was created by three volcanoes - the oldest Kaʻena volcano (4-5 million years) that is now submerged off Kaʻena Point, the Waiʻanae volcano (3-4 million years) on the west side, and the youngest Koʻolau volcano (2-3 million years) on the east. All of these volcanoes have been subject to erosion by wind, rain, surf, and catastrophic collapses with portions of the Waiʻanae and Koʻolau caldera falling into the ocean and leaving the two existing mountain ranges.

The Kawainui-Hāmākua project area is located within the Kawainui Basin, a portion of the ancient caldera of the Koʻolau volcano. The project area was once at the center of the caldera, which existed during the late Tertiary Period of geologic time to the early Pleistocene Epoch (between 1 to 2 million years before the present). The caldera was 6 miles long and 4 miles wide, and indented the summit of the Koʻolau Volcano (WOAI, 1994).

The larger Kawainui Basin occupies an area of almost 3.5 square miles and encompasses the lower floodplains that include Maunawili, Kahanaiki, and Kapaʻa Streams. The Kawainui-Hāmākua project area today is underlain by a volcanic plug of dense basaltic rock, the top of which has been measured to be reached at a depth of approximately 1.6 km (nearly a mile deep). It is believed that this dense rock prevents stream runoff and rainfall water entering the wetland from seeping down and out of this catchment basin (WOAI, 1994).

Volcanic activity of the Koʻolau Volcano ceased about 1.8 million years ago, and was followed by a long period of subsidence and erosion. Streams carved deep amphitheater-headed canyons in the volcano, gradually destroying the caldera. This event was followed by marine sedimentation of the valleys resulting from shifting ocean levels.

At Kawainui, marine deposits of coral, sand or silt with sea shells have been recorded at depths below 30 feet. These deposits have been identified as unconsolidated calcareous marine sediments, which consist of very permeable beach sand of grains of worn coral, coralline algae, and shells with appreciable amounts of foraminifera and other marine organisms (USAED, 1992).

These findings indicate that from approximately 4,000 to 6,000 years ago, Kawainui was an open saltwater marine bay. A coral reef community developed within the embayment, with reef growth proceeding fastest near the mouth of the bay. Gradually, as a sand barrier formed on the

inland side of the coral reef, increasing amounts of alluvial sediment and soil were deposited in the lagoon. As the sand accretion and alluvial sedimentation increased, Kawainui became hydrologically separated from the ocean, and transitioned into more of a fresh water pond (Exhibit 3.1). Archaeological investigations indicated that this transformation of the basin into a relatively closed freshwater system occurred at about 200 BC. This lagoon is what would ultimately become Kawainui (Oceanit, 2006).

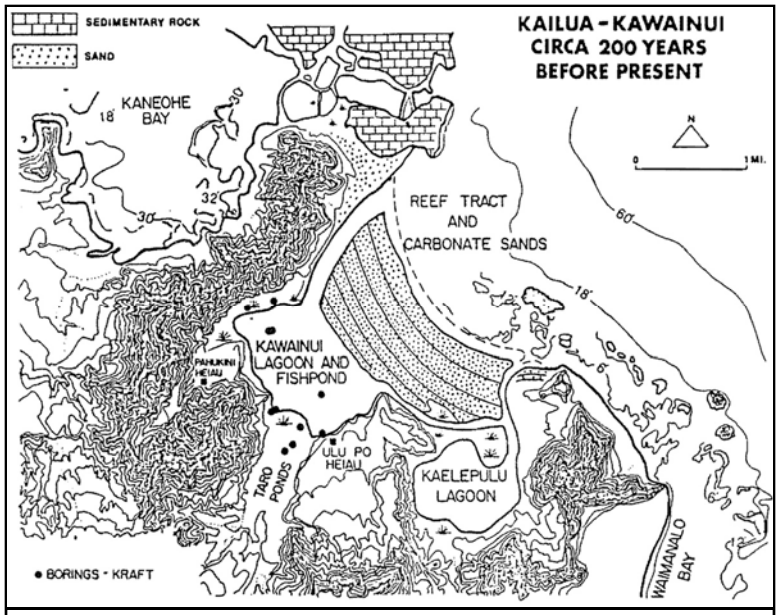


Exhibit 3.1 Kailua-Kawainui Circa 200 Years BC
Source: DPED, 1983

Biogeography and Geomorphology of Kawainui

Wetlands and marshes in particular, are usually viewed as environments in transition. While all environments on the planet are slowly changing (e.g., mountains wearing away by erosion), for wetlands, the process of change is relatively rapid on a geologic time scale. Kawainui has been described as a wetland seemingly well along in the "process of terrestrialization" (Oceanit, 2006).

Terrestrialization is the sequence of physical changes that convert an open body of water, such as a pond or lake, into a marsh and ultimately into terrestrial forest. Like at Kawainui, many wetlands arise from infilling of geologic basins that initially were open water ponds or lakes. This process proceeds, typically over centuries, such that a vegetation-covered marsh replaces open water. At some point, the lake disappears, as the water-filled basin is filled with sediment and peat. This process is termed *autogenic succession,* because the process is largely driven by the biotic components of the ecosystem (e.g., plants producing peat that fills in the basin). This is in contrast to *allogenic* (i.e., caused by abiotic or nonliving components of the ecosystem) *succession,* where infilling is often accelerated by human activities or other outside factors.

Today, the traditional view of succession from wetland to upland is no longer widely accepted, and in temperate climates such as Hawai'i, it is more often the case that over time, a bog habitat would be the ultimate result (Walker 1970 and Redfield 1972 as cited in Oceanit, 2006). Bogs are a type of wetland that are characterized by spongy peat deposits, acidic waters, and a floor covered by a thick carpet of sphagnum moss (USEPA, "Wetlands Classifications and Types, URL=https://www.epa.gov/wetlands/wetlands-classification-and-types#bogs. Accessed December 2016).

Sedimentation has been a major factor in the transformation of the Kawainui basin. Once the lagoon feature was created behind the Kailua barrier reef, there was no direct discharge to the ocean or tidal flushing, and the basin became a sediment trap. The largely autogenic accumulation of marine debris was gradually replaced by allogenic sediment accumulation.

Numerous factors may have affected the rate of sediment accumulation, including variations in sea level; local and global climatic variations; variations in average annual rainfall; and the incidence of major storms, tsunami and other natural disasters. However, within the last 1,500 years, surface disturbance associated with deforestation and increasingly invasive anthropogenic (man-made) land use practices may have accelerated the accumulation of terrestrial sediments in the basin.

Kawainui is presently an environment in change, showing evidence of transition from both the process of terrestrialization, as well as transition into a bog within certain areas. The middle of the wetland appears to be forming a stable bog habitat, while around the perimeter of the wetland, succession towards upland and terrestrial forest habitats is occurring, primarily through human interaction. A summary of some these man-made factors contributing to this transformation is discussed.

Factors Contributing to Kawainui's Terrestrialization

During the time of early Polynesian settlement (500 AD), the basin was a large brackish lake with a single stream outlet to the ocean, and was utilized as a fishpond. Sediment brought in by streams draining Maunawili and Kapa‘a valleys was infilling the more interior (southern) areas of the basin, allowing for the conversion of these lands into pond fields (lo‘i). The early Hawaiians also may have performed maintenance around the lake to minimize encroachment by wetland emergent vegetation. Peat formation was likely well underway in areas of emergent wetland vegetation.

Dated observations from 19th century visitors put this lake or fishpond at approximately 445 acres, although maps from the late 1800s show open water areas to be dwindling (Summers, 1964 as cited in Oceanit, 2006). Based on these historical sources, the change in the lower wetland (western side, along Kapa‘a Quarry Road) from a large fishpond to a vegetated marsh occurred quickly, mostly within the latter half of the 19th century.

Between the mid-1800s and the mid-1900s, the introduction of sugarcane farming and cattle ranching in the lowlands and valleys of eastern Ko‘olaupoko resulted in human-induced manipulations of water levels within the basin. Initially, water was pumped out for export to Waimānalo sugar growers. Channels were constructed across the lower wetland to feed the pump and perhaps to drain for expanding rice production. Water levels were at various times raised to store more water for export, and lowered to expose more pasture for grazing (Smith 1978 in Guinther et al, 2006).

It is believed that these natural and manmade changes to water levels can have profound impact on the evolution of a wetland from open water lake to wetland or even non-wetland (Oceanit, 2006). It is likely that these manipulations of water levels accelerated the eventual reduction in open water and a permanent wetland at Kawainui. Moreover, during and after these periods, the expansion of western agriculture and the development of housing within the larger watershed area (e.g. Maunawili) increased the delivery of both sediment and plant nutrients. Sediment accumulation likely increased significantly during the rapid urbanization of the Kailua area watersheds during the 1970s through 1990s (Guinther et al, 2006). This contributed to infilling the basin with eroded sediment and enhanced the production of plant debris. Sewage discharges into streams above the wetland and directly into it for over a decade beginning in 1957 also promoted plant growth.

Since the early 1900s, large areas of wetland around the perimeter of Kawainui were also lost by direct infilling as a result of landfill and quarry operations, road building, farming, and placement of flood prevention structures. Quarry operations on the northwest corner of Kawainui led to the construction of Kapa‘a Quarry Road, and produced thousands of cubic yards of “overburden” material from what is now the City’s landfill. The upland areas of Kawainui along this road likely consists of some of this material.

The construction of Kapa‘a Quarry Road across the northwest corner of the marsh isolated about 27 acres of wetland from the body of Kawainui. The excavation to create the initial roadbed remains as the stagnant canal on the northern side of the road. Overburden soil was placed 30 to 50 feet deep over wetlands, a stream, and farmlands to create what is now the Kapa‘a Triangle light industrial area (outside the current project area). The site of the Model Airplane Park and proposed vegetation processing area, located across the light industrial area, was formerly wetland that became a sanitary landfill and was eventually capped with dirt in 1965.

3.1.1.2 Potential Project Impact and Mitigation

No Action Alternative

Under the No Action alternative, already approved and ongoing wetland restoration and maintenance activities at Kawainui and Hāmākua, as discussed in Section 2.3.1, would continue being implemented by DOFAW. This covers the approximately 80-acre Kahanaiki area and other wetland and upland areas from DLNR’s *Management Plan for Kawai Nui Marsh* (DLNR LD 2000). Continued cultural landscape improvements at Ulupō Heiau and Nā Pōhaku would similarly continue.

These wetland improvements, upland reforestation, cultural landscape improvements, and other DOFAW related maintenance activities would have minimal if any impact to the geology of the basin and immediate surrounding area because work would not involve extensive cutting or filling of the existing terrain. The improvements are intended to maintain Kawainui’s flood control capabilities, restore wetland and upland areas, enhance wildlife habitat, and restore the

riparian habitat along Maunawili and Kahanaiki Streams. These efforts would remove invasive vegetation and the peat mat within the wetland, creating more open water areas and mudflat habitat for waterbirds.

Proposed drainage culvert improvements along Kapa‘a Quarry Road generally across Le Jardin Academy would mitigate erosion and reduce the discharge of soils into the wetland. Upland drainage improvements (e.g. causeway) would support restoration efforts by reducing discharges of eroded sediment and plant debris into the wetland that have contributed to terrestrialization. Therefore, wetland restoration and reforestation improvements would have a positive effect in addressing and reducing the current process of terrestrialization of the wetland. In addition, it would create more open water areas, restoring habitat for endangered waterbirds.

Construction of improvements at the Kawainui SPR, Kalāheo park site would not have a significant impact on the geology of that site, which is relatively flat and does not contain any unique geologic features as discussed in the Final EA for the Kawai Nui Gateway Park (HHF, 2002). Improvements at DOFAW’s management and research station would also not have a significant impact on the geology of that site. Facility improvements are intended to support DOFAW’s management and operations of Kawainui that center around restoration efforts and would reducing terrestrialization of the wetland.

Proposed Action

Under the Proposed Action, ongoing and previously approved wetland restoration and upland reforestation activities would continue, and be expanded to additional areas within the Kawainui-Hāmākua project area. Wetland restoration improvements proposed for the Kahanaiki area would be expanded to additional areas further north, and within Hāmākua (e.g. expanding wetland area). Upland reforestation efforts would include other upland areas of Kawainui, such as Mokulana, Pōhakea, and within Pu‘uoehu.

These expanded restoration improvements should have minimal, if any, impact to the geology of the basin and immediate surrounding area because wetland restoration activities primarily involves cutting vegetation and grubbing areas. Upland reforestation would essentially consist of landscaping activities that would not involve extensive cutting or filling of the existing terrain and therefore should not impact the geology of areas. Additional drainage improvements implemented along Kapa‘a Quarry Road (north of Kahanaiki) would further reduce discharges of sediment, plant material, and other debris into the wetland. As noted previously, these efforts would have a positive impact by slowing or reversing the process of terrestrialization and the loss of wetland habitat due to human-influences from outside areas such as urbanization (e.g. Maunawili subdivision), infilling, and other land modifications.

Educational programs and community service projects would support increasing public education and understanding of the area’s geologic history and process of terrestrialization occurring at Kawainui that is trying to be reversed by this project. Participation in these

programs and activities (e.g. DOFAW monthly clean-up) by school groups and community volunteers would further support DOFAW's efforts in slowing or reversing the process of terrestrialization and the loss of wetland habitat. Improvements to DOFAW's Kawainui management and research station would support restoration efforts and reduce terrestrialization of the wetland. Accessory facilities constructed (education center, program areas, trails and viewing areas) would support implementation of community outreach, educational programs, and stewardship opportunities that all contribute to public education and a better understanding of Kawainui's resources.

Construction of facilities associated with cultural centers and the educational center operated by non-profit organizations should have minimal, if any, effect on the area's geology and terrestrialization of Kawainui's wetland. Some grading of areas may be required to level site conditions to support facilities, but such activities should have minimal effect on the area's geology. The design of site improvements and facilities would be developed by the non-profit organizations, but reviewed by DOFAW and DSP, as applicable, for approval. Sustainability components and BMPs would be incorporated into such design plans to minimize effects. Stewardship responsibilities undertaken by non-profit organizations as requirements for managing their areas would support DOFAW's efforts in keeping wetland areas maintained and support reversing the process of terrestrialization.

3.1.2 Topography

3.1.2.1 Existing Conditions

The general topography associated with the Kawainui project area generally slopes in a north to northeast direction from the south (along Kalaniana‘ole Highway). Upland areas along Kapa‘a Quarry Road, the Kūkanono subdivision, and Mokapu Saddle Road have higher elevations that slope into the wetland. At Hāmākua, the Pu‘uoehu hillside serves as a watershed area sloping toward the wetland which eventually slopes and drains into Kawainui Stream that runs in a southeast direction. Figures 3.1A and 3.1B show the general topography of the project area.

Elevations within the project area vary due to the large area covered, ranging from near sea level (within wetland areas) up to about 100 feet above mean sea level (AMSL) along Kapa‘a Quarry Road. The Pu‘uoehu hillside above Hāmākua ranges in elevation from about 25 feet up to 280 feet AMSL at the top of the ridgeline. The topography of lower elevations of Kawainui are relatively flat, which is characteristic of wetland areas within the alluvial plain. A summary of existing topographic conditions by subareas is provided.



Source: State of Hawai'i GIS

Kawainui - Hāmākua Master Plan Project

Figure 3.1A - Topography Map

Kailua, O'ahu

0 550 1,100 FEET

HHF PLANNERS places for people



Source: State of Hawai'i GIS

Kawainui - Hāmākua Master Plan Project

Figure 3.1B - Topography Map

Kailua, O'ahu

0 250 500

FEET

HHF PLANNERS
places for people

1. Kawainui Subarea A. Kawainui's wetland area drains and slopes in a north to northeast direction toward the levee and Kawainui Canal. The wetland basin is relatively flat with an average slope of less than 0.25 percent. The basin ranges in elevation from about 17 to 20 feet AMSL at the south end (near Mokulana peninsula), to about 6 to 8 feet AMSL by the restoration ponds, to about 3 feet AMSL near the Kawainui Canal entrance and levee.
2. Kahanaiki-Nā Pōhaku-Kapa'a Subarea B. This upland area along Kapa'a Quarry Road has the highest elevations along the roadside which then slope makai toward the wetland. Elevations along this road vary from 50 feet AMSL at the south end, to a high of about 100 feet AMSL between Kahanaiki and Nā Pohaku, to a low of about 15 feet AMSL at the City's model airplane park.
    a. The upland area at Kahanaiki has mild and moderate slopes along with a large gully generally across of Le Jardin Academy. Immediate areas along Kapa'a Quarry Road generally have the steepest slope before leveling as it approaches the wetland.
    b. The Pōhakea to Nā Pōhaku area has elevations along Kapa'a Quarry Road varying from 50 feet on the southern end, to 100 feet at Nā Pōhaku, before dropping to about 25 feet AMSL further north. Nā Pōhaku is a promontory overlooking the wetland that varies in elevation from 30 feet to 120 feet AMSL.
    c. At Pōhakea, the site generally slopes in a southeast direction. Within the proposed education center site, there is an elevation change of about 50 feet from the road down to the wetland, with gradual tiered areas, and average moderate slope of about 17 percent. The existing lawn area where the kauhale complex is planned to the south has a more level topography with gentle slopes.
    d. The Kapa'a area north of Nā Pōhaku up to the City's model airplane park gently slopes from the road toward the wetland. Elevations range from about 20 to 15 feet AMSL at its highest point along Kapa'a Quarry Road before gently sloping (5 to 7 percent) toward the wetland. The area proposed for a Hawaiian cultural center across of the City's transfer station has about a 3 percent slope, while the vegetation processing area is rather flat with an average slope of about 1 percent.
3. Kapa'a-Kalāheo-Levee Subarea C. Upland areas between Kapa'a Quarry Road and the wetland range from 5 to 10 feet elevation and gently slope toward the wetland. Areas mauka (north) of Kapa'a Quarry Road have steeper slopes that rise up to Mōkapu Saddle Road to about 80 feet in elevation before lowering to about 15 feet near Kalāheo High School. The Kawainui SPR, Kalāheo park site is relatively flat with gentle slopes from the roadway toward the Kawainui Canal. Elevations along Mōkapu Boulevard vary from about 7 to 12 feet AMSL.
4. Wai'auia-Ulupō-Mokulana Subarea D. Upland areas within this subarea are highest along existing residences or roadways that then slope toward the wetland.
    a. The Wai'auia site is fairly level with higher elevations along Kailua Road varying from about 5 to 12 feet AMSL that gently slope toward the wetland.

b. Upland areas from the levee toward Ulupō Heiau are steeper leading up to churches and residences with elevations ranging from about 10 feet (Kawainui Vista) up to 50 feet AMSL. Slopes in this area vary from moderate to strong (10% to 30%).
c. At Ulupō Heiau, elevations near Kailua Road are about 85 feet AMSL, and consist of both gentle and moderate sloped areas leading toward the wetland.
d. Upland areas from the Kukanono subdivision residences are generally steep as they slope toward the wetland. Elevations along the Kūkanono slopes range from 75 feet AMSL to 5 feet AMSL at the fringes of the wetland, with slopes of 30 percent or more in some places.
e. The DOFAW research and maintenance station site is at about 40 feet AMSL, and is relatively flat with gentle slopes (about 8%) toward the wetland.
f. Mokulana is a peninsula overlooking the wetland that gently slopes (about 5%) from Kalanianaole Highway toward the wetland. Elevations along the highway vary from about 25 to 30 feet AMSL.

5. Hāmākua-Pu‘uoehu Subarea E. Upland areas of Hāmākua are situated at about 5 feet AMSL, with fairly level topography. The Pu‘uoehu hillside, overlooking Hāmākua, has gentle slopes along the wetland that increase to moderate and strong slopes toward the ridge situated at a height of about 315 feet AMSL (U.S. Geological Survey, 2003).

3.1.2.2 Potential Project Impact and Mitigation

No Action Alternative

Under this scenario, ongoing and proposed wetland restoration activities would continue. The removal of invasive vegetation occurs within the top foot of the ground surface. No large scale grading is proposed as part of upland reforestation, although there may be minor reshaping of certain areas to accommodate a maintenance trail for DOFAW vehicles. Drainage repairs and improvements occurring along Kapa‘a Quarry Road and within upland areas would have a positive impact by reducing ongoing erosion in those areas. No major cut or fill activities are proposed.

Previously approved development projects occurring also includes improvements at Kalāheo Park site, located between Mōkapu Boulevard and the Kawainui Canal. The City’s Kawai Nui Gateway Park plans included a comfort station, interpretive shelter, observation/education pavilion, outdoor canoe storage, canoe launch area, and a pedestrian bridge over the canal. The Final EA for the Kawai Nui Gateway Park stated that there would be grading and grubbing at this site to clear vegetation, level the berms of fill material and prepare the foundations for the access road, parking lot, comfort station, and pavilion. No significant topographical impacts would occur because no appreciable elevation change is anticipated, and grading would be restricted to the uppermost 2 to 3 feet of fill material (HHF, 2002).

Cultural landscape restoration and associated improvements occurring at Ulupō Heiau and Nā Pōhaku would also continue under this alternative, and should have minimal impact on the area's present topography. No significant cut and fill activities would occur, and these improvements are predominantly being done by hand using non-mechanized machines. Facility improvements at DOFAW's management and research station and their vegetation processing site next to the City's model airplane park would also not significantly change present topographic conditions because areas are relatively flat. Restoration improvements would have a positive effect by reducing erosion of areas and sediment discharges into the wetland.

Proposed Action

Wetland Restoration and Upland Reforestation

Ongoing and previously approved wetland restoration and upland reforestation activities would continue, and be expanded to additional areas within the Kawainui-Hāmākua project area. Wetland restoration improvements would expand to additional areas further north of the Kahanaiki area and include Hāmākua (e.g. expanding wetland area). These restoration efforts would not impact the topography of wetland areas because removal of invasive vegetation occurs within the top foot of the ground surface. No large-scale grading or cut and fill activities are proposed.

Expanding wetland area within Hāmākua will include excavating adjacent lowland areas that are predominantly comprised of fill material. Excavated material would likely be dispersed within the Hāmākua area, and should not significantly alter the overall topography of the site. BMPs would be incorporated in excavation plans to prevent discharges of material into the wetland and to minimize sediment discharges during periods of heavy rainfall (e.g. compost filter socks).

Upland reforestation efforts would expand to include other upland areas of Kawainui, such as Mokulana, Pōhakea, and within Puʻuoehu. Reforestation activities would essentially consist of landscaping activities that would not involve extensive cutting or filling of the existing terrain and therefore should have minimal impact on the area's topography. Additional drainage improvements beyond the No Action Alternative implemented along Kapaʻa Quarry Road (north of Kahanaiki) would have a positive effect on the area's topography by further reducing erosion and discharges of sediment, plant material, and other debris into the wetland.

Impacts associated with reforestation efforts would primarily involve short-term construction-related effects. There should not be any long-term impacts on area topography of upland area because activities would consist of management and maintenance activities (e.g. cutting grass, trimming trees, etc.). Therefore, BMPs similar to those incorporated in design plans for the Kahanaiki area would be incorporated in plans developed for additional upland areas to address short-term impacts.

The actual reforestation actions implemented will be developed during the final design phase for specific areas over time. A State Department of Health (DOH) National Pollutant Discharge Elimination System (NPDES) permit for construction activities would be obtained, and approval of a Conservation Plan from the Windward O‘ahu, Soil and Water Conservation District (SWCD) of DLNR could also be obtained, if necessary. BMPs would include structural and non-structural measures following site-specific assessments during the project’s design phase, as deemed appropriate. Such measures could include the following:

- Installing a perimeter construction fence.
- Using controlled watering to allay dust during the work.
- Installing silt fences, filter socks or other means to mitigate silt laden runoff from leaving the site.
- Installing stabilized construction entrances, tire wash areas, and washout areas.
- Thorough watering of disturbed areas after construction activity has ceased for the day.

Structures and Trails

The construction of pedestrian trails was evaluated in the Kawainui Marsh Pathway Final EA (HHF, 2003). This document concluded that the construction of path segments around Kawainui would have no significant impact on topography. Except for the boardwalk sections, the path would be cleared of vegetation only, and would follow the existing topography.

Pedestrian trails under the Proposed Action would generally follow similar alignments as that proposed under the City’s pathway plan, and should similarly not negatively impact site topography. Several trail segments have been eliminated from the project as discussed in Section 2.2, further reducing impacts to site topography. With this reduction, the only areas impacted by trails would be: 1) upland area from Kahanaiki up to Nā Pōhaku; 2) Ulupō Heiau to DOFAW’s management station; and 3) section from Wai‘auia to the levee. Some leveling of site conditions may be required for improved pedestrian trails and sections meeting ADA requirements (e.g. trails to the education center), but such changes should not significantly impact area topography. Foot trails would essentially be unimproved dirt hiking trails following established routes and thus have minimal effect on topography. Sections requiring boardwalks to cross wetland areas have been eliminated from the project. ~~Boardwalks would be constructed over wetland area, and have minimal effect on wetland topographic conditions.~~

Construction of parking areas and staging areas would require some grubbing and grading of the sites to level the area and driveway access. Proposed sites are fairly level and should not require extensive site disturbance, and would not significantly impact existing site topography. Parking and staging areas are planned to have pervious surfaces, such as gravel, that would allow for slight variations in site conditions further minimizing changes to existing area topography.

Structures constructed for the education center and cultural centers would require grubbing and some grading of the sites to accommodate building footprints. The education center site topography slopes downward toward the wetland. From Kapa‘a Quarry Road, which is at about 68 feet AMSL, the proposed entry driveway leads to a parking area located at approximately 60 feet AMSL. There would need to be some grading for the entry road and parking area, but the parking area has been sited in a relatively level area to minimize grading. The education center site ranges in elevation from 40 feet at the top of the site down to 20 feet AMSL on the wetland side. The building would be designed using post and pier construction to minimize the need for grading, as well as to optimize views of the wetland.

Sites proposed for the cultural and educational centers at Wai‘auia, Kapa‘a, and Pōhakea are relatively flat. The Wai‘auia site is fairly level that gently slopes toward the wetland. The Kapa‘a area across of the City’s transfer station is generally level with only about a 3 percent slope toward the wetland. As a result, grading of these sites to accommodate building footprints would be minimal. The kauhale complex area of the Pōhakea site has a large open grassed area for structures with gently sloping areas nearby. Building footprints would be small to minimize grading requirements. The portion of the Pōhakea site where the education center is sited slopes toward the wetland. Features to minimize ground disturbance will be incorporated into the design of the education center. ~~The hale wa‘a planned at the Kawainui SPR Kalāheo park site has fairly level areas to accommodate this structure.~~ Other accessory structures (e.g. pavilions, shelters) within upland areas are small and can be sited in suitable areas to minimize grading activities.

Final site conditions and siting of building footprints would be developed during the design phase for individual improvements. There should not be any long-term impacts on area topography from these improvemsents, and design features will be incorporated to minimize site disturbance, such as post and pier design of buildings. BMPs would also be incorporated in design plans to address short-term impacts, such as erosion, during construction activities.

Project improvements would comply with the City’s new administrative rules related to water quality. Improvments that involve more than 1 acre of disturbance would also trigger a National Pollutant Discharge Elimination System (NPDES) permit that would include conditions and requirements to minimize impacts. Some project improvements (e.g. cultural center) may also require the preparation of an Erosion and Sediment Control Plan (ESCP), which contains the following information: 1) project site information detailing existing and finish grading and drainage conditions; 2) BMPs addressing erosion and sediment control during construction; 3) BMP monitoring; and 4) inspection reporting until the project site is stabilized. General BMPs would typically include the following, however, more detailed and site specific BMPs would be developed during the design phase.

1. Measures before construction:
    a. Existing ground cover will not be destroyed, removed or disturbed more than 20 calendar days prior to start of construction.
    b. Erosion and sediment control measures will be in place and functional before earthwork may begin, and will be maintained throughout the construction

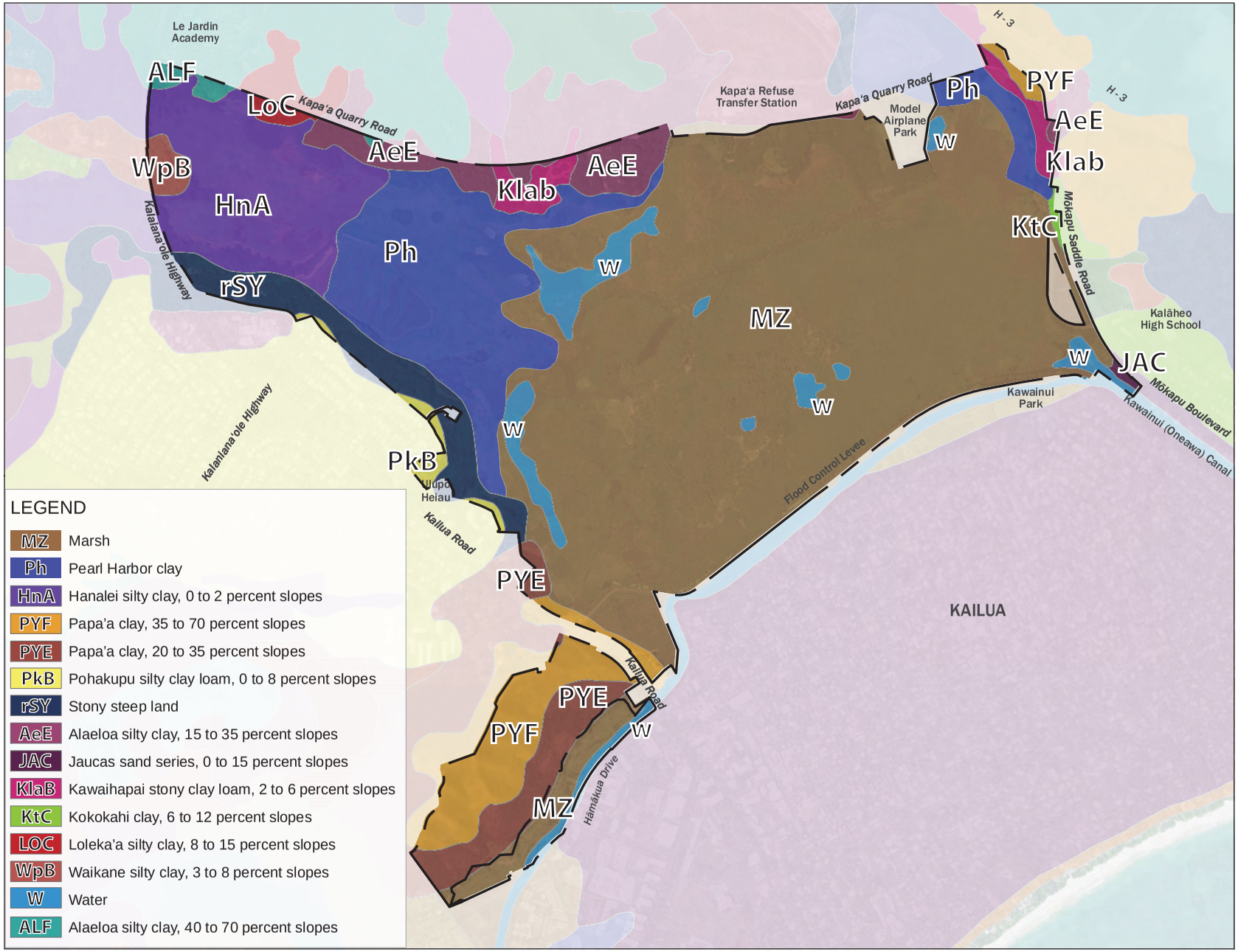
period. Temporary measures may be removed at the beginning of the work day, but shall be replaced at the end of the work day.

2. Measures during construction:
   a. Clearing shall be held to the minimum necessary for grading, equipment operation, and site work.
   b. Construction shall be sequenced to minimize the exposure time of cleared surface areas.
   c. Areas of one phase, maximum of 5 acres in size, shall be stabilized before another phase can be initiated.
   d. Slope management and protection is required for slopes exceeding 15 percent.
   e. Stabilization shall be accomplished by protecting areas of disturbed soils from rainfall and runoff by use of structural controls such as PVC sheets, geotextile filter fabric, berms or sediment basins, or vegetative controls such as grass seedling or hydromulch.
   f. All control measures shall be checked and repaired as necessary, e.g., weekly in dry periods and within 24 hours after any heavy rainfall event. During periods of prolonged rainfall, daily checking shall be conducted.
3. Measures during adverse weather conditions:
   a. The contractor shall listen to weather reports daily while conducting work.
   b. If an emergency weather warning is issued, work shall cease. All equipment and materials shall be secured against wind, rainfall and flooding, and the work area cleared of construction debris to the extent practicable. Work shall not resume until conditions improve and weather warnings are rescinded.
   c. Prior to recommencement of work activities following an event, the Contractor shall inspect all BMPs, including silt fence, sandbag barriers, and stabilized construction entrance, to ensure that they are not damaged, and that all BMP's are properly installed and functioning.
   d. Construction materials and debris that is dispersed due to wind or rainfall shall be collected by the Contractor and reused or disposed of in compliance with State and County regulations.

3.1.3 Soils

3.1.3.1 Existing Conditions

The U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) (formerly the Soil Conservation Service) has classified several soil types within the project area (SCS, 1972), which vary considerably. Figure 3.2 illustrates the NRCS classification of project area soils. State GIS data was used to identify the general soil types associated with the project area shown. However, this data is not entirely accurate. Almost all wetland areas within the project area were classified as Marsh (MZ) soils. Much of the upland area at Kawainui



Source: State of Hawai'i GIS Data

Kawainui - Hāmākua Master Plan Project

Figure 3.2 - Soil Types

Kailua, O'ahu

0 800 1,600 FEET

HHF PLANNERS places for people

particularly along Kapa‘a Quarry Road consist of fill material from prior construction of the road and adjacent developments. This includes the upland area across from the City transfer station, which is comprised of fill land, and is not Marsh as indicated by the GIS data. The upland area was previously used as a City baseyard and vegetation processing site.

Hanalei Silty Clay, 0 to 2 percent slope (HnA) and Pearl Harbor clay soils (Ph) are also common in Kawainui. The Pu‘uoehu Hillside is comprised of Papa‘a clay, 35 to 70 percent slope (PYF) and Papa‘a clay, 20 to 35 percent slope (PYE). ~~Figure 3.2 illustrates the NRCS classification of project area soils.~~

NRCS Soil Classifications

Pearl Harbor clay (Ph). This soil can be found in the central portion of Kawainui Marsh. As a whole, this soil is commonly found adjacent to the ocean on low coastal plains. This soil has slow permeability with slow runoff. Erosion hazard is slight and workability is difficult.

Hanalei silty clay, 0 to 2 percent slopes (HnA). This soil type is found in the southern portion of the marsh. This alluvial soil type is often found on stream bottoms and flood plains. This soil has moderate permeability, moderate erosion hazard, and slow runoff. Flooding is a concern with this soil type.

Papa‘a clay, 35 to 70 percent slopes (PYF). This soil can be found along Kailua road near the flood control levee and in the northwest corner of the marsh below Interstate H-3. Permeability of this soil is slow, with rapid runoff, and severe erosion hazard. Papa‘a Clay, 20 to 35 percent slopes (PYE). This soil is found on the slope below Kailua Road near Kailua Lutheran church and is also found on Pu‘uoehu hillside. Runoff of this soil is slow to medium and runoff hazard is slight to moderate.

Stony steep land (rSY). This soil can be found along the Kūkanono slope and consists of boulders and stones deposited by runoff and gravity on side slopes of drainageways. The small portion of soil among the stones provides a foothold for plants.

Alealoa silty clay, 15 to 35 percent slopes (AeE). This soil can be found on the slopes below Kapa‘a Quarry Road. This soil possess moderate permeability, medium runoff, and moderate erosion risk. The soil type occurs on smooth side slopes and toe slopes.

Alealoa silty clay, 40 to 70 percent slopes (ALF). This soil is found within the project area near Kapa‘a Quarry Road and Kailua Road. Erosion risk for this soil is severe and runoff is rapid to very rapid.

Kawaihapai stony clay loam, 2 to 6 percent slopes (KlaB). This soil can also be found below Kapa‘a Quarry Road with a small portion found in the northwest area of Kawainui Marsh along Kapa‘a Quarry Road. Runoff for this soil is slow and erosion risk is slight.

Kawaihapai clay loam, 2 to 6 percent slopes (KlB). This soil type occupies a small area in the northwest portion of Kawainui Marsh along Kapa‘a Quarry Road. This soil type has similar characteristics to Kawaihapai stony clay loam soil types but has more stones.

Kokokahi clay, 6 to 12 percent slopes (KtC). Kokokahi clay, 6 to 12 percent slope soils can be found in the northwest portion of the marsh along Kapa‘a Quarry Road. This soil can be found on alluvial fans and on talus slopes. The soil is very sticky and plastic with slow to moderate permeability. Runoff is medium and erosion hazard is moderate.

Waikane silty clay, 3 to 8 percent slopes (WpB). This soil can be found near Kalaniana‘ole Highway on the southwest portion of the project area. This soil type is well-drained and found on alluvial fans and terraces. Erosion hazard for this soil type is slight to moderate and runoff is slow.

Waikane silty clay, 40 to 70 percent slopes (WpF2). This soil occupies a small area near the Maunawili wetland that is located on the southern tip of the master plan area. Runoff for this soil type is rapid and erosion hazard is severe.

Marsh (MZ). This soil is described as consisting of wet, periodically flooded areas covered dominantly with grasses and bulrushes or other herbaceous plants. It occurs as small, low-lying areas along the coastal plains. Water stands on the surface, but marsh vegetation thrives (SCS, 1972).

Characterization of Wetland Soils

The wetland soils within the project area are classified broadly as Marsh (MZ) by the NRCS. Although the NRCS soil classifications provide general information on wetland soils, the classification does not provide more specific information on the characterization of the soils as it relates to the project area. Other studies involving coring samples and trenches provide more information documenting wetland soil conditions.

A sedimentation rates study included in the 1994 Kawainui master plan report (WOAI, 1994) concluded that sediment inflow into the wetland was significant with an average annual estimated yield of 10,081 tons per year or 9.3 acre-feet per year. The study also calculated sediment delivery rates for 2-year, 10-year, 50-year, and 100-year occurrence flood events.

Summary of 1990 Sediment Coring Results. A series of 10 sediment cores were extracted from wetland areas on the northern half of Kawainui in 1990 to address the impact of the City’s project to open channels for flood control (CSH, 1990). The cores shows that a modern vegetation mat comprised the top 3 feet of the wetland, and floated on a layer of water and mud slurry about 10 to 13 feet deep (depth to about 16 feet). Sediment sampled from cores varied between 15 to 30 feet further below. Compacted sediment below consisted of terrestrial, transitional, and marine sediments.

Marine sediments from coring in the most northern area of Kawainui consisted of white, almost purely coralline silty clay loam, with 30 to 60 percent very coarse sand and pebble-size coral fragments. Marine shell was evident in some cores as angular, very coarse sand size fragments, some with whole specimens of sea snail. Finer facies of marine sediment occurred in sections having well sorted fine to medium beach sand as well as sandy clay and clay loam.

Sediments from the southern area consisted of grey to greenish grey silty clay loam. A fine bedding of still water deposition indicated by platy structure was present, and the marine environment was identified by the presence of shells. These results indicated that a still water marine lagoon environment existed here, and the contrast of depth of occurrence, bedding and texture show that the water was deeper and of lower deposition energy than at the northern end of the coring samples (CSH, 1990).

Summary of 2001 Testing. The wetland have been the subject of further analysis by researchers from Hawai‘i Pacific University (HPU). A 2001 program conducted in part as a HPU field practicum collected soil samples from Kawainui and provided information on the depth, thickness, character, and lateral continuity of marsh sediments (Guinther et al, 2006). These soil layers are referred to as “facies,” commonly defined in a geologic context as the character of a rock expressed by its formation, composition and soil content.

Study results provide an understanding of the soil composition of Kawainui’s wetland areas along with characterizing soils at the margins of the wetland. Similar analysis for characteristics of Hāmākua’s wetland soils does not exist. Four distinct facies were identified at Kawainui, and starting from the deepest to upper layers that are categorized as: 1) Marine Facies, 2) Lagoonal Facies, 3) Early Marsh Facies (brackish to freshwater), and 4) Modern Freshwater Wetland facies.

1. Marine Facies. Marine Facies comprise the lowest sedimentary sequence in Kawainui. This facie is found at a depth of 51 to 110 inches (4 to 9 feet) from the surface of the wetland, with depth increasing as one travels inward from the present wetland margin. The Marine Facie is generally comprised of coarse grained permeable calcareous sands with abundant coral and shell fragments. This facies is interpreted to represent deposition of primarily biogenic calcareous sediments in a shallow, open marine embayment similar to present-day Kāne‘ohe Bay.
2. Lagoonal Facies. The Lagoon Facie sediment interval is narrow, and generally 4 to 8 inches thick. This interval is significantly uniform and homogenous vertically and laterally. The color and composition of the Lagoon Facie appeared to vary with the relative proportion of marine and terrestrial components. As a result, this facie can be divided into terrestrial and marine lagoon subfacies. Terrestrial lagoonal subfacies are generally medium to dark gray and comprised largely of terrestrial clays and humus or peaty organics. It is found proximate to the lagoon paleoshoreline or in areas adjacent to fluvial paleochannels. Marine lagoonal subfacies are very fine grained, compact, and medium to light greenish gray, suggesting low presence of terrestrial and organic content.

3. Early Marsh Facies. These are characterized by the accumulation of generally high concentrations of partially decomposed peaty organic material. The thickness of this facie is highly variable, ranging from 4 to 31 inches. This material is found in a sequence of brownish-gray to medium gray organic-rich sediments comprised primarily of strongly reduced terrestrial clay and humus. Peaty plant material makes up at least 40 to almost 100 percent of this facie, and ranges from shades of brown to purple, deepening in shade to black due to exposure to the atmosphere.
4. Modern Freshwater Marsh Facies. Differentiation between Modern Freshwater Marsh Facies and Early Marsh Facies is based largely on the absence of over 30 to 40 percent of peaty plant debris. As a whole, the Modern Freshwater Marsh Facies is characterized by probable zonal arrangement of subfacies relative to the present wetland shoreline, with associated variation in facie characteristics. Near the shoreline, basin sediments are part of a sequence of transported soils that are gradational into a saturated sequence of greenish gray to brownish-gray clay-rich sediments with a high organic content. Dominant organic components are coarse to fine black, highly decomposed plant detritus and variably decomposed roots and stems, particularly immediately below the vegetation mat (Guinther et al, 2006).

Wetland Soil Characteristic Along Margins. Soils at the margins of the wetland near Na Pōhaku are characterized by a narrow strip of terrestrial soils that were likely washed down from adjacent slopes. Soils in this area vary in thickness toward the wetland interior, transitioning into Freshwater Marsh Facie sediments. These soils are characterized by an upper horizon up to 8 inches thick, composed generally of black to dark gray humus containing many living roots with minimal soil mineral content.

Beneath this upper horizon is a lower horizon up to 9 inches thick composed of gray clay with irregular areas of yellow brown iron oxides. The soil horizons discussed are underlain by a sequence 12 to 20 inches thick of greenish-gray to dark gray clays characteristic of wetland soils. These sediments are consistently saturated and anoxic, located at or below the water table. The uppermost portion of this horizon locally preserves a peat-like vegetation mat up to 4 inches thick along the wetland margin at Na Pōhaku. This reflects possible wetland vegetation buried by rapidly accumulating transported soils related to the deforestation of the surrounding slopes within the last 50 to 100 years. Sediment inflow patterns from upland areas of the watershed into Kawainui does show influence of wetland soil characteristics.

The 1994 master plan (WOAI, 1994) included a sediment study that estimated sediment loads from the watersheds draining into Kawainui. The Kawainui watershed was divided into eight sub-basins based on major drainage boundaries and land use. This study determined that there was significant sediment load from the watersheds draining into Kawainui. The average annual estimate yield to the wetland was approximately 10,081 tons/year or 9.3 acre-feet based upon 2-year rain events (WOAI, 1994). These sediment loads draining from upland areas outside of the project area into Kawainui's wetland contribute to the current wetland soil conditions.

3.1.3.2 Potential Project Impact and Mitigation

No Action Alternative

Ongoing and proposed wetland restoration and upland reforestation activities would not adversely impact soils within the project area. Restoration activities would focus on removing existing invasive vegetation, involving little disturbance beyond the surface soil layer. Wetland restoration activities predominantly involves cutting vegetation and also removing the peat mat within a few inches from the surface. These activities would not disturb sediment below the vegetation that is about 3 feet thick based upon coring samples and prior studies. Restoration activities would not disturb the lagoonal and marine facies sediment layers located well below.

Impacts associated with upland reforestation efforts would primarily involve short-term construction-related effects. There should not be any long-term impacts on soils associated with upland areas because activities conducted would consist of management and maintenance activities (e.g. cutting grass, trimming trees, etc.) of trees and vegetation. Drainage culvert and other drainage site improvements (e.g. causeway) would involve short-term land disturbance along Kapa‘a Quarry Road culverts and within upland areas. These improvements would have a beneficial long-term effect by reducing erosion, detaining stormwater runoff to allow infiltration, reducing sediment and pollutants discharges into the wetland.

Construction of park improvements at the Kawainui SPR, Kalāheo park site should not have a significant impact on soil conditions. Effects would primarily be associated with short-term construction activities and long-term effects would be minimized by BMPs incorporated in design plans to detain runoff, maintain grass and landscaping, etc. Construction would include some site grading and grubbing, but this would generally be restricted to the uppermost 2 to 3 feet of soil some of which contains fill material from prior surrounding developments. There would be changes in vegetation as a result of development, but this should not impact the soil’s slow runoff potential in the long term (HHF, 2002). During construction, soils would be exposed as vegetation is cleared and the potential for soil erosion would increase. BMPs should be employed during construction to minimize erosion.

Continued cultural landscape restoration and associated improvements occurring at Ulupō Heiau and Nā Pōhaku should have minimal impact on the area’s soils. No significant cut and fill activities would occur, and these improvements are predominantly being done by hand using non-mechanized machines. Facility improvements at DOFAW’s management and research station and their vegetation processing site would not significantly change present relatively flat topographic conditions, and thus have minimal impacts on soils (e.g. erosion).

Proposed Action

Wetland Restoration and Upland Reforestation

Similar to the No Action alternative, no adverse impact to soils are anticipated as a result of continued and expanded wetland restoration and upland reforestation activities, as proposed in the master plan. Wetland restoration improvements expanding to additional areas further north of the Kahanaiki area and include Hāmākua would not impact wetland soil characteristics. No large-scale grading activities would occur within the wetland. These activities predominantly involve cutting vegetation and also removing the peat mat within a few inches from the surface, and would not disturb sediment below the vegetation that is about 3 feet thick based upon coring samples and prior studies. Restoration activities would not disturb the lagoonal and marine facies sediment layers located well below. Expanding wetland area within Hāmākua will include excavating adjacent lowland areas that are predominantly comprised of fill material. Excavated material would likely be dispersed within the Hāmākua area, and thus should not significantly alter the overall soil conditions of the site.

Upland reforestation efforts would expand to include other upland areas of Kawainui, such as Mokulana, Pōhakea, and within Pu‘uoehu. Reforestation activities would essentially consist of landscaping activities that would not involve extensive cutting or filling of the existing terrain and therefore should have minimal impact on the area’s soil conditions. Additional drainage improvements implemented along Kapa‘a Quarry Road (north of Kahanaiki) would have a positive effect on the area’s topography by further reducing erosion and discharges of sediment, plant material, and other debris into the wetland.

Impacts associated with wetland restoration and upland reforestation efforts would primarily involve short-term construction-related effects. Long-term impacts on soil conditions of upland areas are not anticipated because activities conducted would consist of management and maintenance activities (e.g. cutting grass, trimming trees, etc.). Therefore, BMPs similar to those incorporated in design plans for the Kahanaiki area would be incorporated in plans developed for additional upland areas to address short-term impacts.

The actual BMP measures implemented will be developed during the final design phase for areas implemented over time. A NPDES permit from the State DOH for construction activities would be obtained along with potentially receiving Conservation Plan approval from the Windward SWCD. BMPs incorporated as part of permit approvals would include structural and non-structural measures following site-specific assessments during the project’s design phase. Such measures were identified in the previous Section 3.1.2 (Topography) and would minimize short-term construction-related effects on soils.

Structures and Trails

Proposed buildings, driveways and parking areas have been sited to minimize grading and potential impacts on soils from erosion. The education center is proposed on an area with some slope between Kapa‘a Quarry Road and the Kawainui wetland. This facility is envisioned to be built with post-and-pier construction, to take advantage of the dramatic views while minimizing ground modification. There would need to be some grading for the entry road and parking area, but the parking area has been sited in an area to minimize grading.

Sites proposed for the cultural and educational centers at Wai‘auia, Kapa‘a, and Pōhakea are relatively flat and should thus require minimal grading activities for building footprints and general site preparation. The Wai‘auia site is fairly level and the Kapa‘a area site is generally level with only about a 3 percent slope toward the wetland. If necessary, a soil study could be conducted for the cultural center at Kapa‘a to determine appropriate building foundations during final design. However, the selected non-profit organization(s) would be responsible to determine what is required when construction plans are prepared. The kauhale complex area of the Pōhakea site has a large open grassed area for structures with gently sloping areas nearby. Building footprints would be smaller minimizing grading requirements. The area of the Pōhakea site where the education center is proposed slopes toward the wetland. The design of the education center will incorporate features to minimize ground disturbance. ~~The hale wa‘a planned at the Kawainui SPR-Kalāheo park site has fairly level areas to accommodate this structure.~~ Other accessory structures (e.g. pavilions, shelters) supporting educational programs and outdoor recreation within upland areas are small and can be sited in suitable areas to minimize grading activities.

Resulting site conditions and locations of building footprints would be developed during the design phase for these improvements. Nevertheless, there should not be any long-term impacts on area topography and associated soils from these improvements, and design features can be incorporated to minimize site disturbance and reduce erosion potential (e.g. post and pier design of buildings). BMPs would also be incorporated in design plans to address short-term impacts during construction activities.

The construction of pedestrian trails were evaluated in the Kawainui Marsh Pathway Final EA, which concluded that the construction of the trail segments around Kawainui would have no significant impact on soils (HHF, 2003). Pedestrian trails under the Proposed Action would generally follow similar alignments as that proposed under the City’s pathway plan, and should similarly not have a significant impact on soil conditions. Several trail segments have been eliminated from the proposed project, further reducing potential impacts to soils. Existing trees and vegetation in the vicinity of the trails would be trimmed or retained, unless its removal is necessary for safety, site distance, etc. Trail segments would occur around the perimeter of the wetland, and would be designed to generally follow the existing topography to the extent possible. Thus, no significant grading or retaining walls would be required.

Some leveling of site conditions may be required for improved pedestrian trails and sections meeting ADA requirements (e.g. trails to the education center), but such changes should not significantly impact area topography and associated soils. Foot trails would essentially be unimproved grass or dirt hiking trails following established routes and thus have minimal effect on soils. If some erosion of hiking trails appears to occur due to its use, measures can be implemented to address routes such as adding gravel along trails. ~~Boardwalks would be constructed over wetland area, and thus have minimal effect on wetland soil conditions. Natural drainage patterns should not be changed, and boardwalks would allow for crossing over drainage areas without altering discharge points.~~

Therefore, likely impacts on soil conditions from building structures, site preparation, and trails would primarily be associated with short-term construction-related activities. During construction, BMPs would be utilized to manage stormwater and potential erosion during larger storm events. Existing, on-site soil material generated from site disturbance would be used as fill material on the site to the extent possible. Soil-related impacts such as the generation of fugitive dust would be temporary and minimized with BMPs. Once the structures and trail segments are completed, there would be no long-term impacts on soils. The sites would be landscaped and surrounding areas would quickly revegetate. Construction would be done during the dry months to the extent possible to minimize stormwater runoff.

The actual BMP measures implemented will be developed during the final design phase for areas implemented over time. A NPDES permit from the State DOH for construction activities would be obtained along with the pottential to require a Conservation Plan approval from the Windward SWCD. BMPs incorporated as part of permit approvals would include structural and non-structural measures, and such potential measures were identified in the previous Section 3.1.2 (Topography).

3.2 NATURAL HAZARDS

3.2.1 Seismic Hazards

3.2.1.1 Existing Conditions

Earthquakes in Hawai‘i are mainly associated with volcanic eruptions resulting from the inflation or shrinkage of magma reservoirs beneath which shift segments of the volcano. Earthquakes may occur before or during an eruption, or from the underground movement of magma toward the surface. However, earthquakes also occur due to the shifting of tectonic plates. Except for the Island of Hawai‘i, the Hawaiian Islands are generally not situated in a high seismic area subject to numerous large earthquakes (Macdonald, Abbott & Peterson, 1983).

The central region of the Hawaiian Island chain encompassing the islands of Maui and O‘ahu are subject to seismicity associated with tectonic activity on the seafloor. Tectonic activity capable of generating hazardous earthquakes is due to seafloor fractures and suspected faults around the islands. Exhibit 3.2 reproduced from the *Atlas of Natural Hazards in the Hawaiian Coastal Zone* (USGS, 2002) shows major seismic areas affecting O‘ahu, including the Molokai Seismic Zone and the Diamond Head Fault. The exhibit identifies the recent (since 1950) significant earthquakes occurring in the Hawaiian Islands.

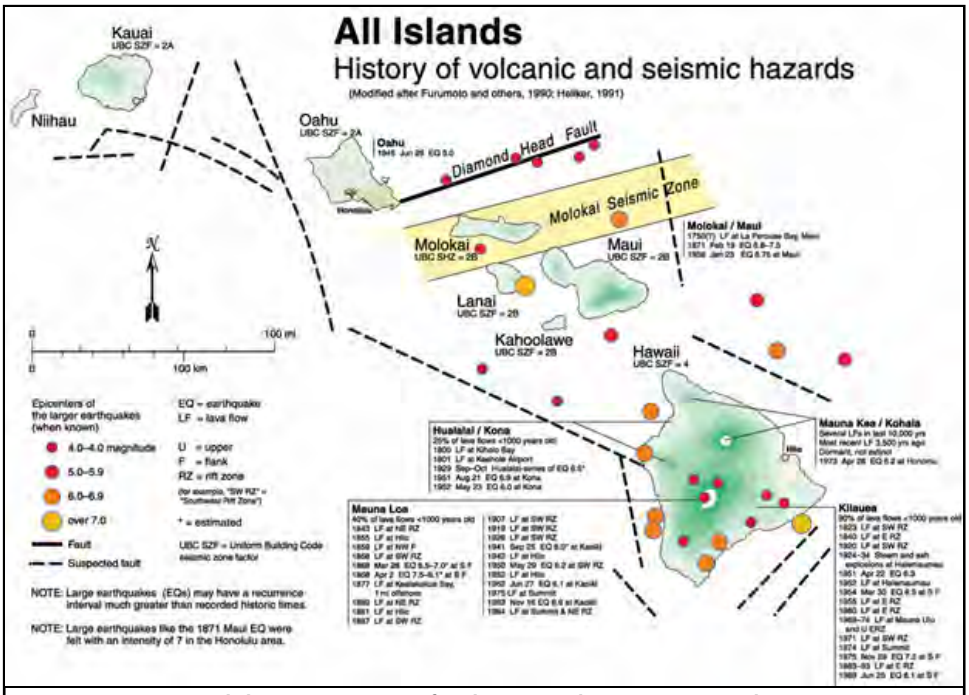


Exhibit 3.2 History of Volcanic and Seismic Hazards
Source: USGS, 2002

The Moloka‘i Fracture Zone is an extension of a transform fault from the East Pacific Rise that extends from Moloka‘i to the Gulf of California. This fracture is tectonic in origin and suspected to contribute to central region seismicity associated with an active seafloor. Because two known earthquakes (1871 and 1938) have occurred along the fracture, it is referred to as the Molokai Seismic Zone (USGS, 2002).

The Diamond Head Fault is said to pass through O‘ahu’s Koko Crater and extend along the seafloor northeast of the island. The existence of a Diamond Head Fault was hypothesized in 1980 by scientists from the University of Hawai‘i on the basis of data from seismic surveys a few years prior. These scientists believed that a 4.8 to 5.0 magnitude earthquake which occurred offshore of Honolulu in 1948, as well as several smaller quakes over the last hundred years, are due to the presence of a Diamond Head Fault. The 1948 O‘ahu quake resulted in broken windows, plaster cracks and ruptures to building walls. However, there remains controversy among scientists today whether the Diamond Head Fault actually exists, and to what extent it can be used to predict future seismic events. Some scientists contend that confirmation of a Diamond Head Fault depends on determining the exact location of the 1948 quake, which is unknown.

Regardless, there exists some seismic risk on Oʻahu. Most of the earthquakes recorded on Oʻahu have been volcanic earthquakes causing little or no damage to the other islands. Available historical data indicates that the number and severity of earthquakes have been fewer and of lower magnitude than those on other islands such as Hawaiʻi. However, earthquakes of magnitude 5 or higher on the Richter Scale can cause property damage and endanger lives.

The USGS has assigned seismic hazard intensity ratings to all islands on a scale from 1 to 5, with 1 representing lowest hazard and 5 the highest (USGS, 2002). The southern half of Oʻahu was assigned a volcanic/seismic risk rating of 3 due to its proximity to the Molokaʻi Seismic Zone. This area extends from Mākaha in west Oʻahu, past Diamond Head, around Makapuʻu, and north up to Kāneʻohe Bay, and includes the Kawainui-Hāmākua master plan area. The remainder of Oʻahu is of lower volcanic/seismic risk, with a hazard ranking of 2 (USGS, 2002). The earthquake hazard risk within the project area is comparable to other areas of Oʻahu.

3.2.1.2 Potential Project Impact and Mitigation

No Action Alternative

Although difficult to predict, an earthquake of sufficient magnitude could result in damages to trees, vegetation, and structures within the project area as well as other areas of Kailua and the larger Windward Oʻahu region. However, most of the earthquakes that have occurred in the state have been volcanic earthquakes causing little or no damage on the Island of Oʻahu.

Wetland restoration and upland reforestation activities, including drainage improvements, implemented would not be subject to any additional seismic risks (Risk Rating of 3) as other existing developments or landscaped areas. This includes Ulupō Heiau and Nā Pōhaku that would have continued cultural landscape restoration and associated improvements occurring. Thus, an earthquake of sufficient magnitude could cause damages to trees, drainage culverts, etc. within the project area similar to potential damages that may be caused to other surrounding areas.

Facility improvements at DOFAW's management and research station, the vegetation processing site, and park improvements (parking lot, comfort station, pavilion, pedestrian bridge) at the Kawainui SPR, Kalāheo park site could be damaged by an earthquake of sufficient magnitude. A pedestrian bridge included at the Kalāheo park site (under the Gateway Park project) could be subject to more exposure to damages from an earthquake, depending upon its design and materials (e.g. concrete bridge). However, these facilities are planned to be constructed using current applicable building design standards that would be reviewed by the State for approval. Such facilities could also be designed to meet City building code requirements, and pertinent ministerial permits obtained subject to City review. Therefore, these facilities and structures should generally not be subject any increased exposure to damages from an earthquake as compared to other existing urban development in Kailua and the Windward District.

Proposed Action

The expansion of natural resource management initiatives, such as additional wetland restoration and upland reforestation activities and areas under the project, would have the same level of exposure to damages from a large earthquake as that under the No Action Alternative. An earthquake of sufficient magnitude could thus cause damages to trees, drainage improvements, fencing, etc. within the project area similar to potential damages that may be caused to other surrounding areas.

Damages could also occur to accessory structures (e.g. pavilion) constructed to support passive outdoor recreation and educational programming activities. Parking areas and staging areas should be subject to minimal damages because they would be constructed using pervious material such as gravel that would not have potential cracking issues as compared with asphalt pavements. Pedestrian trails would also be predominantly constructed using pervious material, such as gravel, that would be susceptible to minimal damages. Unpaved hiking (dirt) trails should similarly have minimal potential for damage from an earthquake.

Structures constructed as part of DOFAW's management and research station along with cultural and educational centers at Waiʻauia, Kapaʻa, and Pōhakea would be subject to possible damages from earthquake of sufficient magnitude. Although these facilities would involve the congregation of people in certain portions of the project area, the overall susceptibility of injury would be no different than residents or the public congregated at residences or other urban developments in the surrounding Kailua area.

To minimize potential damages to structures, all permanent structures would be constructed based upon established building design guidelines and standards that would be reviewed by the State for approval. Such facilities could also be designed to meet City building code requirements, and pertinent ministerial permits obtained subject to City review. Therefore, these facilities and structures should generally not be subject to any increased exposure to damages from an earthquake as compared to other existing urban development in Kailua and the Windward District.

Traditional Hawaiian structures may be built by non-profit organizations at Ulupō Heiau, and the kauhale complex at Pōhākea~~, and possibly at the hale waʻa at Kalāheo park~~. These structures may be used for educational/cultural display as well as used for activities such as preparation of traditional foods, traditional crafts, meeting/assembling, and storage. Construction could follow the City's ordinance on indigenous Hawaiian architecture (ROH Chapter 16-12, Indigenous Hawaiian Architecture) which provides specifications on materials, size, location, use, and general design standards. Incorporating these City standards would further help mitigate potential damages from an earthquake.

3.2.2 Hurricane Hazards

3.2.2.1 Existing Conditions

Hurricanes are one type of tropical cyclone with maximum sustained winds exceeding 74 miles per hour. Other less severe types of tropical cyclones include tropical storms and tropical depressions. A tropical cyclone is defined as a "non-frontal synoptic scale low-pressure system over tropical or sub-tropical waters with organized convection (i.e. thunderstorm activity) and definite cyclonic surface wind circulation" (Holland, 1993 as cited in HHF, 2012). Hurricanes would typically dissipate when making landfall, where there is less available moisture that can enter the hurricane system. Hurricanes have affected every island in the State and can cause major damage and injury usually resulting from high winds, marine over-wash, heavy rains, and other intense small-scale winds and high waves.

Exhibit 3.3 shows the paths of past hurricanes and tropical storms that have affected the Hawaiian Islands from 1950-2016 based upon hurricane tracking information from the National Oceanic Atmospheric Administration's (NOAA) website accessed in January 2017. Tropical Storm Flossie passed close to the Hawaiian Islands in July 2013, but only brought stormy weather. The Central Pacific basin had a record number of storms (15) in 2015. Not all of these storms pass directly through the state, and actual hurricane strikes on the Hawaiian Islands are relatively rare in the modern record. More commonly, hurricanes pass close to the islands generating large swells and moderately high winds causing varying degrees of damage (USGS, 2002). Of these many storms, Hurricanes Dot (1959), Iwa (1982) and Iniki (1992) directly hit the Island of Kaua'i. The most recent, Hurricane Iniki, hit Kaua'i as a Category 4 hurricane, causing nearly $2 billion in damage, more than any other hurricane to affect the state since records began.

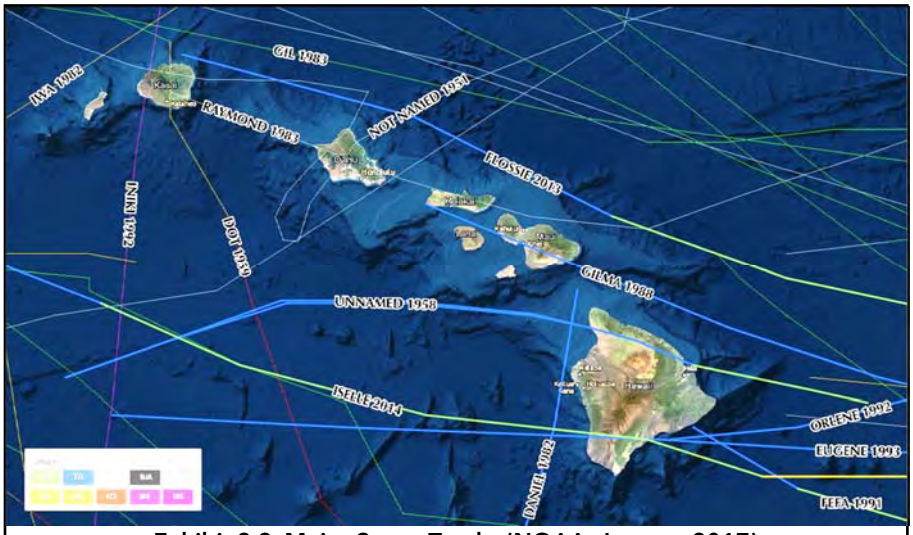


Exhibit 3.3 Major Storm Tracks (NOAA, January 2017)

3.2.2.2 Potential Project Impact and Mitigation

The three major elements making a hurricane hazardous are: 1) strong winds and gusts, 2) large waves and storm surge, and 3) heavy rainfall (FEMA, 1993). Impacts from hurricanes can thus be severe and lead to beach erosion, large waves, high winds, and marine over-wash, despite the fact that the hurricane may not directly hit a particular island (USGS, 2002). Study of the aftermath of Hurricane Iniki found that a significant threat related to hurricane overwash along the coastline in the Hawaiian Islands is due to water-level rise from wave forces rather than wind forces.

No Action Alternative

A hurricane of significant strength and high winds passing directly over or close to the Island of O‘ahu could damage existing trees and vegetation within the upland areas of the Kawainui and Hāmākua project areas. This includes damaging cultural landscape restoration and associated improvements occurring both Ulupō Heiau and Nā Pōhaku. However, DOFAW management and maintenance operations along with continued cultural landscape activities by non-profit organizations would allow trees and other vegetation would to recover over time. Heavy rainfall would increase stormwater discharges into both Kawainui and Hāmākua wetlands and flood adjacent low lying areas. These wetlands should not be negatively impacted since they already serve as a detention basin for flood protection, and the levee at Kawainui has been raised to improve its function.

New structures built at the Kalāheo Park site that include the comfort station, interpretive shelter, and pedestrian bridge over the canal could be damaged from strong winds. Because the park site is located adjacent to the Kawainui Canal, it is vulnerable to all three risk elements associated with hurricanes that are strong winds, storm surge, and heavy rainfall. The pedestrian bridge could be subject to more exposure to damages from high winds due to its span over the canal. None of the proposed structures are intended for permanent habitation or occupancy. In the event that a hurricane makes landfall, it is anticipated that sufficient warning would be available to clear the park of visitors, and that canoe launchings would be postponed until the storm has passed.

Facility improvements at DOFAW’s management and research station and the vegetation processing site could also similarly be damaged primarily from strong winds. However, these facilities are planned to be constructed using current applicable building design standards that would be reviewed and approved by the State. Such facilities could also be designed to meet City building code requirements, and pertinent ministerial permits obtained subject to City review. Hawai‘i is classified in the International Building Code (IBC) as both a hurricane-prone region and a windborne debris region. Therefore, all these park and operational facilities and structures should generally not be subject to any increased exposure to damages from a hurricane as compared to other existing urban development in Kailua and the Windward District.

Proposed Action

A hurricane of significant strength and high winds could damage trees and vegetation within the additional upland areas of Kawainui and Hāmākua improved under the Proposed Action in a similar manner to that under the No Action Alternative. Trees and other vegetation would recover over time and be supported by DOFAW management and maintenance operations along with continued cultural landscape activities by non-profit organizations. Similar to the No Action Alternative, the wetlands of both Kawainui and Hāmākua should not be negatively impacted by heavy rainfall and increased stormwater discharges because they already serve as a detention basin for flood protection. Drainage improvements planned under the project would help reduce discharges into the wetland and potential erosion of upland areas under heavy rainfall.

Pedestrian and hiking trails along with parking and staging areas should not be significantly impacted by a hurricane because these improvements are site improvements and would be constructed using pervious materials. Parking areas can also be closed in advance of a hurricane to restrict access by visitors until the threat passes.

The Proposed Action includes the construction of buildings in several locations throughout the project area associated with cultural centers, the education center, DOFAW management and research station, vegetation processing site, and other accessory structures such as pavilions, viewing areas, etc. All structures, particularly buildings, are vulnerable to damage from strong winds and heavy rainfall generated by a hurricane. The entire State of Hawai‘i has been designated a “wind borne debris region” under the IBC. However, no structures are proposed in areas that are directly vulnerable to storm surge.

~~Structures planned at Kalāheo Park are located along Kawainui Canal that could receive some storm surge within canal waters. However, the park site is situated over 1.5 miles inland from the shoreline, and storm surges occurring at the shoreline should dissipate as it moves inland up the canal. The Proposed Action does not include constructing the pedestrian bridge over the canal, which would reduce the potential for damages from a hurricane (over the No Action Alternative), particularly from strong winds.~~

None of these structures are intended for permanent habitation or residential occupancy, except for a caretaker cottage proposed for the cultural center at Kapa‘a. Buildings and accessory structures are planned to be constructed using current applicable building design standards that would be reviewed and approved by the State. Such facilities could also be designed to meet City building code requirements, and pertinent ministerial permits obtained subject to City review. Therefore, planned structures should generally not be subject to any increased exposure to damages from a hurricane as compared to other existing urban development in Kailua and the Windward District.

3.2.3 Tsunami Hazards

3.2.3.1 Existing Conditions

Tsunami are caused by a sudden movement of the seafloor that generates a series of waves which travel across the ocean until they reach a coastline. Seafloor movements may include faulting, landslides, or submarine volcanic eruptions. Landslides originating either under the sea or above sea level and then sliding into the water may also generate a tsunami. Tsunami manifest themselves as either large breaking waves, often largest around headlands where they are concentrated by wave refraction, or as rapidly rising sea level like a flooding tide. The high degree of volcanism and seismic instability in and around the Pacific Ocean has contributed to a history of tsunami occurrences (USGS, 2002).

The coastline of the Hawaiian Islands is under the continuous threat of tsunami inundation because this region is one of the most geologically active regions on Earth. The geography of the shoreline often plays an important role in the form of the tsunami. Tsunami waves may be very large in an embayment, actually experiencing amplification in long funnel-shaped bays. Fringing and barrier reefs appear to have a mitigating influence on tsunamis by dispersing the wave energy (USGS, 2002). In March 2011, a massive tsunami was generated from a large earthquake generated off the coast of Tohoku, Japan which affected O‘ahu. This tsunami did not result in any damage within the Kawainui-Hāmākua project area. Damage to urban areas along Kailua Bay were minimal compared to other areas of the island.

The City’s tsunami evacuation maps for O‘ahu, developed in 1991 and updated in 2010, show the minimum safe evacuation distance from shoreline areas in the event of a tsunami. The evacuation zone is comprised of the inundation zone, i.e., the area where the tsunami is expected to go beyond the immediate shoreline, plus an additional buffer for safety. Following the 2011 Tohoku (Japan) tsunami, there was a newly recognized risk of tsunami from a very large Aleutian event. As a result, in 2015, the City unveiled a new set of “Extreme Tsunami Evacuation Zone (XTEZ)” maps, outlining refuge areas and routes in worst case scenarios.

The XTEZ represents a secondary evacuation zone, should an extremely large (9M+) earthquake occur in the Aleutian Islands, generating an especially destructive tsunami in Hawai‘i. Figure 3.3 illustrates both the standard tsunami evacuation zone and the extreme evacuation zone. Within the project area, only existing stream routes and Kawainui Canal are within the standard tsunami evacuation zone. It should be noted that the stream routes shown within Kawainui may not reflect actual site conditions because streams have been overgrown and affected by terrestrialization over the years. It is possible that water entering Kawainui’s wetland from Kawainui Canal would instead disperse and dissipate within the wetland area due to existing wetland vegetation inhibiting flows in addition to following streams and low lying areas along the levee. The entire Kawainui, Hāmākua, and portions of the Pu‘uoehu hillside are completely within the extreme tsunami evacuation zone, as is almost all of Kailua.



Legend

- Extreme Tsunami Evacuation Safe Boundary Line
- Extreme Tsunami Evacuation Boundary Line
- Tsunami Evacuation Zones
- Extreme Tsunami Evacuation Zones
- Safe Zone

Kawainui - Hāmākua Master Plan Project

Figure 3.3 - Tsunami Evacuation Areas

Kailua, O'ahu

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3.2.3.2 Potential Project Impact and Mitigation

No Action Alternative

Existing trees and vegetation within the upland areas of the Kawainui and Hāmākua project areas being restored should not be significantly impacted by a tsunami. Waters entering Kawainui from the canal would likely follow existing streams and low lying areas along the levee, and disburse and dissipate within the wetland. The wetland serves as a basin for dispersing and detaining stormwater discharges from upland areas during heavy rainfall before eventually discharging into Kawainui Canal. Conversely, the wetland would function in a similar manner for waters entering it from the canal due to a tsunami.

DOFAW improvements to their management and research station should not be affected being located at the southern end of Kawainui and at higher elevations. However, this site is near Maunawili Stream, and could experience possible flooding damage. The vegetation processing site would be potentially exposed to possible damages because it is located closer to the canal, near Kapa‘a Stream and at a lower elevation. New structures built at the Kalāheo Park site could experience damage being situated along Kawainui Canal along with other residences along the canal.

These facilities would be constructed using current applicable building design standards, and reviewed and approved by the State. Such facilities could also be designed to meet City building code requirements, and pertinent ministerial permits obtained subject to City review. Therefore, structures should generally not be subject to any increased exposure to damages from a tsunami as compared to other existing urban development in Kailua.

However, the entire Kawainui-Hamākua project area is within the newly identified XTEZ. Therefore, any improvements occurring under the No Action alternative could be impacted by sustaining damages under an extreme tsunami. This would also apply to all of Kailua situated makai of Kawainui and Hāmākua.

Proposed Action

Existing trees and vegetation within Kawainui and Hāmākua upland areas improved under the Proposed Action should similarly not be significantly impacted by a tsunami as under the No Action Alternative. Trees and other vegetation would recover over time and be supported by DOFAW management and continued restoration efforts, along with cultural landscape activities by non-profit organizations. Kawainui’s wetland would serve to disperse and dissipate waters entering it from Kawainui Canal due to a tsunami. Hāmākua’s wetland would similarly serve to disperse and dissipate waters entering it from Kaelepulu Stream.

Pedestrian and hiking trails along with parking and staging areas should not be significantly impacted by a tsunami because these site improvements are located within upland areas surrounding the large wetland basin of Kawainui. Structures built in several locations throughout the project area associated with cultural centers, the education center, DOFAW management and research station, vegetation processing site, ~~Kalāheo park site,~~ and other accessory structures such as pavilions, viewing areas, etc. should similarly not be significantly impacted by a tsunami because of their location within upland areas and distance away from Kawainui Canal. Planned structures should generally not be subject to any increased exposure to damages from a tsunami as compared to other existing urban development in Kailua, and are located further away from the shoreline than the majority of businesses and residences in Kailua.

An extreme tsunami could potentially damage these structures if the wetland does not sufficiently reduce and dissipate water flow. However, this situation would apply to all of Kailua situated makai of Kawainui and Hāmākua.

None of these structures are intended for permanent habitation or residential occupancy. Buildings and accessory structures are planned to be constructed using current applicable building design standards that would be reviewed and approved by the State. Such facilities could also be designed to meet City building code requirements, and pertinent ministerial permits obtained subject to City review.

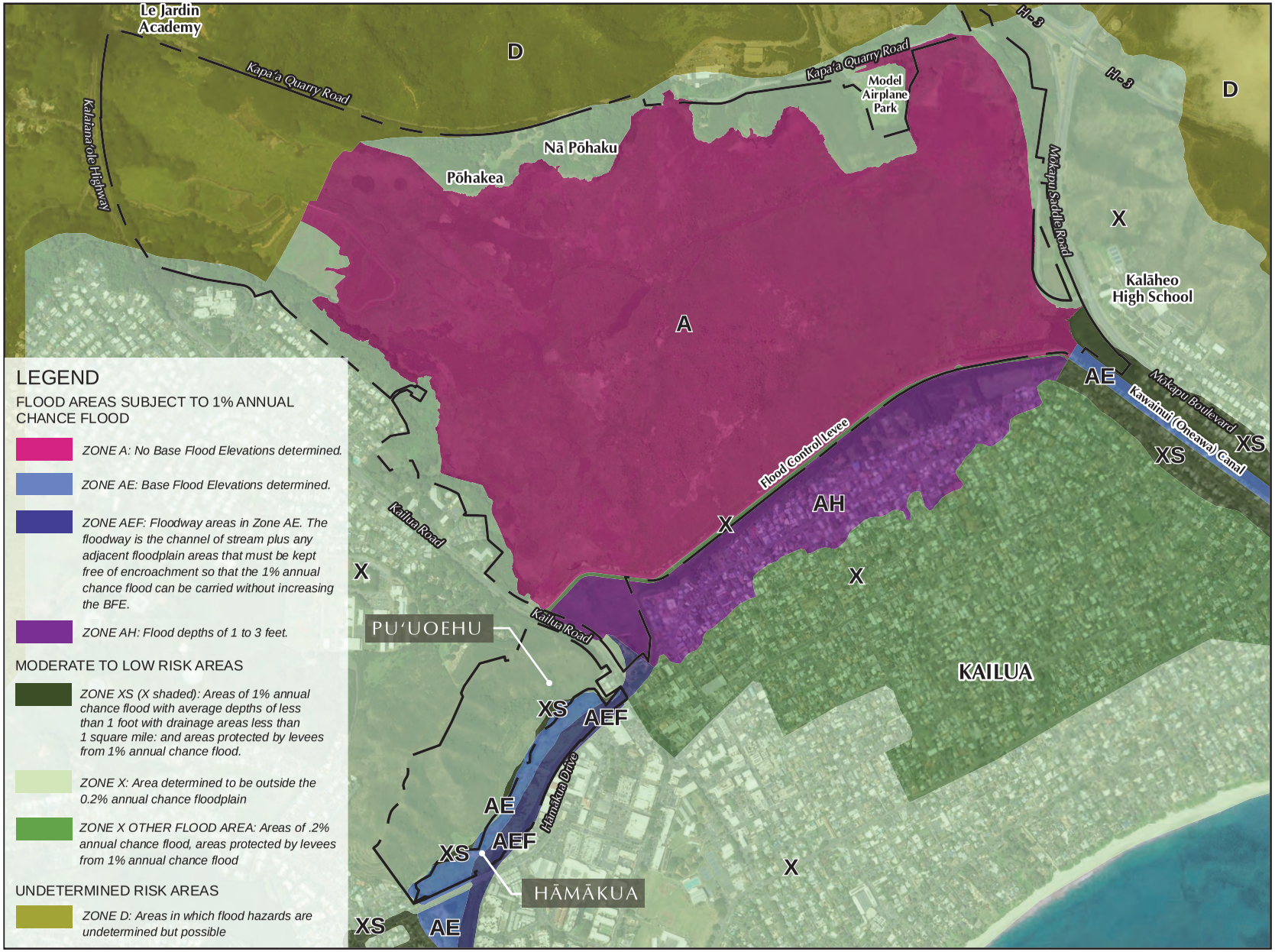
3.2.4 Flood Hazards

3.2.4.1 Existing Conditions

FEMA Flood Zones

The Federal Emergency Management Agency (FEMA) flood hazard area classifications are utilized to gauge flood hazard risk for the project area. Figure 3.4, Flood Hazard Zones, highlights the flood hazard designation within the project area. The wetland areas of Kawainui are predominantly within Zone A, special flood area subject to 100-year flood (i.e., inundated by 1% annual chance flooding) and for which no base flood elevation has been determined. The southern portion of Kawainui's wetland is designated as Zone D. This designation is for unstudied areas where flood hazards are undetermined, but flooding is possible. Because Kahanaiki Stream flows through this wetland area, most of this lower lying wetland area would likely be subject to the 100-year flood.

The wetland area of Waiʻauia located on the makai side of the levee is designated as being within Zone AH, areas subject to inundation by 1% annual chance flooding with average depths between 1 to 3 feet. The updated designation with the levee improvements for this wetland area should be Zone X (0.2% annual chance flood, protected by levee) due to protection by the levee.



Source: Federal Emergency Management Agency,
FIRM 15003C0290H and State of Hawai'i GIS Data

Kawainui - Hāmākua Master Plan Project

Figure 3.4 - Flood Hazard Zones

Kailua, O'ahu

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The uplands around the perimeter of Kawainui's wetland to the north (Mōkapu Saddle Road), west (Kapa'a Quarry Road) and south (toward Kailua Road) are mostly within Zone X, which are areas determined to be outside the 0.2% annual change floodplain (500-year). This includes the Pōhakea to Nā Pōhaku area, sites proposed for the Kapa'a Cultural Center, and the vegetation processing site. As discussed in Section 3.1.1 (Topography), these areas gradually slope downward from Kapa'a Quarry Road situated at elevations between 50 feet to 100 feet AMSL, with the lowest area being at the City's model airplane park (15 feet AMSL). Therefore, these upland areas should not be subject to flooding because stormwater discharges from upland areas would sheet flow across these areas into the low-lying wetland.

The upland areas at Kahanaiki, Mokulana peninsula, and DOFAW's management and research station should similarly be located outside the 100-year flood hazard. Kahanaiki's upland area slopes mild to moderately toward the wetland with elevations ranging from about 40 feet to 80 feet AMSL along Kapa'a Quarry Road. Mokulana peninsula overlooking the wetland has elevations of about 25 feet to 30 feet AMSL near Kalanianaole Highway. DOFAW's management station is similarly located at 25 feet to 30 feet AMSL with upland areas gradually sloping toward the wetland.

Upland areas from levee's south end at Wai'auia toward Ulupō Heiau and along the Kukānono subdivision are located outside the 100-year flood area and designated as Zone X (outside the 0.2% annual chance flood). These areas have moderate to steeper slopes from the wetland leading up to existing developments. Elevations at these areas extend up to 50 feet to 85 feet AMSL allowing stormwater discharges to sheet flow across these areas into the low-lying wetland.

The northern end of Kawainui between the wetland and along Kapa'a Quarry Road is generally flatter and at a lower elevation (5 to 10 feet AMSL). The flood map for this area designates it as being Zone X (outside the 0.2% annual chance flood). However, sections of Kapa'a Quarry Road in this area is known to flood during heavy storms. Areas from Kapa'a Quarry Road up to Mōkapu Saddle Road has moderate slopes and is at a much higher elevation (20 to 65 feet AMSL), and should not be subject to flooding.

The land on the opposite side of the flood control levee is the low-lying community of Coconut Grove. This predominantly residential area with some commercial uses are shown (Figure 3.4) as being within Zone AH, areas subject to inundation by 1% annual chance flooding with average depths between 1 to 3 feet. However, the updated designation with the levee improvements for this area should be Zone X (0.2% annual chance flood, protected by levee) similar to other areas of the Coconut Grove community.

Upland areas at the Wai‘auia site are predominantly outside of the flood area and are designated Zone X (outside the 500-year flood). However, the eastern corner is designated as Zone AEF (floodway area in Zone AE) likely due to Kawainui Stream to the east (Exhibit 3.4).



Exhibit 3.4 Flood Hazard Zones for Wai‘auia

At the Kalāheo site, the majority of the property is designated as Zone XS, which are non-special flood hazard areas (500-year flood or within the 100-year flood with average depths of less than one foot) as shown on Exhibit 3.5. The western end of this site is designated Zone A (special flood area subject to 100-year flood) likely due to Kawainui’s wetland and a drainage channel in that area leading up to Mōkapu Boulevard. Areas along the canal bank is within the 100-year flood designated Zone AE (1% annual chance flood, base elevations determined).



Exhibit 3.5 Flood Hazard Zones for Kalāheo Park Site

The Pu‘uoehu Hillside above Hāmākua area is mostly in Zone X (outside the 500-year flood), and outside the 100-year flood zone. Small portions along the base of the hillside are within the non-special flood hazard area Zone XS (500-year flood or within the 100-year flood with average depths of less than one foot), and within Zone AE (100-year flood, base elevations determined) due to its location next to Hāmākua’s wetland. Hāmākua itself is within both the Zone AE and AEF 100-year flood zones (Exhibit 3.6) likely due to Kawainui Stream.



Exhibit 3.6 Flood Hazard Zones for Hāmākua Site

History of Flooding at Kawainui

One of the major functions of Kawainui is as a flood basin which protects portions of Kailua. The construction of flood control structures to protect the town of Kailua from flood waters of Kawainui were recognized for a long time prior to construction of the original levee and outlet channel. The original flood control project, constructed in 1966, consisted of the Oneawa Channel (Kawainui Canal) and a levee with a crest height of 9.5 feet AMSL. The levee extended from the canal to Kailua Road.

Over the subsequent three decades, the lands within the drainage basin continued to urbanize at a rapid pace. Land clearing activities within the watershed, particularly in Maunawili Valley, resulted in the discharge of eroded soils downstream and into Kawainui. Increased urbanization also led to the need to discharge treated municipal sewage into the wetland from several outfalls. Nutrients from the sewage stimulated massive growths of vegetation, which inhibited the free flow of water through the through the wetland and to the outlet channel (USAED, 1992).

The cumulative effects of this reduction in flood storage capacity became evident during the New Year's Eve flood on December 31, 1987 and extending through the following day. Over this period, a storm brought 17 inches of rain over the within the drainage basin. Soils in the area were already saturated with moisture due to heavy rains earlier in the month. The amount of rainfall in the New Year's Eve storm was an extreme weather event, with rainfall totals that occur only once every 100 to 200 years.

The dense vegetation and accumulated sediment and debris Kawainui inhibited the wetland's flood storage capability, and floodwaters could not reach the Kawainui Canal. As a result, water ponded in the wetland and overtopped the levee, resulting in sustained and severe flood damage to the adjacent Coconut Grove neighborhood. In all, more than 1,250 homes sustained damage, with over 300 homes receiving major structural damage.

In the aftermath of the 1987-1988 New Year's Flood, federal, state and city agencies declared an emergency situation, authorizing public action to provide immediate relief and to reduce the imminent threat of additional danger. U.S. Marine Corps Amphibious Assault Vehicles were employed to push aside vegetation along the levee, allowing water to drain to the outlet channel. At the recommendation of the U.S. Army Corps of Engineers, vegetation was removed from the wetland (west) side of the levee, and an emergency ditch was constructed to quickly pass stored waters to the Kawainui Canal. Gravel was used to raise the crest of the levee by 6 inches, to elevation 10.0 feet AMSL. Despite these immediate measures, there was recognition that a more permanent solution was needed to restore the wetland's flood retention capacity.

Over the next several years, more than 12 alternatives were identified, analyzed and evaluated by the USACE and the City. According to the Final Environmental Impact Statement (FEIS) for Kawainui Flood Control Project (USAED, 1992), the main areas of controversy were the need to focus on vegetation and sediment removal, and the aesthetic appearance of a floodwall. The

compromise was to construct a 4-foot rather than an 8-foot high wall. However, there remained conflicting opinions among stakeholders about the importance of removing vegetation and sediments for flood control and erosion control within the watershed.

In 1997, construction of the raised levee and the concrete floodwall on the levee was completed. With these improvements, flood storage capacity of Kawainui increased to meet the 100-year storm event. The resulting levee structure is 6,300 feet long and varies from 8-1/2 feet wide at Kailua Road on the south to a gradual tapering into the existing levee at the Kawainui Canal outlet on the north. A flood warning system consisting of two real time reporting stations was also included. The stations monitor rainfall and stream level in the Makawao Stream area of Maunawili Valley and monitor wetland water elevation near the levee.

Operational and maintenance of the flood control levee, as well as the overall Kawainui, is the responsibility of DOFAW. Activities within the wetland must comply with federal regulations and ensure that at all times, the levee and wetland provide the flood protection for which they were designed. DOFAW's flood control maintenance responsibilities include control of vegetation growth; maintenance of the levee, riprapped and revetted areas, and the floodwall; and control of encroachment and trespassing. The USACE uses water gage information from upstream and within Kawainui to confirm whether the flood control project is operating according to the plan.

3.2.4.2 Potential Project Impact and Mitigation

No Action Alternative

Ongoing wetland restoration and upland reforestation efforts conducted by DOFAW and cultural landscape improvements by non-profit organizations would continue and have a beneficial effect by enhancing the natural function of Kawainui as a flood control basin and reducing the potential for flood damage during a storm event. These reforestation efforts would have minimal effect on existing drainage patterns, and stormwater will continue to sheet flow down these upland areas eventually discharging into the wetland. Onsite drainage improvements would help to reduce erosion and provide for detention of stormwater and settlement of sediment.

DOFAW improvements to their management and research station should have minimal, if any, change to existing drainage patterns within the site and thus not create flooding issues. Facilities could potentially receive damage from flooding due to waters within nearby Maunawili Stream overflowing banks and rising within the wetland area. However, these facilities are sited at moderately higher elevations, and the large wetland basin should have sufficient storage to accommodate significant storm events.

The vegetation processing site would similarly not create flooding issues because no changes are expected to existing drainage patterns within the site. This site is more level and gradually slopes toward the wetland. Facilities could potentially receive some damage from flooding due to waters rising within the wetland area and encroaching into upland area. However, facilities would be sited closer to Kapa‘a Quarry Road, a considerable distance away from the wetland.

The Kalāheo Park site is located in a flood zone of low to moderate flood risk (Zone XS) with the exception along the canal banks (Zone AE). Structures consisting of restrooms, educational pavilion, and viewing platform are within Zone XS and should not have a significant effect on existing flood conditions associated with the site. No structures or site changes would occur along the canal bank fronting this site. The majority of the site (Zone XS) is not within the City’s special flood hazard area, and not subject to flood hazard requirements under the City’s *Land Use Ordinance* (Chapter 21A). Nevertheless, new structures would be appropriately designed given the potential for low flood risk of the site, comply with applicable building design standards, and reviewed and approved by the State.

Proposed Action

No adverse flooding impacts are expected as a result of the master plan improvements under the Proposed Action. The project would continue and expand the current wetland restoration and upland reforestation efforts, further enhancing the wetland’s flood control function. Efforts to clear invasive vegetation and increase open water area would increase the wetland’s flood water retention capability and improve stream and water flow through the wetland, thereby improving the wetland’s function as flood control over the long-term. Additional drainage improvements implemented within the project’s upland areas along Kapa‘a Quarry Road would further provide measures to detain runoff, reduce sediment discharge into the wetland, and reduce erosion of upland area.

Hāmākua Marsh would be expanded mauka along the lower areas below Pu‘uoehu, creating up to 4 acres of additional wetland. Expansion of this wetland would modify the boundary of the area presently designated Zone AE to account for the expanded wetland. Improvements adjacent to a watercourse, such as this wetland, must be reviewed by the City in compliance with Chapter 21A (Flood Hazard Areas) Revised Ordinances of Honolulu (ROH), as amended.

Pedestrian trail segments and hiking trails should have minimal effect on existing flood conditions and would not increase flood hazards. Trails are either located within upland areas or along the wetland perimeter, and would consist of pervious surfaces or dirt/grassed hiking trails. Trails along the Kahanaiki to Nā Pōhaku ~~Kapa‘a~~ subarea would be located within upland areas or along Kapa‘a Quarry Road which are outside flood hazard areas (Zone X; outside 500-year flood) or in areas undetermined (Zone D). ~~Between Nā Pōhaku and Kapa‘a, there is a short section generally across of the City’s transfer station that is within Zone A (100-year flood) extending across Kapa‘a Quarry Road. The pedestrian trail is planned to be routed along Kapa‘a Quarry Road at this section, and should not change potential flooding here.~~

Between the Wai‘auia to DOFAW management station ~~Mokulana~~ subarea, the pedestrian trail would generally be routed along the foot of upland areas generally along the wetland perimeter. This would include areas within Zone A (100-year flood), Zone X (outside 500-year flood), and Zone D. As already discussed, the section of the trail from the levee to Ulupō Heiau has been eliminated from the project. ~~However, there are several potential boardwalk segments planned within Zone A flood hazard areas that would cross wetland areas and possible low-lying drainageway crossings. These boardwalk segments should not negatively impact flood hazard areas because they would be designed to be elevated above the base flood elevation allowing water to flow beneath, and minimize impeding potential stormwater discharges at drainageway crossings. Boardwalks would not require cut or fill of existing topography, not change drainage patterns, and should involve minimal site clearing of vegetation.~~

All structures proposed at the sites of the education center and cultural complex at Kapa‘a would be sited outside of flood prone areas (Zone X). Structures would increase impervious area within these sites, however, site design would include measures, such as detention basins, to minimize increased stormwater discharges from the site. Therefore, these uses should not significantly change existing drainage patterns that sheet flow toward the wetland or increase the amount of stormwater discharges from the site.

A portion of the Wai‘auia site on Kailua Road planned for a cultural complex is within flood Zone AEF, which is identified as a floodway subject to the 100-year flood likely due to it being adjacent floodplain area near Kawainui Stream. Other upland areas of this site are outside the flood hazard (Zone X) and structures should not be impacted by flood. One of the structures planned would be situated within Zone AEF, and its design would need to address compliance with the City’s flood hazard requirements. The lowest finished floor elevation of the structure should be at least one foot above the base flood elevation (BFE), and ensure that it does not impede storm water flow or negatively impact the wetland’s function. Further design work would be conducted when being implemented to evaluate the flood condition of site in more detail, and could include modifying the building configuration or location to minimize being within the flood hazards. Structures would comply with applicable provisions of the Chapter 21A (Flood Hazard Areas), ROH, as amended.

~~At the Kalāheo park site, similar improvements to the No Action Alternative are planned with exception of adding a hale wa‘a and not constructing a pedestrian bridge over the canal under the Proposed Action. The park site is located in a flood zone of low to moderate flood risk (Zone XS) with the exception along the canal banks (Zone AE). Proposed structures, including the hale wa‘a, within Zone XS should not have a significant effect on existing flood conditions associated with the site. No structures or site changes would occur along the canal bank fronting this site. Furthermore, new structures would be appropriately designed given the potential for low flood risk of the site, comply with applicable building design standards, and reviewed and approved by the State.~~

Accessory structures constructed support passive outdoor recreational activities (e.g. pavilions, restroom, observation decks) would be sited within upland areas located outside of flood hazard areas to the extent possible. A viewing deck planned along the pedestrian trail from Waiʻauia to the levee is shown as being Zone AH. However, the updated designation for this area is low to moderate flood risk and Zone X, which is areas within the 500-year flood, and protected by the levee. Therefore, this structure should not have a significant effect on flood areas or be subject to increased exposure.

3.2.5 Climate Change and Sea Level Rise

Climate is usually defined as the "average weather" in a place, including patterns of temperature, precipitation, humidity, wind and seasons. Climate change refers to a long-term shift in these patterns. Scientific observations show that earth's climate has been warming and much of this has been attributed to rising levels of carbon dioxide and other "greenhouse gases" generated by the burning of fossil fuels. These greenhouse gases trap heat in the atmosphere, causing the earth to warm, and resulting in wide-ranging impacts including rising sea levels; melting snow and ice; more extreme heat events; fires and drought; and more extreme storms, rainfall, and floods. Scientists project that these trends would continue, potentially posing risks to human health, forests, water supplies, coastlands, and other natural resources.

Sea levels around the globe are rising due to ocean thermal expansion and the melting of ice sheets and glaciers. As the climate and the oceans continue to warm, it is projected that global mean sea levels would rise at an increasing rate over the next century and beyond. The Intergovernmental Panel on Climate Change (IPCC), established in 1988, is the leading international body for the assessment of climate change.

3.2.5.1 Existing Conditions

In Hawaiʻi, the effects of climate change include rising air temperatures, rising sea levels, and warmer, more acidic coastal waters. Sea level rise can exacerbate the impacts of coastal hazards, and render low-lying coastal areas more vulnerable to inundation from tsunami, storm surge, and high water events. Similarly, as sea levels and the adjacent landside water tables rise, coastal areas would experience drainage issues and an increased risk of flooding especially during heavy rainfall events.

The U.S. Global Change Research Program (USGCRP) has been mandated by Congress to "assist the Nation and the world to understand, assess, predict, and respond to human-induced and natural processes of global change." At its 2014 Third National Climate Assessment on Hawaiʻi and the U.S. affiliated Pacific Islands, the USGCRP confirmed that island communities such as Hawaiʻi are especially vulnerable to the risks of climate change because of their small size, low elevation, remote geographical location, and concentration of infrastructure along

coastlines (U.S. Environmental Protection Agency, URL: https://www.epa.gov/climate-impacts/climate-impacts-us-islands. Accessed December 2016).

The USGCRP has projected that in Hawai‘i, temperatures would rise by 1.5° Fahrenheit (F) to 3.5° F by mid-century. In recent years, Hawai‘i has experienced decreasing precipitation, and the USGCRP has projected that in the future, the state would experience a small decrease in precipitation during the wet season and a small increase during the dry season. Climate change is expected to result in reduced ground and surface water supplies, less freshwater availability, and increasing likelihood of drought. At the same time, some areas may receive heavier downpours which can cause flooding, overload water infrastructure systems or sewage contamination.

In 2014, the University of Hawai‘i at Mānoa Sea Grant College Program (UH Sea Grant) prepared a climate change impacts report presenting the current state of scientific knowledge regarding climate change and its anticipated effects in Hawai‘i. The study provided the following summary of current and projected climate change impacts:

- The rate of warming air temperature in Hawai‘i has quadrupled in the last 40 years to over 0.3°F (0.17°C) per decade. This warming could cause thermal stress for plants and animals and heat-related illnesses in humans as well as expanded ranges for pathogens and invasive species.
- A decrease in the prevailing northeasterly trade winds which drive orographic precipitation on windward coasts has been recorded over the last 40 years.
- Hawai‘i has seen an overall decline in rainfall in the last 30 years, with widely varying precipitation patterns on each island. It is projected that Hawaii would see more drought and heavy rains causing more flash flooding, harm to infrastructure, runoff, and sedimentation.
- Declining precipitation trends have caused a decrease in stream base flow over the last 70 years, and could reduce aquifer recharge and freshwater supplies and influence aquatic and riparian ecosystems and agriculture.
- Sea surface temperatures have warmed between 0.13°F and 0.41°F per decade in the Pacific for the last 40 years. This trend is projected to accelerate and can influence ocean circulation and nutrient distribution.
- Global ocean acidity has increased by 30% due to marine update of CO2, correlating to a pH change of 0.1. Acidification is expected to continue and could trigger a wide range of impacts on marine biota.
- Sea level has risen over the last century on each island, averaging 0.6 inches (1.5 cm) on O‘ahu per decade, which has contributed to shoreline recession. Rates of rise are projected to continue to accelerate resulting in a 1-3 foot rise or more by the end of the century. Sea level rise would exacerbate coastal inundation, erosion hazards, beach loss, and damage to infrastructure in low-lying areas.
- Threats to human health posed by Hawaii’s warming climate may include increased heat-related illness and wider ranges of vector-borne diseases such as dengue fever (UH Sea Grant, 2014).

Climate Change Effects on Endangered Waterbirds

The 2011 Hawaiian Waterbirds Recovery Plan discussed the potential impact of global warming and sea level rise on wetland habitat used by endangered waterbirds. Coastal wetlands, such as Kawainui and Hāmākua, are vulnerable to sea level rise, which can lead to the loss or diminished quality of wetland habitat. Increased groundwater salinity may also increase salinity levels in the wetlands. Plants and animals can be increasingly stressed by high temperatures or in some areas, reduced rainfall. These subtle but cumulative environmental changes could adversely impact endangered species. Species such as the Hawaiian duck and Hawaiian common moorhen which prefer fresh water would be particularly sensitive to changing salinity levels (USFWS, 2011).

All of these climate change impacts could affect the ecosystem at Kawainui and Hāmākua. In order to mitigate impacts to terrestrial ecosystems, the UH Sea Grant report recommended that: "*Particular attention must be made to employ ecosystem- and watershed based conservation of native and endemic species, wetlands and high elevation forests to avoid extinction. Diligent monitoring for invasive species prevention through strong biosecurity and early detection systems would help protect existing ecosystems.*" (UH Sea Grant, 2014).

Sea Level Rise

Based on measurements at Honolulu Harbor, the mean sea level has increased at an average rate of 1.41 ± 0.22 millimeters (mm) per year (5.52 inches per century) between 1905 and 2014. This rate is less than the eustatic (global average) rate of sea level rise over the 20th century of about 2 mm per year, possibly a result of ongoing land uplift experienced on O'ahu (HHF, 2017).

The Sea Level Rise and Coastal Land Use Policy Toolkit published by the UH Sea Grant in 2011 suggests, "the governor or state legislature should direct state agencies to incorporate a sea-level rise benchmark of 1-foot-by-2050 and 3-feet-by-2100 in planning and permitting processes and decision-making" (ICAP, 2011). Geographic Information System (GIS) data available from NOAA's web viewer for sea level rise and coastal flooding (http://coast.noaa.gov/slr/) shows that a 1-foot projected sea level rise would have minimal change to the Kawainui and Hāmākua project area. A 3-foot projected sea level rise using this viewer similarly resulted in minor changes to existing stream and low-lying areas. As shown on Exhibit 3.7, changes in areas are highlighted in "light blue"

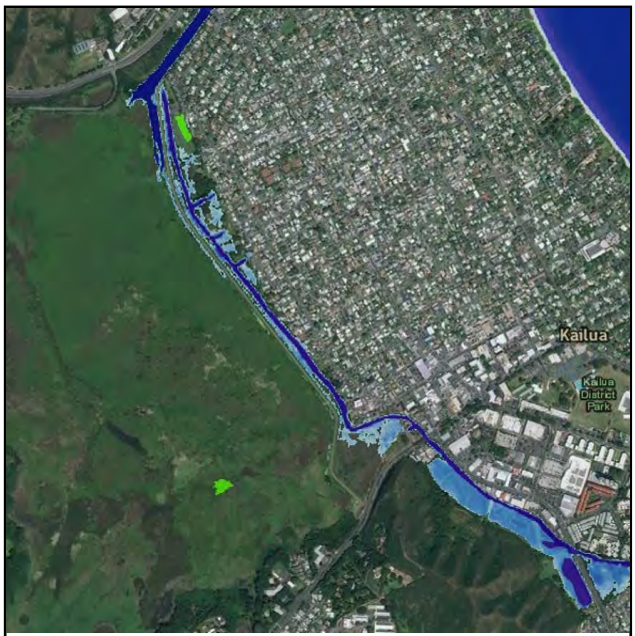


Exhibit 3.7 NOAA Projected 3-Foot Sea Level Rise

and mainly occur along Kawainui Stream along the levee, wetlands at Wai‘auia, and increased water levels at Hāmākua. No inland areas of Kawainui would be affected.

A more recent study on sea level rise (*Hawai‘i Sea Level Rise Vulnerability and Adaptation Report*) was published by the Hawai‘i Climate Change Mitigation and Adaptation Commission (HCCMAC) in 2017 (HCCMAC, 2017). This study predicted a 3.2 foot global increase in sea level by the year 2100, and suggested that this sea level increase could occur as early as 2060. This updated study predicts a slightly higher increase in sea level than the UH Sea Grant study within the same 2100 timeframe.



Exhibit 3.7A HCCMAC Projected 3.2 Foot Sea Level Rise

Exhibit 3.7A illustrates the areas inundated by a projected 3.2 foot increase in sea level (light blue) on Kawainui and Hāmākua. These changes are similar to what is shown on Exhibit 3.7, with areas affected mainly occurring along Kawainui Stream along the levee, wetlands at Wai‘auia, and increased water levels at Hāmākua. A few existing open water areas within Kawainui would have more water.

3.2.5.2 Potential Project Impact and Mitigation

The No Action Alternative and Proposed Action would both have little influence on global climate changes in terms of changing the rate of melting of ice sheets and glaciers, rising air temperatures, sea levels, and frequency of natural disasters. Nevertheless, improvements implemented within the project area can take into account the effects of projected sea level rise. The Sea Level Rise and Coastal Land Use Policy Toolkit identified three basic approaches to sea level rise adaptation:

1. Accommodation. Adjustment of an existing system to changing natural conditions (e.g., strengthening flood-proofing regulations or expanding hazard zones).
2. Protection. Hardening of a system in its existing location to withstand impacts from changing conditions (e.g., shoreline hardening such as seawalls and revetments).
3. Retreat. Relocating existing structures to avoid impacts.

The HCCMAC study included several recommendations to provide guidance for State and County agencies, communities, and other stakeholders to improve capacity to adapt to sea level rise. Recommendations included supporting sustainable and resilient land use and community development in light of sea level rise, prioritizing redevelopment in areas outside the risk area,

limiting exposure for development within the area, and improving flood risk management. An inventory, protocols, and process was suggested to preserve Native Hawaiian culture, and a review of environmental regulations allowing for the siting of environmental hazards (e.g. hazardous materials/waste storage facilities) to protect nearshore water quality with rising seas. Other cross-cutting recommendations highlighted the need to engage diverse stakeholders in making complex decisions about addressing the impacts of sea level rise.

No Action Alternative

The No Action alternative includes the continuation of DOFAW-sponsored wetland restoration and upland reforestation activities and cultural landscape initiatives at Ulupō Heiau and Nā Pōhaku. Although these restoration activities would not reduce the likelihood or occurrence of human-induced climate change in Hawai‘i, they may serve to strengthen the resilience of the biological environment in the project area.

Wetland and habitat enhancement, reduction of invasive species, predator control, and reforestation are consistent with the UH Sea Grant report's recommendations to mitigate some of the impacts associated with climate change. These actions support employing ecosystem and watershed based conservation of native and endemic species, wetlands and high elevation forests to avoid extinction. Monitoring for invasive species prevention and control are already part of DOFAW's management and operations at both Kawainui and Hāmākua helping to protect existing ecosystems.

Improvements to DOFAW's management and research station, the vegetation processing site, and at the Kalāheo Park site should not be affected by sea level rise based upon NOAA's 3-foot and HCCMAC 3.2-feet projected sea level rise models. Historic data on mean sea level rise over the last 100+ years was less than 6 inches. Changes to areas mainly occur at Kawainui Stream and along the levee, and should not affect the Kalāheo site.

Proposed Action

Expanded wetland restoration and upland reforestation activities with the project would have a beneficial effect by further reducing the likelihood or occurrence of human-induced climate change in Hawai‘i. Project improvements would serve to strengthen the resilience of the biological environment in the project area. As with the No Action Alternative, additional activities implemented with the project would have a positive effect by employing ecosystem and watershed based conservation of native and endemic species, wetlands and high elevation forests to avoid extinction. Monitoring for invasive species prevention and control would continue to be a part of DOFAW's management and operations at both Kawainui and Hāmākua helping to protect existing ecosystems.

The 3.2 foot increase in sea level predicted by the HCCMAC study would result in inundation of small areas of the central portion of the Kawainui wetland. Wetland restoration activities expanding into this area would not increase susceptibility to climate change hazards in other areas. Restoration actvities would enhance the wetland in alignment with UH Sea Grant recommendations. These activities could also be modified given DOFAW adaptive management principles guiding these efforts should inundation neccesitate modifications to restoration efforts. This flexibility supports HCCMAC recommendations to improve flood risk management.

The proposed education center, cultural complexes, pedestrian trails and associated accessory structures (e.g. viewing platforms), and improvements to DOFAW's management station are all located inland of areas potentially affected by sea level rise under the sea level rise scenarios discussed. Given the historic change in mean sea level at Honolulu Harbor of less than 6 inches per century, these structures and activities conducted there should not be affected by sea level rise. A portion of the unpaved maintenance access road realignment proposed mauka of Hāmākua's wetland expansion could be inundated by a 3.2 foot increase in sea level. However, this maintenance access could be realigned further inland, if warranted, in the future.

3.3 BIOLOGICAL RESOURCES

The Kawainui-Hāmākua project area is a habitat for four endangered Hawaiian waterbird species, multiple migratory bird species and two native aquatic organisms. There are also a variety of non-native plants and animals throughout the project area. The occurrence of the various plant and animal species varies by geographic area. The majority of the 986-acre project area is dominated by the wetland areas of Kawainui and Hāmākua, which is comprised of wetland vegetation and provides primary habitat for the endangered waterbirds and native aquatic species. The surrounding upland (non-wetland) area around the periphery of Kawainui is comprised of a very different plant community, which has been described as wet alien forest (LeGrande, 2014).

3.3.1 Botanical Resources

Two studies provide information on existing botanical conditions in the project area, and are identified below:

1. USACE Aquatic Plant Study. The *Kawai Nui Marsh Invasive Aquatic Plant Study* (Oceanit Laboratories, Inc., 2006) was conducted in 2006 for the U.S. Army Corps of Engineers and State DLNR that focused on wetland vegetation. The objective of this study was to quantify the distribution of native and alien plants within Kawainui in support of the long-term objective to control invasive plants and increase habitat for endangered Hawaiian waterfowl. Field efforts focused on the composition of the vegetation and the nature and distribution of the marsh substratum, with emphasis on the extensive layer of peat across the marsh. Plant species were categorized into assemblages, and a vegetation map of the wetland was prepared.

2. LeGrande Botanical Assessment. A subsequent botanical survey was conducted by LeGrande Biological Surveys, Inc. (LeGrande, 2017) of the project area in 2014 that focused on upland areas, and is included in Appendix B. This study focused on the areas around the periphery of the wetland that are proposed for pedestrian trails, and other sites where buildings and site improvements are expected (e.g. educational and cultural facilities). The objectives of the botanical survey were to: 1) describe existing vegetation; 2) list all species encountered; and 3) identify threatened or endangered plant species.

3.3.1.1. Existing Conditions

Overview

Kawainui formerly encompassed about 400 acres of open water based upon early descriptions of the area. This was significantly reduced to about 40 acres in 2005, at the time of the Oceanit Laboratories, Inc. aquatic plant study. The study noted that a significant amount of the wetland supports plant assemblages characterized as either dominated by alien (non-native) species or invaded by non-native species (including many upland species normally not associated with wetlands). However, a large proportion of the vegetation does consist of native wetland plants. Native species dominated assemblages cover 52 percent of the approximately 890-acre marsh with the two indigenous species Saw-grass (*Cladium jamaicense*) and Neke fern (*Cyclosorus interruptus*) accounting for this (Oceanit Laboratories, Inc., 2006).

The upland areas around the perimeter of the project area consist of an upland forest, with patches of mangrove and hau. These upland areas were the subject of the 2017 LeGrande botanical survey, which referred to them as “wet alien forest” and described as highly altered from their native state. The upland areas host a variety of primarily invasive vegetation, and several large trees (e.g., monkeypods and java plum). The 2017 botanical survey noted that 95 percent of the plant species observed within the (upland) survey sites are alien (introduced), and 5 percent are native. The upland areas are typical of a wet alien forest. There are a total of 128 plant species observed within the survey sites, with 121 species being alien (introduced) and 7 being indigenous (native to the Hawaiian Islands and elsewhere).

None of the vegetation within the upland areas of the project site is known to be Federal or State-listed threatened or endangered, or candidate threatened or endangered botanical species based upon the aquatic plant survey. Further discussions of botanical resources from these studies are organized by subareas.

Subarea A: Kawainui (Wetland)

Subarea A includes all of Kawainui’s wetland, which comprises the majority of the project area. With terrestrialization of the wetland over time, open water has been reduced to only about 40 acres, most of which was covered with vegetation supported by a floating mat of peat.

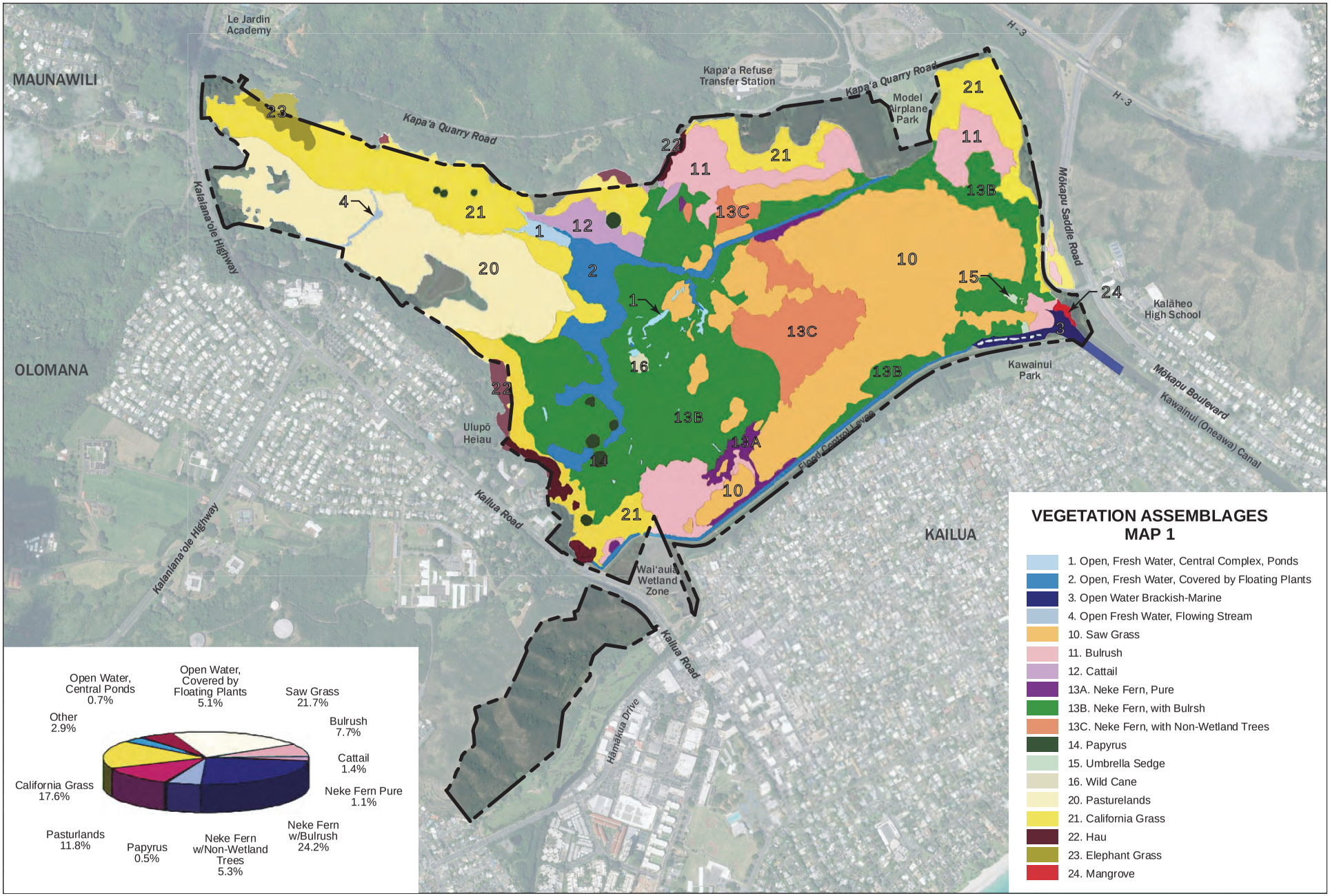
Peat Mat Layer Description. The peat layer generally has an average thickness of up to 4 feet, but is up to 8 feet thick in some areas based upon surveys (Oceanit Laboratories, Inc., 2006). These results are consistent with soil surveys done in 1990 (coring) and 2001 (test trenches) discussed in Section 3.1.3 (Soils) that identified a peat layer about 3 feet deep floating on a layer of water and mud slurry that was about another 10 to 13 feet deep.

The accumulation of dead plant material below this vegetation forming the peat layer is characterized by a buoyant, inundated, anoxic, organic layer. This waterlogged, oxygen-deficient state facilitates decomposition of vegetation causing accumulation. In some areas of the wetland, this peat layer is capable of supporting the weight of upright trees, while in others it can barely support the weight of a person. Neke fern was widely distributed in the wetland, and was a significant contributor to the peat layer. Native Saw-grass covered extensive areas of peat, sometimes combined with Neke fern. A peat layer has not formed in areas where the upper wetland area and wetland margins are covered in California grass (Oceanit Laboratories, Inc., 2006).

The presence of a thick peat mat results in an absence of open water habitat for wetland birds. In addition, a body of water covered by a layer of peat is (except for bacteria) considered biologically dead. Without light penetration, oxygen cannot be generated by algae, and therefore the subsurface cannot support invertebrates such as aquatic insects or prawns, or vertebrates such as fish. Removal of the overlaying living and dead vegetation is needed to create a wetland with a combination of open water areas with vegetated margins which can attract and support aquatic life (AECOS, Inc., 2017a).

Plant Assemblage Description. The 2006 aquatic plant study noted that much of the original wetland vegetation in Kawainui has been overtaken by alien (non-native) species. At the time of the 2006 survey, native wetland plant assemblages covered a little over one half of the project area. Native plants in the project area are primarily two indigenous species: Saw-grass (*Cladium jamaicense*) and Neke fern (*Cyclosorus interruptus*). Non-native plants found in Kawainui include invasive trees, sedges, and grasses, such as California grass, Water Hyacinth (*Eichhornia crassipes*), Kariba Weed, and Cattail, as well as various trees such as the Hawaiian dwarf umbrella plant and Fiddlewood. Over time, the proliferation of non-native species has reduced open water areas and contributed to an accumulation of peat.

The aquatic study identified three basic areas within the wetland: 1) open water; 2) peat covered central wetland; and 3) wetland margins and upper wetland. The open water area has a single assemblage, central wetland has seven assemblages, and the marginal areas have five assemblages. Figure 3.5 graphically shows the general areas associated with these different vegetation assemblages along with the dominant plant species within general geographic areas (Oceanit Laboratories, Inc., 2006). It should be noted that the present restoration ponds are not included in the figure, but they now occupy the general area where pasturelands are indicated. Table 3.1 provides a summary of the various vegetation assemblages by acreage and percentage of area based upon Figure 3.5.



Source: Oceanit Laboratories, Inc. 2006

Kawainui - Hāmākua Master Plan Project

Figure 3.5 - Vegetation Assemblages

Kailua, O'ahu

0 800 1,600 FEET

HHF PLANNERS places for people

Table 3.1
Summary of Plant Assemblage Coverages for Kawainui's Wetland

Code	General Description of Vegetation Assemblages	Acreage	Area (%)
	Open Water Assemblages		
01	Open, fresh water, central complex, lower wetland	4.8	0.7
02	Open, fresh water, covered by floating plants	35.2	5.1
03	Open water, brackish	5.5	0.8
04	Open, fresh water, flowing stream	1.1	0.2
	Subtotal	**46.6**	**6.8**
	Central Wetland Plant Assemblages		
10	Saw-grass dominated	149.9	21.5
11	Bulrush dominated	53.0	7.6
12	Cattail dominated	9.7	1.4
13A	Neke dominated	7.8	1.1
13B	Neke with bulrush	167.0	24.0
13C	Neke with non-wetland trees	36.7	5.3
147	Papyrus	3.2	0.5
15	Umbrella sedge	0.6	0.1
16	Wild cane	1.0	0.1
	Subtotal	**428.9**	**61.6**
	Wetland Margin and Upper Wetland Plant Assemblages		
20	Pasture lands, California grass/Hilo grass	81.7	11.7
21	California grass	121.3	17.4
22	Hau	11.6	1.7
23	Elephant grass	6.3	0.9
24	Mangrove	0.7	0.1
	Subtotal	**221.6**	**31.8**
	Total Wetland Area	**697.1**	**100%**

These plant assemblages tend to evolve as a unit, or are characterized by a regular succession of species replacing one another until relative stability is achieved. As shown in the figure, vegetation within the interior areas of the Kawainui wetland are dominated by assemblages of saw grass, Neke fern, and papyrus. The outer edges of the wetland, particularly areas parallel to Kapa'a Quarry Road, are dominated by California grass and bulrush. A large area makai of Kahanaiki Stream is categorized as pastureland assemblage, consisting primarily of California and Hilo grasses. This pastureland, formerly grazed by cattle, has been largely replaced by the recently completed restoration ponds now being managed by DOFAW.

Invasive species within the wetland include California grass (*Urochloa mutica*), Water Hyacinth (*Eichhornia crassipes*), Kariba Weed (*Salvinia molesta*), Cattail (*Typha latifolia*), Papyrus (*Cyperus papyrus*), Umbrella Sedge (*Cyperus involucratus*), various trees particularly Hawaiian dwarf umbrella plant (*Schefflera*) and Fiddlewood (*Citharexylum*), *Vigna luteola*, and *Paederia foetida*. Invasive plant species affect the wetland by reducing open water and through progressive intermingling with native plant dominated areas, increased accumulation of organic

matter (peat), and subsequent reduction of many wetland functions and values (Oceanit Laboratories, Inc., 2006).

None of the vegetation within the project area is known to be Federal or State-listed threatened or endangered, or candidate threatened or endangered botanical species based upon the aquatic plant survey. This study also reviewed plant lists of prior botanical studies of this wetland.

Subarea B, Kahanaiki-Nā Pōhaku-Kapa‘a

This subarea encompasses the upland areas along Kapa‘a Quarry Road from its intersection with Kalaniana‘ole Highway, north past Nā Pōhaku, to just beyond the model airplane park. The area along Kapa‘a Quarry Road was surveyed during the LeGrande botanical study and was described in the report. In addition to the construction of pedestrian trail segments, sites in this subarea area proposed for development of the education center and the Kapa‘a Cultural Center. The proposed vegetation processing area next to the existing model airplane park would also include small office buildings and equipment shed.

Vegetation along Kapa‘a Quarry Road area is characterized as a matrix of cleared areas with grassy maintained lawns and planted ornamentals with naturalized forest vegetation forming a buffer along the Kapa‘a Quarry Road and the open areas. The naturalized forest is composed of mango (*Mangifera indica*), Java plum (*Syzygium cuminii*), gunpowder tree (*Trema orientalis*), albizia (*Falcataria moluccana*), hau (*Hibiscus tiliaceus*). The understory consists of various non-native grasses and shrubs. Areas with mowed grassy lawn are scattered with monkeypod (*Samanea saman*) trees and kou (*Cordia subcordata*), and ti (*Cordyline fruticosa*).

The wetland interface is dominated by California grass and hau thickets. The survey area between this section heading north to Pōhakea and Nā Pohaku is characterized by large canopies of monkeypod trees with recently cleared and/or open understory with weedy plants including kukui (*Aleurites moluccana*), date palm (*Phoenix* sp.), cats claw (*Caesalpinia decapetala*), and wood rose (*Merremia tuberosa*).

Pōhakea. At the time of the 2014 botanical survey fieldwork, a former ranch located on an elevated bluff above the wetland was still operating and included maintained grassy open areas, workshop, and livestock. Today, the ranch has closed and the structures have been removed. The open grassy areas remain, and are surrounded by monkeypod forest, with an understory of Guinea Grass (*Panicum maximum)* and other non-native shrubs and grasses. The steep slope from the bluff descending to the wetland is dominated by a monkeypod forest with an understory of scattered Java plum, koa haole (*Leucaena leucocephala*) and African tulip trees.

Nā Pōhaku O Hauwahine. This area is being utilized as a native Hawaiian botanical garden through continued cultural landscape restoration. Although it has hundreds of species of native plants, they were not inventoried in the survey, since they were outplanted and maintained, rather than natural to the area. Over the last several years, the community group ‘Ahahui Mālama I Ka

Lōkahi has spearheaded efforts to restore the area into a native dryland forest. Once overgrown with introduced koa haole and java plum trees, the area now boasts a large area of native plant species creating a rare complete dryland forest ecosystem from ground cover to canopy. Volunteers and other workers have cleared invasive vegetation and created a trail system through the area.

Kapa‘a. This area is located across of the City's transfer station and a portion of it was formerly used by the City as a maintenance baseyard. Several large push piles or dump sites were observed in the area. The entire site is overgrown with monkeypod trees, tropical almond (*Terminalia catappa*), Elephant grass (*Pennisetum purpureum*), and Guinea Grass. The botanical study noted that the only native species observed in the area was ‘uhaloa (*Waltheria indica*).

Further north up to the City's model airplane park is the site previously used for vegetation processing by the City. The vegetation in this area is similar to that observed at the former City maintenance baseyard area. Overgrown sections of Guinea Grass and invasive weed species dominate the area.

Subarea C: Kapa‘a-Kalāheo-Levee

The linear shaped Subarea C generally runs roughly parallel to Mōkapu Saddle Road, includes the Kawainui SPR, Kalāheo park site, and forms the northern boundary of the project area. It also includes the flood control levee.

Vegetation within this stretch of upland area between Kapa‘a Quarry Road and the wetland can be characterized as being overgrown with Guinea Grass with other species such as koa haole, and kiawe. Monkeypod trees line along Kapa‘a Quarry Road.

The vegetation at the Kalāheo site along Kawainui Canal can be characterized as an overgrown Guinea Grass field with other species such as koa haole, kiawe, sourbush (*Pluchea carolinensis*), and honohono (*Commelina diffusa*). Monkeypod trees line the Mōkapu Boulevard side, while red mangrove (*Rhizophora mangle*), coconut (*Cocos nucifera*), milo (*Thespesia populnea*), Indian fleabane (*pluchea indica*), and hau grow along the canal.

Subarea D: Wai‘auia-Ulupō-Mokulana

Subarea D generally includes the upland area along the southern and eastern boundaries of Kawainui. It extends southwest from Wai‘auia to Ulupō Heiau, and continuing past the DOFAW management research station to the Mokulana Peninsula.

Wai‘auia. The area known as Wai‘auia is located near the corner of Kailua Road and Kainehe Street and is adjacent to the City and County pump station. The site is dominated by a maintained grassy area with a few scattered trees and shrubs that include Chinese banyan (*Ficus microcarpa*), coconut (*Cocos nucifera*), and milo (*Thespesia populnea*). Shrubs include naupaka

(*Scaevola coriacea*), castor bean (*Ricinus communis*), and koa haole (*Leucaena leucocephala*). The narrow path leading to the levee is dominated by weedy plants such as koa haole, (*Cenchrus echinatus*), (*Sida acuta*), swollen fingergrass (*Chloris barabata*), khaki weed (*Althernanthera pungens*), and garden spurge (*Chamaesyce hirta*). A row of kou (*Cordia subcordata*) trees are planted along the Kailua Road side of the strip. Several piles of wood chips were located along the wetland boundary.

Ulupō Heiau SHP and Surroundings. The Ulupō Heiau site is actively being maintained by co-curators the Kailua Hawaiian Civic Club and ʻAhahui Mālama I Ka Lōkahi. Vegetation is dominated by mowed grassy areas interspersed with planted Hawaiian cultural plants such as ti, ulu (*Artocarpus altilis*), kukui (*Aleurites moluccana*), noni (*Morinda citrifolia*), kalo (*Alocasia esculenta*), coconut, and hala (*Pandanus tectorius*) in and around the loʻi. Other naturalized plant species include, molasses grass (*Melinis minutiflora*), Hau (*Hibiscus tiliaceus*), Java plum (*Syzygium cuminii*), monkeypod, African tulip, earpod (*Enterolobium cyclocarpum*), mango, Canavalia, Little bell (*Ipomoea triloba*), kilioopu (*Kyllinga brevifolia* and *K. nemoralis*), and kolomona (*Senna surattensis*).

Restoration work continues by community members during monthly community work days. These efforts have focused on cutting back hau, weeding walls and ʻauwai, clearing invasive plants from the bird pond, and preparing/maintaining loʻi kalo. Restoration efforts are planned to continue, with the intent to reflect pre-contact settlement and subsistence patterns of the ahupuaʻa.

The sections to the north and south of Ulupō Heiau where pedestrian trails are proposed are dominated by thickets of Hau (*Hibiscus tiliaceus*) with other invasive tree species including, Java plum, kou, African tulip, Chinese banyan, and kukui. Understory includes several liana species such as maile pilau (*Paederia foetida*) and pothos vine (*Epipremnum pinnatum*). Understory shrubs include Guinea Grass, Achyranthes (*Achyranthes aspera* var. *aspera*), buffelgrass (*Cenchrus ciliaris*), castor bean, koa haole, mock orange (*Murraya paniculata*), coral berry (*Rivina humilis*), fern tree (*Felicium decipiens*), and mickeymouse plant (*Ochna thomasiana*).

DOFAW Management and Research Station. This area includes the existing DOFAW baseyard with offices and equipment and vehicle storage. The surrounding area is dominated by large monkeypod trees with various other tree species mixed in with the canopy. Along the banks of Maunawili Stream, plants such as hau, paperbark (*Melaleuca quinquenervia*), and various ornamental plants are present. Fruit trees such as papaya (*Carica papaya*), noni (*Morinda citrifolia*), and avocado (*Persea americana*) were also observed in the area.

Mokulana Peninsula. This area is currently unoccupied and overgrown. In the past, it appears to have been utilized as an opportunistic dumping area for various debris, including construction waste. The tree canopy is composed of monkeypod, mango, Chinese banyan (*Ficus microcarpa*), orchid tree (*Bauhinia* sp.), rubber tree (*Ficus elastica*), and coconut. Large bougainvillea (*Bougainvillea* sp.) were observed growing into the canopy of many of the trees. Thickets of hau

dominate along the wetland interface. Understory plants include palm grass (*Setaria palmifolia*), monster, fiddlewood (*Citharexylum caudatum*), Achyranthes (*Achyranthes aspera* var. *aspera*), and solanum (*Solanum seaforthianum*).

Subarea E: Hāmākua-Pu‘uoehu

This subarea includes Hāmākua and the eastern half of the Pu‘uoehu hillside up to the ridgeline, located above Hāmākua. Within this subarea, the botanical survey focused on vegetation along north-east facing slope of Pu‘uoehu above the Hāmākua. This area is dominated by a koa haole (*Leucaena leucocephala*) forest with other scattered tree species such as Chinese banyan (*Ficus microcarpa*), African tulip (*Spathodea campanulata*), Christmas berry (*Schinus terebinthifolius*), monkeypod (*Samanea saman*), and kiawe (*Prosopis pallida*). Other species include Guinea grass (*Panicum maximum*), panini cactus (*Opuntia ficus-indica*), and cow pea (*Macroptilium lathyroides*).

Hāmākua Wetland. A wetland delineation conducted by the NRCS in 2012 for Hāmākua’s wetland documents existing wetland vegetation. Common plant species identified under a 2012 wetland delineation include koa haole (*Leucaena leucocephala*), Christmasberry (*Schinus terebinthifolius*), marsh fleabane (*Pluchea sp.*), Paspalum sp., and pickleweed (*Batis maritima*). Native plant species that are present include `ae`ae (*Bacopa monnieri*), `ākulikuli (*Sesuvium portulacastrum*), makai sedge (*Schoenoplectus maritimus*), makaloa (*Cyperus laevigatus*), and `ahu `awa (*Cyperus javanicus*). The dominant plant in the wetland is pickleweed, but there are the other species present. In some areas, California grass (*Brachiaria mutica*) is the dominate plant in the wetland (usually on the edges of the upslope side). Koa haole is the dominate upland plant in the unmanaged areas and pasture grass (*Paspalum sp.*) is the dominate species in the managed areas (NRCS, 2012).

3.3.1.2 Potential Project Impact and Mitigation

No Action Alternative

Under the No Action Alternative, ongoing wetland restoration and upland reforestation initiatives conducted by DOFAW would continue within the wetland areas of Kawainui and Hāmākua. These efforts would continue replacing non-native invasive vegetation with native vegetation, reduce terrestrialization of Kawainui’s wetland, and have a positive impact on botanical resources in these areas. Wetland management would continue to occur at Hāmākua to re-vegetate using native plants, maintain a diversity of habitat (open water, mud flats), and reduce the need for vegetation maintenance activities. Wetland restoration activities within Kawainui would remove invasive vegetation and create more suitable and diverse habitat for endangered waterbirds consisting of open water, mud flats, and transitional wetland vegetation along fringes.

The continuation and expansion of upland reforestation efforts would also have a positive beneficial impact on botanical resources by removing non-native and invasive vegetation, and replacing them with native vegetation. The proposed hybrid ecosystem model allows native and existing non-native species to mix in a transitional period, promoting biodiversity, and helping to re-establish a native forest in a cost effective and practical manner. None of the vegetation within the project area is known to be a federal or state-listed or candidate threatened or endangered species. Overall, restoration efforts support Kawainui and Hāmākua's designation as a Wetland of International Importance under the Ramsar Convention, and enhance the wetland's functions and values.

DOFAW improvements to their management and research station would support restoration and management activities at Kawainui that contribute to positive effects on present botanical resources, which are mainly non-native and invasive species, particularly within upland areas. The vegetation processing site would similarly support these activities by providing a site with facilities to process vegetation removed. Restoration activities could be delayed without having a suitable site to process vegetation removed, thus, this site minimizes such issues.

Improvements at the Kawainui SPR, Kalāheo park site would not have a negative impact on existing botanical resources there, which consist mainly of overgrown Guinea Grass field with other non-native species. Site development would allow for removal of non-native species and allow for revegetation with grass and other perimeter landscape improvements that would be more manageable for DSP to maintain.

Proposed Action

Wetland Restoration and Upland Reforestation

The Proposed Action would continue and expand ongoing wetland restoration and upland reforestation activities occurring under the No Action Alternative, continuing and having an increased positive impact on botanical resources. These efforts include replacing non-native invasive vegetation with native vegetation and reducing terrestrialization of Kawainui's wetland within expanded wetland and upland areas. Wetland area at Hāmākua would be expanded by up to about 4 acres by excavating adjacent upland areas. This would expand open water and mud flat areas, allow for further re-vegetation using native wetland plants, and improve habitat for endangered waterbirds.

Structures and Trails

Permanent facilities constructed at DOFAW's management and research station under the project would further support restoration and management activities at Kawainui by greatly improving facilities used by staff for research, management, and overall operations. Improving DOFAW's management capabilities would have a positive effect in their ability to restore areas resulting in a beneficial influence on botanical resources.

The construction of the proposed pedestrian trails, ~~boardwalks,~~ and structures would not have an adverse impact on botanical resources. In addition, the elimination of various trail segments would further reduce impacts on botanical resources. The 2014 botanical survey looked at the planned routes of trails and areas where new structures are proposed, and found that the majority of existing plant species in these areas are introduced. All seven native plant species observed during the survey are widespread indigenous species, and the project impact to native plants would be minimal (LeGrande, 2014). These survey results are consistent with a botanical survey conducted in 2003 as part of the City's pathway plan project. That study similarly determined that much of the vegetation was comprised of introduced or alien species (HHF, 2003).

Accessory improvements and structures supporting passive outdoor recreational activities, such as off-street parking or staging areas, viewing decks and pavilions, would directly support educational programming efforts. Increased public education of the project area's resources and condition can support increased participation in community volunteer efforts to maintain or improve areas resulting in beneficial effects on botanical resources. For example, the proposed parking area at Pōhakea would provide a safe, off-street parking area for community volunteers conducting restoration at Nā Pōhaku.

Sites proposed for the education center and cultural centers should not have a negative impact on botanical resources because these areas consist mainly of non-native invasive vegetation. Improvements would support clearing these alien vegetation and replacing them with grass and other landscaping improvements using native plants.

The education center would be an important element in enhancing environmental education for both visitors and residents by emphasizing the importance of controlling invasive species and restoring native vegetation. Cultural centers planned for use by non-profit organizations would include requirements to support DOFAW and DSP educational programs as well as implement stewardship activities of those areas to maintain vegetation, all of which support DOFAW efforts and have a positive effect on botanical resources.

Cultural practices and related activities that are envisioned to occur at cultural center sites would include growing traditional Hawaiian food crops including kalo (taro) and ulu (breadfruit). These environmental, educational, and cultural activities would have a positive impact on botanical resources by replacing invasive vegetation with native vegetation and supporting DOFAW and DSP's efforts to maintain these areas (e.g. keeping vegetation mowed and managed).

Proposed improvements would not have an impact on Federal or State-listed threatened or endangered, or candidate threatened or endangered botanical species because none were observed during current and prior botanical surveys. Because improvements under the Proposed Action would be implemented in a phased approach, updated botanical surveys should be conducted of areas planned for site development, such as cultural centers and pedestrian trails, to further minimize pottential effects on botanical resources. Surveys can be incorporated in site

design work and construction plans development to minimize effects on native vegetation that may be present. Landscape plans prepared as part of this phase can also use this information.

3.3.2 Avifauna Resources

Rana Biological Consulting conducted an avian and mammalian survey (Rana, 2017) of the project site. This study is included in Appendix C. The primary purpose of the survey was to determine whether any species currently proposed for, or listed as threatened or endangered under either federal or State of Hawai‘i endangered species statutes were present within the project site. There is no federally delineated Critical Habitat present on or adjacent to the project site.

Survey Method

Eighteen count stations were sited 500 meters apart and roughly equidistant of each other within the project site. Care was taken to include a count station in each of the vegetation sub-categories around the exterior of the marsh. A single eight-minute point count occurred at each station using binoculars and listening for vocalizations. Counts were conducted between 7:00 AM and 10:30 AM, when birds are most active and vocal. Time not spent conducting counts was used to search the rest of the site for species and habitats not detected during the counts.

3.3.2.1 Existing Conditions

As discussed in Section 3.3.1, existing vegetation within the areas surveyed have been highly altered over time, and predominantly consist of introduced non-native plants dominating the entire survey area. The once exception is within the Nā Pōhaku O Hauwahine native plant restoration site located along Kapa‘a Quarry Road, which is a community led native plants restoration site.

Avian Survey Results

A total of 1,448 individual birds of 34 species were recorded during the survey. Four of the species recorded: 1) Hawaiian Duck (*Anas wyvilliana*); 2) the Hawaiian Moorhen (*Gallinula galeata sandvicensis*); 3) Hawaiian Stilt (*Himantopus mexicanus knudseni*); and 4) the Hawaiian Coot (*Fulica alai*) are endemic to Hawai‘i and are listed as endangered under both federal and Hawai‘i State endangered species statutes. One species, Black-crowned Night-Heron (*Nycticorax nycticorax hoactli*) is an indigenous, resident water obligate breeding species. Four species are indigenous migratory shorebird species, and include: 1) Pacific Golden-Plover (*Pluvialis fulva*); 2) Wandering tattler (*Tringa incanus*); 3) Ruddy Turnstone (*Arenaria interpres*); and 4) Long billed Dowitcher (*Limnodromus scolopaceus*). The remaining 25 species recorded are alien to the Hawaiian Islands, and the survey results are listed under Table 3.2.

Table 3.2
Avian Species Detected In the Project Area

Common Name	Scientific Name	Status	Relative Abundance
ANSERIFORMES ANATIDAE - Ducks, Geese & Swans Anatinae - Ducks			
Muscovy	*Cairina moschata*	A	.052
Hawaiian Duck	*Anas wyvilliana*	EE	.20
Hawaiian Duck x Mallard	*Anas wyvilliana x A. platyrhynchos*	A	2.00
PHASIANIDAE - Pheasants & Partridges Phasianinae - Pheasants & Allies			
Gray Francolin	*Columba livia*	A	1.16
Domestic Chicken	*Streptopelia chinensis*	A	1.84
Indian Peafowl	*Geopelia striata*	A	6.92
COLUMBIFORMES COLUMBIDAE - Pigeons & Doves			
Rock Pigeon	*Columba livia*	A	1.16
Spotted Dove	*Streptopelia chinensis*	A	1.84
Zebra Dove	*Geopelia striata*	A	6.92
GRUIFORMES RALLIDAE - Rails, Gallinules and Coots			
Common (Hawaiian) Gallinule	*Gallinula galeata sandvicensis*	EE	0.89
Hawaiian Coot	*Fulica alai*	EE	1.48
CHARADRIIFORMES RECURVIROSTRIDAE - Stilts & Avocets			
Black-necked (Hawaiian) Stilt	*Himantopus mexicanus knudseni* *CHARADRIIDAE - Lapwings & Plovers* *Charadriinae - Plovers*	EE	0.76
Pacific Golden-Plover	*Pluvialis fulva* *SCOLOPACIDAE – Sandpipers* *Arenariinae - Turnstones*	IM	1.08
Ruddy Turnstone	*Arenaria interpres* *Limnodrominae - Dowitchers*	IM	0.56
Long-billed Dowitcher	*Limnodromus scolopaceus* *Tringinae - Tringines*	IM	0.11
Wandering Tattler	*Tringa incana*	IM	0.08
PELECANIFORMES ARDEIDAE – Herons, Bitterns & Allies			
Cattle Egret	*Bubulcus ibis*	A	3.44
Black-crowned Night-Heron	*Nycticorax nycticorax hoactli*	IR	1.04
PASSERIFORMES PYCNONOTIDAE - Bulbuls			
Red-vented Bulbul	*Pycnonotus cafer*	A	4.44
Red-whiskered Bulbul	*Pycnonotus jocosus*	A	0.56

Table 3.2 (continued)
Avian Species Detected In the Project Area

Common Name	Scientific Name	Status	Relative Abundance
CETTIIDAE - Cettia Warblers & Allies			
Japanese Bush-Warbler	*Horomis diphone*	A	1.08
ZOSTEROPIDAE - White-eyes			
Japanese White-eye	*Zosterops japonicas*	A	4.52
TIMALIIDAE - Babbler			
Red-billed Leiothrix	*Leiothrix lutea*	A	1.08
TURDIDAE - Thrushes			
White-rumped Shama	*Copsychus malabaricus*	A	0.96
MIMIDAE - Mockingbirds & Thrashers			
Northern Mockingbird	*Mimus polyglottos*	A	0.04
STURNIDAE - Starlings			
Common Myna	*Acridotheres tristis*	A	5.20
FRINGILLIDAE - Fringilline and Carduline Finches & Allies Carduelinae - Carduline Finches and Hawaiian Honeycreepers			
House Finch	*Haemorhous mexicanus*	A	5.28
Yellow-fronted Canary	*Ceithagra mozambica*	A	0.32
PASSERIDAE - Old World Sparrows			
House Sparrow	*Passer domesticus*	A	5.28
CARDINALIDAE - Cardinals & Allies			
Northern Cardinal	*Cardinalis cardinalis* *THRAUPIDAE* – Tanagers *Thraupinae* - Core Tanagers	A	1.64
Red-crested Cardinal	*Paroaria coronate*	A	1.12
ESTRILDIDAE - Estrildid Finches			
Common Waxbill	*Estrilda astrild*	A	4.36
Java Sparrow	*Lonchura oryzivora*	A	1.08
Chestnut Munia	*Lonchura atricapilla*	A	1.12

Key:
ST Status
A Alien – Introduced to the Hawaiian Islands by humans
ER Endangered Endemic – Listed as an endangered species and native and unique to the Hawaiian Islands
IM Indigenous Migrant – Native but not restricted to the Hawaiian Islands, migratory, non-breeder in Hawaii
IR Indigenous Resident – Native but not restricted to the Hawaiian Islands resident breeding species
RA Relative Abundance - Number of birds detected divided by the number of point counts (~18)

The findings of the avian survey are consistent with the current habitats present within and adjacent to the Kawainui complex and the survey area that consist of predominantly alien vegetation.

The four migratory shorebird species nest in the high Arctic during the late spring and summer months, returning to Hawai‘i and the Tropical Pacific to spend the fall and winter months each year. They usually leave Hawai‘i for their trip back to the Arctic in late April or the very early part of May. Migratory waterfowl tend to arrive in Hawaii later than shorebirds, first beginning to appear in numbers in November and leaving for their continental breeding areas by late April.

The remaining 25 species recorded are alien to the Hawaiian Islands (Table 3.2~~1~~). Historically, when there was more open water within the wetland areas, numerous other species of migratory waterfowl and shorebirds were recorded within the habitat then available. Hopefully, the continued and increased restoration and management of habitat suitable for migratory waterfowl and shorebirds will provide a much-needed wintering area for these extra-limital vagrants.

No owl species were recorded during this survey. There are two resident owl species on O‘ahu, which are the introduced Barn Owl (*Tyto alba*) and the indigenous endemic sub-species of the Short-eared Owl, or Pue‘o as it is locally know (*Asio flammeus sandwichesis*). This species has become increasingly scarce on the Island. The O‘ahu population is listed as an endangered species by the State of Hawai‘i, but it is not listed under federal statute.

It is probable that this resident indigenous species occasionally uses resources in the general project area ~~on a seasonal basis~~. This species is not habitat restricted on O‘ahu, though there certainly is less suitable nesting habitat than there once was. This species faces daunting odds on an Island as heavily populated as O‘ahu. They are a ground nesting diurnal species, and the sheer number and densities of mammalian predator on the Island make it very difficult for this species to successfully nest, except within protected areas that have a strong mammalian predator control program in place.

Endangered Seabird Species

Although seabirds were not detected during the course of the survey, several seabird species potentially overfly the site on occasion. These species include: 1) the endangered Hawaiian petrel (*Peerodroma sandwichensis*) and band-rumped storm-petrel (*Oceanodroma castro*); 2) the Wedge-tailed Shearwater or ‘ua‘u kani (*Puffinus pacificus*)~~,~~; 3) the threatened Newell’s Shearwater (*Puffinus auricularis newelli*)~~,~~; and 4) the White-Tern (*Gygis alba*). The O‘ahu population of White-Tern (*Gygis alba*) is listed as an endangered species by the State of Hawai‘i, but it is not listed under federal statute. This ephemeral species was not recorded during this survey, nor was it expected. The current resident population of White Terns on O’ahu is found on the leeward side of the island concentrated in the Waikiki area.

The primary cause of resident seabird mortality is thought to be predation by alien mammalian species at nesting colonies. The second most common cause of mortality for locally nesting seabirds occurs when they collide with man-made structures after they are disoriented by exterior lighting. If these seabirds are not killed outright, the dazed or injured birds are easy targets for predation by feral mammals.

Endangered Waterbird Species

The Kawainui and Hāmākua project area serves as habitat for four endangered species of native Hawaiian water birds: Hawaiian Stilt (*Himantopus mexicanus knudseni*), Hawaiian Coot (*Fulica alai*), Hawaiian Moorhen (*Gallinula galeata sandvicensis*), and Hawaiian Duck (*Anas wyviliana*). DOFAW presently manages Hāmākua's wetland and the restoration ponds at Kawainui as important habitat for endangered waterbirds. Currently, these are the only two areas considered important nesting habitat areas, and DOFAW implements a trapping program at these areas to control invasive mammals.

The 1992 Final EIS conducted by the US COE (USAED, 1992) determined these waterbirds generally occur within areas having more stable water levels. Such areas within Kawainui were identified as being within the middle areas of the wetland from the northern Kahanaiki to Nā Pōhaku area and the open water area where Kahanaiki and Maunawili Streams meet. The open water along the levee is another area identified. At Hāmākua, the wetland area was identified as a location where these waterbirds occur. Other areas of Kawainui's wetland are not known to serve as important nesting habitat at this time because of the overgrowth of vegetation within the wetland and along the wetland fringes that don't provide suitable habitat. If other areas become identified as being important nesting habitat, trapping programs would extend to include those areas. The following are descriptions of the four endangered Hawaiian waterbird species.

Hawaiian Stilt

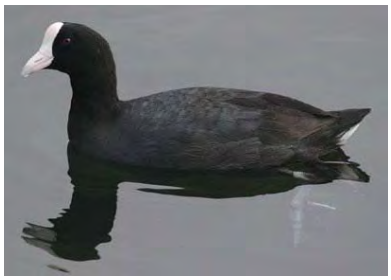


The Hawaiian Stilt or aeʻo is a distinct subspecies of the black-necked stilt (*Himantopus mexicanus*). It is a slender wading bird, black above and white below with distinctive, long, pink legs. The Hawaiian Stilt was historically found on all the main Hawaiian islands except Lanaʻi and Kahoʻolawe. Historic population estimates are unavailable, but it appears the Hawaiian Stilt was common in the late 1800s, and scarce by 1900. Over the last 30 years, the population statewide has been relatively stable or slightly increasing. Biannual surveys from 1998 through 2007 estimated the average population statewide at 1,484 birds.

Declining populations are attributed to the loss of natural wetland habitat, a decline in aquatic agriculture, greater urbanization, modification of channels and shorelines, increased siltation and filling of wetlands. Predation by introduced species and game hunting (prohibited in 1939) also contributed to the decline.

The Hawaiian Stilt can use a variety of aquatic habitats but requires mudflats or marshlands with a shallow water depth and perennial vegetation that is limited and low growing. They generally nest on freshly exposed mudflats interspersed with low-growing vegetation. Because their nests are exposed, they are more susceptible to predators such as dogs, cats, mongoose, black-crowned night herons, and cattle egrets. The presence of invasive vegetation such as pickleweed (*Batis maritima*) and California grass (*Brachiaria mutica*) also inhibit successful nesting. At Kawainui, suitable shallow habitat is limited and State bi-annual waterbird counts have resulted in few stilt observations.

Hawaiian Coot



The Hawaiian Coot or ʻalae keʻokeʻo is endemic to the Hawaiian Islands. It has a black head, a slate gray body with white under tail feathers, and a prominent white frontal shield and bill. Hawaiian Coots prefer more open water. They will nest in fresh and brackish ponds, and construct floating nests of aquatic vegetation in open water or semi-floating nests anchored to emergent vegetation.

Hawaiian coots have historically inhabited all the main Hawaiian Islands, and were most numerous on Oʻahu, Maui, and Kauaʻi. They were once fairly common in marshes and ponds. Data from the late 1950s to the late 1960s showed a decline in the population, contributing to their federal listing as endangered in 1970. Hawaiian Coots are preyed on by a variety of introduced predators including cats, dogs, mongoose, rats, fish, bullfrogs, and possibly cattle egrets. The indigenous black-crowned night heron (*Nycticorax nycticorax*) may also be a serious predator of Hawaiian Coot chicks.

Hawaiian Moorhen



The Hawaiian Moorhen or ʻalae ʻula is an endemic subspecies of the common moorhen (*Gallinula chloropus*). It is a dark gray bird with a black head and neck, with a distinctive red frontal shield. These birds prefer to forage, nest, and rest in dense emergent vegetation. Most birds encountered in exposed areas quickly seek cover when disturbed.

The Hawaiian moorhen was historically found on all the main Hawaiian Islands except Lanaʻi and Niʻihau. Today, the Hawaiian moorhen is found only on the islands of Oʻahu and Kauaʻi. By the 1940's their status was considered "precarious". Due to their secretive nature, they are difficult to census, but in the 1950s and 1960s, their numbers statewide were estimated at no more than 57 individuals. This is attributed to the decline of wetland agriculture, and loss of wetlands due to increased urbanization. Predation by introduced species also impacts ground-nesting.

Hawaiian Duck



The Hawaiian Duck or koloa maoli is one of two extant native duck species found in Hawai‘i. It is a small duck, and both sexes are mottled brown, similar in appearance to a female mallard. Hawaiian Ducks were known historically from all of the main Hawaiian Islands except Lana‘i and Kaho‘olawe, and in the 1800s, were fairly common in natural and farmed wetland habitats. By the early 20th century, there was a significant decline in population, due to factors such as predation of eggs and chicks by introduced species, habitat reduction due to agricultural practices and urban development, and local hunting pressure. By the 1960s, Hawaiian Ducks were found in small numbers and only on Kaua‘i and probably Ni‘ihau. (USFWS, 2011).

The Hawaiian Duck was reintroduced on O‘ahu through a captive breeding propagation and release program between 1958 and 1982. During this time, a total of 326 Hawaiian ducks were related by State biologists, including 177 at Kawainui Marsh. Existing duck populations on all islands are being adversely affected by hybridization with feral mallards. Biannual waterbird surveys indicate a decreasing trend in the Hawaiian Duck population and an increase in mallard-Hawaiian Duck hybrids. Today, hybridization with feral mallards is the primary threat to the recovery of this species. Damage to watersheds by pigs, goats, and other feral ungulate may pose direct impacts to nesting habitat (USFWS, 2011).

Hawaiian Ducks are still reported at Kawainui and Hāmākua marshes and other windward O‘ahu wetlands (He‘eia Marsh, Ka‘elepulu and Nu‘upia Ponds, and Ho‘omaluhia Botanical Garden). Within the Kawainui-Hāmākua project area, Hawaiian Ducks are most commonly observed around open waterways and channels.

Human Waterbird Interaction at Hāmākua Marsh

Impacts to endangered waterbirds have occurred at the unprotected perimeter of Hāmākua Marsh along this site’s northern border of Kawainui Canal with the adjacent commercial uses along Hāmākua Drive (Na Pua Makani Power Partners LLC, 2015). These impacts have included the death or disturbance of waterbirds and the accumulation of trash in the area. Local residents and neighboring restaurants often discard food in parking areas, which attracts waterbirds to eat. Waterbirds leaving the wetland to forage in parking areas have been killed by vehicles and occasionally by people. Waterbirds have also been disturbed and harmed when dog owners throw tennis balls into the wetland for their dogs to retrieve, leading to contact with waterbirds. Open access to the wetland also creates opportunities for trespassing and illegal disposal of garbage, which affects the suitability of the Hāmākua’s wetland as a nesting habitat.

To address this situation, DOFAW is planning to implement improvements along Hāmākua's property line (along Kawainui Canal) with the commercial properties consisting of fencing (4 feet tall) and informational signage. Fencing would reduce the ability of waterbirds to cross over into the parking lots and commercial business areas, and control illegal access from businesses and the commercial parking lots.

Funding for a part-time biologist to act as an on-site monitor and conduct public outreach with businesses in this area may also be provided from other sources over a possible 2-year period. The part-time biologist would serve to educate local businesses and the public about the harm caused by feeding waterbirds, as well as monitoring the area for waterbird fatalities. (Na Pua Makani Power Partners LLC, 2015). Fencing and signage improvements, such as this planned at Hāmākua, are already permitted for implementation as part of DOFAW's daily management activities and operations, and does not require land use entitlements to implement.

3.3.2.2 Potential Project Impact and Mitigation

No Action Alternative

Under the No Action Alternative, DOFAW would continue its ongoing management and enhancement of the project areas as waterbird habitat. Activities that are part of DOFAW's mission and have been previously approved include control of invasive vegetation, planting native vegetation, predator control, perimeter fencing, and phased reforestation of upland areas. Drainage repair and improvements along Kapa'a Quarry Road would be implemented as well. These improvements were described in detail in the Final EA for the Kawainui Marsh Wetland Restoration and Habitat Enhancement project (HHF, 2012).

Ongoing habitat enhancement is sensitive to the preferences of the various species of waterbirds, and improvements seek to create a diverse environment, including both open water and vegetated areas. The Hawaiian Stilt requires wadable, exposed mudflats with a water depth less than six inches and limited, low growing vegetation. The Hawaiian Coot prefers open water areas where they construct floating nests of aquatic vegetation or semi-floating nests anchored to emergent vegetation. Hawaiian Moorhen prefer to forage, nest, and rest in dense late serial vegetation. Hawaiian Ducks are now most commonly observed around open waterways and channels.

An important component of DOFAW's ongoing management activities is predator control, which includes fencing and trapping to reduce the threat to nesting birds from mongoose, dogs, feral cats and human intrusion. Feral cats are already present at Kawainui and Hāmākua, but feral cat colonies have not been a major issue with Hawaiian waterbirds as part of DOFAW's management activities. Predator control traps are presently being used to address feral cats, and this program could be expanded as wetland restoration improvements are implemented creating improved habitat for endangered waterbirds. All ongoing efforts are consistent with DOFAW's Kawainui Marsh Restoration Area Management Plan. In particular, these efforts can minimize predation of endangered seabird species and Pue'o by invasive mammalian species.

Such predator control efforts benefit Hawaiian waterbirds, but there is also a potential non-target effect associated with the unintentional capture of Hawaiian Moorhen in such traps. These traps are checked every 48 hours and they are non-lethal. If a Moorhen happens to walk into one, it is released and the trap is moved. DOFAW's biologists managing Kawainui-Hāmākua have not had any issues with Moorhen fatality within traps, and will continue to monitor and manage this trapping program.

DOFAW and its wildlife control contractors would continue to follow standard ethical treatment of animal control guidelines in the course of live trapping. If any unforeseen circumstances arise, consultation with the U.S. Fish and Wildlife Service and other experienced wildlife control operators would be conducted to modify trapping techniques to minimize to the maximum extent practicable potential impact to non-target protected avian species.

Restoration activities may have negative impacts on listed waterbirds. These impacts have occurred with other similar restoration projects at Kawainui (e.g., USACE ponds). Impacts are anticipated to be primarily associated with disturbance of nesting birds during the nesting season when restoration activities are implemented. Waterbirds disturbed when nesting may abandon their nest, eggs, or chicks. In order to minimize these impacts, specific restoration activities such as heavy clearing should be conducted in periods when waterbirds are not nesting. Prior to occurrence of these activities, areas that may serve as suitable nesting habitat would be searched by an experienced biologist to determine if nesting is occurring. If nesting is detected, restoration activities would not be initiated before it is determined that nests have failed, hatched successfully, or been abandoned.

Overall, the ongoing habitat management and enhancement efforts within the project area are beneficial for endangered Hawaiian waterbirds. As "core" wetlands identified in the Hawaiian Islands Waterbird Recovery Plan and as State wildlife sanctuaries, Kawainui and Hāmākua play an important role in supporting these protected species. DOFAW's ongoing actions contribute to the enhancement of the bird habitat, and over time, the number of birds utilizing the marsh is expected to increase.

Adverse impacts to endangered seabird species, such as the Wedge-tailed shearwater, Newell's Shearwater, and the White-Tern are not anticipated since these species were not detected in the project area. Although these species were not detected, lighting from proposed facilities and site improvements associated with DOFAW's vegetation processing site and the Kawainui SPR, Kalāheo park site may impact these species if they travel near these facilities. These birds may become disoriented if lighting is used during night construction of proposed improvements or if streetlights and exterior lighting are installed. No nighttime construction activity is planned to occur for ~~this project~~ these improvements. Outdoor lighting, such as building lighting, will be designed to be shielded to the extent possible and use the lowest wattage bulbs feasible. DOFAW staff and park users can also be educated about seabird fallout risk and options to bring downed birds to Sea Life Park for rehabilitation.

Proposed Action

Wetland Restoration and Upland Reforestation

The Pproposed Aaction would continue and expand habitat restoration efforts described above, and includes invasive vegetation control and removal, planting of native vegetation, upland reforestation, predator control, and stormwater management. These project improvements would have a beneficial effect by enhancing the potential for nesting and foraging habitat for native waterbirds by creating more open water areas and seasonal mud flats.

The principal potential impacts resulting from further wetland restoration and upland reforestation improvements under this project would be disturbance of nesting birds during the nesting season. Waterbirds that are disturbed when nesting may abandon their nest, eggs and to a lesser degree chicks. DOFAW has been managing both the Kawainui wetlands and Hāmākua for some time now, and have done an excellent job of conducting heavy clearing activities during periods when waterbirds were not nesting to minimize deleterious impacts to listed avian species to the maximum extent practical. As their biologists are part of the team that would be managing and/or participating in much of the work in the wetlands, it is not expected that those expanded restoration and reforestation activities would result in deleterious impacts to listed waterbird species.

As with the No Action Alternative, specific restoration activities, such as heavy clearing, would be conducted in periods when waterbirds are not nesting in order to minimize impacts. Prior to occurrence of these activities, areas that may serve as suitable nesting habitat would be searched by an experienced biologist to determine if nesting is occurring. If nesting is detected, restoration activities would not be initiated before it is determined that nests have failed, hatched successfully, or been abandoned. These wetland restoration and upland reforestation improvements would significantly increase the habitat and protection provided to nesting waterbirds within the project area, and these proposed efforts would result in a net benefit to all of the listed species discussed.

DOFAW's ongoing management activities and predator control would continue, which includes fencing and trapping to reduce the threat to nesting birds from mongoose, dogs, feral cats and human intrusion. DOFAW's biologists managing Kawainui-Hāmākua have not had any issues with Moorhen fatality within traps, but will continue to effectively monitor and manage this trapping program. This includes DOFAW and its wildlife control contractors continuing to follow standard ethical treatment of animal control guidelines in the course of live trapping. If necessary, consultation with the U.S. Fish and Wildlife Service and other experienced wildlife control operators would be conducted to modify trapping techniques to minimize to the maximum extent practicable potential impact to non-target protected avian species.

Structures and Trails

Short-term construction of structures associated with the education center, cultural centers, and accessory structures supporting public access (e.g. restrooms, shelters) are not expected to have a significant impact on endangered waterbirds. There are no important nesting habitat located near these sites. Other avian species within the project area are alien and common throughout the island, and would not be negatively impacted by construction activities. Construction activities involving site improvements of areas would be designed to include BMPs to not create ponds or other areas that may support standing water ponds over prolonged periods because it may attract waterbirds.

Building structures, such as the education center, are also situated in upland areas considerable distances away from the wetland and potential waterbird habitat. Therefore, waterbird nesting is unlikely to occur within these dry upland areas, and short-term construction activities should not have a negative impact. Structures supporting public access, such as observation decks, would be programmed for construction outside of the waterbird nesting season. Construction of the majority of pedestrian trails sections would not be routed near the wetland.

To minimize and avoid building construction effects on waterbirds, management measures implemented for wetland restoration activities would be conducted prior to construction. Areas within sites being constructed that may serve as suitable nesting habitat would be searched by an experienced biologist to determine if nesting is occurring. If nesting is detected, construction of structures would not be initiated before it is determined that nests have failed, hatched successfully, or been abandoned. Implementation of these measures would ensure that nesting habitat is not impacted.

Visitors to the education center would not be allowed to enter the wetland except at designated areas, such as observation decks. Parking area's associated with proposed structures are located in upland areas near existing roadways that are situated away from wetlands. Therefore, conflicts between vehicles and waterbirds should not be an issue. Facilities for cultural centers would be situated away from the wetland, and low fencing and vegetation buffers can be constructed along the wetland perimeter to physically restrict and separate cultural practices and activities. The cultural center at Kapa'a is located mauka of the wetland area identified as peat mat and remediation zones, where no wetland restoration is planned. Therefore, there is less potential for nesting and other waterbird activities occurring in this wetland area and being affected by cultural center activities.

The main potential impact that proposed improvements designed to support public access, passive outdoor recreation, and cultural practices poses to endangered waterbirds are predominantly associated with potential disturbances of nesting birds during the nesting season from visitor activities. Waterbirds that are disturbed when nesting may abandon their nest, eggs, and to a lesser degree their chicks. Interaction with waterbirds should be minimal because visitor access would be limited to specific areas and along pedestrian trails. Vegetative buffers are

planned along wetland fringes to provide separation from open water areas, mud flats, and wetland vegetation.

Once facilities and other improvements are completed allowing public access, appropriate signage and Informational and Educational (I&E) signage should be placed predominately to notify visitors of the site's importance, the legal status of the protected waterbirds, and the restrictions on public usage and behavior. Other prohibitions should support management of upland areas such as not allowing dogs within areas and prohibiting the feeding of feral cats and other wildlife. The education center thus serves an important function in providing visitor education materials and guidance, and supports monitoring of activities within the Kahanaiki to Nā Pōhaku upland area.

If necessary, DOFAW may also impose additional restrictions on public access within certain areas or times of year, e.g., during bird nesting season. DOFAW can restrict access to certain areas if waterbird nesting sites are established within more popular visitor areas. Such actions include closing off sections of the pedestrian trails that approach closer to the wetland through signage or other temporary measures to prevent access. Areas further upland would not need to be closed, and would continue to provide viewing opportunities of the wetland and area from a distance for visitors. DOFAW could also construct low fencing along pertinent sections of the wetland perimeter that would physically restrict access to areas along the wetland fringe.

The primary potential impact to endangered seabirds is from outdoor building and site lighting that may disorient these seabirds. Although endangered seabirds were not detected in the project area, appropriate design requirements would be implemented to mitigate impacts on seabirds that may overfly facilities constructed within upland areas. Accessory structures supporting public access would not have outdoor lighting because they are only intended to support day activities. Similar to the No Action Alternative, nighttime construction is not planned to occur. Outdoor lighting for buildings at the cultural centers would be required to be designed so that bulbs are shielded to the extent possible and use the lowest wattage bulbs feasible. DOFAW staff and park users will continue to be educated about seabird fallout risk and options that exist to rehabilitate injured birds. This also includes non-profit organizations operating cultural centers following similar DOFAW protocols having staff being educated about seabird fallout risk and options to bring downed birds to Sea Life Park for rehabilitation. These standard agency accepted measures would minimize effects on seabirds.

3.3.3 Mammalian Fauna

The mammalian survey was conducted by Rana Biological Consulting concurrently with the avian survey, and was limited to visual and auditory detection coupled with visual observation of scat, tracks, and other animal signs. A running tally was kept of all terrestrial vertebrate mammalian species detected within the project area during time spent on site.

3.3.3.1 Existing Conditions

With the exception of the endangered Hawaiian hoary bat (*Lasirus cinereus semotus*), or ʻōpeʻapeʻa as it's locally known, all terrestrial mammals currently found within the project area are alien species and are deleterious to native ecosystems. No mammalian species currently proposed for listing or listed under either the federal or State of Hawaiʻi endangered species statutes was recorded on site. Eight terrestrial mammalian species were detected within the project area during the survey, and are identified along with the type of detection shown on Table 3.3. The findings of the mammalian survey are consistent with the current habitat present on site and the current land usage of the area surveyed.

No endangered Hawaiian hoary bat were detected on site. However, the bat may roost and forage within open and patchy forest and open water sites in the project area. These sites are suitable roosting and foraging habitat for these bats. Hawaiian hoary bat roost in both exotic and native woody vegetation and leave young unattended in "nursery" trees and shrubs while foraging. It is possible that the bats are present ~~on a seasonal basis~~ occassionally given the potential on-site vegetation provides for bat roosting and foraging.

3.3.3.2 Project Impacts and Mitigation

No Action Alternative

Under the No Action Alternative, DOFAW management activities and operations within the project area would continue. Management efforts include a feral animal trapping program at Hāmākua and the restoration ponds to remove invasive species such as mongoose, rats, and feral dogs that were detected in the survey. Fencing is also used to keep these species, as well as humans, out of sensitive habitat areas. Any additional fencing improvements would not include the use of barbed wire, which Hawaiian hoary bats may become tangled in if they are present. These activities would continue and are an important component to overall management of the resource.

Table 3.3
Mammalian Species Detected In the Project Area

Common Name	Scientific Name	Status	Detection Type
RODENTIA - Gnawers Muridae - Old World Rats & Mice			
Rat sp.	Rattus sp.	A	V, Car
Euopean house mouse	Mus musculus domesticus	A	V
CARNIVORA- Flesh Eaters Canidae - Wolves, Jackals & Allies			
Domestic dog	*Canis familiaris*	A	V, A, Sc, Tr
VIVERRIDAE - Civets & Allies			
Small Indian mongoose	*Herpestes auropunctatus*	A	V, A, Sc
FELIDAE- Cats			
House cat	*Felis catus*	A	V, Sc, Tr
PERISSODACTYLA - ODD-TOED UNGULATES EQUIDAE - Horses, Asses & Zebras			
Domestic horse	*Equus caballus*	A	SC, Tr
ATRIODACTYLA - EVEN-TOED UNGULATES SUICIDAE - Old World Swine			
Pig	*Sus scrofa*	A	V, A, Sc, Tr, Si, Car
CERVIDAE - Antlered Ruminants Bovidae- Hollow-horned Ruminants			
Domestic cattle	*Bos taurus*	A	Sc, Tr

Key:
Status: **A** Alien – Introduced to the Hawaiian Islands by humans
Detection: **V** Visual – an animal seen **Car** Carcass –animal identified by presence of a carcass
A Audio – an animal heard **Sc** Scat – an animal detected by fecal droppings
Tr Tracks - animal detected by the presence of tracks
Si Sign – an animal detected by sign, i.e., tunnels, beds, tree scrapping etc.

Ongoing wetland reforestation initiatives would continue under this alternative. Removal of invasive plants would create more open water areas and seasonal mudflats, increasing the suitability of wetland areas as habitat for endangered Hawaiian waterbirds. These efforts should increase the number of endangered waterbirds, highlighting the importance of DOFAW's continued efforts to control mammalian predation of endangered waterbirds occurring.

Upland reforestation initiatives in the project area would continue under this alternative. Invasive trees and shrub vegetation would be removed as part of ongoing upland reforestation efforts. Although Hawaiian hoary bat were not detected in the project area, the bats may be present ~~on a seasonal basis~~ given the suitability of existing vegetation as roosting sites and places to leave young while foraging. Therefore, restoration and reforestation efforts that require clearing of large trees and shrubs during birthing and rearing season (June 1 through September 15) may impact Hawaiian hoary bats.

During this period, female bats and their pups may be unable to quickly vacate their roosts as vegetation is cleared. If trees or shrubs suitable for roosting are cleared during birthing and rearing season, there is a risk that juvenile and adult bats could inadvertently be harmed. Potential impacts from such disturbances will be minimized by avoiding disturbance of woody vegetation taller than 15-feet (4.6 meters) during bat birthing and rearing season. ~~If disturbance of trees 15-feet or taller is required during this period, trees would first be inspected by a knowledgeable individual to ensure bats are not present.~~

Improvements at the Kapa‘a Vegetation Processing Area and Kawainui SPR, Kalāheo Section should not increase the presence of invasive mammalian species or impact Hawaiian hoary bat that may be present ~~on a seasonal basis~~. ~~As mentioned, a knowledgeable individual would be consulted to determine if these bats are present in trees or shrubs that may need to be cleared if construction of these improvements overlaps with pup rearing season.~~ No clearing of large trees taller than 15-feet during the Hawaiian hoary bat birthing and rearing season would be conducted.

Proposed Action

Wetland Restoration and Upland Reforestation

The Proposed Action would expand the size of wetland restoration and upland reforestation activities beyond that under the No Action Alternative. These efforts are not anticipated to adversely impact mammalian species identified within the project area. Existing mammalian species, all of which are deleterious to native ecosystems, would continue to be present threatening endangered waterbirds. Expanded wetland restoration would continue to improve wider areas serving as habitat for endangered waterbirds resulting in the need for an expanded trapping programs. DOFAW plans to continue and expand this trapping program to control invasive mammals present as they monitor the progress of wetland restoration and waterbird activity.

Predator control fencing improvements would not use barbed wire, and thus not impact Hawaiian hoary bats. Construction of maintenance roads in upland areas along with southern and eastern ends of Kawainui would provide additional support to DOFAW’s management activities under this alternative. This would provide improved access for staff to monitor trapping programs, wildlife activity, and evaluate the effectiveness in control predatory mammals.

Structures and Trails

The short-term construction of pedestrian trails, education center, cultural centers, and accessory structures supporting public access would not have an impact on mammalian species identified within the project area because species are invasive and deleterious to native ecosystems. ~~Measures would be implemented for c~~Construction activities that require the clearing of large trees and shrubs taller than 15 feet would not be conducted during the bat birthing and rearing

season (June 1 through September 15) ~~to avoid impacting Hawaiian hoary bats that may be present. Disturbance of woody vegetation taller than 15-feet (4.6 meters) during bat birthing and rearing season would be avoided, if possible. If disturbance of trees 15-feet or taller is required during this period, trees would first be inspected by a knowledgeable individual to ensure bats are not present.~~

Construction of recreational trails will allow the public greater access to the project area and may increase the presence of domesticated dogs, which are often walked illegally within portions of the project area designated as State Wildlife Sanctuaries. DOFAW would continue to enforce rules prohibiting pets in these wildlife sanctuary areas under their jurisdiction, and visitors to the education center and associated upland areas would similarly be prohibited from bringing pets.

The education center would serve an important function in educating visitors of not introducing invasive mammals or bringing pets to this area, and staff operating the center would support monitoring of activities. Activities associated with the cultural centers would similarly abide by these same restrictions and would support stewardship and monitoring of their areas for potential violations of regulations and restrictions.

3.4 WATER RESOURCES

This section discusses water resources including groundwater, watershed, surface and coastal resources. AECOS, Inc. conducted an aquatic resources assessment for this project that included background discussion of the hydrology associated with the Kawainui-Hāmākua project site (AECOS, 2017). The report also covers the results of aquatic biological surveys conducted, and a copy of this report is included in Appendix D.

Another important reference incorporated includes the *Koʻolau Poko Watershed Management Plan* (KPWMP) (Townscape, 2012), which is a long-range 20-year plan for the preservation, restoration and balanced management of ground water, surface water, and related watershed resources in the Koʻolau Poko Development Plan District on Oʻahu. The KPWMP was prepared for the Honolulu Board of Water Supply (BWS) and the City Department of Planning and Permitting. Other reference documents include *Studies Relevant to Restoration Efforts in Kawai Nui Marsh* (Guinther et al, 2004), and other published sources.

3.4.1 General Hydrology and Watershed

The Kawainui-Hāmākua project site includes large wetlands that are located within a drainage basin on the windward side of Oʻahu that encompasses the floodplain of Maunawili, Kahanaiki, and Kapaʻa streams. As discussed in a previous section, the geologic events that led to the creation of Kawainui-Hāmākua started with the collapse of the northeastern face of the Koʻolau Volcano (the Nuʻuanu avalanche).

Eventually, the Kawainui and Kaʻelepulu ocean embayments formed by erosion of the remnant face of the Nuʻuanu avalanche scarp in an area previously occupied by the ancient Koʻolau caldera. The lower portion of this incised stream valley network was drowned during Holocene sea level rise, forming an open marine embayment similar to present-day Kāneʻohe Bay. Sea level then started dropping and the basins became the site of successive phases of sedimentation in marine, then brackish, and finally freshwater lagoons. The transformation from marine to nearly freshwater was enhanced by accretion of reef and sand across the mouth of the embayments.

Prior to human intervention, a single outlet (in the vicinity of Kaʻelepulu Stream mouth) discharged water from these aquatic features into Kailua Bay, although it has been suggested that a second outlet existed closed to the Oneawa end of the Bay. Alluvial sedimentation and human activities (e.g., filling and dredging) resulted in the altered water features present on the Kailua coastal plain today. This consists of a more or less freshwater pond surrounded by a residential community (Enchanted Lake) and a freshwater wetland serving as a flood control basin (Kawainui) for a residential community (Coconut Grove).

Construction of the levee and other flood control projects in the 1940s through 1960s isolated Hāmākua from Kawainui. Hāmākua's wetland now lies adjacent to Kawainui Canal, which drains the Coconut Grove neighborhood. The outlet for Kawainui's wetland starts as a narrow channel on the mauka side of the flood-control levee, tidal but flowing northwest, becoming the Kawainui Canal that empties into the north end of Kailua Bay.

Kawainui is now a large, former lagoon more than 98 percent covered by vegetation. Most of this vegetation does not consist of a thin layer of floating plants like *Salvinia molesta* or water hyacinth (*Eichhornia crassipes*), but is a community of wetland and some upland species supported on a layer of floating peat material that generally exceeds 1 foot in thickness. This mat floats on water or on a water-sediment slurry, or rests directly on mud. The absence of open water means there is precious little habitat for wetland birds, and minimal dissolved oxygen to support life in the water beneath the blanket of peat.

Wetlands, such as Kawainui and Hāmākua, provide an important hydrologic function by regulating the movement of water within a watershed. Wetlands store precipitation and surface water flows, then slowly release the water into associated surface water bodies, ground water and the atmosphere. Kawainui plays an important hydrologic role within the Kawainui watershed, slowing the momentum and erosive potential of water flow and functioning as a flood control basin to protect the downstream areas of Kailua Town. Sediments transported from upland areas have time to settle, and nutrients and other pollutants are filtered out, contributing to improved water quality in Kailua Bay.

A watershed is defined as a drainage basin that catches, collects, and stores water that travels toward the ocean via rivers, streams, or through subterranean springs or seepages (Townscape, 2012). Water from the ocean is heated by the sun and is blown inland by trade winds. As moisture-laden air approaches the high mountain ranges, it rises, cools and condenses, causing rain on the island. Some rain is absorbed by plants, some of it absorbed underground, and the remainder flows into streams and other surface waters, then ultimately to the ocean.

3.4.1.1 Existing Conditions

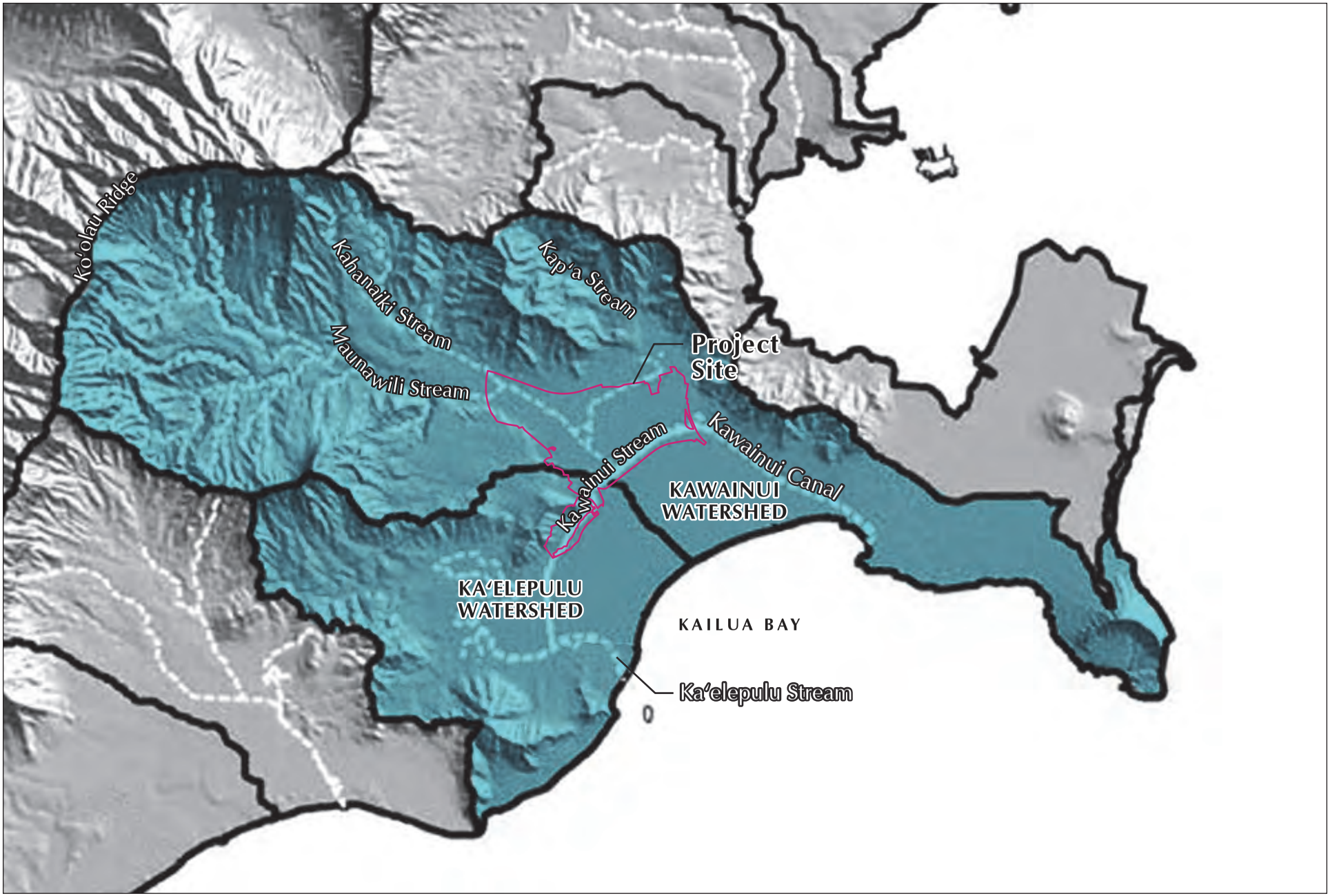
The State of Hawai‘i has identified 19 watersheds in the Ko‘olaupoko area of O‘ahu, which encompasses much of the windward side of the island and includes the Kawainui-Hāmākua project area. Studies of this watershed area include the KPWMP along with a *Ko‘olaupoko Watershed Restoration Action Strategy* (KBAC, 2007), and State DLNR, Division of Aquatic Resources (DAR) *Atlas of Hawaiian Watersheds and Their Aquatic Resources* (April, 2008).

The project area is situated within a larger watershed generally corresponding to the Kailua ahupua‘a, that is further divided into the Kawainui and Ka‘elepulu watersheds (KBAC, 2007) as shown on Exhibit 3.8. The Kailua watershed encompasses just over 20 square miles of area and drains into Kailua Bay. The watershed is flanked by the Pali slopes, and water gradually flows into the foothills (Olomana Peak, Olomana Ridge, Olumawao, Aniani Nui Ridge, Pu‘uoehu, Keaalu, Mahinui, and Pu‘u Papa‘a) before entering the coastal plain.



Exhibit 3.8 Kailua Ahupua‘a Watershed

Figure 3.6 illustrates the general boundaries for both the Kawainui and Ka‘elepulu watersheds within this larger ahupua‘a watershed based upon the KPWMP. The majority of the project area is located in the lower region of the Kawainui watershed (DAR Watershed Code 32013). Hāmākua and the adjacent Pu‘uoehu Hillside extend into the northwestern periphery of the Ka‘elepulu watershed (DAR Watershed Code 32014). There is minimal water inflow from the watershed into Hāmākua, and this wetland does not play a significant role in the hydrology of the Ka‘elepulu watershed (DAR, 2008).



Source: Koʻolau Poko Watershed Management Plan (Townscape, 2012)

Kawainui - Hāmākua Master Plan Project

Figure 3.6 - Kawainui and Kaʻelepulu Watersheds

Kailua, Oʻahu

NOT TO SCALE

HHF PLANNERS
places for people

Kawainui Watershed and Hydrology

The Kawainui watershed extends from Maunawili and Olomana and west to the Koʻolau Mountains down to the shoreline on the northern end of Kailua Bay. The KPWMP estimates this watershed to be about 14.7 square miles as shown on Figure 3.6, while the DAR's study estimates this watershed encompassing a total area of about 11.3 square miles (7,232 acres) and extending up the mountain range to an elevation of 3,081 feet (DAR, 2008). As shown on Figure 3.6, three streams within the watershed that flow into Kawainui are Maunawili Stream, Kahanaiki Stream, and Kapaʻa Stream. Several tunnels and flumes transport water from the upper reaches of these streams, exporting it to the neighboring Waimānalo watershed. Other freshwater inputs from runoff, springs, and intermittent streams feed water and sediment into the system. A water budget has been proposed of 9.5 mgd for all stream inputs, 3.2 mgd lost to evapotranspiration, and 6.3 mgd discharged through the Kawainui Canal (WOAI, 1994).

The land within the Kawainui watershed includes both public and privately-owned land. Approximately 35 percent of the land is managed by the state or city governments and the remaining 65 percent is controlled by private entities. The majority of the land is within the State Conservation District (66.7%), with 19.1% in the Urban District and 14.2% in the Agricultural District (DAR, 2008).

Kawainui's general hydrology is primarily a palustrine wetland, which is essentially a freshwater system dominated by low-growing, herbaceous vegetation. Kawainui was, in the not too distant past, a marine embayment. When sea level fell, the embayment became further isolated by accretion of a sand bar across the ocean front. The impact of stream flow from the rather significant watershed of Maunawili Valley gradually shifted Kawainui from an estuarine body of water to more of a freshwater one. A low berm on the mauka side of the shallow channel, which parallels the levee on its mauka side, isolates Kawainui from tidal influence via the Kawainui Canal and presumably maintains water level in the marsh at around +3 feet MSL. However, water level in the wetland can vary substantially depending on inputs from the mauka drainage basins.

The interaction of the moisture laden tradewinds with the Koʻolau mountain range produces orographic precipitation with maximum rainfall occurring along the ridge crest. Median annual rainfall may exceed 150 inches along this part of the crest of the Koʻolau, and averages about 84 inches in upper Maunawili Valley, far exceeding losses by evapotranspiration (WOAI, 1994). Median annual rainfall of about 50 inches over Kawainui is exceeded by estimated annual evapotranspiration of 70 inches, with a net loss of 20 inches annually. Median annual rainfall continues to decrease towards the coast, with around 40 inches in Kailua and 30 inches at the northeast tip of Mōkapu Peninsula.

Flood storage capacity of Kawainui was increased to 3,000 acre-feet after the levee was constructed in 1966. Additional improvements to the levee in 1998 have further increased the flood capacity of the system.

Kaʻelepulu Watershed and Hydrology

The Kaʻelepulu watershed includes the neighborhoods of Enchanted Lake and Lanikai. The watershed is formed on the slopes of Mount Olomana, at a maximum elevation of 1,621 feet, and extends down to Kailua Bay, encompassing a total area of 4.6 square miles (2,944 acres) based upon DAR's study. The KPWMP shown on Figure 3.6 includes a slightly larger area estimating the watershed to encompass about 5.4 square miles. Kaʻelepulu Stream also drains the Kaʻelepulu Pond ("Enchanted Lake") area, which is located outside (southwest of) the project area. No further information on the water budget of Hāmākua appears to be available.

The majority of the land within the Kaʻelepulu watershed is privately owned (91%), with the remaining 9 percent of the land managed by the state, city, or federal governments. In 2008, 66.1 percent of the watershed was in the State's Urban District, with the remainder in the agricultural (5.5%) and conservation (28.4%) districts (DAR, 2008).

Both Kawainui and Kaʻelepulu Streams are the remains of former natural streams that originally provided drainage for Kawainui and Kaʻelepulu Pond. Drainage patterns within the watershed were drastically altered with the construction of flood control projects. In addition, when the Enchanted Lake housing development was constructed, Kaʻelepulu Stream and its tributary Kaʻelepulu Pond were dredged, filled and channelized.

Prior to construction of the Kawainui flood control levee, Kawainui Stream was the outlet for both Kawainui and Hāmākua. Today, Kawainui Stream (sometimes called Kawainui Canal or Hāmākua Canal) is fed by stormwater runoff from the Coconut Grove subdivision area and by ground water seepage from Kawainui. Kawainui Stream flows beside Hāmākua, connects with Kaʻelepulu Stream, and discharges into Kailua Bay. The mouth of Kaʻelepulu Stream is often blocked by accumulated beach sand, which limits the capacity of the system to exchange water with the ocean. The stream mouth is opened regularly by City personnel in an effort to maintain and improve water quality and prevent algal growth in Kaʻelepulu Stream and Pond.

The Puʻuoehu hillside mauka of Hāmākua is devoid of surface stream features. The location receives approximately 40 inches of rainfall per year. The bulk of this runoff ends up in Kawainui and Hāmākua's wetlands with a portion draining towards Kaʻelepulu Pond.

Koʻolaupoko Watershed Management Plan (KPWMP)

The *Koʻolau Poko Watershed Management Plan* (Townscape, 2012) is a long-range plan for the preservation, restoration, and balanced management of ground water, surface water, and related watershed resources in Oʻahu's Koʻolau Poko District. The KPWMP is one of eight watershed management plans prepared for Oʻahu's eight Development Plan (DP) areas. Collectively, these district-specific watershed management plans would form the updated Oʻahu Water Management Plan.

Chapter 4 of the KPWMP addresses "Plan Objectives, Water Supply and Watershed Management Projects and Strategies." The five major objectives of all O'ahu Watershed Management Plans, including the KPWMP are:

1. Promote sustainable watersheds
2. Protect and enhance water quality and quantity
3. Protect Native Hawaiian rights and traditional and customary practices
4. Facilitate public participation, education, and project implementation
5. Meet future water demands at reasonable cost

The KPWMP identifies watershed management "projects and programs with project champions," and "watershed management strategies" by Neighborhood Board area. Two identified projects/programs applicable to the project area are identified below, and further information of these programs are in the KPWMP.

1. #24, Management and Stewardship of Kawainui Marsh
2. #25, Hāmākua Marsh Ecosystem Restoration Program

3.4.1.2 Potential Project Impact and Mitigation

No Action Alternative

The No Action alternative would include the continuation of ongoing wetland restoration and upland reforestation efforts. These activities would strengthen the functional values of Kawainui and Hāmākua's wetlands by increasing retention, serving as a sediment trap, contributing to improved nearshore water quality, and regulating the movement of water before it discharges into Kailua Bay. Reducing terrestrialization of Kawainui's wetland would improve water flow through the basin and its function as flood control for the area. These actions would therefore improve this portion of the watershed under DOFAW's control and jurisdiction.

These wetland restoration, upland reforestation, and accessory improvements (e.g. drainage) efforts are also consistent with the KPWMP's objectives and strategies for the preservation, restoration, and balanced management of ground water, surface water, and related watershed resources. These activities support the management and stewardship of the Kawainui and Hamākua ecosystems, and subsequent portion of the watershed area under DOFAW jurisdiction.

DOFAW improvements to their management and research station would support restoration and management activities at Kawainui that contribute to improving wetland functional values and this section of the watershed. The vegetation processing site would similarly support these activities by providing a site with facilities to process vegetation removed. Construction of recreational improvements at Kalāheo Park would not have adverse impacts on the wetland's hydrologic role or its ability to perform these functions within this portion of the watershed. Improvements would be located outside the wetland area. During construction, BMPs would be used to avoid soil runoff into the wetland areas.

Proposed Action

DOFAW and DSP cannot control what occurs in the larger watershed because those mauka areas are outside of the Kawainui and Hāmākua project area, are not under DOFAW and DSP jurisdiction. Furthermore, the purpose and need for this project is not to improve the watershed area outside of the project site limits. However, DOFAW can manage the wetlands within the Kawainui and Hāmākua project area to support and improve their function and value within the watershed.

The Proposed Action would allow DOFAW to expand their wetland restoration and upland reforestation efforts to additional areas within Kawainui and Hāmākua and further reduce terrestrialization of wetlands. These activities would further enhance the wetland's ability to provide an important hydrologic function by regulating the movement of water within this area of the watershed under DOFAW jurisdiction before discharging into Kailua Bay. Sediments transported into the project area from upland areas have time to settle, allow plants to filter out nutrients and other pollutants, all of which contribute to improved water quality in Kailua Bay. Proposed wetland restoration, upland reforestation, and accessory improvements (e.g. drainage) efforts would be consistent with the KPWMP's objectives and strategies for the preservation, restoration, and balanced management of ground water, surface water, and related watershed resources.

Permanent facilities constructed at DOFAW's management and research station would greatly improve facilities used by staff for research, management, and overall operations supporting restoration and management activities at Kawainui. These facilities would support DOFAW's efforts to improve wetlands and their function within the watershed.

Educational and recreational proposals such as the education center and trails support current initiatives for hands-on learning. They would provide new opportunities to appreciate and learn about the watershed. Schools, universities, and community groups could participate in scientific data collection and help create data sets that could be used by DOFAW in its management efforts. These proposals directly support the KPWMP objectives to: 1) promote sustainable watersheds; 2) protect and enhance water quality and quantity; 3) protect Native Hawaiian rights and traditional and customary practices; and to 4) facilitate public participation, education, and project implementation.

Cultural centers planned for use by non-profit organizations would include requirements to support DOFAW and DSP educational programs as well as implement stewardship activities to maintain those areas, all of which support DOFAW efforts and have a positive effect on wetland restoration, upland reforestation, and the watershed. ~~Improvements at the Kawainui SPR, Kalāheo park site would essentially be the same as under the No Action Alternative, with the exception of adding a hale waʻa and not constructing the pedestrian bridge. These changes would not negatively impact wetlands and its function within the watershed.~~

The project would continue and expand the watershed management projects and programs that were endorsed by the KPWMP. Several of the KPWMP's stated Watershed Management Strategies (District-Wide Strategies) are being addressed by project improvements. These district-wide and Kailua-specific recommendations include:

1. #04, Native Plant Propagation Program
2. #05, Establish Alien Plant Control Programs
3. #06, Establish Fencing Enclosures in High Priority Areas for Feral Pig Control
4. #08, Minimize the Impacts of Small Mammals on Watershed Resources
5. #16, Promote Kalo Restoration Projects
6. #23, Encourage Water Efficient Fixtures in Current and Future Development
7. #24, Encourage Low Impact Development Design Concepts in Future Development
8. #35 Maintain "Green Spaces" in Kailua

3.4.2 Groundwater

3.4.2.1 Existing Conditions

Groundwater Hydrology

Groundwater is water beneath the land's surface and stored in aquifers, permeable rock formations that are saturated with water. Groundwater can be brought to the surface through natural springs or by pumping. In Hawai'i, groundwater is the primary source of municipal water and is also used for agricultural and industrial purposes. The most abundant form of groundwater on O'ahu is the basal aquifer, a lens of fresh to brackish water floating on sea water. In parts of O'ahu, including the area of Kawainui, groundwater in the basal aquifer is confined by the overlying caprock and is under pressure. Waters that flow freely to the surface from wells that tap the basal aquifer are referred to as artesian.

Another type of aquifer found on O'ahu is the caprock aquifer, which consists of various kinds of unconfined and semi-confined groundwater. The caprock in the area of Kawainui is a relatively thick (probably greater than 700 feet) sequence of permeable limestone interbedded with nearly impermeable clay layers. This thick sequence of impermeable clays separates the caprock aquifer from the basal aquifer. These clays and the artesian nature of the basal aquifer severely restrict the downward migration of groundwater from the upper caprock aquifer (WOAI, 1994).

Groundwater beneath Kawainui consists of a sedimentary caprock aquifer resting on a basalt aquifer. The caprock aquifer is classified as a basal, unconfined, sedimentary aquifer. The protection status for the caprock aquifer corresponds to groundwater that is used, but not as an ecological or drinking water source, is replaceable, and has a high vulnerability to contamination. The basalt aquifer is classified as a basal confined, flank aquifer. The protection status for the basalt aquifer corresponds to groundwater that is currently used, but not as an ecological or

drinking water source, is irreplaceable, and has a low vulnerability to contamination (Wil Chee, 2008).

Recharge of the aquifer occurs in the interior mountainous areas that experiences higher rainfall. Groundwater then flows from the recharge areas to coastal discharge areas. Frictional resistance to flow causes the groundwater to accumulate within the island until it attains sufficient hydraulic head to overcome the friction. Therefore, basal groundwater always slopes toward the shoreline. The hydrological gradient within the Kawainui area is anticipated to be toward the northeast, generally flowing from the southern end of Kawainui toward Kawainui Canal and Kailua Bay.

Groundwater Management

The State DLNR, Commission on Water Resource Management (CWRM) is responsible for managing and protecting the state's surface and groundwater supply. The CWRM has established groundwater hydrologic units to provide a consistent basis for managing groundwater resources. A coding system has been established under the State's Water Resource Protection Plan that classifies and describes the islands aquifers. The system is comprised of Aquifer Sectors with smaller Aquifer Systems located within these sectors (CWRM, 2008).

The Kawainui-Hāmākua project area is located within O'ahu's Windward Aquifer Sector (306) which has an estimated sustainable yield of 91 million gallons per day (mgd). The Windward Aquifer Sector is further divided into four aquifer systems: the Ko'olauloa, Kahana, Ko'olaupoko, and Waimānalo aquifers. The project area is located within the Waimānalo Aquifer system (30604), which extends from the ridgeline of the Ko'olau mountains to the shoreline, and in a south to north direction from Waimānalo to the beginning of Kāne'ohe.

The Waimānalo Aquifer system primarily contains high-level groundwater (CWRM, 2008). The Waimānalo aquifer is subdivided into two layers with distinct hydrogeological characteristics (DOH Aquifers 2011). The uppermost aquifer is characterized by sedimentary, non-volcanic geology. This aquifer is currently used with low salinity and is ecologically important. This water is irreplaceable and highly vulnerable to contamination.

The lower aquifer is characterized by basal, confined geology where the aquifer is bounded by impermeable dike geology. These waters are currently used for drinking and possess fresh water salinity. The waters are considered irreplaceable with low vulnerability to contamination. The Waimānalo Aquifer system has a sustainable yield of 10 mgd. Within this system, Kawainui serves as a basin for surface water flow into the wetlands and provides some recharge of the groundwater aquifer system.

Groundwater in the Pu‘uoehu hillside is stored within an aquifer characterized by dike compartment geology. These freshwaters are unconfined and located within the upper surface of a saturated aquifer. These water resources are not in contact with seawater and possess freshwater salinity. The waters are currently used for drinking, have a high vulnerability to contamination, and are considered irreplaceable.

Groundwater Quality

The quality of groundwater in the Kawainui-Hāmākua project area is considered high, and all of the area’s ground water meets Federal and State drinking water standards (Townscape, 2012). The BWS and the State Department of Health (DOH) regularly monitor drinking water quality for traces of more than a 100 different types of natural and human-induced contaminants. All tests are performed at the water source. Monitoring of certain types of contaminants such as coliform bacteria is conducted throughout the distribution system. Contaminants that may enter drinking water as a result of water flowing through the water delivery system, such as lead and copper, are tested both at the source and also at the consumer’s tap.

To further safeguard drinking water sources from contamination, BWS, DOH, and the U.S. Environmental Protection Agency (USEPA) have several other monitoring and treatment programs.

The State DOH regulates the underground injection control (UIC) program to protect the quality of the state’s underground sources of drinking water from pollution by subsurface disposal of fluids under Chapter 11-23, HAR (State, 2000). Under these regulations, UIC maps show exempted aquifers from underground source drinking water that are situated below (makai) this line. Exempted aquifers are those that: 1) do not currently serve as a source of drinking water; and 2) will not in the future serve as a source of drinking water due to several criteria. The UIC line generally runs mauka of Kamehameha Highway, along Maunawili Road, and along the top of ridgelines as shown on Exhibit 3.9. Therefore, the Kawainui and Hāmākua project area are located below and well away from this UIC line indicating they are situated above exempt aquifers.

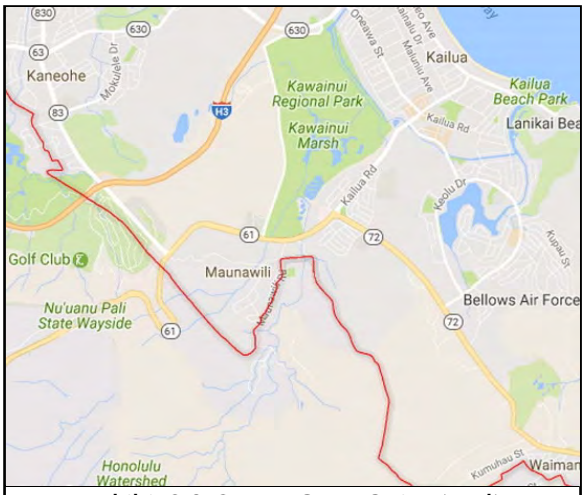


Exhibit 3.9 State DOH UIC Line (Red)

3.4.2.2 Potential Project Impact and Mitigation

No Action Alternative

Continuation of ongoing wetland restoration and upland reforestation efforts should not have a significant impact on the aquifer below this project area because it not considered a drinking water source and is located below (makai) the State DOH's UIC line. Any herbicide used for wetland restoration and maintenance activities to control vegetation would be approved for such use. Accessory improvements, such as drainage culvert repairs, should similarly not negatively impact the underlying aquifer. Restoration and management of Kawainui and Hāmākua's wetlands are intended to improve its functional value that includes stormwater retention and allowing vegetation to filter out nutrients and other pollutants before infiltration and recharge of the underlying aquifer. As a result, these activities conducted by DOFAW should have an overall beneficial impact on the underlying aquifer and not negatively impact the aquifer system sustainable yield.

Improvements to DOFAW's management station and vegetation processing site would support their restoration and management activities at Kawainui that contribute to improving wetland functional values and the underlying aquifer system. DOFAW already has a septic tank system serving their restroom facilities at their management station, and a septic tank system would similarly be provided at facilities serving the vegetation processing site. The aquifer below this site, next to the City's model airplane park, is not a drinking water source and would not be negatively impact by the small wastewater generated from vegetation processing operations. Construction of recreational improvements at Kalāheo Park would not have adverse impacts on the wetland's functional value or the underlying aquifer from restroom facilities.

Proposed Action

Proposed project improvements are expected to have minimal effect on both the volume and quality of groundwater within the underlying aquifer. Wetland restoration and upland reforestation activities would be expanded to additional areas within Kawainui utilizing techniques similar to what is currently being done. Expansion of wetland area at Hāmākua would increase its functional value (e.g. filtering pollutants). These improvements would thus enhance wetlands and its function within the hydrologic system providing an overall improvement to the underlying aquifer systems by filtering nutrients and pollutants and groundwater recharge of the underlying aquifer even though these aquifers are not drinking water sources.

The removal of invasive vegetation and as part of vegetation control maintenance activities would occasionally require the use herbicides. But only approved herbicide would be used and would not adversely impact water sources within the underlying aquifer. DOFAW has obtained State NPDES general permit coverage for application of herbicide and pesticide within wetland and wildlife sanctuaries statewide.

The construction of parking and staging areas, pedestrian and hiking trails, and accessory passive outdoor recreational facilities (e.g. observation decks, pavilion) should have minimal effect on groundwater resources. Parking and staging areas would be constructed using pervious material, such as gravel, that would continue to allow infiltration into the underlying aquifer. Pedestrian trails would also utilize pervious material, and hiking trails would be dirt or grass. Accessory outdoor recreational structures ~~and boardwalks constructed across wetlands and drainageways~~ would consist of relatively small areas, allow rainfall to sheet flow into the surrounding wetland for infiltration, and should have a minor, if any, effect on the underlying aquifer.

New structures constructed as part of the education center, cultural centers, permanent facilities at DOFAW's management station~~, and the hale waʻa at Kalāheo park~~ would increase the amount of impervious areas within those sites. Actual areas created would be subject to the design phase for site and building improvements when implemented. The total increase in impervious areas based upon current project concepts is estimated to generally be in the range of about 6.6 acres spread over various upland areas at Kawainui and Hāmākua.

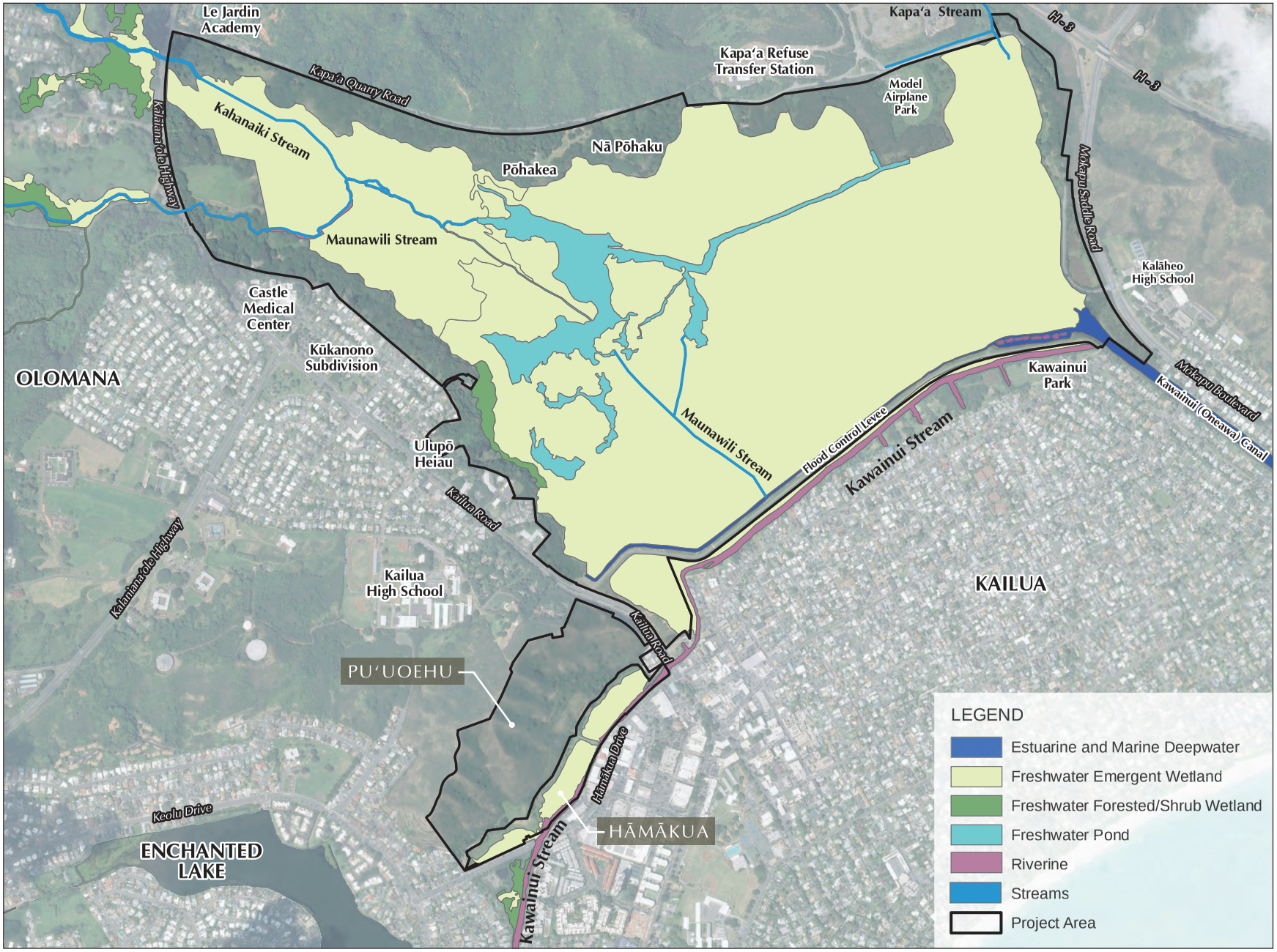
Site design for improvements would need to incorporate measures to detain increased runoff generated using detention basins or other measures. As a result, the net increase in stormwater runoff from these sites should generally equal existing conditions. This change is not expected to have a significant impact on the underlying aquifer systems and groundwater, which is not a drinking water source. Stormwater runoff discharged into the wetland would be detained within this basin to allow for infiltration and filtering of nutrients and pollutants.

New comfort stations included at applicable sites would utilize septic treatment systems or other possible sustainable design measures, such as constructed wetlands, and be determined during the design process when implemented. These systems would be designed in accordance with applicable State regulations. The comfort station ~~at the Kalāheo Park site and~~ at Waiʻauia would be connected to the municipal wastewater system that are available along adjacent roadways further reducing the effect of treated wastewater on the underlying aquifer system.

3.4.3 Streams

3.4.3.1 Existing Conditions

There are four streams, the Kawainui Canal, and other low-lying drainageways located within the Kawainui-Hāmākua project area. Three major tributaries that flow into Kawainui are Maunawili Stream, Kahanaiki Stream, and Kapaʻa Stream. Kawainui Stream is located makai of the levee receiving runoff from residential areas in Kailua, and flows toward Hāmākua and Kaʻelepulu Pond. Figure 3.7 identifies these streams as Kahanaiki Stream, Maunawili Stream, Kapaʻa Stream, and Kawainui Stream. The names of these streams vary under different references, but are referenced in this document as that identified on Figure 3.7.



Source: State Department of Health, Kapa'a Stream Study (May 2007) and State of Hawai'i GIS

Kawainui - Hāmākua Master Plan Project

Figure 3.7 - Streams and Wetlands

Kailua, O'ahu

0 800 1,600 FEET

HHF PLANNERS places for people

Maunawili Stream is the main source of inflow into Kawainui. Other sources of inflow into Kawainui include peripheral drainages, smaller, non-perennial streams, and surface runoff from upland areas. Most of the surface runoff comes from drainage systems along Kapa‘a Quarry Road, Kalaniana‘ole Highway, and Kailua Road. Waters from these streams and wetlands eventually flow into Kawainui Canal that discharges into Kailua Bay.

Kawainui Stream runs along the makai side of the levee flowing in a north to south direction toward Wai‘auia and then to Hāmākua. Surface runoff feeding into this stream comes from the Coconut Grove subdivision and businesses along Hāmākua Drive. Kawainui Stream travels past Hāmākua on its way to Ka‘elepulu Pond and into Ka‘elepulu Stream, before emptying into Kailua Bay.

The Kawainui watershed extending from Maunawili and Olomana up to the Ko‘olau Mountains serves as the primary water source for both Kahanaiki and Maunawili Streams before they enter Kawainui. Previous studies have estimated freshwater inflow from all sources into Kawainui at anywhere from a low of 6.8 mgd to a high of 13.1 mgd.

Other sources reviewing stream flow data back in 1994 estimated flows from Maunawili and Kahanaiki Streams into Kawainui’s wetland to be 12.3 mgd (98%) and 0.3 mgd from other sources. Kawainui generally drains in a south to north direction, toward the ocean and Kawainui Canal. It is estimated that outflow (discharge) from Kawainui is approximately 4.6 mgd through evapotranspiration and 8.0 mgd through groundwater seepage and surface outlets (USACE, 2008).

Hāmākua is located downstream from Kawainui. As already discussed, Kawainui Stream located on the makai side of the flood control levee used to be the primary drainage for Kawainui, and ran past Hāmākua on its way to Ka‘elepulu Pond. The construction of the flood control levee in the early 1960’s cut off upstream flow from Kawainui to Kawainui Stream. As a result, Hāmākua became dependent on rainfall runoff and saltwater backed up from Kailua Bay. No information is available on total water inflow into Hāmākua.

Streams Descriptions

Maunawili Stream. Maunawili Stream is a perennial stream with a run of 22 miles, ~~and~~ is the longest stream in the Ko‘olaupoko district, and is comprised of a network of many smaller intermittent streams and tributaries within Maunawili Valley (CWRM, 2008). The *Hawai‘i Stream Assessment (HSA)* identifies Maunawili Stream (HSA Code 3-2-13) as the primary perennial stream (i.e., continuous, year-round flow) in this area with others serving as tributaries (HCPSU, 1990). The HSA Code is based upon Maunawili Stream flowing into Kawainui Canal before discharging into Kailua Bay at this canal’s mouth. Maunawili Stream is categorized as a small stream due to median flows being less than 10 cubic feet per second (cfs) (HCPSU, 1990).

Kahanaiki and Kapa‘a Streams are two smaller tributaries that feed into Kawainui’s wetland and contribute to the section of Maunawili Stream within Kawainui as shown on Figure 3.7. Maunawili Stream generally runs in a south to north direction entering Kawainui from the south end across Kalaniana‘ole Highway. Beneath the highway, Maunawili Stream is incised about 6 to 10 feet deep and is about 25 feet wide (AECOS 2017a). The stream channel turns to the northwest after entering the wetland, avoiding a tongue of upland created by sedimentation from Maunawili Valley. Maunawili Stream then connects with Kahanaiki Stream, and flows northbound within the wetland before reaching the mauka side of the levee where it eventually discharges into Kawainui Canal (Exhibit 3.10).

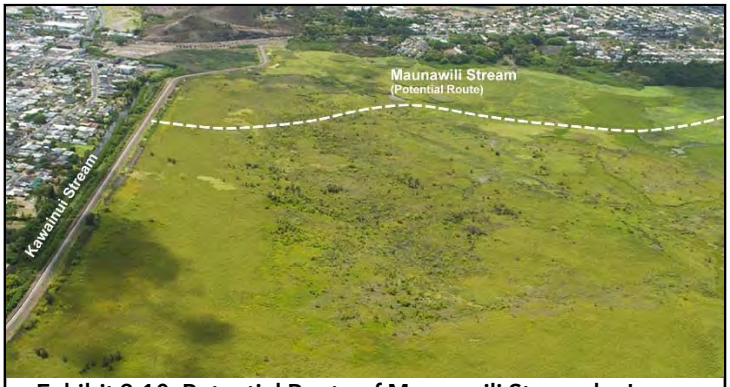


Exhibit 3.10 Potential Route of Maunawili Stream by Levee (Route based on data from Hawai‘i State DAR and CWRM)

On the south end, Maunawili Stream runs between the restoration ponds, where it is typically fairly shallow varying from about 2 to 4 feet deep. Within the restoration ponds area, the bed and banks of this stream are easily distinguishable (Exhibit 3.11), but are not as definable further north where terrestrialization is more prevalent.



Exhibit 3.11 View of Maunawili Stream Between Restoration Ponds

Maunawili Stream is comprised of a network of smaller tributaries including more than 50 intermittent and perennial springs located in the back of Maunawili Valley (outside the project area). These smaller tributaries include Palapū, ‘Ōma‘o, Makawao, and Olomana streams.

An average of 1.4 mgd of water from Maunawili Stream is diverted by the Maunawili Ditch to the Waimānalo Irrigation system, a State-owned and operated system. This diversion occurs above (inland of) the Maunawili residential subdivision. The pumping of water from Maunawili Stream to support sugar cane cultivation in Waimānalo began in 1923, and is believed to have had a major impact on Kawainui (Townscape, 2012). Other modifications to Maunawili Stream include various drainage improvements and channelization within urban areas to minimize flooding in areas near the stream that pass near residences in Maunawili Valley. Major drainage improvements around Kawainui include the installation of a weir by Kān‘ohe Ranch in the early 1950s, and construction of Kawainui Canal in 1966. These improvements blocked the flow of

water from the wetland to the southern portion of Kailua Bay. Water from Kawainui now flows through the Kawainui Canal before entering the bay (CWRM, 2008).

Prior to 1950, there were over 100 operating stream gages in Koʻolaupoko operated by the United States Geological Survey (USGS). Over the last 50 years, the number of gages has dramatically declined, mainly due to decreases in funding. According to the KPWMP, there were only 17 USGS stream gaging stations in the Koʻolaupoko district in 2009, and thus existing stream flow data is sparse. Stream flow data for Maunawili Stream is as follows, and indicates a mean average monthly flow of 14.5 cfs or 9.4 mgd (Note: gage location and flow data not provided in KPWMP) (Townscape, 2012). The high average flow compared to median flow suggests that Maunawili Stream experiences regular episodes of flashiness (changes in stream flow in response to storm events) (CWRM, 2008).

Stream Name	Median Flow (cfs/mgd)	Average Flow (cfs/mgd)
Maunawili Stream	7.9/5.1	14.5/9.4

Source: Townscape, 2012

Historic surface water flow data for Maunawili Stream (between 1967 and 1995) from the USGS (Station 16260500) taken at Kalanianaʻole Highway at the stream's entrance into Kawainui showed an average monthly flow of 14.88 cfs or 9.62 mgd, which are consistent with data from the KPWMP (USGS, 2017). Monthly averages varied from a low of 4.44 mgd during summer (July) to a high of 16.80 mgd during spring (March).

A water gage in Maunawili Stream located along the levee on the south end near Waiʻauia records water levels. Over the past 10 years, this gage had an average height of 4.26 feet with a low of 3.72 feet and high of 4.69 feet. The 75th percentile height was 4.61 feet. Therefore, water levels in this section of the stream along the mauka side of the levee is fairly consistent at about 4.61 feet in height the vast majority of the time (USGS, 2017). With the exception of seasonal changes in water levels, this data indicates there does not appear to significant changes occurring to this stream's water levels over the past 10 years.

Kahanaiki Stream. Kahanaiki Stream is a perennial stream that arises on the slopes of the Koʻolau Mountains at approximately 1,150 feet AMSL. Wetlands and a tributary ditch are adjacent to the stream at its reach mauka of Kawainui. Kahanaiki Stream enters the Kawainui project area near the corner of Kalanianaʻole Highway and Kapaʻa Quarry Road. The stream is less than 1 foot deep and about 16 feet wide at the portion of the stream traveling below Kalanianaʻole Highway.

Stream flow observations indicate the flow of this stream is noticeably slow as it opens into the wetland in an area covered with California grass. The stream meanders south to north through Kawainui's wetland, and converges with Maunawili Stream. The HSA categorizes Kahanaiki Stream as a tributary to Maunawili Stream (HCPSU, 1990). Kahanaiki Stream is generally shallow at about 1 to 2 feet deep in most areas of the wetland. Invasive vegetation has encroached on Kahanaiki Stream, reducing its water flow and has allowed the formation of a thick peat layer in the surrounding wetland (Exhibit 3.12). Distinct stream beds or banks were not observed within the wetland.



Exhibit 3.12 View of Kahanaiki Stream (2010 Photo)

Kapa'a Stream. Kapa'a Stream is also referred to as "Kawainui Stream" in other studies, such as the CWRM GIS data, USGS stream data, and HSA study. However, for this document, Kawainui Stream is the name used to identify another stream running along the makai side of the levee. The Kapa'a Stream is perennial and runs for 1.9 miles before draining into Kawainui north of the City's model airplane park (SD&C, 2011). Kapa'a Stream is included in Hawai'i's Section 303(d) List of Impaired Waters because of elevated concentrations of turbidity, suspended solids, nutrients, and metals in the stream (DOH, 2017).

The Kapa'a Stream watershed encompasses an area of about 1.3 square miles (825 acres) situated west of Kawainui and includes areas along the H-3 Freeway. The stream channel has been altered to fit into a highly modified landscape.

This stream originates from the southwest slope of Pu'u Ulumawao at approximately 330 feet AMSL and flows discontinuously in a northeast direction alongside a number of industrial uses associated with the Kapa'a Light Industrial Park. It then enters the northeastern end of Kawainui as shown on Figure 3.7 through a pond like feature passing through three culverts beneath Kapa'a Quarry Road as indicated on Exhibit 3.13 (view of upland stream before entering Kawainui under road).



Exhibit 3.13 Kapa'a Stream Flowing Makai into Kawainui Beneath Kapa'a Quarry Road (Source: DOH, 2007)

Within Kawainui, stream flow is directed through a much disturbed section of the wetland that is overgrown with vegetation. A man made channel within the wetland terminates near where Kapa‘a Stream disappears. This channel was constructed to redirect flood water flow entering upper Kawainui towards Kawainui Canal as mitigation following the 1987-88 flooding of Coconut Grove. The stream’s estimated baseflow volume was about 1.0 cfs or 0.65 mgd (DOH, 2007).

A canal segment of this stream overgrown with vegetation also runs along the mauka (west) side of Kapa‘a Quarry Road along the model airplane park up to Kapa‘a Quarry Access Road. This drainageway usually appears stagnant, receiving little surface water inflow during rainfall events. However, groundwater weeping from the side of the landfill into the canal has been observed (DOH, 2007). A similar canal drainageway is also present along the makai side of Kapa‘a Quarry Road along the same route.

Development in the Kapa‘a watershed during the past 60 years has included major quarry operations in two locations, two municipal sanitary landfills, a City refuse disposal landfill, deposition of quarry materials over wetlands and mid-valley stream course, construction of a federal highway through the center of the valley, and the development of multiple light industrial business uses on lands filled over the streambed. All of these activities have had impacts on the stream, and it is doubtful that any significant length of the present Kapa‘a streambed is in its original condition or location (DOH, 2007).

Kapa‘a Stream is a Class 2 Inland Stream. The objectives of Class 2 waters, as they apply to Kapa‘a Stream, are to protect its uses for recreational purposes, the support and propagation of fish and other aquatic life, and agricultural and industrial water supplies. The State DOH identified water quality in Kapa‘a Stream as impaired by elevated turbidity, total suspended solids (TSS), nutrients (TN, TP), and metals. Subsequent review of toxic metals standards and data relative to total hardness (calcium + magnesium) present in Kapa‘a Stream found the stream not being impaired by excessive metals (DOH, 2007).

Kawainui Stream. In this document, Kawainui Stream refers to the drainageway located on the makai side of the levee running in a south direction toward Hāmākua as shown on Figure 3.7. Kawainui Stream is not located within the Kawainui project area because it is situated makai of the levee (City property), but is present within the Hāmākua project area. Kawainui Stream was formerly the drainage outlet for Kawainui, and flowed along its present course past Hāmākua to Ka‘elepulu Stream. The natural flow of the stream was altered when the Kawainui flood control levee was developed, separating Kawainui and Hāmākua. Water from Kawainui’s wetland now flow toward the ocean through the Kawainui Canal.

Today, Kawainui Stream is no longer fed by wetland waters, but is instead fed by stormwater runoff, with stream waters traveling south along Hāmākua and east toward Ka‘elepulu Stream before flowing into Kailua Bay. The upper part of Kawainui Stream along the levee is actually a canal that was dug to provide flood protection for the Coconut Grove area in the early 1950s,

after water flow from Kawainui was diverted to the Kawainui Canal. The State GIS data, based upon DLNR DARS, identifies Kawainui Stream (Figure 3.7) as a "Riverine" system, which is an open conduit either naturally or artificially created that periodically or continuously contains moving water (FWS, 1992). The stagnant Kawainui Stream has minimal water turnover, and the resulting anaerobic conditions result in poor water quality. Unfortunately, no data is available on streamflow volumes associated with it.

Along Hāmākua, Kawainui Stream flows in a makai direction (southeast) toward Ka'elepulu Pond. The water level of this stream is usually lower than the elevation of Hāmākua's wetland, and buffered by the banks of this stream and vegetation that generally prevent stream waters from flowing into the wetland. During heavy rainfall, water levels of the stream would rise and overflow into Hāmākua's wetland.

Kawainui Canal

Kawainui Canal was constructed as part of the original Kawainui Marsh Flood Control Project completed in 1966. This canal consists of a 9,470-foot-long, 115-foot-wide trapezoidal channel that extends from the entrance of Kawainui's wetland makai (northeast) to its connection with Kailua Bay. The canal has an estimated capacity to accommodate about 6,750 cfs of water (4,362.6 mgd). The canal depth near the entrance into Kawainui is about 10 feet below mean sea level (msl), and the average bottom of the canal is about 6 feet below msl (Swain and Huxel, 1971).

Kawainui Channel is tidally influenced below Kawainui's wetland, but is effectively blocked from intruding into the wetland by a weir of vegetation. A prior study showed that the water in the wetland normally remains higher than high tide levels in the canal, maintaining a head against saltwater intrusion. Therefore, it is unlikely that Kawainui Channel exercises any tidal influence over water height in the wetland or that salinity intrusion is very great (Swain and Huxel, 1971). During the wet season, outflow from the wetland can be seen and heard as numerous small waterfalls flowing over the vegetation mat into the canal. Penetration of salt water into the wetland beyond Kawainui Channel seems not to occur, even during prolonged dry periods.

The U.S. Geological Survey (USGS) operates two rain and water elevation monitoring stations in the watershed: a rain gage and crest-stage gage on Makawao Stream in Maunawili (Sta. No. 16254000) and a rain gage and water elevation gage on the levee (Sta. No. 16264600). Annual-mean discharge measured in Makawao Stream between 1912-1916 and 1958-2016 ranged from 1.31 cfs to 11.10 cfs. Peak streamflow in Makawao Stream measured from 1958-2016 was 6,000 cfs on February 4, 1965.

The Kawainui Marsh Station (Sta. No. 16254600) measures only water level because it is distant from any water flows, and was first established on the levee in response to the 1987/1988 New Year's flood to serves as a flood warning station. A Level 1, non-emergency threshold is

established at 7.0 feet for this station. The maximum water level measured from 2006-2016 was 7.87 feet on April 2, 2006, following what was termed locally as "the 40 days of rain" (AECOS, 2017a). Information on gage height data for annual peak water level is included in Appendix D.

3.4.3.2 Potential Project Impact and Mitigation

No Action Alternative

The ongoing wetland restoration efforts would continue to have a beneficial impact on stream flows by reducing encroachment into Kahanaiki Stream and Maunawili Stream by invasive vegetation. Invasive vegetation have expanded into the open water areas of the wetland over the years through terrestrialization, significantly impacting stream flow. Although invasive vegetation continues to be an ongoing challenge, restoration efforts would maintain wetland vegetation at more manageable levels, allowing the formation of seasonal mud flats supporting waterbird habitat (HHF, 2012).

Restoration efforts do not disrupt or modify the direction of stream flows or modify the bed or banks of streams, which allows them to continue along their present routes following their natural drainage patterns. The path of Kahanaiki Stream is not as clear due to the extent of invasive vegetation and broader open water areas with the central area of Kawainui. Therefore, restoration work includes field inspections of the area and stream prior to implementing vegetation removal to ensure there is no encroachment into the stream banks (HHF, 2012).

DOFAW's management station and vegetation processing site improvements would support restoration and management activities at Kawainui that contribute to improving wetland functional values and reducing encroachment of vegetation into streams.

Improvements permitted at the Kawainui SPR, Kalāheo site should not have a significant impact on Kawainui Canal or flows through that channel. No structures are allowed within the canal for flood hazard control reasons, therefore, no boat docks or ramps are proposed. To allow for the launching of canoes under this alternative, the canal embankment would be reinforced with grass to stabilize the slope. The specific design would be refined based on consultation with the U.S. Army Corps of Engineers. Any improvements would not affect water flow within the canal.

Proposed Action

Wetland Restoration and Upland Reforestation

Under the Proposed Action, wetland restoration and upland reforestation activities would continue and expand into additional areas of Kawainui and Hamākua. Work methods, procedures and protocols are proposed to be similar to what would occur under the No Action Alternative. Invasive vegetation expanding into the wetland's open water areas and Kahanaiki and Maunawili Stream through terrestrialization would be addressed by restoration work significantly reducing

effects on these streams and water flows. Expanded restoration activities would maintain wetland vegetation at more manageable levels, maintaining more open water and allow the formation of seasonal mud flats supporting waterbird habitat.

The stream beds and banks would not be impacted or modified, and no diversion of stream waters is proposed. Restoration work is proposed to include field inspections, particularly in the central area of Kawainui, where Kahanaiki and Maunawili Stream's paths are not as clear due to the extent of invasive vegetation and broader open water areas. These efforts would ensure there is no encroachment into the stream banks as part of vegetation removal activities.

Restoration activities are not expected to affect Kapa'a Stream because it is located at northern end of Kawainui near the City's model airplane park. That area is identified as the Remediation Zone where no wetland restoration work is planned except for the selective removal of trees. That area is intended to serve as a vegetative buffer for flood control within Kawainui. Kapa'a Stream generally ends after crossing under Kapa'a Quarry Road entering Kawainui's wetland where water likely dissipates within the large wetland. Drainage canals associated with this stream along Kapa'a Quarry Road would not be affected by wetland restoration or upland reforestation activities.

Expansion of wetland area at Hāmākua would occur on the mauka end of the wetland away from Kawainui Stream. These activities should not impact the condition of the stream or water flow. Increasing the wetland area by up to 4 acres would increase the amount of overflow water from the stream that can be detained having a beneficial effect on Kawainui Stream's flow capacity.

The removal of invasive vegetation and as part of vegetation control maintenance activities would occasionally require the use herbicides. Only approved herbicides would be used and would not adversely impact water within streams in the project area. DOFAW has obtained State NPDES general permit coverage for application of herbicide and pesticide within wetland and wildlife sanctuaries statewide. Compliance with permit conditions and application practices would ensure no negative impacts on streams and their water quality.

Structures and Trails

None of the proposed structures or trails would impact streams or stream flows. A maintenance access road ~~and pedestrian trail~~ would cross over ~~both Kahanaiki Stream, west of the Mokulana Peninsula, and across~~ Maunawili Stream near DOFAW's management station. ~~These~~ This crossing ~~are~~ is intended to support access for DOFAW maintenance vehicles ~~as well as support pedestrian trails~~. Proposed bridge~~s~~ would span the stream~~s~~, not alter ~~their~~ flow~~s~~, and subsequently minimize environmental impacts. ~~Boardwalks would be used to cross drainageways, and would minimize effects on them by not altering or preventing discharges when they occur.~~

The construction of parking and staging areas and accessory passive outdoor recreational facilities (e.g. observation decks, pavilion) should have minimal effect on streams and drainageways. Parking areas, staging areas, and pedestrian trails would be constructed using pervious material, such as grass or gravel that would allow infiltration and minimize increased runoff. These support structures would not be constructed within or along existing streams.

Permanent structures constructed at DOFAW's management station to replace temporary facilities would not impact Maunawili Stream located in the area. Facilities are setback a considerable distance from the banks of this stream. New structures constructed as part of the education center~~,~~ and cultural centers~~, and the hale wa'a at the Kawainui SPR, Kalāheo~~ would not have a significant impact on streams. Facilities would be setback sufficient distances from any streams that are in the immediate vicinity.

New structures constructed as part of these facilities would increase the amount of impervious areas within those sites. Surface runoff from the education center and cultural centers would not impact existing streams because it would sheet flow and discharge directly into Kawainui's wetland where it would disperse. ~~The hale wa'a included at the Kawainui SPR, Kalāheo would slightly increase discharges into Kawainui Canal, but the increase would be minimal due to the small size of the structure, and would not have a significant impact on the Canal banks or water capacity.~~

The actual areas developed would be subject to the design phase for site and building improvements when implemented. Site design for these improvements would need to incorporate measures to detain increased runoff generated using detention basins or other measures. As a result, the net increase in stormwater runoff from these sites should generally equal existing conditions and not significantly impact existing drainageways or streams.

3.4.4 Wetlands

3.4.4.1 Existing Conditions

The majority of the Kawainui-Hāmākua project area is comprised of wetlands, as previously shown in Figure 3.7. Wetlands are defined as areas that are regularly wet or flooded throughout most of the year and characterized by specific plant associations and soil types. Wetlands are considered one of the most biologically productive ecosystems based on their vegetative productivity and species diversity. In addition to providing habitat for waterbirds and other wildlife, wetlands serve two important hydrological functions: 1) intercepting and storing flood water; and 2) absorbing and trapping sediments and pollutants in runoff. Wetlands also have aesthetic value, providing natural places with recreational opportunities (Townscape, 2012).

Kawainui and Hāmākua have been extensively modified by human activities. While stakeholders and the public agree these wetlands should be "restored", it is difficult to determine to what condition they should be (or even could be) restored to. Prior to human habitation on Oʻahu, the area was likely occupied by brackish lagoons and a large estuary. Pollen studies have suggested surrounding uplands would have been a loulu (palm) forest. Upon arrival of the Polynesians, and for over hundreds of years, the lagoon area was actively managed as a fishpond. Wetland taro was cultivated in surrounding terraced fields.

A large population inhabited the area and it was a culturally-important place as evidenced by the presence three heiau in the area. After the Māhele in the 1800s, the wetlands were used for rice production and, later, drained when water was pumped out of the wetland and transported to Waimānalo for agricultural irrigation and parts used for cattle grazing. Development of the Coconut Grove community on the north side of Kawainui in the early 20th century prompted federal and state agencies to undertake projects designed to reduce flood hazard. Areas of the wetland were filled and sedimentation shoaled others.

Today, Kawainui is a large, former lagoon that is currently more than 98% covered by vegetation. Most of this vegetation is not a thin layer of floating plants like *Salvinia molesta* or water hyacinth (*Eichhornia crassipes*), but a community of wetland and some upland species supported on a layer of floating peat material that generally exceeds one foot in thickness. This mat floats on water or on a water-sediment slurry, or rests directly on mud. The absence of open water means there is precious little habitat for wetland birds and minimal dissolved oxygen to support life in the water beneath the blanket of peat.

An important function of Kawainui's wetland is to maintain it as a surface water storage area to protect Kailua from flooding. A second function is to manage the wetland as habitat suitable for endangered waterbirds. Other important ecosystem functions for this wetland include:

- Sediment accretion;
- Water quality improvement;
- Groundwater recharge;
- Aesthetic enjoyment;
- Recreational opportunities;
- Archaeological, historical, and cultural importance; and
- Education and research.

As discussed in Section 3.4.3, an average of 1.4 mgd of water from Maunawili Stream is diverted to the Waimānalo Irrigation system from areas inland of the Maunawili residential subdivision. Stream flow data for Maunawili Stream shows a relatively high flow with a mean average monthly flow of 9.4 mgd and median flow of 5.1 mgd. Maunawili Stream experiences regular episodes of flash flow in response to large storm events. These flows combined with estimated flows from other streams and surrounding drainageways result in about 12.6 mgd of water discharged into Kawainui's wetlands. Thus, the volume of water flow into Kawainui is not an issue. However, addressing the growth of invasive wetland vegetation is a concern.

Wetland Type

Figure 3.7 shows the various wetland types using GIS data provided by the USFWS National Wetlands Inventory (NWI). The majority of the project area is classified as "freshwater emergent wetland" with smaller "freshwater pond" areas scattered throughout the project area. The freshwater emergent wetland areas are dominated by trees, shrubs, and mosses that are present for most of the growing season. The wetlands possess persistent vegetation that normally remains standing until the beginning of the next growing season. Kawainui's freshwater emergent wetlands differ by the quantity of freshwater present throughout the year.

Freshwater ponds in the project area are classified as non-tidal wetlands occurring in tidal areas with saline concentrations below 0.5 ppt. These habitats are dominated by plants that grow principally on or below the surface of the water. Freshwater pond areas also differ by the amount of freshwater present in the wetland throughout the year.

Ramsar Convention

As noted previously, in 2005 Kawainui Marsh was designated a "Wetland of International Importance" under the Convention on Wetlands of International Importance (Ramsar Convention). This multilateral agreement, signed in 1971 in the Iranian city of Ramsar, provides the framework for national action and international cooperation for the conservation and wise use of wetlands. Wise use involves the use of an ecosystem approach within the context of sustainable development.

In subsequent decades, the aspects of wetlands discussed within the 1971 Ramsar Convention have broadened considerably, incorporating aspects such as water management, human health, and a consideration of the cultural aspects of wetlands. Two Ramsar Resolutions, adopted in 2002 and 2005, addressed among other things the rationale for incorporating cultural values in the conservation and management of wetlands, and the recognition of the position of indigenous peoples and local communities.

Since 2006, the Ramsar Culture Working Group has been responsible for work on the cultural aspects of wetlands, and has disseminated guidance on integrating cultural heritage with wetland management activities. The Ramsar Culture Working Group has recognized that natural resource conservation "cannot be successful without considering the welfare of local populations and ensuring their active participation." At the same time, it notes that objectives and actions based on cultural values must always be considered in a context of compatibility with the wise use principle of the Ramsar Convention. The designation of Kawainui-Hāmākua as a Ramsar recognized wetland underscores the importance of this wetland resource, and the project's need to implement restoration and reforestation improvements, particularly at Kawainui.

3.4.4.2 Potential Project Impact and Mitigation

No Action Alternative

Under this alternative, ongoing wetland restoration conducted by DOFAW would continue. These activities were described in Chapter 2 of this document and include wetland restoration improvements planned within the Kahanaiki area (HHF, 2012) and other improvements approved under DLNR's management plan (DLNR LD, 2000). Wetland restoration involves a combination of mechanical methods (e.g. mowing) and localized application of herbicide to control invasive vegetation. It includes removal of the underlying thatch layer, comprised of dead vegetation, up to a few inches below the existing surface. A floating excavator or other equipment would be used to cut or grub the vegetation and thatch layer.

Prior to the initiation of these restoration efforts, the project area wetlands were severely overgrown with invasive vegetation and terrestrialization, and the functions of the wetland were significantly compromised. These activities would strengthen the functional values of Kawainui and Hāmākua's wetlands by increasing retention, serving as a sediment trap, and contributing to improved nearshore water quality, and regulating the movement of water before it discharges into Kailua Bay. Reducing terrestrialization of Kawainui's wetland would improve water flow through the basin and its function as flood control for the area.

Upland reforestation and other accessory improvements (e.g. drainage) efforts would also have beneficial long-term effects on Kawainui and Hāmākua's wetlands by reducing erosion, detaining stormwater runoff to allow infiltration, reducing sediment and pollutants discharges into the wetland.

DOFAW improvements to their management station would support their restoration and management activities at Kawainui that contribute to improving wetland functional values. The vegetation processing site would similarly support these activities by providing a site with facilities to process vegetation removed. Upland reforestation, wetland restoration activities, and other improvements support DOFAW's management, educational programming, and stewardship of Kawainui and the Hamākua ecosystem restoration programs and wetlands within this project area.

Construction of recreational improvements at Kalāheo Park would not have adverse impacts on the wetland's hydrologic role or its ability to perform these functions. Improvements would be located outside the wetland area. During construction, BMPs would be used to avoid soil runoff into the wetland areas.

Proposed Action

Wetland Restoration and Upland Reforestation

The Proposed Action includes continuation and expansion of wetland restoration and upland reforestation efforts by DOFAW beyond that under the No Action Alternative. These efforts would continue to have positive beneficial effects on the health and functioning of wetlands. These efforts would continue replacing non-native invasive vegetation with native vegetation and reducing terrestrialization of Kawainui within expanded wetland and upland areas. Wetland area at Hāmākua would be expanded by up to about 4 acres by excavating adjacent upland areas. This would expand open water and mud flat areas, allow for further re-vegetation using native wetland plants, and improve habitat for endangered waterbirds.

DOFAW improvements to their management and research station would support restoration and management activities at Kawainui that contribute to improving wetland functional values and this section of the watershed. The vegetation processing site would similarly support these activities by providing a site with facilities to process vegetation removed. ~~Construction of recreational improvements at Kalāheo Park would not have adverse impacts on the wetland's hydrologic role or its ability to perform these functions.~~ Improvements would be located outside the wetland area. During construction, BMPs would be used to avoid soil runoff into the wetland areas.

Structures and Trails

Most of the proposed improvements are intended to support DOFAW and community stakeholders who are involved in wetland restoration efforts. Currently, there is no off-street parking, restrooms, shaded shelters, hose bibs, or equipment storage areas for DLNR staff or volunteers working at Nā Pōhaku or Ulupō Heiau. There are no off-street bus loading areas for school children participating in education and service projects at Kawainui. There are no trails for viewing wetland resources. The Proposed Action would provide for parking and staging areas using pervious material, such as gravel, to support DOFAW management and operations, educational programs, and community service (e.g. clean-up) projects. Accessory improvements (e.g. restroom, pavilion) and pedestrian trails associated with passive outdoor recreational activities also support these efforts by improving access for activities, students, etc.

~~Boardwalks would be used to cross some sections of wetland for access along the pedestrian trail. However, this improvement should not have a significant impact on wetlands affected because water would continue to flow, and boardwalks would not significantly change the functional value of the large wetland of Kawainui. The design of boardwalks would be coordinated with both the USFWS and COE to address permit requirements and conditions of approval.~~

The project also broadens stewardship opportunities and support for wetlands by incorporating traditional cultural practices, consistent with the efforts of the Ramsar Culture Working Group. The project has identified geographic areas with traditional historical significance (Nā Pōhaku, Ulupō Heiau, Pōhakea, Waiʻauia) where cultural practice would be reestablished, enhanced, and combined with wetland stewardship and educational program activities in cooperation with DOFAW and DSP.

New sites, such as the cultural and educational centers at Kapaʻa, Pōhakea, and Waiʻauia would provide new opportunities for non-profit organizations operating them to conduct cultural practices and expand educational programs and participation in stewardship activities. Facilities constructed at these new sites would not occur within the wetland, and include other possible wetland improvements such as creating taro loʻi that support wetland restoration and functional values.

These proposals for cultural activities and facilities are consistent with Ramsar guidance to "consider indigenous populations and ensure their active participation in wetland management." Overall, the broadening of activities within the project area to include cultural practice, educational use and passive recreation is entirely compatible with current Ramsar guidance.

That said, as noted by the Ramsar Culture Working Group, actions or proposals based on cultural values must always be considered in a context of compatibility with Ramsar's "wise use" principle. Wise use of wetlands is "the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development." Wise use can thus be seen as the conservation and sustainable use of wetlands and all the services they provide, for the benefit of people and nature (Ramsar.org, URL: http://www.ramsar.org/about/the-wise-use-of-wetlands. Accessed 2/25/2017). If implemented and conducted in a sustainable manner, the proposed project improvements can provide successful examples of wise use, which incorporate cultural values and recognize indigenous people in the conservation and management of wetlands.

3.4.5 Water Quality

AECOS, Inc. conducted a water quality study of the project site, and the study is included in Appendix E of this document. The primary purpose of the study was to assess likely project impacts to the water quality of Kawainui and Hāmākua from proposed improvements.

Background Information

The Federal Clean Water Act (CWA) of 1972 established a regulatory framework for protection of the nation's surface water resources. The CWA calls for a bi-annual surface water quality assessment in each state. Those surface water bodies found to be in violation of State standards must be reported pursuant to §303(d) of the CWA. This list of impaired water bodies is usually

referred to as the 303(d) list. The 303(d) list contains information on the types of pollutants that are impairing the water quality of a stream. Additionally, the list identifies priorities for Total Maximum Daily Load (TMDL) development. A TMDL is a regulatory term in the CWA, describing the maximum amount of a pollutant that a body of water can receive, while still meeting water quality standards. It is used as a planning tool for restoration and protection activities, with the ultimate goal of attaining or maintaining water quality standards (Townscape, Inc., 2012).

The TMDL development process identifies the causes of pollution and calculates the maximum daily amount of a pollutant that can enter water bodies without violating water quality standards. TMDL calculations are performed for both point and non-point source pollutants. Point sources may include industrial discharges, sewage treatment plants or municipal storm water drainages. Non-point source pollutants are all other pollutants, including those that are carried by rainfall or stream flow. The calculated maximum pollutant loads are then divided and assigned among the identified sources of pollution.

The State Department of Health assesses several types of water quality parameters including nutrients, turbidity, total suspended solids (TSS), bacteria, heavy metals, pesticides, herbicides and other potentially harmful substances. In Koʻolaupoko streams, excess pollutants are mostly nutrients, turbidity, and TSS. The following is a brief overview of these three major sources of pollution.

- **Nutrients** in a water quality context refers specifically to nitrogen and phosphorous, two essential substances for the growth of aquatic biota. At an elevated level, nutrients cause accelerated growth of phytoplankton that leads to an increase in turbidity.
- **Turbidity** refers to the cloudiness of water. High levels of turbidity are considered unfavorable in a stream because it hampers sunlight from reaching the bottom of the stream, which in turn inhibits the growth of aquatic biota.
- **Total Suspended Solids (TSS)** is a measure of particulate matter in water, usually as a result of dissolution of solid particles from eroded soils (Townscape, Inc., 2012).

Based on the DOH's 2018~~4~~ list of 303(d) waters, pollutants of concern in Maunawili Stream include nitrate/nitrite, total nitrogen, total phosphorus, trash and turbidity. This stream was given a Medium TMDL priority listing. Kailua Beach Park has low TMDL priority, with pollutants of concern nutrients, turbidity, and chlorphyll-a. The portion of Kailua Beach where Kaʻelepulu Stream enters the ocean has high TMDL priority with pollutants of concern being enterococcus bacteria, nutrients, turbidity, and chlorphyll-a.

Project area waters flow via the Kawainui (Oneawa) Canal into Kailua Bay, which is classified by the State of Hawai‘i as a Class A marine water. Class A waters are intended for recreational and aesthetic enjoyment. Previous research by the University of Hawai‘i Water Resources Research Center (Krock and Fujioka 1993) assessed the impact that the project area streams have on Kailua Bay nearshore water quality. The study noted that the presence of waterborne bacteria was highest near Kawainui Canal and Ka‘elepulu Stream discharge points, decreasing as one traveled further from these areas. It found high bacteriological conditions at areas where Kawainui and Ka‘elepulu Stream discharge due to the presence of sewage, animal feces, and soil in these waters. The study concluded that efforts to improve coastal water quality should focus on improving the quality of these stream waterbodies.

The 2012 Ko‘olau Poko Watershed Management Plan discussed nearshore water quality. It notes that common nearshore pollutants in the project area include nutrients, turbidity and bacteria. Nutrients and turbidity in nearshore waters are often the result of stream runoff, and the quality of the nearshore waters reflects the degradation of local stream water.

State Water Quality Standards

The wetlands of Kawainui and Hāmākua encompasse inland waters designated as “Class 1” based upon the State Department of Health’s Water Quality Standards (Chapter 11-54, HAR). The area can be further classified as both Class 1.a. or 1.b., Inland Waters based upon Kawainui’s designation as a regulated wildlife sanctuary and its State land use designation as “protective subzone” under the Conservation District.

Due to characteristics such as decomposing vegetation, low flow rates, and removal of sediments and pollutants, water quality parameters in wetlands cannot be compared with streams or ocean conditions. For this classification only, there are no specific water quality criteria that must be met, just the basic water quality criteria for all waters. The basic water quality criteria prescribed under Chapter 11-54-4, HAR are applicable to the wetlands of Kawainui and Hāmākua. Under the State DOH’s Water Quality Standards, the objective of Class 1 water use is to allow waters to remain in their natural state with minimum pollution from human caused sources. The wilderness character of these areas should be protected. Activities resulting in a demonstrable increase in levels of point or nonpoint source contamination are prohibited (State of Hawai‘i, 2004).

For Kahanaiki and Maunawili Streams, the inland water quality standards for streams under Chapter 11-54-5.2, HAR is applicable and are shown on Table 3.4. The wet season occurs from November 1st through April 30th.

Table 3.4
State Water Quality Standards (Chapter 11-54-5.2, HAR)

Parameter	Geometric Mean Not to Exceed		Not to Exceed More Than 10%		Not to Exceed More Than 2%	
	Wet	Dry	Wet	Dry	Wet	Dry
Total Nitrogen (ug N/L)	250.0	180.0	520.0	380.0	800.0	600.0
Nitrate + Nitrate (ug [NO3+NO2] – N/L)	70.0	30.0	180.0	90.0	300.0	170.0
Total Phosphorus (ug P/L)	50.0	30.0	100.0	60.0	150.0	80.0
Total Suspended Solids (mg/L)	20.0	10.0	50.0	30.0	80.0	55.0
Turbidity (N.T.U.)	5.0	2.0	15.0	5.5	25.0	10.0
pH	5.5 – 8.0					

The State DOH's *2018~~06~~ State of Hawai'i Water Quality Monitoring and Assessment Report* identified Kawainui as a major wetland component of a stream network. The wetland is a Tier II decision unit from the upstream tributary segment of Kapa'a Stream and the downstream receiving segment of Kawainui Stream. The wetland is classified as an elevated wetland and is listed as a Water Quality-Limited Segment under Section 303(d) of the Clean Water Act. States review existing available surface water quality data and related information to compare against the State's Water Quality Standards, and after applying listing criteria, determines the level of impairment for that water body. Kawainui Marsh was a water body assessed and given a Category 3 rating where there is insufficient available data and/or information to make a use support determination. No pollutants of concern were identified, and there was no TMDL priority given (DOH, 2018). The wetland would~~d~~ be subject to comply with Total Maximum Daily Loads (TDML) when eventually established by the State DOH.

3.4.5.1 Existing Conditions

Wetlands such as Kawainui and Hāmākua play an important role in maintaining the quality of stream and coastal water resources. A critical ecological function of wetlands is serving as a settlement basin and providing a physical means of cleansing pollutants from waters that pass through its boundaries. Kawainui functions as a settling basin for particulates, nutrients, and other pollutants introduced into the wetland through stream discharge, stormwater runoff, and rainfall. Particulates such as turbidity and total suspended solids introduced by storm runoff or stream discharge, tend to settle in the wetland basin. Introduced nutrients such as nitrogen or phosphorous are converted into plant biomass by uptake or converted into ammonia by bacterial process. Nutrients are also recycled from dead vegetation and are released from bottom sediments. Water quality studies by AECOS in 1981 and 1989 for Kahanaiki and Maunawili Streams similarly highlight the wetland's pollutant retention function (USACE, 2008). These studies determined that the wetland retains nutrients and suspended solids by slowing the flow of runoff, allowing pollutants to settle, decompose, and oxidize so wetland plants can absorb them.

Water circulation in Kawainui is presumed to be linear from south to north. This directional flow is the result of continuous inputs from both Maunawili and Kahanaiki Streams at the extreme south end and outflows via Kawainui Canal at the north end. Forces capable of generating contrary flows are unknown. A canal dredged from about the center of the wetland due north to the vicinity of the model airplane field was intended to enhance flow toward the north end and outlets into Kawainui Canal, against a natural tendency to flow to the east and the original outlet into Kawainui Stream now blocked by the levee.

Water Cycle of Project Area

Background information on the water cycle of Kawainui and Hāmākua is provided.

Kawainui Water Cycle. Rainfall is the ultimate source of water for Kawainui and arrives by several means: direct rainfall on the wetland, stormwater runoff from land areas adjacent to the wetland, and input from streams, springs, and seeps within the Kawainui Watershed. Water loss or output from the wetland is mainly through evapotranspiration and outflow to the ocean via Kawainui Canal. These inputs and outputs, together with complex physical, chemical, and biological interactions influence water quality characteristics within Kawainui's wetland.

No continuous long-term rainfall data are available for the Kawainui Watershed. Water input characteristics for Kawainui were estimated from streamflow data for Maunawili Stream and average rainfall characteristics developed by USGS. Exhibit 3.14 shows rainfall categories superimposed on a frequency distribution of Maunawili Stream flow data. Analysis results imply a correlation between greater rainfall and greater water flow velocity for Maunawili Stream. Base flow, represented by the "no rain" category is typically between an average of 2 and 11 cfs and accounts for stream flow about 70 percent of the time. Light rainfall results in an increase from about 11 to about 20 cfs and increases rapidly with heavier rains.

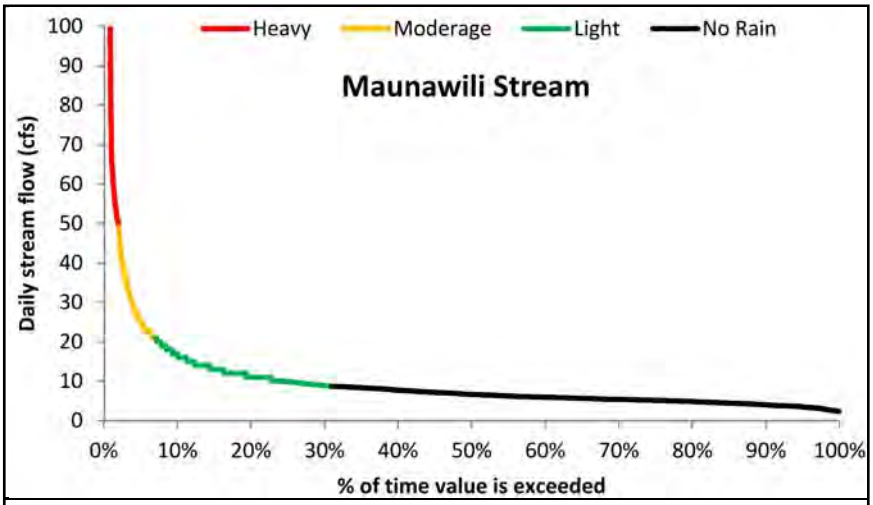


Exhibit 3.14 Maunawili Stream Frequency Distribution of Average Daily Flows (1991–1995) and Estimated Rainfall Categories (AECOS, 2017b)

Hāmākua Water Cycle. The primary source of water for Hāmākua is direct rainfall, stormwater runoff from Pu'uoehu hillside, and areas upstream of Kawainui Stream. Presumably, the wetland exchanges water with the adjacent Kawainui Stream which eventually discharges into Kailua Bay via the Kaelepulu Stream outlet at Kailua Beach. The entire system is considered a low-lying "pond" with some tidal influence.

Kawainui Water Quality

A summary of water quality data collected from two sampling events in March and April 1989 is provided. Exhibit 3.15 graphically shows the locations of these sampling stations, along with sampling stations from a 2002-03 study, and AECOS's current 2017 study. Samples were taken at a variety of locations on Maunawili, Kahanaiki, and Kapa'a Streams as well as sampling sites within the wetland. Table 3.5 includes a summary of the sampling results from 1989.



Exhibit 3.15 Kawainui Water Quality Sampling Station Locations (1989, 2002-03, and 2017)

The data indicates that nitrate+nitrite (NO_3+NO_2) concentrations decreased and total phosphorous (P) concentrations increased as water moves from Maunawili and Kahanaiki Streams in the south (Stations 1 and 2) toward Kawainui Canal at the north end of Kawainui's wetland. The decrease in nitrate+nitrite concentrations may be attributed to plant or bacterial uptake. Ammonia concentrations in the wetland represent an intermediate breakdown product of decaying organic nitrogen to ammonia, and then to nitrite and nitrate taken up by wetland plant growth. The total phosphorous trend of increasing concentrations from south to north may indicate recycling of this nutrient from decaying vegetation, especially at Station 8.

Table 3.5
Water Quality Results for Two Sampling Events in Maunawili and Kahanaiki Streams and Kawainui Marsh in 1989 (M&E 1990, AECOS 1992)

	DO sat (%)	pH	Turb. (NTU)	TSS (mg/L)	NH_3	NO_3+NO_2	Total N	Total P (µg P/L)
					(µg N/L)			
Sta. 1	---	7.93	4.6	16	22	179	395	34
Sta. 2	---	7.71	4.6	6.9	15	199	327	40
MEAN	**---**	**7.88**	**4.6**	**13**	**20**	**184**	**378**	**36**
Sta. 3A	---	7.60	5.4	9.2	26	181	376	43
Sta. 3B	---	7.00	9.6	6.5	18	89	242	54
Sta. 4	---	7.01	8.6	5.5	20	54	314	51
Sta. 6	---	6.52	16.6	7.0	7	1	388	166
Sta. 7	---	7.05	9.3	7.5	14	1	378	123
Sta. 8	---	7.28	3.3	11.0	215	<1	1,400	363
MEAN	**---**	**7.08**	**7.81**	**7.6**	**24**	**15**	**425**	**95**

Source: AECOS, 2017b

Table 3.6 summarizes the average results of 12 approximately monthly sampling events for input streams (Maunawili and Kahanaiki) and Kawainui between March 2002 and May 2003, and provides a picture of annual conditions in the wetland. Samples were taken at a variety of locations in Maunawili, Kahanaiki, and Kapa‘a Streams along with the western most end of Kawainui Canal. Samples were also taken within the wetland. Sampling station locations can be seen in Exhibit 3.15.

Table 3.6
Water Quality Results for 12 Sampling Events in Maunawili and Kahanaiki Streams and Kawainui Marsh in 2002-2003 (Guinther, et al., 2006)

	DO sat (%)	pH	Turb. (NTU)	TSS (mg/L)	NH_3	NO_3+NO_2	Total N	Total P (µg P/L)
					(µg N/L)			
Sta. 1	61	7.68	6.9	6.0	3	103	287	46
Sta. 2	42	7.49	6.5	5.3	4	50	250	52
MEAN	**51**	**7.58**	**6.7**	**5.7**	**3**	**72**	**268**	**49**
Sta. 5	2	6.77	17.5	16	23	1	754	240
Sta. 6	6	6.91	14.6	15	10	1	694	128
Sta. 7	46	8.42	96.3	95	6	2	8,811	2,094
Sta. 10	9	7.23	71.3	32	12	2	1,192	530
Sta. 12	34	7.00	10.8	7.3	1	1	704	210
MEAN	**17**	**7.32**	**34.5**	**27**	**9**	**2**	**1,469**	**410**

Source: AECOS, 2017b

Dissolved oxygen saturation and pH levels are on average comparably lower in the wetland compared to stream data that may be attributed to two factors. The first factor is the absence of sunlight penetration for photosynthesis in the water column due to the peat mat that covers the surface of the wetland. The second factor is the high biological demand of sediments and decaying organic matter, which further reduced dissolved oxygen concentrations except at open water areas at Stations 7 and 12. All nutrient concentrations in the wetland are notably high compared to stream inputs with the exception of nitrate+nitrite, which may be becoming assimilated by plants, while other nutrients are high as a result of regeneration from decaying vegetation and organics in sediments.

Table 3.7 highlights results of water quality sampling conducted by Oceanit Laboratories, Inc. in 2008 of Maunawili Stream. Samples were taken at locations upstream and downstream of a test well associated with the USACE's restoration ponds project. In general, their results indicated that Maunawili Stream water quality measurements were comparable to the State's water quality standards (USACE, 2008). These results are shown in Table 3.7.

Table 3.7
Results of 2008 Water Quality Measurements (Oceanit, 2008)

Sampling Locations (Multiple Samples Taken)	DO sat (%)	pH	Turb. (NTU)	TSS (mg/L)	NH_3	NO_3+NO_2	Total N	Total P (µg P/L)
					(µg N/L)			
Maunawili Stream	---	7.41	5.67	3.9	---	60	227	42
Upstream Samples		7.14	10.4	12.9		50	341	71
Test Well	---	7.02	12.5	38.8	---	1	324	238
Maunawili Stream	---	8.03	12.4	24.5	---	10	3,260	245
Downstream Samples		6.82	112.0	42.9		5	1,350	289

Source: USACE, 2008

Most recently, water quality sampling occurred during three monthly sampling events in Maunawili and Kahanaiki streams and four stations within the wetland between January and March 2017. Table 3.8 shows the results of this sampling effort. Dissolved oxygen saturation levels were very low throughout the wetland. Turbidity and TSS levels were elevated compared with stream inputs. Nitrate-nitrite concentrations were higher compared to earlier studies, but demonstrated a district decrease with distance from stream inputs while Total Nitrogen and Phosphorous increased.

Table 3.8A provides more information on sampling results by indicating the range and mean values during both dry and wet seasons. All particulate (turbidity and TSS) and nutrient means are reported as geometric means in the State water quality standards. The results in Table 3.8A demonstrate that pH typically met the State standard of a range between 5.5 to 8.0 most of the time, for both wet and dry seasons. Turbidity geometric means exceeded State standards for both wet and dry seasons. TSS geometric means, on the other hand, regularly met State standards for both seasons. There are no State standards for ammonia in streams. Nitrate+nitrite geometric

means exceeded standards for both wet and dry seasons, except Sta. 1 in 2017 during the wet season. Total nitrogen exceeded State standards during both seasons at both stations. Wet season standards were met in all cases for wet season, but not for dry season standards.

Table 3.8
Water Quality Results for Three Sampling Events in Maunawili and Kahanaiki Streams and Kawainui Marsh in 2017 (present study)

	DO sat (%)	pH	Turb. (NTU)	TSS (mg/L)	NH_3	NO_3+NO_2	Total N	Total P (µg P/L)
					(µg N/L)			
Sta. 1	73	7.44	5.9	5	42	60	299	35
Sta. 2	79	7.47	9.6	8.3	52	88	304	45
MEAN	**74**	**7.45**	**6.8**	**6**	**44**	**66**	**300**	**38**
Sta. 3	64	7.31	13.2	12	51	98	322	46
Sta. 4	3	7.04	11.9	9	19	30	380	58
Sta. 5	3	7.15	48.0	21	3,274	10	4,574	231
Sta. 6	11	7.04	31.5	42	68	14	953	223
MEAN	**20**	**7.13**	**22.0**	**18**	**121**	**25**	**854**	**108**

Source: AECOS, 2017b

Table 3.8A
Water Quality Results for Two Sampling Events in Maunawili (Station 1) and Kahanaiki (Station 2) Streams within Kawainui Marsh in 2002-2003 and 2017

	pH	Turb. (NTU)	TSS (mg/L)	NH_3	NO_3+NO_2	Total N	Total P (µg P/L)
				(µg N/L)			
2002-2003 Dry							
Sta. 1 (n=4) Mean	7.82	6.2	5.9	2	92	275	46
Range	*7.49-8.10*	*4.8-8.3*	*4.7-7.8*	*<1-9*	*77-124*	*238-398*	*39-52*
Sta. 2 (n=5) Mean	7.65	6.5	5.1	2	34	203	59
Range	*7.20-8.30*	*5.3-7.6*	*2.7-7.3*	*<1-11*	*29-41*	*160-320*	*44-72*
2002-2003 Wet							
Sta. 1 (n=6) Mean	7.69	7.7	6.6	4	120	311	49
Range	*7.42-8.10*	*4.7-48*	*3.6-69*	*<1-22*	*82-232*	*232-558*	*24-208*
Sta. 2 (n=7) Mean	7.38	6.6	5.5	7	66	290	48
Range	*7.05-8.00*	*3.7-57*	*3.2-56*	*<1-60*	*24-657*	*182-842*	*20-203*
2017 Wet							
Sta. 1 (n=3) Mean	7.45	5.8	4.8	43	59	315	30
Range	*7.39-7.51*	*5.1-6.6*	*4.3-5.2*	*41-46*	*38-91*	*248-420*	*10-75*
Sta. 2 (n=3) Mean	7.47	10.2	8.1	62	90	314	41
Range	*7.31-7.63*	*7.7-14.2*	*7.6-8.6*	*29-160*	*69-120*	*242-420*	*21-73*

Source: AECOS, 2019

Water quality data from the previous studies discussed are summarized in Table 3.9 to illustrate changes in these water quality indicators over time. In general, variation for any water quality parameter is greater in Kawainui compared with the two input streams. Other consistent patterns include:

- Lower dissolved oxygen content in the wetland;
- Lower pH levels in the wetland;
- Generally higher turbidity levels in the wetland; and
- Generally higher nutrient levels in the wetland, except for nitrate+nitrite levels which are consistently lower.

Table 3.9
Summary of Average Water Quality in Maunawili and Kahanaiki Streams and Kawainui's Wetland

	DO sat (%)	pH	Turb. (NTU)	TSS (mg/L)	NH_3	NO_3+NO_2	Total N	Total P (µg P/L)
					(µg N/L)			
Streams								
1989	---	7.88	4.6	13	20	184	378	36
2002-03	51	7.58	6.7	6	3	72	268	49
2017	74	7.45	6.8	6	44	66	300	38
Wetlands								
1989	---	7.08	7.8	8	24	15	425	95
2002-03	17	7.32	34.5	27	9	2	1,469	410
2017	20	7.13	22.0	18	121	25	854	108

Source: AECOS, 2017b

Hāmākua Water Quality

Hāmākua serves as a settling basin for particulates, nutrients, and other pollutants introduced by storm water runoff and direct rainfall, similar to Kawainui. Particulates introduced during storm runoff tend to settle out in the wetland or the adjacent canal. Introduced nutrients such as nitrogen and phosphorous are converted into plant biomass. Nutrients are also recycled from dead vegetation as well as released from bottom sediments.

A summary of existing water quality data for Kawainui Stream is provided in Table 3.10 with sampling stations shown in Exhibit 3.16 for recent and prior sampling efforts. Prior sampling efforts occurred in 1989, 1991, 1992, and 1995. Recent sampling efforts include data collected during two sampling events by the Pacific American Foundation PAF in 2002, for which exact station locations are unavailable. Sampling occurred for the current water quality study by AECOS, Inc. at a single station in the canal at Wai‘auia on three monthly sampling events. Ranges rather than averages were provided for these two recent water quality data sets.

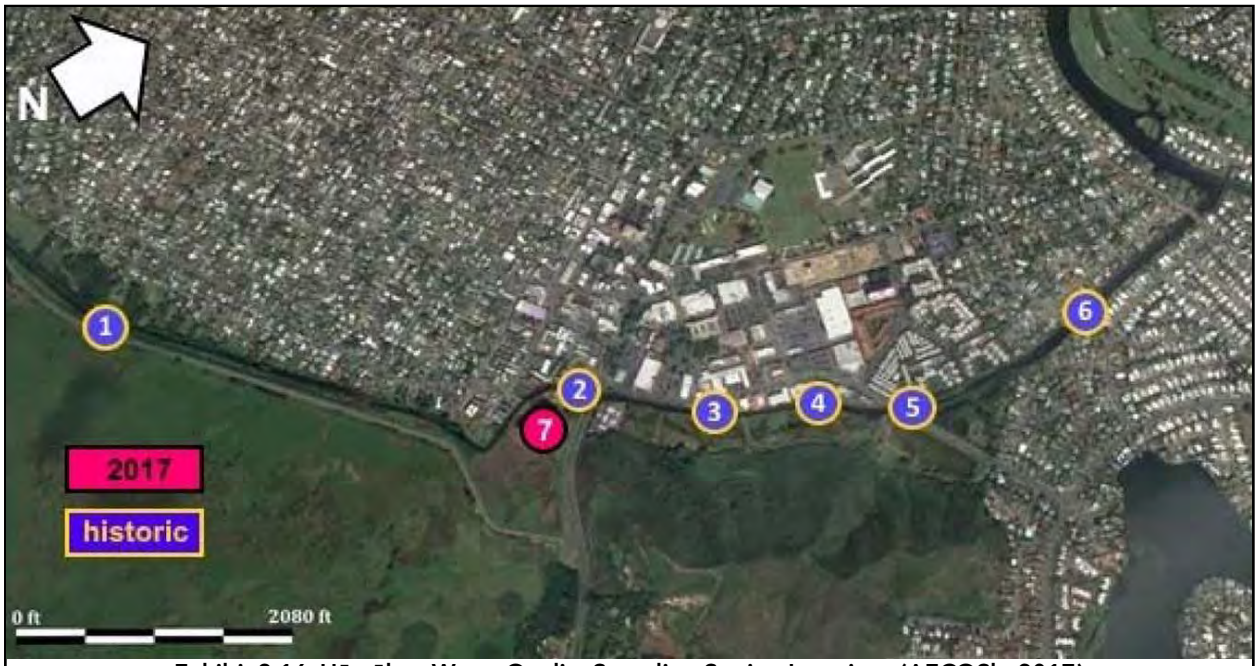


Exhibit 3.16 Hāmākua Water Quality Sampling Station Locations (AECOSb, 2017)

Table 3.10
Summary of Average Water Quality Results for Kawainui Stream and Ranges for Hāmākua Marsh (AECOS 1992a, 1992b, 1995, 2017; PAF 2002)

	Salinity (ppt)	DO sat (%)	pH	Turb. (NTU)	TSS (mg/L)	NH_3 (µg N/L)	NO_3+NO_2	Total N	Total P (µg P/L)
Hāmākua (PAF)									
2002	0-35	28-123	7.1-7.9	1-1,220	---	---	---	---	---
Kawainui Stream									
2017									
Sta. 7	---	23-47	7.3-7.9	2.7-4.4	4.5-10	13-180	5-71	898-1,700	397-850
1995-97									
Sta. 1	12	37	7.82	5.74	8.3	261	36	1,536	135
1992									
Sta. 1	14	101	8.12	5.05	3.5	19	1	1,250	204
Sta. 2	14	9	8.09	3.10	2.5	19	1	938	392
1991-92									
Sta. 2	11	---	7.91	2.98	3.6	237	10	1,350	120
Sta. 3	13	---	7.91	2.90	5.4	127	25	1,150	103
Sta. 4	14	---	7.79	2.54	8.5	204	22	1,160	99
Sta. 5	17	---	7.84	3.40	8.5	171	15	1,560	118
Sta. 6	17	---	7.87	2.34	6.1	389	60	1,220	91
1989									
Sta. 2	---	---	6.72	18	5.5	275	3	626	339

Source: AECOS, 2017b

Summary of Water Quality for Kawainui and Hāmākua Wetlands

Kawainui and Hāmākua influence the discharge and quality of water discharging into coastal waters by intercepting surface runoff and removing or retaining inorganic nutrients, processing organic wastes, and reducing suspended sediments. Waters flowing into and out of the wetlands are covered by state standards (DOH, 2014), whereas no criteria for wetlands exist, primarily for the reason that it is not possible to define wetland water quality as either "good" or "degraded". It is easier to assess water quality in streams, lakes, and marine waters at least from a human perspective of good (clear water with low particulate and nutrient levels) to degraded (low water clarity, high particulate and nutrient levels). However, the same cannot be said for wetlands.

Since the Kawainui-Hāmākua wetlands naturally function as a trap for particulates, assimilation and recycling of nutrients, and sequestering of pollutants, there is no logical basis for developing a ranking system of good to poor water quality. As seen in the water quality data presented above, there are wide variations in particulates and other water quality parameters in the wetland, both spatially and temporally. It is better to consider the wetland as a treatment system intercepting surface runoff and removing or retaining inorganic nutrients, processing organic wastes, and reducing suspended sediments before they reach open water. On the other hand, the natural functions of the wetland could be vastly improved by removing naturalized exotics and opening up bodies of water for wildlife use.

Summary of Toxic Materials within Kawainui and Hāmākua

The presence of toxic materials in Kawainui waters has also been assessed. Sediment samples were taken in the 1989 water quality study effort previously discussed to assess the presence of toxic materials in Kawainui. Samples detected the presence of heavy metals including chromium (Cr), lead (Pb), and mercury (Hg). With the exception of cadmium (Cd) and mercury, both of which generally occur in same concentrations in the samples, the heavy metal presence in the upper wetland sediment was substantially greater than that in the lower wetland sediments. However, nickel (Ni) was found in greater concentration at Station No. 8.

Table 3.11 shows the results of the sediment samples collected which also include arsenic (As), copper (Cu), silver (Ag), and Zinc (Zn). Samples of the vegetation mat, consisting of marsh vegetation particles and debris in various stages of decomposition, were also analyzed for various heavy metals.

Sediment samples were also analyzed for a variety of other chemical properties shown on Table 3.11. These include pesticides and PCBs, and for polynuclear aromatic hydrocarbons (PAH) and phenols using EPA methodologies. The results of pesticides and PCB analyses were all less than reporting limits. Therefore, none of these potentially hazardous organic compounds was detected in the sediment samples (M&E Pacific, Inc., 1990).

Table 3.11
Results of Sediment Heavy Metals from Kawainui (mg/kg)

Sampling Stations	As	Cd	Cu	Cr	Hg	Ni	Pb	Ag	Zn
Sta. 2	0.50	0.35	9.2	9.8	0.03	17.0	6.0	0.36	6.8
Sta. 3a.	1.44	0.34	35.9	56.7	0.08	53.0	12.4	0.28	35.2
Sta. 3b.	1.42	0.35	34.8	53.3	0.06	48.0	12.0	0.34	30.8
Sta. 8.	0.40	0.38	41.4	48.5	0.03	86.6	6.8	0.45	33.2
Vegetation Mat Samples									
Sample 1	0.13	0.20	*	10.2	0.032	*	13.9	0.20	*
Sample 2	0.016	0.20	*	14.9	0.016	*	7.5	0.49	*
Sample 3	0.063	0.30	*	34.4	0.024	*	8.0	0.23	*

Source: M&E Pacific, Inc., 1990
** Substance was not sampled for in vegetation mat sampling analysis.*

A number of metals do occur naturally in the environment at relatively high concentrations. Usually, these metals are combined in insoluble forms and do not move readily into solution in the aquatic environment. The toxicity of these adsorbed forms is not great under normal circumstances because they remain sediment bound so long as pH is neutral or slightly basic. They become soluble only if the pH shifts to acidic. These metals would tend to release more into solution at a pH 5 as compared to a pH range of 6 to 8 which is typical of the waters in Kawainui.

This was not considered unusual compared to other O‘ahu watersheds due to the natural presence of heavy metals in weathered basalt and would be expected in sediments derived from erosion of this material. For example, chromium appears to be naturally concentrated in weathered basalt, becoming less concentrated as soil is eroded and carried into streams and then added as coastal deposits. Lead is complexed in the fine deposits of stream and estuarine sediments, where its concentration rises. A 1978 DOH study found a relative abundance of nickel, zinc, chromium, lead, and copper in estuarine sediments, and concluded metal concentrations in general appear to be influenced by soil mineral composition and weathering of Hawaiian basalts (DOH, 1978).

Current Sampling for Toxic Material

Water samples for toxic analyses were collected for the 2017 project water quality assessment (AECOS, Inc., 2017b). Samples were collected at Station locations 3, 5, and 6 (Exhibit 3.15) throughout Kawainui for analysis of the following toxic substances: asbestos, cyanide, dioxin, various metals, various pesticides and PCBs, various semi-volatile organics, various volatile organics, total Petrochemical Hydrocarbons (TPH)-diesel, and TPH-motor.

Results of this analysis are shown in Table 3.12 for moieties that were present in detectable amounts and are compared with freshwater acute and chronic criteria of the Hawai‘i Department of Health and United States Environmental Protection Agency (EPA). A list of all toxics analyzed is provided in the project water quality study included in Appendix E.

Table 3.12
Toxic Materials Present in Detectable Amounts (µg,L) in Water Samples at Kawainui on January 2016 (Criteria Based on DOH 2014 and EPA 1979, 2001, and 2017)

Toxic Material	Station			Freshwater Criteria	
	3	5	6	Acute DOH-EPA	Chronic DOH-EPA
Aluminum	180	40	329	750-1,400	260-390
Chromium VI	6	Nd	4	16-16	11-11
TPH-diesel	Nd	100	Nd	Nc	Nc
TPH-motor oil	Nd	84	Nd	Nc	Nc
Toluene	Nd	1.2	Nd	5,800-5,200	Nc

Nd = not detected
Nc = no criterion promulgated
Source: AECOS, 2017b

Aluminum concentrations of samples taken at Station 6 near the eastern end of the wetland were the only toxic moiety exceeding State DOH freshwater chronic criterion. Federal EPA criterion were not exceeded for this substance. Aluminum likely enters the wetland primarily during major storm events, and is either absorbed in wetland sediments or taken up by vegetation.

Chromium VI was also present at Stations 3 and 6 in low concentrations. The presence of Chromium VI in aquatic systems is typically associated with discharge from electroplating, leather tanning, or textile industries. However, this substance may also naturally occur in groundwater, which is the likely source for concentrations at Kawainui. Natural attenuation in the aquatic environment occurs through reduction by organic matter, iron hydroxides, and/or sulfides.

The presence of TPH-deisel and TPH-motor compounds at Station 5 may be attributed to runoff from Kapa‘a Quarry Road or upstream light industrial uses. TPH can be broken down by bacteria and/or sink into wetland sediments. Toluene, a water insoluble component of gasoline, was the only volatile organic detected. In surface waters, the biodegradation half-life of toluene is estimated to range from 4 to 22 days. Therefore, it is not surprising that only 5 of 141 analyzed pollutants were present in detectable amounts since Kawainui functions as a sediment trap and repository for many toxic substances. The few toxic compounds found in solution in the wetland are likely due to the assimilation and sequestering capabilities of the wetland. This conclusion may explain the greater presence of heavy metals in upper marsh segments identified in the 1989 water quality study, as the wetland may be retaining suspended heavy metals before they arrive in lower marsh areas.

3.4.5.2 Potential Project Impact and Mitigation

No Action Alternative

Wetland Restoration and Upland Reforestation

Ongoing wetland restoration and upland reforestation efforts would continue and would enhance natural wetland functions that cleanse pollutants from input waters. In particular, wetland restoration improvements planned should have a beneficial impact on water quality by removing portions of the peat mat layer and invasive vegetation. This would improve water flow through the basin, allowing water borne pollutants to be taken up by sediments or processed by vegetation or bacteria. These activities would contribute to improved nearshore water quality and better regulate the movement of water before it discharges into Kailua Bay.

Drainage improvements associated with improved culverts planned along Kapa‘a Quarry Road would mitigate existing erosion occurring at these discharge points. Other site improvements such as causeways and open detention areas would further improve stormwater runoff by allowing sediments to settle before discharging into the wetland. These efforts should improve water quality and improve conditions toward a more natural state with reduced pollution from anthropogenic sources.

A State DOH NPDES permit (Permit No. HI S000439) for construction activities was also obtained by DOFAW for Kahanaiki restoration and reforestation improvements planned. The permit includes several conditions and requires implementation of proposed BMPs to minimize discharges into the wetland. These efforts would further mitigate stormwater discharge impacts on wetlands and streams resulting from restoration activities.

BMPs associated with wetland and upland restoration improvements would be in place prior to project implementation. All green waste materials generated from activities would be stored at a designated vegetation processing area, which should minimize risk that green waste travels into nearby waterways. DOFAW also has General Permit Coverage (File No. HI 16MF071) under the State’s NPDES for the use of approved herbicide within Kawainui. Compliance with permitting requirements for herbicide usage would also ensure there are no negative water quality impacts on streams and the wetland.

Restoration improvements should not have an adverse impact on the coastal waters of Kailua Bay due to the nature of activities planned. This consists of removing invasive vegetation and peat, and re-establishing growth of native wetland plants and vegetation within this project area. These activities would not generate a significant new source of urban pollutants into the wetland that would eventually discharge into Kawainui Channel and Kailua Bay. The project should have a positive beneficial impact on the water quality by removing the extensive peat mat and invasive vegetation and subsequently improve the water cleansing capacity of project wetlands.

~~**Structures and Trails**~~ **Subareas**

Subarea B: Kapa‘a. Improvements proposed for the vegetation processing site include an equipment shed and office that would be constructed under this alternative. As a whole, buildings and parking area from the vegetation processing site account for the largest percentage of runoff from improvements proposed for the Kapa‘a portion of Subarea B. About 370 cubic feet per hour (cfh) of runoff is estimated from this site. Runoff estimates could be reduced further if LID elements were used in the construction of facilities.

Subarea C: Kapa‘a-Kalaheo. Buildings supporting public access (e.g. restrooms) and site improvements at the Kawainui SPR, Kalāheo site of this subarea would be constructed under this alternative. Of these improvements, parking for facility visitors would comprise the largest percentage of estimated runoff at about 410 cfh. Buildings would account for another 40 cfh of runoff, resulting in a total of about 450 cfh, or about 20 percent of runoff from the entire site.

Subarea D: Mokulana. DOFAW would construct a new storage building with some office space at their management station. This building would add an estimate of about 100 cfh of runoff from the site, or about 1 percent of runoff from the entire subarea.

The amount of runoff from improvements proposed under the No Action Alternative would not have a measureable effect on the water quality of Kawainui. All improvements would occur in discreet areas that are comparatively smaller than undeveloped areas. Further, improvements would not have a measureable effect on water quality unless runoff produced contained high amounts of particulates and nutrients. These contaminants may be conveyed to the wetland when stormwater flows over parking areas and buildings. Nutrients typically found in fertilizers such as nitrogen and phosphorous may also be conveyed to wetland waters if fertilizers are used for landscape maintenance.

It is not possible to provide a realistic estimate of particulates and nutrients that may be included in any runoff produced. However, amounts that may be conveyed would be small and inconsequential for a number of reasons. First, runoff from project subareas would only occur when rainfall events were at or greater than 0.25 inches. Secondly, the total amount of runoff from proposed improvements is comparatively smaller than other wetland water inputs. Finally, the relative concentrations of both particulates and nutrients in storm water runoff would be small in comparison to existing inputs to the wetland. Kawainui wetland’s pollutant scrubbing functions would continue to protect downstream waters, and should have the capacity to accommodate and cleanse any additional runoff attributable to these improvements under this alternative.

Individual septic systems will service wastewater generated by restroom facilities proposed at the vegetation processing center and the Kawainui SPR, Kalāheo site. These individual wastewater systems would consist of a septic tank providing primary wastewater treatment with effluent discharged to a leach field. Septic systems would be designed and developed in compliance with

applicable State and City requirements, including State DOH wastewater system guidelines (§11-62, HAR). Compliance with these requirements will ensure adverse impacts to nearby and downwstream water resources are avoided. Additional details on individual wastewater system proposed and requirements governing their design and development are provided in Sections 2.2 and 5.2.

Proposed Action

Impacts of the project on Kawainui and Hāmākua's water quality were evaluated using changes in runoff into the wetlands from proposed improvements and landscaping. Proposed improvements include buildings, access roads, and pedestrian trails. Runoff estimates resulting from the project were evaluated for each project subarea utilizing the rational runoff equation method (Q = ciA).

Building rooftops were assumed to be non-porous, unless otherwise indicated. Roads were assumed to be 12 feet wide and composed of gravel. Pedestrian trails were assumed to be 12 feet wide and composed of gravel, while foot trails were assumed to be 6 feet wide and composed of soil. The design and material of proposed paths and trails have been approximated for this study. These improvements may be constructed of different materials when the improvements are actually designed for implementation, which may slightly alter runoff estimates. However, these assumptions are sufficient to provide an overall assessment of project impacts on water quality. All unimproved upland portions of each subarea were assumed to be restored with native vegetation.

A storm event of 0.4 inches per hour is assumed to estimate project-related runoff conditions. This factor is assumed because runoff from Hawai‘i's non-urban and agricultural lands typically does not occur until rainfall reaches roughly 0.25 inches. Runoff estimates do not include LID features, such as bioswales or pervious pavers that may significantly reduce storm runoff or any effects to water quality. As a result, assessment estimates represent a more conservative (worst case) estimate or runoff resulting from the project.

Wetland Restoration and Upland Reforestation

Continuation and expansion of these restoration activities would have long-term positive impacts on wetland function and an improvement in water quality. Work methods, procedures and protocols would be similar to what would occur under the No Action Alternative as previously discussed. With the removal of vegetation, there is an increased potential for erosion and runoff during periods of heavy rain. BMPs would be employed during vegetation removal, and no work would occur within stream banks.

Wetland restoration improvements planned should have a positive beneficial impact on the water quality by removing portions of the extensive peat mat and invasive vegetation. This would reduce the amount of decomposing vegetation present and subsequently reduce the amount of

organic acids being leached into the water. Surface water would continue being brackish at the confluence of both streams, however, water draining from the wetland should be improved with less dissolved organics leaching from the decomposing vegetation. These efforts would improve the coastal water quality of Kailua Bay where Kawainui Channel discharges surface water from Kawainui.

Drainage improvements associated with improved culverts planned along Kapa‘a Quarry Road would mitigate existing erosion occurring at these discharge points. Terraced walls for drainage control at a gully along with causeways planned will further mitigate surface water discharging into this marsh by slowing down flows and allowing sediments and other materials to settle within upland areas before discharging into the wetland. These efforts should improve water quality and support the State DOH’s Water Quality Standards for Kawainui by improving conditions toward a more natural state with reduced pollution from human caused sources.

Wetland restoration and upland reforestation improvements should not cause significant short-term impacts on the water quality of Kawainui along with coastal resources (Kailua Bay). Best management practices would be included in the design and construction of drainage improvements as they are implemented in phases dependent upon funding availability. Such measures would include silt fencing or other appropriate measures to mitigate storm water runoff into the wetland.

Vegetation mowed or grubbed as part of wetland restoration efforts will either be left in open upland areas within the project site to decompose or temporarily stored in established staging areas within these upland areas. Soil removed during clearing and grubbing operations would be dispersed on-site in areas above the wetland. This will aid retention of storm water, and it may be mixed with vegetation to enhance decomposition. If necessary, the existing vegetation processing area next to the model airplane park would be used for larger scale processing of vegetation before being properly disposed off. Use of this existing processing site further supports these efforts because this site has already been created to conduct these types of activities.

Sediment samples indicated that the marsh contained heavy metals including chromium, lead, and mercury. However, this was not unusual in comparison with other O‘ahu watersheds due to heavy metals being naturally present in weathered basalt and would thus be expected in sediments derived from erosion of this material. The concern with heavy metals is that the runoff from vegetation and sediments removed should not be allowed to acidify. Metals are entombed in the sediments and concentrated through plant uptake ~~update~~ into fibrous tissue in the biomass. Concentrations obtained from tests in 1989 did not warrant characterizing the sediments or vegetation as EPA toxic wastes for landfill purposes. In addition, the analysis of sediments for pesticides and PCB’s did not include the presence of these types of compounds at concentrations above the reporting limits (M&E Pacific, Inc., June 1990).

Continuous monitoring of the sediment and vegetation removed from the wetland should not be required under environmental rules and regulations. EPA notification requirements should only apply if test results from representative samples exceed Federal requirements. Therefore, periodic testing under a maintenance program can be conducted to monitor and control runoff quality. Testing of the pH of return water that has drained after vegetation removal can be implemented, and the application of lime can be added if the pH falls below 6.0. This will provide return water of comparable acidity to that removed from the wetland.

It is expected that the contractor or DOFAW staff will minimize stormwater runoff during construction by implementing best management practices in accordance with project design plans and applicable regulations. Plans developed would be reviewed and approved by pertinent agencies prior to construction and restoration activities. Therefore, impacts on coastal waters and water quality should be minimal or minor because approved measures will be employed to minimize runoff from construction areas along with complying with other related permit conditions.

The State DOH's Class A marine waters designation for the coastal area of Kailua Bay should not be compromised by this restoration project. Under these standards, the objective of Class A water use is to allow their use for recreational purposes, and aesthetic enjoyment is protected. Any other use is permitted as long as it is compatible with the protection and propagation of fish, shellfish, and wildlife, and with recreation in and on these waters. The project would be consistent with the objective of this class designation for coastal waters.

Structures and Trails

Table 3.13 summarizes runoff estimates for developments in Kawainui and Hāmākua project subareas under the Proposed Action without the reduction of project improvements discussed in Section 2.2 (e.g. reduced trail segments, buildings). Reduction of improvements would result in a small decrease in the projected runoff volumes shown on Table 3.13. What is shown reflects a more conservative assessment of effects. Most of the reductions would occur for runoff associated with pedestrian paths and buildings. With elimination of the hale wa‘a at the Kalāheo site, there would also be no new project initiated improvements occurring there. Only already entitled improvements could occur at that park site as part of the No Action Alternative. Consequently, runoff shown for that area in Table 3.13 would be eliminated because such volumes are no longer project related.

Trails and paths account for about 40 percent of estimated runoff attributable to site improvements for public access. Runoff estimates are especially high for foot trails in part because they are assumed to be compacted soil trails with a high runoff coefficient. Runoff from both paths and trails would likely be reduced through implementation of low impact design features. These features would include constructing the trails from permeable pavers or grass.

Table 3.13
Summary of Runoff (cfh) Estimates by Subareas from Project

Section	Paths	Trails	Parking	Building	Road
Kahanaiki	607	1,322	243	0	0
Nā Pōhaku	283	1,376	211	300	0
Kapa'a	283	0	306	1,006	531
Kapa-Kalāheo	42	0	410	164	0
Mokulana	0	315	602	395	889
Ulupō	184	687	245	140	94
Wai'auia	0	156	102	286	0
Hāmākua-Pu'uoehu	58	1,292	131	55	0
Totals	**1,457**	**5,148**	**2,250**	**2,346**	**1,514**
Percent	**11%**	**40%**	**18%**	**18%**	**12%**

Source: AECOS, 2017b

For Kawainui, estimated inputs from a 0.40 inch per hour rainfall intensity storm from stream flows, surface runoff, and direct rainfall are shown in Table 3.14. A 0.40 inch storm occurs about two percent of the time or roughly seven days per year in the Kailua area. Stream flow accounts for the majority of inputs at about 53 percent. Runoff from proposed project infrastructure would account for about 0.3 percent of total estimated runoff.

Table 3.14
Estimated Runoff into Kawainui

Discharge Source	Runoff Coefficient	Discharge (cfh)	Percent of total	Area (acres)
Direct Rain	1.0	909,432	29.6	743
Stream Input	0.28*	1,642,657	53.4	4793
Other Runoff	0.28*	447,249	14.6	1465
Project Baseline	Various**	64,349	2.1	198
Project Infrastructure	Various**	10,668	0.3	13
Total		**3,074,355**	**100**	**7,212**

*Based on DAR & Bishop Museum (2008). ** See individual estimates provided for subarea tables later.
Source: AECOS, 2017b

For Hāmākua, estimated inputs from a 0.40 inch per hour rainfall intensity storm from hillside runoff and surface runoff are shown in Table 3.15. Direct rainfall and hillside runoff account for about 97 percent of estimated water entering the wetland. Runoff from estimated project improvements would account for about three percent of total estimated runoff. The estimated amount of runoff created by proposed improvements would not have a noticeable impact on water levels or water quality within Hāmākua.

Table 3.15
Estimated Rainfall into Hāmākua

Discharge Source	Runoff Coefficient	Discharge (cfh)	Percent of total	Area (acres)
Direct Rain	1.0	28,152	49.3	23.0
Runoff	0.28*	27,445	48.0	64.1
Project Infrastructure	Various**	1,535	2.7	1.6
Total		**57,132**	**100**	**88.7**

*Based on DAR & Bishop Museum (2008). ** See individual estimates provided for subarea tables later.
Source: AECOS, 2017b

Similar to the No Action alternative, the quantity of runoff from proposed improvements across the project area would likely have an unmeasurable impact to Kawainui and Hāmākua's wetland water quality. An adverse impact is not anticipated because all improvements would occur in specific areas around the perimeter of both wetlands that are comparatively smaller than undeveloped areas. Improvements would also only effect water quality if runoff contained high amounts of particulates and/or nutrients. These pollutants may become introduced to the wetland when stormwater flows over proposed buildings, roads, parking/staging areas, paths, and trails. Nutrients typically found in fertilizers such as nitrogen and phosphorous may also be conveyed to wetland waters if fertilizers are used for landscape maintenance.

Providing a realistic estimate of pollutants that may be conveyed by runoff is not possible. Quantities of pollutants that may be conveyed would be small and inconsequential for the same reasons already discussed in the No Action Alternative. Thus, the contribution of proposed improvements would provide an insignificant contribution to outflow from the wetland to downstream waters. Kawainui and Hāmākua's wetland cleansing functions would continue to protect downstream waters and may have the capacity to cleanse additional runoff attributable to project improvements. A summary of runoff estimates by project subareas are provided in Chapter 5.

Wastewater generated by restroom facilities at the Kahanaiki subarea, the education center at Pōhakea, and the cultural center at Kapa'a would be serviced by new individual wastewater systems. The cultural center at Wai'auia and a new restroom facility at Hāmākua would likely connect to the existing municipal sewer system located nearby. Individual septic systems would provide primary treatment of wastewater via a septic tank with effluent discharged to a leach field. Such systems would be designed and developed in compliance with State DOH wastewater system requirements (§11-62, HAR). Compliance with these requirements would prevent adverse impacts to nearby and downwstream water resources. Additional detail on septic system proposed and requirements governing their development are discussed in Section 5.2.

As discussed in Section 2.2.3, another type of restroom that could be utilized consists of a self-contained facility utilizing green technology for treatment that is efficient with regard to energy consumption and water utilization (water use reduction up to 70%). Such facilities would consist of modular buildings featuring vault toilets that can be constructed with or without utilities, with

options to utilize solar power and rainwater collection. Wastewater is stored in the sealed sewage vault below the floor, and would need to be pumped by a disposal service similar to other individual treatment systems.

The three sites along the Kahanaiki to Kapa‘a subarea using new individual wastewater systems are projected to generate an average daily demand of about 1,620 gallons. In comparison, a home generates between 70 to 100 gpd per person. A family of four would generate up to about 400 gallons a day. Typically, the smallest septic tanks used for residences start at 1,000 gallons. Such tanks would likely be utilized for these new systems. There are different types of septic systems (e.g. chamber, evapotranspiration, etc.) that could be installed. The non-profit organization developing facilities would determine the appropriate system, which may include use of a “green” self-contained facility.

The septic system would involve a small area of disturbance for the septic tank, trench for the line, and absorption field. Given the relatively low average daily demand generated at Kahanaiki and the cultural center at Kapa‘a, an absorption field of 600 square feet or less would be required. The education center would require a larger absorption field of about 1,500 square feet as discussed in Section 5.2. Therefore, the area needed for such a system is relatively confined (less than 5,000 square feet of area). The area required for treatment systems would be determined during facility design, but there is more than enough area available to accommodate such use within the upland areas of Kahanaiki, Pōhakea, and Kapa‘a. Minimal grading and grubbing would be required for restroom facilities, which would be similar or smaller than the 175-square foot City airplane park restroom.

Therefore, it is reasonable to assess and determine that such minimal wastewater generated from these activities would not negatively or significantly impact water quality at Kawainui. The City Airplane Park restroom facility and treatment system have not resulted in major issues or concerns with water quality at Kawainui based upon the water quality samples collected and the condition of that wetland area. Projected wastewater demands are relatively low at 1,620 gallons, or similar to about four homes, and facilities would be disbursed over three sites within the approximately 80 acres of upland area from Kahanaiki to Kapa‘a. There is sufficient land area to accommodate such systems, and they would be designed in compliance with State DOH wastewater system requirements. Furthermore, wetlands are biologically productive ecosystems based on their vegetative productivity and species diversity that function to absorbing and trapping sediments and pollutants in runoff. Kawainui’s over 820 acres of wetland effectively serves this function.

Short-Term Impacts. Construction activities would involve grubbing, grading and newly exposed soils which could increase stormwater runoff. The environmental impact of path construction was addressed in the Kawai Nui Pathway Plan Final EA (HHF, 2003). Most of the proposed perimeter trail is located outside the wetland areas. During construction, BMPs would be used to prevent erosion, runoff, and sedimentation which could impact marsh and stream water quality. BMPs may include use of silt fences, fiber rolls or other water and soil barriers, or

covering exposed areas with mulch or grass. Design of drainage improvements for the pathway should include measures for a slower release of stormwater runoff to the marsh to allow sediments to settle before reaching the marsh.

~~There are several sections of pathway proposed within wetland areas as discussed in Chapter 2. These sections would have raised boardwalks, and would require the excavation of soil for support posts and for viewing platforms. The Pathway Plan FEA notes that because of the small size of the postholes, the impact of post excavation should be minimal.~~ As with all path segments, best management practices would be employed. Slope stabilization, the use of vegetation buffers, and diversion of runoff from exposed areas would be employed. The use of heavy equipment would be avoided to the extent possible to minimize ground disturbance. Construction would be done during the dry months to the extent possible. Erosion control devices would be installed before construction and removed only after the site has been revegetated and stabilized. ~~Because of the proximity of the boardwalk segment to the wetland, greater attention would be paid to erosion control measures.~~

The construction of parking areas and structures at several locations within the project area would involve grading and site preparation. All buildings, structures, and parking areas have been sited outside the wetland areas and away from streams. Structures were designed to work with the existing topography and minimize the amount of grading required. During construction, contractors would utilize BMPs to mitigate potential runoff. Specific BMPs would be determined by the construction contractor during the final design of the proposed improvements.

3.4.6 Aquatic Biota

AECOS, Inc. conducted an aquatic resource assessment survey of the project site. The study associated with this survey is included in Appendix D. The primary purpose of the survey was to evaluate potential project impacts to aquatic biota in Kawainui and Hāmākua. Federally delineated Critical Habitat are not present within or adjacent to the project site.

Survey Method

Visual observations to identify aquatic biota that may be present occurred at 20 locations throughout the project site in June 2017. Observations involved walking along or in stream channels and open water sections of the wetlands and along margins of the restoration ponds. Dip nets were utilized to confirm the identity of species observed and to access deeper water in survey areas. Algal samples were also collected for microscopic identification from four locations: 1) the segment of open water at Waiauʻia; 2) a small branch of Kahanaiki Stream; 3) Maunawili Stream near the restoration ponds; and 4) from an area near the southern end of the levee. Exhibit 3.17 shows the location of survey points within the project area.

3.4.6.1 Existing Conditions

No fish or invertebrates protected by State Administrative Rules or the Endangered Species Act and its amendments were observed within the project area. A full listing of species observed or previously recorded at the project site is provided in the aquatic resource assessment survey included in Appendix D.

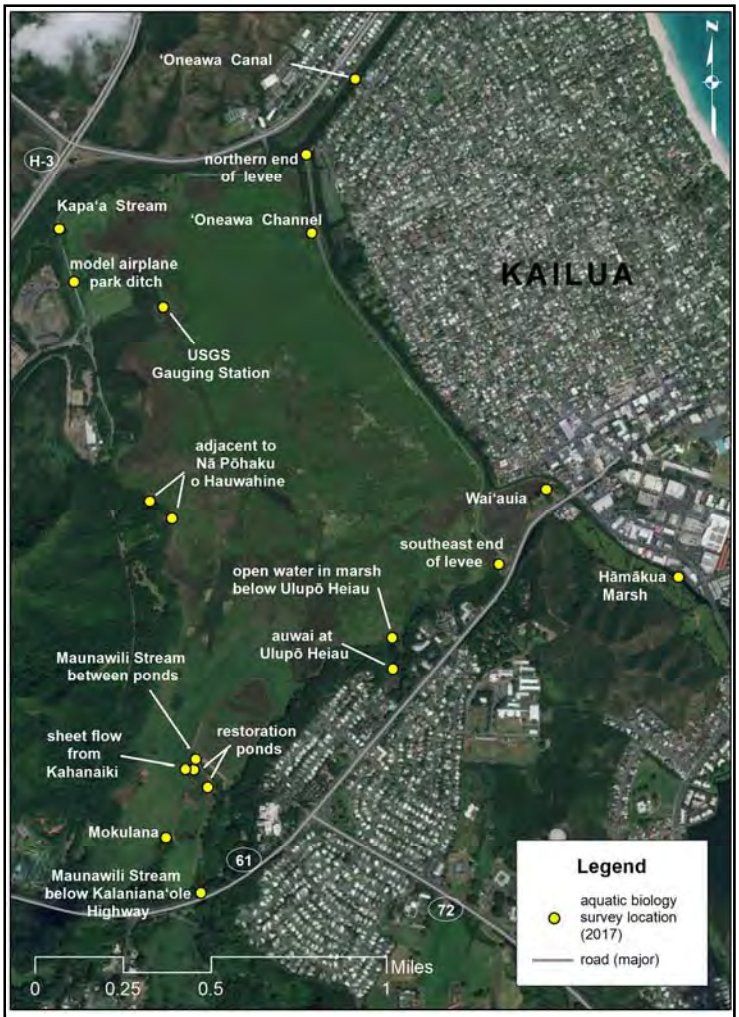


Exhibit 3.17 Aquatic Biology Survey Locations (AECOS, Inc., 2017a)

The biological sampling locations represent only a fraction of the area occupied by Kawainui. However, despite the long list of animals known from Kawainui-Hāmākua project area, most of the recorded animals occurred in the flowing waters of streams and canals leading into or away from the wetland. It should be noted that a body of water covered by a layer of peat is biologically dead (except for bacteria). Without light penetration, oxygen cannot be generated by aquatic algae, and the subsurface of the wetland supports no invertebrates (such as aquatic insects and prawns) or vertebrates (such as fishes) over most of its area.

Survey results indicate Blackchin tilapia (*Sarotherodon melanotheron*) and molly (*salvatoris/mexicana* hybrids) were the most abundant fish within the project site. Both species were observed at most of the survey locations. The survey results concluded the freshwater "rice-paddy" eel (*Monopteris albus*) inhabits the peat and muck to an unknown extent beyond the open water boundaries. The population of these eels at Kawainui may be high since the eels are capable of surviving in low-oxygen marsh environments. Apple snail (*Pomacea canaliculata*) were also commonly observed in the wetland and restoration pond waters. The snail prefers calm or slow flowing water, and deposits bright pink egg masses on emergent vegetation or other substrates.

Three endemic ʻoʻopu (*Eleotris sandwicensis*, *Awaous stamineus*, and *Stenogobius hawaiiensis*) and two endemic crustaceans (*Atyoida bisulcata* and *Macrobrachium grandimanus*) have been reported at the project site. These endemic species are amphidromous, meaning eggs of these

species are laid in freshwater streams with larvae later drifting into the ocean. Juveniles later return to freshwater to grow into adults. The ʻOʻopu Nākea (*Awaous stamineus*) that migrates downstream to reproduce has been documented in the section of Maunawili Stream located upstream of Kawainui. Similarly, native ʻOpaeʻula (*Halocaridina rubra*) have also been observed in Makawao Stream, a tributary of Maunawili Stream and an unnamed tributary of Kahanaiki Stream. Migration of these species through Kawainui's wetland may also occur on rare occasions.

Rambur's forktail damselfly (*Ischnura ramburii*) and scarlet skimmer dragonfly (*Crocothemis servilia*) are present in most locales, skimming the surface of water or perching on emergent vegetation. The indigenous pinao or Giant Hawaiian darner (*Anax junius*) and the Roseate skimmer (*Orthemis ferruginea*) were also observed regularly in the marsh complex.

The Oceanic Hawaiian damselfly (*Megalagrion oceanicum*) and Blackline Hawaiian damselfly (*Megalagrion nigrohamatum nigrolineatum*) have been reported to be present within the larger upland Kawainui watershed region outside of the project site and within the Koʻolau mountains. The Oceanic Hawaiian damselfly prefers cascades and steep runs capable of producing standing waves, while the Blackline Hawaiian damselfly occurs in slow sections or pools along mid-reach and headwater portions of perennial, upland streams, and in seep-fed pools along overflow channels bordering such streams. These two damselfly species prefer different stream habitats, but are limited to stream reaches without naturalized predatory fishes. These habitats do not exist within or near the Kawainui-Hāmākua project area, and both wetlands have abundant fish (e.g. Blackchin tilapia) serving as predators.

Observations Within Specific Project Areas

Levee. The open water of the channel routed along the mauka-side of the levee is regularly utilized by *ʻalaeʻula* (Hawaiian Gallinule; *Gallinula chloropus sandvicensis*). Blackchin tilapia, molly, and apple snail are visible from the bank. Chinese catfish (*Clarias fuscus*) is present in deeper water. The southern end of the levee hosts Chinese catfish, indeterminate juvenile poecilids, and apple snail. Filaments of the cyanophyte, *Oscillatoria* sp., grow attached to aquatic vegetation at this end of the levee.

Waiauʻia. The open water area at Waiauʻia has dark colored water and, as elsewhere, blackchin tilapia and molly. *ʻAlaeʻula* and Mallard duck (*Anas platyrhynchos*) swim across the surface, while the bottom of the waterway is covered in a thick mat of a green alga in the genus, *Rhizoclonium*.

Ulupō Heiau. The spring fed auwai near Ulupō Heiau hosts several naturalized aquatic species. Mosquitofish (*Gambusia affinis*), rainbow guppy (*Poecilia reticulata*), unidentified armored catfish (Loricariidae), red-rimmed melania (*Melanoides tuberculata*), crayfish (*Procambarus clarkii*), and marine toad (*Rhinella marina*) tadpole inhabit the auwai above its entry into Kawainui's wetland. In nearby areas of the wetland, similar species are extant, with blackchin

tilapia and apple snail also present. The fragile forktail (*Ischnura posita*), Rambur's forktail, and scarlet skimmer fly just above the wetland, their offspring likely in the water below.

DOFAW Management Station. The restoration ponds were filled or partially filled with turbid brown water at the time of the survey. Apple snail eggs line the edges of some ponds. Molly, red-eared slider (*Trachemys scripta elegans*), and American bullfrog (*Lithobates catesbeianus*) were present in the ponds. Native birds are also present in or around most of these ponds. Sheet flow of the wetland and Kahanaiki Stream is visible just to the west of the restoration ponds. Here, Juvenile poecilids and apple snail are visible in the flow. Scarlet skimmer and Rambur's forktail skim the water and rest on nearby emergent vegetation.

The segment of Maunawili Stream that flows between the restoration pond areas is home to a numerous banded jeweled cichlid (*Hemichromis elongatus*). This is the only location in the survey area where ubiquitous blackchin tilapia or molly are not the most abundant fish species. Bronze corydora (*Corydoras aeneus*), Asian clam (*Corbicula fluminea*), *pinao*, globe skimmer dragonfly (*Pantala flavescens*), crayfish, American bullfrog, red eared slider, and a few large koi (*Cyprinus carpio*) are present in the stream at this location as well.

Mokulana. The flooded area off Mokulana peninsula has slow, shallow flow with a surface film of debris. Juvenile poecilids and apple snail are the only species readily observed. A green alga, *Spyrogyra* sp., grows densely in shallow pools and Rambur's forktail flies nearby. Chinese mystery snail (*Cipangopaludina chinensis malleata*) can be seen in the shallows of Kahanaiki Stream further upslope under the Kalanianaole Highway Bridge.

Nā Pōhaku o Hauwahine. The open water in the wetland next to Nā Pōhaku o Hauwahine is home to a molly (*Poecilia* sp.), apple snail, tilapia, and pond snail (*Physa virgata*). Fragile forktail, Rambur's forktail, roseate skimmer, and scarlet skimmer fly above the open water and aquatic vegetation nearby.

Kapa'a/Vegetation Processing Site. The wetland vegetation near a newly installed USGS gauge station (below the vegetation processing site) is dense, allowing only very limited observations of aquatic biota. Apple snail is the only species observed in the area. The ditch near the model airplane park and Kapa'a Stream at Kapa'a Quarry Road are overgrown with vegetation, and only molly are noticeable in these waterways. The Black-crowned Night Heron or *'auku'u* (*Nycticorax nycticorax hoactli*) is conspicuous along the margins of the stream and wetland.

Hāmākua. The open waters of Hāmākua's wetland were dominated by blackchin tilapia and molly with few other species present. Native birds are quite abundant in the pickleweed (*Batis maritina*) and the open water of the wetland.

Downstream from Hāmākua (outside of the project site), in the canal leading to the nearby coastal waters of Kailua Bay, the aquatic biota assemblage present comprises species typical of nearshore marine waters. *Manini* (*Acanthurus triostegus sandvicensis*), *mamo* (*Abdominalis*

abudefduf), mullet (*Mugil cephalus*), and *pualu* (*Acanthurus blochii* and *Acanthurus xanthopterus*) swim in deeper water of the canals. Samoan crab (*Scylla serrata*) and blue-pincer crab (*Thalmita crenata*) inhabit the sandy bottom, whereas *ʻalamihi* (*Metopograpsus thuhukar*) clamber along the banks.

3.5.4.2 Potential Project Impact and Mitigation

No Action Alternative

Under the No Action Alternative, ongoing upland reforestation and wetland restoration activities would continue. Wetland restoration activities would remove invasive vegetation and improve stream flows. This would enhance the environmental quality of streams and positively benefit aquatic biota that may be present. Invasive vegetation removal for vegetation control activities would occasionally require herbicide application. Only approved herbicides would be used and would not adversely impact aquatic biota that may be living in project site water bodies. DOFAW has also obtained State NPDES general permit coverage for herbicide and pesticide usage within wetland and wildlife sanctuaries statewide. Compliance with permit conditions and application practices would ensure aquatic biotas are not negatively impacted.

Improvements at the Kawainui SPR, Kalāheo should not impact aquatic species that may be present within the Kawainui Canal. Improvements would be constructed within the upland site, and would be designed to minimize runoff discharges into the canal. Construction of the pedestrian bridge would be over the canal and should not impact aquatic biota. Improvements at the Kapaʻa Vegetation Processing site would occur in upland areas and would not impact project site wetland area where aquatic species may be present.

Short-term constructed related effects for improvements would be designed to include BMPs that would minimize erosion and discharges into the wetland. Such measures would minimize short-term effects on aquatic biota.

Proposed Action

Wetland Restoration and Upland Reforestation

The Proposed Action includes continuation and expansion of wetland restoration and upland reforestation efforts by DOFAW beyond that under the No Action Alternative. Replacing non-native invasive vegetation with native vegetation would reduce terrestrialization of Kawainui within expanded wetland and upland areas. Clearing invasive vegetation and the floating peat mat from the wetland would create more open water areas, allowing existing streams to flow and meander through the area. These efforts would have beneficial effects on the health and functioning of wetlands, which support aquatic biota present.

As previously discussed, the body of water covered by a layer of peat is biologically dead. Oxygen cannot be generated by aquatic algae without light penetration. Therefore, wetland restoration would increase open water areas and flows within Kawainui reducing the extent of biologically dead areas under the layer of peat. This has a significant beneficial effect supporting invertebrates (such as aquatic insects and prawns) and vertebrates (such as fishes) within improved areas. This would facilitate the migration of native aquatic fauna and have a long-term positive impact on their sustainment.

Wetland area at Hāmākua would be expanded by up to about 4 acres by excavating adjacent upland areas. This would expand open water and mud flat areas, allow for further re-vegetation using native wetland plants, and subsequently increase and improve habitat for aquatic biota.

Reforestation and associated upland improvements, such as drainage enhancement, would also have beneficial long-term effects for aquatic biota. These efforts can reduce erosion and detain stormwater runoff, reducing rates of sedimentation and pollutant discharges into project site water bodies. This improves the water quality, reduces peat mat and invasive vegetation growth within the wetland, create more open water all of which benefits aquatic biota.

Construction of Trails and Structures

~~Construction within the wetland would be limited to the installation of posts for boardwalk structures. No other structures or modifications are proposed for wetland or stream areas. Soil erosion during the placement of boardwalk posts would increase water turbidity, temporarily degrading the aquatic habitat. BMPs would be implemented to mitigate these impacts. Appropriate permits for this work would be obtained, and associated requirements for water quality monitoring during and after construction would be followed.~~

The proposed trails~~, boardwalks,~~ and viewing platforms may provide up-close, but non-invasive, opportunities to view aquatic species in their natural habitat. This would support environmental education and increase public awareness and support for the protection of the area's aquatic resources. There are no plans to allow recreational fishing within the project area. The gathering of aquatic organisms within the project area, other than in conjunction with DOFAW-approved educational activities, would be prohibited.

DOFAW improvements to their management and research station would support restoration and management activities at Kawainui that contribute to improving wetland functional values and this section of the watershed. The vegetation processing site would similarly support these activities by providing a site with facilities to process vegetation removed. ~~Construction of recreational improvements at Kalāheo Park would not have adverse impacts on the wetland's hydrologic role or its ability to perform these functions. Improvements would be located outside the wetland area.~~ During construction, BMPs would be used to avoid soil runoff into the wetland areas.

These two damselfly species prefer different stream habitats, but are limited to stream reaches without naturalized predatory fishes. Because these habitats do not exist within or near the Kawainui-Hāmākua project area, project would have no effect on populations or habitats of either species.

CHAPTER 4: HUMAN ENVIRONMENT



4.1 HISTORIC, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

This section examines existing historic, archaeological, and cultural resources in the project area, and probable project impacts. If applicable, necessary mitigative measures are identified. This section is divided into two primary subsections: 1) historic and archaeological resources; and 2) cultural resources.

4.1.1 Historic and Archaeological Resources

An *Archaeological Literature Review and Field Inspection for the Kawainui Marsh Master Plan Update* was prepared by Cultural Surveys Hawai‘i (CSH) in 2017, and this literature review and field inspection (LRFI) report is included in Appendix F For purposes of the study, the area of potential effect was considered to be approximately 986-acres. The scope of work for the LRFI was: 1) historical research, to construct a history of land use and to determine if archaeological sites have been recorded on or near the property; and 2) limited field inspection to verify existing sites, identify any surface archaeological features, and to investigate and assess the potential for impact to such sites.

4.1.1.1 History of the Kailua Region

The history of the Kailua region has been documented in a number of studies. All of these studies detailed the legendary history and oral traditions, the legendary rulers and personalities, the early historic accounts, land ownership and utilization changes during and following the Māhele, and the changes in land use from traditional to modern times. A summary is provided below, and more information can be found in the LRFI.

Early Historic Period

Historic accounts of Kailua before the 1950s are rare. Maui high chief Kahekili, who conquered O‘ahu about 1783, settled with his supporting chiefs in Kailua. Kamehameha I was known to spend time in Kailua, and to have worked at the Kawainui and Ka‘elepulu fishponds “with his own hands.” It is also reported that during one of Kamehameha‘s stays in Kailua, there was a shortage of taro. He and his men went to Kawainui to collect the lepo‘ai‘ia, or edible mud that was like pudding. Legend has it that the mud was originally from Kahiki, indicating it had been brought to Kawainui many years before in the past (CSH, 2017).

Lahilahi Webb, the last lady-in-waiting to Queen Liliʻuokalani, and later a guide for the Bernice Pauahi Bishop Museum, stated that lepoʻai was completely unique unto Kawainui. She describes it as thick and jelly-like, similar in texture to haupia. Webb also notes that there was a kapu observed when gathering this resource. “No one was allowed to utter a word while the diver was in the pond getting it. If a word was spoken, ordinary mud rose up around the diver and covered him so that he died. There was no escape.” (CSH, 2017).

A detailed account of Kawainui and its surroundings was provided by missionary Levi Chamberlain, who made a circuit around Oʻahu to inspect the mission schools in 1828. This account describes the landscape in the immediate vicinity of the Kawainui Marsh. It is clear from this account that this west-northwest portion of Kailua, in the vicinity of the study area, was low lying and prone to flooding, a condition that was also supported in later accounts.

Mid- to Late 1800s

The drastic depopulation of the Hawaiian Islands following the introduction of Western disease has been documented in a number of sources. One estimate indicated the population of Hawaiians and part-Hawaiians fell from approximately 300,000 in 1778 to 82,593 by 1850.

Population counts from the 1830s estimate the population of Kailua at approximately 760 individuals. This low population figure is incongruous with the known productivity of the region, but is consistent with population decline estimates due to western disease. Westerners passing through Koʻolaupoko in the mid-1840s made note of the cold and flu symptoms among the native Hawaiians, and it was also noted that much formerly productive land appeared abandoned.

Land use in Kawainui during the first half of the nineteenth century is known through records of Land Commission Awards (LCA) at the time of the Māhele, the land redistribution enacted by Kamehameha III. At the time of the Māhele in 1848, it appears that Kailua, Kāneʻohe, and Waimānalo were considered choice locations for native Hawaiians, as these ahupuaʻa were awarded to the Crown, the royal family, and then to important aliʻi (chief). The LCA records for Kailua document a thriving cultural landscape of garden areas clustered along its approximately 18 permanent and intermittent streams. The Maunawili/Kahanaiki Stream delta was a large, marshy low-lying area, with fertile soils along streambeds with many taro loʻi.

Māhele records mention 123 house lots in the Kailua awards. However, this most likely does not offer a complete reflection of habitations, as virtually all of the 171 claimants probably lived within the ahupuaʻa. Where homes are mentioned, the location of these house lots are typically bounded on all sides by upland, indicating an overwhelmingly inland settlement pattern.

Aliʻi in Kailua generally did not specify what use they were making of their land in the LCAs. Land use information is however usually included with LCA testimonies for kuleana, belonging to commoners. A number of loʻi (irrigated terrace), kula (pasture), moʻo (raised area that extends

between irrigated terraces), and house lots were described in LCA claims within the project area. Exhibit 4.1 shows ‘ili locations within the vicinity of the project area.

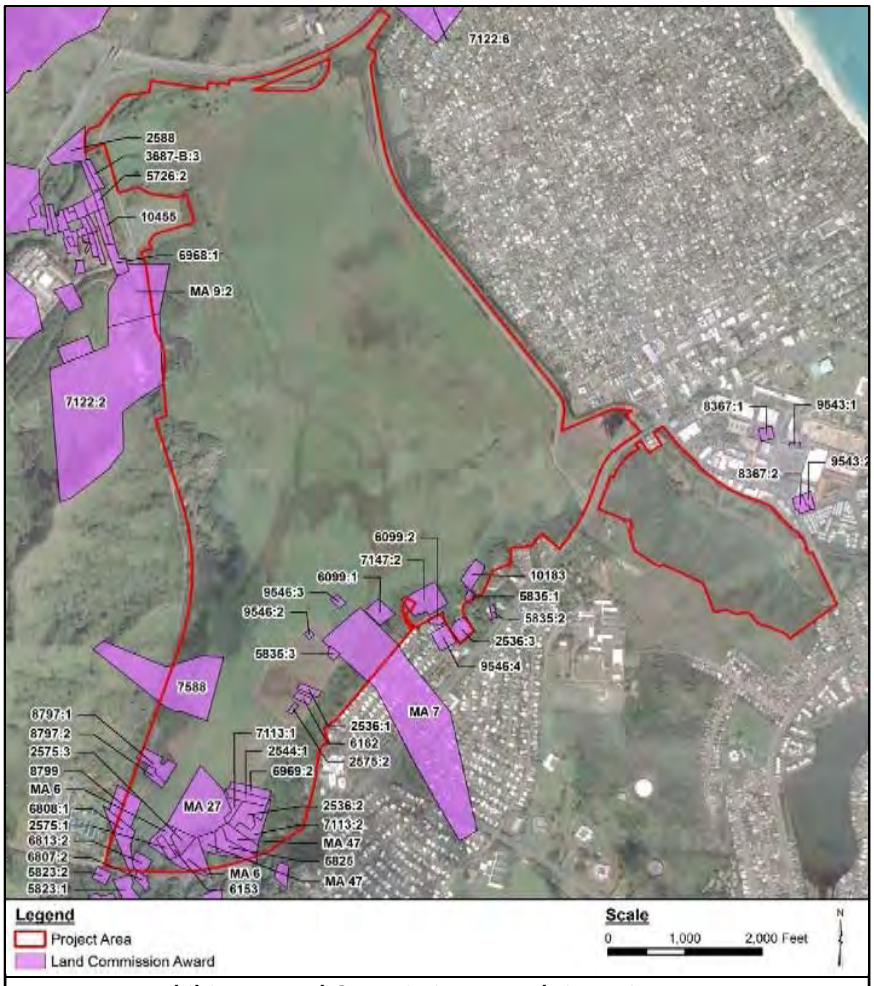


Exhibit 4.1 Land Commission Awards in Project Area
Source: Cultural Surveys Hawai‘i (2017)

During the mid-1800s, the settlement pattern within the Kawainui-Hāmākua project area was dominated by irrigated agriculture. The hillslopes above the wetland were utilized for dryland agriculture, with traditional Hawaiian economic plants as well as Western introduced plants, such as fruit trees. House lots were dispersed on the higher grounds surrounding the wetland.

By the late 1800s, agriculture in the project area was changing to rice farming. In 1880, rice fields were described in one-fourth of the valley of Kawainui and plans for additional rice fields in the remainder. In the years following the Māhele, Kailua grew into an important area of commercial agriculture. Kailua’s numerous abandoned taro lo‘i in the former taro lands of Kawainui and Maunawili provided perfect areas for the expansion of rice farms. Despite the conversion of taro lands around Kawainui to rice, areas mauka of the wetland continued to be cultivated in taro.

Mid-twentieth century testimony indicates that as recently as the early 1900s, the fishermen at the shore traded ocean fish for taro with the upland farmers, which was probably a long-established pattern. LCAs in Kailua mention numerous fisheries and pools where fish would have been raised.

1900s

By the early 1900s, the majority of the taro loʻi in Kawainui were converted to rice paddies, leaving little to no physical evidence of previous loʻi cultivation. However, during the first part of the twentieth century, rice farming declined rapidly, due primarily to competition from California rice growers. Another contributing factor to the decline in rice cultivation was the prohibition of Chinese immigration to Hawaiʻi beginning in 1876.

Truck farming of taro, avocado, papaya, and Western crops followed the decline of rice. The Kūkanono slopes along Kailua Road and extending towards Kawainui were utilized for cultivation, raising chickens, and pig farming. The Kailua Fruit Stand was a successful family-owned truck farm that operated for 25 years at the current site of First Presbyterian Church on Kailua Road until the development of the Kūkanono neighborhood.

In the early 1900s, Kāneʻohe Ranch came to dominate land holdings in the Kailua and Kāneʻohe areas. Included within this acreage was much ranch land that has been bought, sold, and used as ranch land by numerous parties since the mid-1850s. Cattle, sheep, and horses, were allowed to roam through many parts of Kailua, and would have destroyed many gardens and abandoned habitation areas. Kāneʻohe Ranch also grew pineapple and sugarcane. With the decline of rice farming around the margins of Kawainui, cattle stock moved onto the abandoned agricultural lands.

Although sugar never became an important crop in Kailua itself, the need for water for the adjacent sugar lands of Waimānalo was an important factor in the transformation of the Kailua watershed. As early as the late 1870s, a system of flumes, ditches, and tunnels were built in the mauka portion of adjacent Maunawili to collect water from the abundant springs and streams. By 1881, close to 1,000 acres of sugar had been planted, and milling operations were underway in Waimānalo, increasing the need for water.

By the 1920s, improvements to the Waimānalo Irrigation System (SIHP # 50-80-15-4042) included catchment tunnels excavated into the base of the Koʻolau in Maunawili to increase flow. Beginning in 1923, water from Kawainui was pumped through a portion of the Waimānalo Irrigation System to a reservoir in Waimānalo. The pumping caused the last portions of the fishpond to dry out and become the wetland it is today. Pumping continued until the early 1950s.

Modern Land Use and History

Cattle and horses grazed throughout Kailua, including Kawainui and Hāmākua wetlands, for many years. In 1928, the Mackay Radio Tower began operating just mauka of the Hāmākua Bridge, on the area known as Wai‘auia (Exhibit 4.2). Mackay Radio Company, which later became ITT World Communications, operated a tall radio tower until it was removed in the 1980s.



Exhibit 4.2. 1949 Aerial Photograph Showing Mackay Radio Tower

In the 1940s, the U.S. military conducted training exercises within the margins of Kawainui. Troop maneuvers were conducted and the use of small arms permitted in the vicinity of Nā Pōhaku. Mortars were also exploded, although areas where this took place are not known. Used and unused 50-caliber shells from large machine guns were found during archaeological investigations of Kūkanono slope, providing evidence of live fire training.

During World War II, Italian prisoners of war were used for construction work in the valley. The location of their camp was described as “in one of the small valleys, probably Pōhakea, on the southwestern edge of the Marsh. The entrance to the val1ey was from a road that preceded the present Kapa‘a Quarry Access Road” (CSH, 2017).

Between 1949 and 1950, the northwest end of the wetland, was filled with soil removed from the “water tank site” from the hill above Mōkapu Saddle Road. This northwestern area of the wetland is known as the Kawainui State Park Reserve (SPR): Kapa‘a Section. This infilled area was leased from Kāne‘ohe Ranch and used as an auto wrecking business. During construction of Mōkapu Saddle Road, soil removed during construction was added to the same northwest end of the wetland, expanding the auto wrecking business. By 1967, approximately 15,000 “auto wrecks were stacked five high in the area” (CSH, 2017).

In 1949, the Honolulu Construction & Draying Company Ltd., now known as Ameron Hawai‘i, began operating the quarry on the opposite side of Kapa‘a Quarry Road. Excess crushed rock was stored for many years in a 76-acre area at the edge of the wetland, at the current site of the City’s model airplane park. From the 1950s to 1962, the site was leased and used by the City “as an open-burn refuse disposal site”. The model airplane field was developed in 1972.

By the late 1950s, the truck farms that had flourished within the bounds of present day Kailua Town were slowly replaced by housing, municipal, and retail developments. Kailua was promoted as a bedroom community from downtown Honolulu. Residential developments were planned for more outlying areas of Kailua Town, such as Olomana, Pōhākapu, and Oneawa Hills.

By the early 1950s, a dike was installed on the makai edge of Kawainui to protect Kailua from flooding. However, the dike did little to prevent flooding during the 1950s. In response, the Oneawa Channel (now referred to as Kawainui Canal) was constructed to protect the expanding residential development in Kailua.

The completion of the Pali Highway in 1957 was the impetus for increased residential development in Kailua, since the highway provided easy access between Honolulu and Kailua. Coconut Grove was established prior to the completion of the highway; Maunawili was not developed until the mid-1960s.

Increased population also required the development of landfills. The Kapa‘a Sanitary Landfill, located across Kapa‘a Quarry Road, opened in 1964. The landfill occupied the location of the former quarry until its closure in 1997. A 1981 report on the landfill describes Kawainui’s use as, “…a flood-control facility for most of the Kailua area, and serves as a buffer zone and sink for sediment and nutrients that are produced by natural and human activities upstream of the marsh, including overland runoff. The marsh is also a receptical [sic] for treated sewage effluent, and, possibly, leachate production from the landfill.” (CSH, 2017).

In the 1960s, two horse and cattle ranches began operation on leased state land within the project area. VO Ranch occupied approximately 10 acres just south of Nā Pōhaku. This lease expired in December 2013, and ranching structures were removed. Diamond K. Ranch occupied approximately 80 acres extending from the Kūkanono Slope, west to Kapa‘a Quarry Road, and north to the VO Ranch. The ranch utilized the Mokulana Peninsula for cattle and horse pasturage, and the land west of the medical center was cleared and fenced with corrals and sheds. DOFAW’s management station now occupies a portion of this former ranch land located downslope of Adventist Health Castle (former Castle Medical Center), off Ulukahiki Street.

The Matsuda Store, which had been the general store for Kailua in the first half of the twentieth century, was also the residence of the Knott family (Diamond K. Ranch) for many years during their cattle grazing period. In 2000, the former Matsuda Store had to be demolished due to extensive termite damage. The only remaining remnant of the store was a small concrete slab that formerly held the gas pumps.

The New Year’s Eve Flood on December 31, 1987 to January 1, 1988 was caused by extreme weather and heavy rain fall combined with reduced water retention capacity of Kawainui due to vegetation and debris. The resulting floodwaters caused severe and extensive property damage, particularly in the adjacent Coconut Grove subdivision east of Kawainui. In response to this

flood, the levee was raised and a concrete four-foot high floodwall was constructed. The levee extends 6,300 feet north/south from Kailua Road to the Kawainui Channel.

Puʻuoehu was quarried in 1963. A roadway to the quarry that extends from the quarry site toward the south following the base of the ridge, then turns toward Hāmākua Drive. The roadway is described as asphalt remnants near the quarry site suggesting that the section of the access road adjacent to the quarry site was paved, while the remaining sections were gravel-filled.

Ulupō Heiau, adjacent to Kawainui's wetland and designated as State Inventory of Historic Places (SIHP) #50-80-11-0371, has been listed on the National Register of Historic Places (National Register) since 1972, and on the Hawaiʻi Register of Historic Places since 1981.

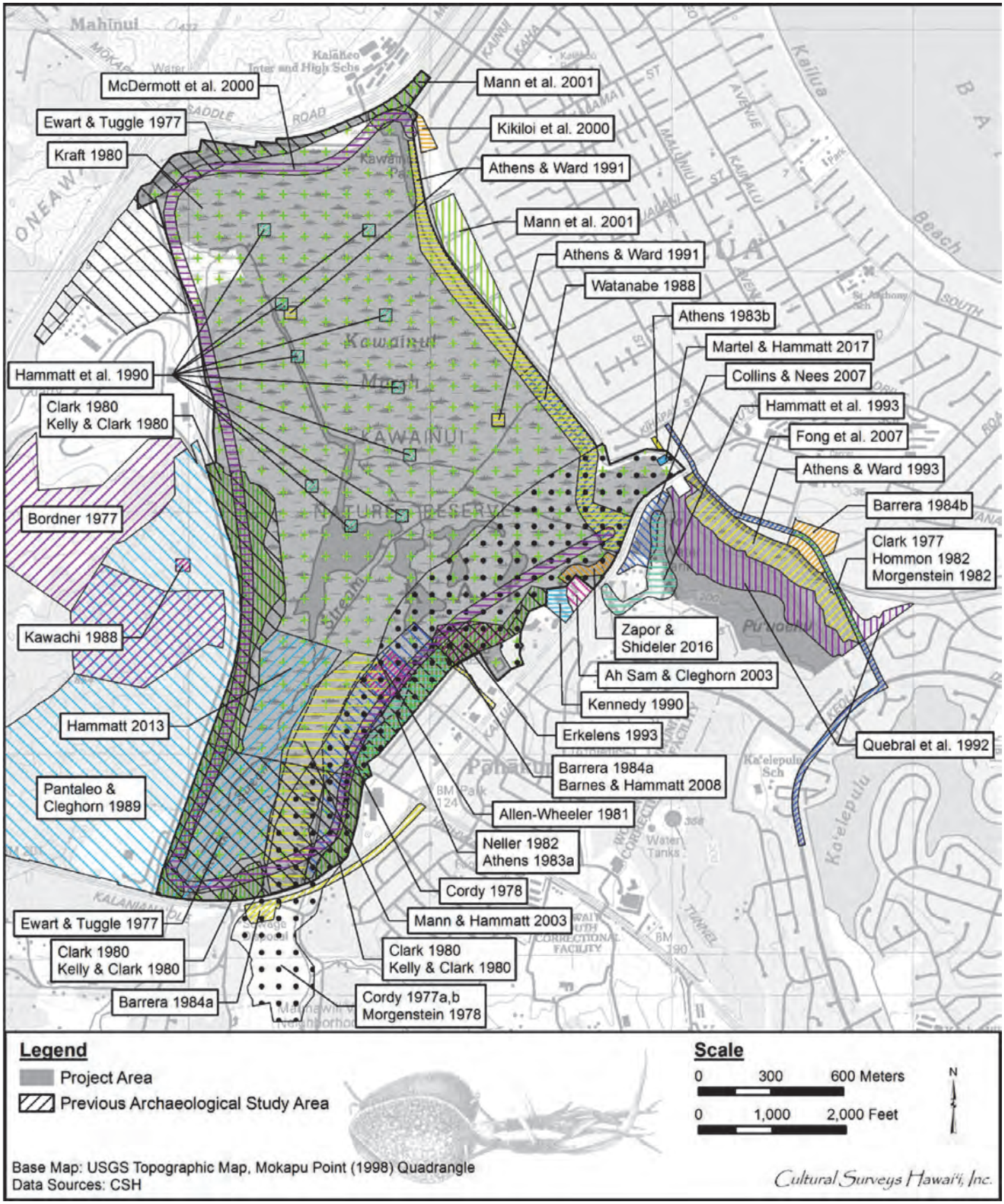
In 1979, the Kawainui Marsh area was determined eligible for listing in the National Register. According to the determination, "Kawainui Marsh is important as a major component of a larger cultural district which would include . . . the ponding/wet agricultural area . . . remains of extensive terracing systems, ceremonial sites, burial sites, and habitation areas associated with this agricultural complex" (CSH, 2017). Kawainui Marsh is not, however, listed on the State Inventory of Historic Places, the National Register or Hawaiʻi Register.

In 1995, Ducks Unlimited donated Hāmākua Marsh to the State. Habitat restoration began at that time with the removal of mangrove and non-native vegetation.

In 2005, the Kawainui and Hāmākua Marsh Complex was designated as a Ramsar Convention Wetland of International Importance. The designation is given to ensure "conservation and sustainable use of wetlands and their resources, for the benefit of humankind" (Ramsar Convention of Wetlands, 2013). The complex was designated as Ramsar site no. 1460.

4.1.1.2 Previous Archaeological Research

Archaeological research in Kailua over the last 25 years has been fairly extensive, but has concentrated along the margins of Kawainui and within Maunawili Valley. Most of the makai portions of the ahupuaʻa were developed prior to the implementation of state and federal historic preservation rules, and did not require extensive study. Investigations within the Kawainui-Hāmākua project area were undertaken as early as the 1970s and through the 2010s. Figure 4.1 shows the location of previous archaeological studies conducted within the vicinity of the project area. A more detailed description of these previous archaeological studies can be found in the LRFI (CSH, 2017) in Appendix F.



Kawainui - Hāmākua Master Plan Project

Figure 4.1 - Previous Archaeological Studies Within the Project Area

Kailua, O'ahu

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The abundance of resources in the Kailua ahupua‘a, including the 450-acre fishpond of Kawainui and the surrounding lo‘i kalo, supported a large population of both ali‘i and maka‘āinana. Remains of upland terraces show that taro has been grown extensively and intensively in Kailua since the 13th or 14th century, possibly earlier. Studies have documented the mix of irrigated and dryland agriculture that was carried out in Kailua during prehistory and continuing into the historic period. Modification to the landscape varied from none at all to the construction of terraces and mounds for planting, ‘auwai (ditch), and earthen and stacked-stone berms. These types of dryland and irrigated agricultural features have been found along the margins of Kawainui Marsh as well as in Maunawili, outside the project area.

Previous archaeological investigations in Kailua have identified dispersed prehistoric habitation remnants. These findings are consistent with the observations of early Westerners that the settlement pattern consisted of habitations scattered amid agricultural fields. Figure 4.2 highlights the location of known historic properties within the project area. A general summary of these sites are provided in Table 4.1.

Table 4.1
Existing Historic Properties within Kawainui and Hāmākua

SIHP # 50-80-11-/ BPBM # 50-Oa-G6-	Site Name	TMK	Site Description
370/ NA	Kawainui Marsh	[1] 4-2-016:015	McAllister (1933:186) designated “Kawainui pond” as site 370; it was “once a large inland fishpond.”
371/ 1	Ulupō Heiau	[1] 4-2-103:018	Heiau documented by McAllister as Site 371. Its large high terrace dominates Kawainui Marsh. Ulupō means “night inspiration.” It is said to have been built in a night by the Menehune.
2022/ 32	Kawainui Terraces	[1] 4-2-013:038	Series of terraces from marsh edge upslope, a long retaining wall upslope, ruins of a historic house, a spring, excavation yielded charcoal dates in range of AD 353-655 and AD 529-965. Artifact found on surface.
2023/ 33	Kawainui Cluster	[1] 4-2-013:010	Cluster 10: 12 features including retaining walls, L-shaped alignments of rocks, terraces, roadbed, level terrace or platform, surface scatter. Cluster 11: two retaining walls. This site includes Nā Pōhaku o Hauwahine.
2024/ 34	Makalii Slope	[1] 4-2-013:010	Mounds, wall remnants, a terrace.
2026/ 36	Kapaloa Agricultural Terrace	[1] 4-2-013: 010	Agricultural terrace that extends along marsh edge; single-course high walls; rusting crane.
2027/ 37	Kūkanono Habitation Site	[1] 4-2-013:038	Stone wall rectangular enclosure, linear pile of rocks, terrace, surface artifacts.
2028/ 38	Ulukahiki Walls	[1] 4-2-006:004 or 007	Two walls that meet at a right angle.



Source: State of Hawai'i GIS Data & Cultural Surveys Hawai'i, Inc.

Kawainui - Hāmākua Master Plan Project

Figure 4.2 - Historic Properties Within the Project Area

Kailua, O'ahu

0 800 1,600 FEET

HHF PLANNERS places for people

Table 4.1 (continued)
Existing Historic Properties within Kawainui and Hāmākua

SIHP # 50-80-11-/ BPBM # 50-Oa-G6-	Site Name	TMK	Site Description
2029/ 39	Kawainui Marsh Archaeological-Cultural-Historical Complex	[1] 4-2-013:005, 022 [1] 4-2-016:015	Complex of agricultural fields consisting of basalt-boulder alignments was documented. Additional subsurface testing identified lithic debitage, volcanic glass flakes and basalt adze. Mound of river cobbles may represent a local adaption to water control. Grinding stone and habitation remains.
2031/ 41	Kawainui Slope Site	[1] 4-3-013:038	Archaeological excavation on Pohakupu/Kūkanono slope prior to residential development found no pre-contact agricultural features. Features dated to post 1900s or post-1950s. However, traditional Hawaiian occupation and tool manufacturing were evident from basalt flakes and very large grinding stone.
3957/ 32	Kawainui Agricultural Complex	[1] 4-2-013:038	Nine dryland agricultural terraces, 20 mounds, small C-shaped structure, walls, walled depression, remains of a historic structure; surface artifact recovered. Also referred to as the "Konohiki Site."
3958/ 32	Kūkanono Terrace and Habitation Complex	[1] 4-2-013:031 or 038	Terrace, wall along marsh extending inland
3959/ 32	Miomio Agricultural and Habitation Complex	[1] 4-2-013:038	Twenty-six mounds, 19 dryland agricultural terraces, linear walls, historic house foundation, prehistoric basalt mirror found on surface and other pre-contact basalt artifacts, large boulder grindstone; historic artifacts, dating from AD 529-965 and AD 353-655
3960/ 32	Pohakupu Agricultural Cluster	[1] 4-2-013:038	Large lo'i, approx. 40x30m; stone and earthen platform, stone-lined channel, stone mounds
3962/ 34	Makalii Historic Site	[1] 4-2-013:010	Three historic buildings
3963/ 34	Makalii Mounds	[1] 4-2-013:010	Earthen mound
3965/ 36	Pōhakea Terrace	[1] 4-2-013:010	Low stone terrace perpendicular to a second stone wall
4428/ NA	--	[1] 4-2-003:030	Two habitation platforms
4429/ NA	--	[1] 4-2-003:017	Lithic scatter
4430/ NA	--	[1] 4-2-003:017	Lithic scatter
4431/ NA	--	[1] 4-2-003:017	Two enclosures-unknown function

Table 4.1 (continued)
Existing Historic Properties within Kawainui and Hāmākua

SIHP # 50-80-11-/ BPBM # 50-Oa-G6-	Site Name	TMK	Site Description
4042/ NA	Waimānalo Irrigation System	[1] 4-2-013	1923 pump house foundation and associated canal that extends into Kawainui Marsh. Nominated to National Register.
7199/ NA	Road Remnant	[1] 4-2-013:005	Historic (prior to 1928) unpaved section of roadway that extends roughly parallel to the western edge of Kawainui Marsh.

SIHP - State Inventory of Historic Places #
BMBM - Bernice Pauahi Bishop Museum #

Kawainui Marsh Archaeological-Cultural Historical Complex (-2029)

As shown in Figure 4.2, the Kawainui Marsh Archaeological-Cultural-Historical Complex, SIHP Site #50-80-11-2029, encompasses most of the southern half of Kawainui's wetland, but not the surrounding upland areas. The boundaries of this site were defined in a 1978 archaeological study (Cordy, 1978) and includes areas that were modified for irrigated loʻi and associated activities. Site 2029 was deemed eligible for listing on the National Register of Historic Places (NRHP) in 1979, based on the marsh's role as a major economic component of a larger prehistoric, historic, and cultural socio-economic unit (ahupuaʻa). Material evidence which verifies this role includes the presence of heiau, extensive wetland agricultural systems, terraced hillslope dryland agricultural systems, habitation sites, and walls.

Ulupō Heiau (-371)

Eight heiau were known to have existed within the ahupuaʻa of Kailua, and it is not unreasonable to conclude there could be more. This is consistent with Kailua's status as a productive ahupuaʻa and the residence of aliʻi. There are three known heiau closest to the Kawainui-Hāmākua project area: 1) Pahukini Heiau (State Site #359); Holomakani Heiau (State Site #360); and 3) Ulupō Heiau (State Site #371). Pahukini Heiau and Holomakani Heiau are outside the study area, well inland (mauka) of Kapaʻa Quarry Road.

Ulupō Heiau is located within the project area, next to the Windward YMCA off Kailua Road. It is recognized for its massive construction, its association with the Hawaiian occupation of the marsh, and its cultural value in prehistoric Hawaiian traditions. The heiau measures 140 feet by 180 feet across, and 30 feet in height, and commands a sweeping view of Kawainui. Because of its location adjacent to fertile farm land, Ulupō may have been an agricultural heiau.

The name Ulupō means "night inspiration". The heiau is said to have been built in one night by menehune who passed the rocks, which average 18 inches in diameter, from hand to hand over a great distance. The source of the rock is said by some to be Kualoa, while others contend that the rock came from Ewa or Waianae. A "Menehune Pathway" of flatter stones runs from south to north, leading down to a spring at the northern corner of the heiau.

Nā Pōhaku o Hauwahine

Although it is not a formally recognized historic site, a large rock formation called Nā Pōhaku o Hauwahine is associated with Hawaiian legends. Nā Pōhaku is located on a promontory along Kapa‘a Quarry Road. The name translates literally as "the stone of Hauwahine". The Hawaiians revered Hauwahine as the mo‘o or guardian spirit of Kawainui pond, who assured the continued productivity of the pond. Pollution in the form of sewage and other rubbish was considered to be an insult to the mo‘o. Because of this, the Hawaiians took care to periodically clear the pond, thus assuring themselves a continuing supply of mullet and other aquatic life upon which they depended. Nā Pōhaku provides a sweeping view of Kawainui’s open water and wetland habitat.

4.1.1.3 Existing Resources Identified by Subarea

A field inspection was conducted by CSH in 2013 as part of the project LRFI and focused on areas where project improvements are proposed. The objectives were to 1) verify or confirm existing archaeological sites, 2) identify any potential new archaeological sites, and 3) assess the potential for project impact to the sites. The descriptions below from CSH’s field inspection are organized by project subarea. This discussion summarizes the results of previous archaeological findings and current field inspection results by subareas.

Subarea A: Kawainui Wetlands

The Bishop Museum conducted a historical study of the Kawainui area by Kelly and Nakamura (1981). They noted the lowland area adjacent to Kawainui contained large agricultural pond fields during recent historic times, and that the area was utilized for agriculture during the pre-Contact period as well. According to their findings, the pre-Contact agricultural system of Kailua Ahupua‘a reflected the typical Hawaiian subsistence of taro-cultivation, pond field type, with its accompanying irrigation system, and with a fishpond at the makai end receiving surplus irrigation waters from the pond fields. McAllister’s (1933) study within the ahupua‘a of Kailua designated “Kawainui pond” as Site 370 (SHIP # -00370), and described it as once being a large inland fishpond. Three known heiau closest to the project area identified by McAllister were: 1) Site 359, Pahukini Heiau; 2) Site 360, Holomakani Heiau; and 3) Site 371, Ulupō Heiau.

Archaeological investigation for a proposed City sewer line undertaken by Cordy in 1978 evaluated an area defined as “Site 7” (SIHP # -2029) as shown on Exhibit 4.3. Aerial photographs reviewed suggested that a number of abandoned agricultural fields could be present in Kawainui from the mouth of Maunawili Valley to Kūkanono.

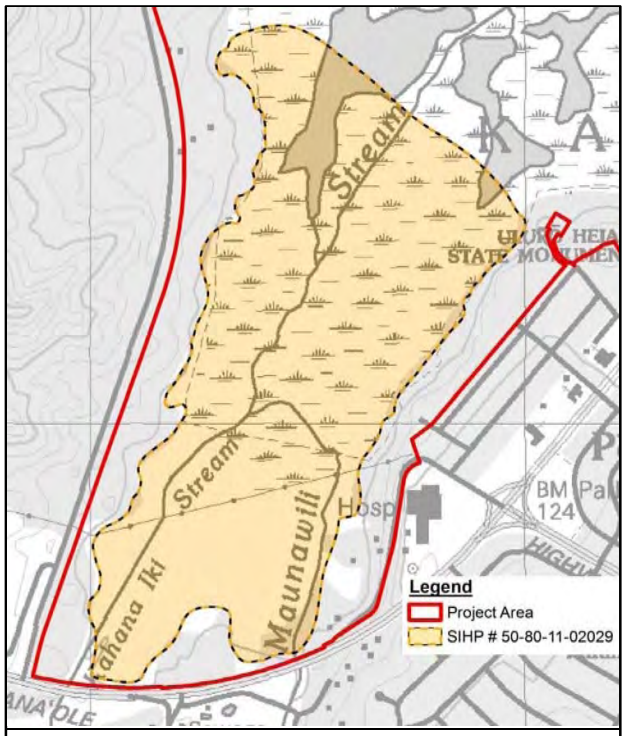


Exhibit 4.3. Cordy (1978) Site 7 Area (SIHP # -2029)

Three test units within Site 7 located east of Maunawili Stream in the immediate vicinity of Pōhakupu slope were excavated. Two trenches were excavated across two stone walls that were 18 and 10 inches below surface, and concluded the stone walls were associated with taro cultivation. A third trench was excavated across a visible stone wall, and associated stratigraphic layers suggest the stone wall may have been used for crops other than taro. This study was significant in demonstrating that buried cultural deposits are still present and intact below the existing ground surface of the wetland. Cordy (1978) defined "Site 7" (SIHP # -2029) as part of a large walled agricultural complex in the marsh at the mouth of Maunawili Valley. Site 7 later came to refer to much larger ill-defined areas of the wetland in which agricultural field walls and agricultural or cultural deposits were thought to possibly be present.

Allen-Wheeler (1981) carried out four archaeological test trenches in the southeast side of Kawainui, in areas where both taro and rice were believed to have been grown. This research fit within the broad area designated as Site 7 by Cordy. The most significant finding was a boulder alignment buried about 2 feet below soil, which appeared to correspond to one of the linear alignments observed on an aerial photograph. The other three test trenches revealed no additional boulder alignments consistent with taro or rice cultivation. This study demonstrated that buried cultural deposits and remnants of cultivation exist below the current ground surface of the wetland.

In 1988, the U.S. Army Engineer Division monitored dredging and vegetation removal during excavations of the Kawainui levee. Two features were identified during monitoring of the southern portion of the levee. One was a possible agricultural field wall or fishpond wall on the mauka side of the levee. The second feature consisted of waterworn basalt cobbles and boulders on the mauka side of the levee. This feature was identified as either a cultural feature (i.e. agricultural field wall, fishpond wall) or a natural layer of stream gravels and cobbles.

International Archaeological Research Institute, Inc. (IARII) (Athens 1991) carried out an archaeological investigation for a flood control project at Kawainui. Thirty-seven core/auger units were excavated along a mauka corridor along the entire drainage control levee to evaluate the presence or absence of significant archaeological remains in the vicinity. The investigation

revealed no archaeological deposits or architectural features. Some possible archaeological sites proved to consist only of levee fill and previously dredged sediment.

In 2003, CSH (Mann and Hammatt, 2003) conducted a study for a project to create a series of pond systems as a habitat for endangered bird species. The primary goal of the archaeological investigation was to confirm the presence or absence of loʻi walls within the project area based upon a 1977 study by Cordy that had indicated the presence of loʻi walls based upon a series of historic aerial photographs. No boulder-alignments consistent with loʻi walls or rice paddies were observed on the surface, and there was no surface indication of any remaining archaeology. However, two linear vegetation alignments running east to west in the center of the project area were observed and later determined to be consistent with the boundaries for LCAs.

Backhoe test excavations investigating subsurface deposits along the vegetation alignments recovered three in situ artifacts and several basalt flakes from the dirt pile during excavation. No basalt boulder alignments discrete loʻi walls, or berms were observed within the test units. However, it was evident there was a buried cultural layer 20 inches below ground surface that contains buried cultural material and charcoal. This cultural layer was approximately 20 inches thick and composed of organic material and oxidized sediments. Abundant basalt waterworn river cobbles were observed in the trenches, and it is not clear what purpose or function this may have played in either loʻi or rice cultivation. The mass appeared to have been pushed up into a mound-like feature.

CSH (Hammatt 2013) conducted a survey with limited subsurface testing for about 80 acres (60 acres of wetland, and 20 acres of upland) within the Kahanaiki area of Kawainui as part of DOFAW's wetland and upland restoration project. Within the wetland area, SIHP # -2029 (Kawainui Marsh Archaeological Cultural-Historical Complex) was identified during the survey. Subsurface testing within the wetland along LCA boundaries did not identify any associated rock or sediment walls (loʻi walls), foundations, or associated features.

Sediment coring at two locations within the wetland provided palynological and radiocarbon data. Radiocarbon analysis suggested the uppermost strata within the project area consisted of deposits of decomposed plant matter overlying relatively modern alluvium. Between minimally 14 to 26 inches of the upper core samples were composed of modern-aged sediment. The relative vertical thickness of modern-aged deposition within Kawainui's wetland indicated the subsurface impact from wetland restoration planned posed little or no threat to subsurface historic properties within the project area.

During CSH's field inspection, DOFAW staff identified the location of several partially buried or submerged basalt stone wall sections identified during the construction of the 11 restoration ponds by the USACE (Exhibit 4.4). These basalt stone wall sections are considered to be features of SIHP # -2029.

Based upon the results of the prior studies and CSH's current field work and study, cultural deposits and remnants of historic cultivation in the form of agricultural field walls or fishpond walls exist below the current ground surface of Kawainui's wetland. These features are more likely present in the southern half of Kawainui (Site -2029), where several land commission awards are located as compared to the northern half. Such features would be located minimally from 14 to 26 inches below the surface and mat of peat covering the surface that can be several feet thick.



Exhibit 4.4. Wall Sections in Restoration Pond 2 (SIHP # -2029)

Subarea B: Kahanaiki-Nā Pōhaku-Kapaʻa

Discussion of historic properties within this subarea is divided into three sections: Kahanaiki, Nā Pōhaku, and Kapaʻa.

Kahanaiki Section

Clark conducted a study in 1980 that covered upland areas around Kawainui's wetland. His findings were presented as 15 clusters (see Exhibit 4.5), and by Bernice Pauahi Bishop Museum (BPBM) site numbers. Of the 15 identified clusters, nine (60%) are within the Kūkanono slope, three (20%) are along the Kapaʻa Quarry Road slope, and three (20%) are in the south central portion of the wetland. No archaeological sites were identified in the southernmost portion of the wetland area. Eleven of Clark's clusters were previously identified during archaeological investigations.

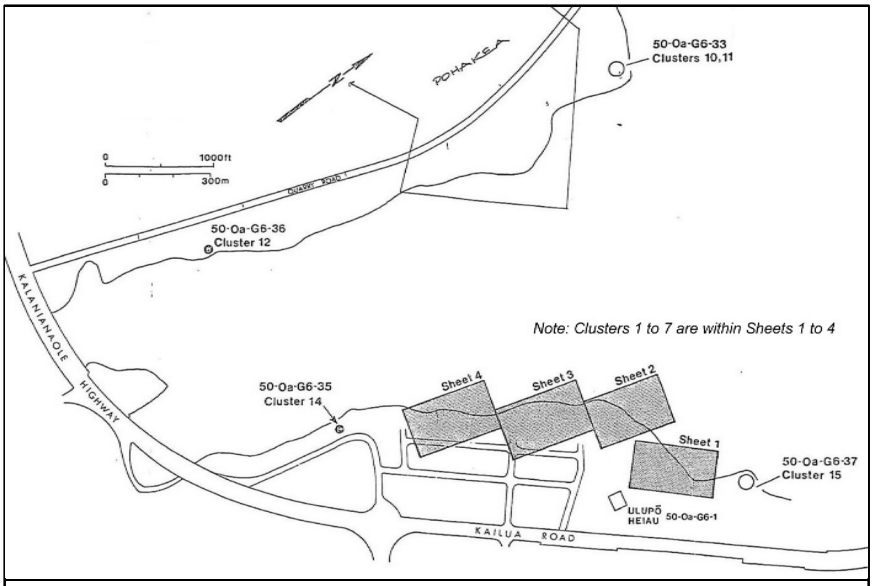


Exhibit 4.5. Cluster Sites Identified by Clark (1980)

Three cluster sites (Clusters 10, 11, and 12) were identified on the Kapaʻa Quarry Road slope within this subarea. Only Cluster 12 is situated within the Kahanaiki section, and conforms to BPBM Site 50-Oa-G6-36 (SHIP # -2026). Cluster 12 is described as having a single large terrace feature. The terrace walls extend for over 210 feet along the wetland edge in a northeast-

southwest direction and for 45 feet southeast-northwest. The walls appear to be a single course high and are marked by a somewhat sporadic occurrence of rocks. An old, rusting, dilapidated crane is the most prominent feature of the area. In the early twentieth century, a number of roads and houses were in the site's immediate area. It may be that this site relates largely, or entirely, to those constructions.

A study by Allen-Wheeler in 1981 study showed that their BPBM Site # 50-Oa- G6-36, Clark's Cluster 12, and a Site 7 identified from a prior 1977 study by Ewart and Tuggle's are one and the same, but are located several distances apart. These terrace sites are associated with SHIP # -2026, further indicated that they relate to road and house construction in this immediate area in the early twentieth century.

CSH's 2013 survey of this upland area for DOFAW's wetland and upland restoration project identified this area as being SIHP # -2029, the Kawainui Marsh Archaeological Cultural-Historical Complex. Two additional historic properties were identified consisting of: 1) SIHP # -7199, an in-use, early twentieth century road remnant; and 2) a modest number of historic and traditional Hawaiian artifacts (e.g. grinding stone) considered to be components of SIHP # -2029, some of which appeared to be linked with habitation based on a house lot footprint. Subsurface testing along LCA boundaries and possible house lots did not expose subsurface cultural deposits or modification within the project area. No further archaeological work was recommended for SIHP # -7199 (road remnant), and the grinding stone was left in-place and would be avoided based upon consultation with SHPD.

Nā Pōhaku Section

The Nā Pōhaku section includes upland area extending north along Kapa'a Quarry Road from the Kahanaiki area. This section includes a former ranch site referred to as Pōhakea and Nā Pōhaku o Hauwahine. Clark's (1980) study covering this upland area identified Clusters 10 and 11 within this Nā Pōhaku area as previously shown on Exhibit 4.5. Clusters 10 and 11 conform to BPBM Site 50-Oa-G6-33 (SHIP # -2023) and is shown on Exhibit 4.6. Cluster 10 includes Nā Pōhaku o Hauwahine, and has 12 features including retaining walls, L- shaped alignments of rocks, terraces, a roadbed, a level terrace or platform and surface scatter. Cluster 11 has two retaining walls.

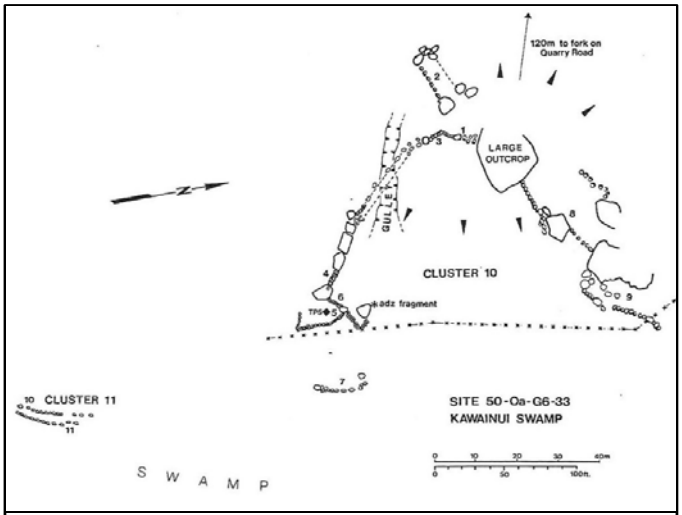


Exhibit 4.6. Cluster 10 and 11 (Site -2023) Identified by Clark (1980)

Nā Pōhaku o Hauwahine (Site -2023) is a prominent basalt outcrop overlooking Kawainui located adjacently north of the Pōhakea area. A non-profit organization is conducting educational programs, restoring the native forest and vegetation at this site, and conducting cultural practices under a DSP permit.

SIHP # -2023 consisting of a wall complex was a previously identified historic property that was confirmed present during the current field inspection. Additional potential historic properties were also observed. The field inspection followed the existing foot trail system at Nā Pōhaku, and the locations of several wall sections near the top of the outcrop were noted, but were covered by vegetation. Several grinding surfaces were identified, and a fine-grain basalt adze preform (Artifact 5) was identified and collected by DSP after being photographed in situ and its GPS location recorded.

Remnant alignments and a wall section were observed at the base of the outcrop near a cleared open water portion of the wetland (Exhibit 4.7). An area referred to the "Navigation Site" was identified that included a rock outcrop surface that may have been modified to form a pool (Exhibit 4.8). The pool reflects the stars at night and may have been used as a navigational tool, leading to its name.



Exhibit 4.7. Basalt Stone Alignment at Nā Pōhaku o Hauwahine



Exhibit 4.8. Area Referred to as "Navigation Site" at Nā Pōhaku o Hauwahine

The Pōhakea area located adjacently south of Nā Pōhaku was used as a former ranch site for raising horses, and later cattle were added. However, more recently, the ranch was likely used for other activities besides horses and cattle. Several ranch buildings were in the process of being demolished during CSH's field survey conducted in 2013. These structures have since been removed by DSP. CSH's field inspection through the area followed an abandoned road that extended to the south (toward Kahanaiki), as shown on Exhibit 4.9. The abandoned road may be a continuation of SIHP # -7199, the road remnant documented within the Kahanaiki upland area.

One previously identified historic property was located during CSH's current field inspection, which is SIHP # -3965 consisting of a small basalt stone terrace on a steeply sloping embankment (Exhibit 4.10). A discarded iron plow blade (Artifact 3) was encountered at the top of the slope on level ground near SIHP # -3965 and left in place. A lithic flake composed of fine-grain basalt was identified in a level area near an intermittent drainage and collected by DSP. The artifact (Artifact 4) was photographed in situ and GPS location data was recorded.



Exhibit 4.9. Abandoned Road at Former Ranch Site That May be Extension of Site -7199 (Road Remnant)

An open lawn area on the southern end of the former ranch site is presently being maintained by an organization conducting cultural practices under a permit from DSP. A dirt road connects this open lawn to former ranch structures. A hālau recently constructed by that organization and a basalt stone ahu are present within the open lawn. A water retention pond is located near the wetland along the dirt road (Exhibit 4.11). Former ranch personnel indicated the pond was constructed by rice farmers as a water retention pond from which water was pumped. No walls or constructed surfaces were observed around the pond.



Exhibit 4.10. Small Basalt Stone Terrace at Former Ranch Site



Exhibit 4.11. Water Retention Pond at Former Ranch Site

Kapa'a Section

The northern-most Kapa'a section of this larger Subarea B (Kahanaiki-Nā Pōhaku-Kapa'a) includes the area north of Nā Pōhaku up to the City's Model Airplane Park. This area includes upland area across (makai) of the City's Kapa'a transfer station that was formerly used by the City as a vegetation processing area and as a maintenance baseyard. This section contains no

previously identified historic properties. The current field inspection by CSH included a walk-through of the large open field at the City's Model Airplane Park, which was previously used as a municipal landfill. The remainder of this area was occupied by dense vegetation at the time of the field inspection.

Subarea C: Kapaʻa-Kalāheo-Levee

Discussion of historic properties within this subarea is divided into three sections: 1) Kapaʻa (from Model Airplane Park east to Kapaʻa Quarry Road's intersection with Mōkapu Saddle Road); 2) Kawainui SPR, Kalāheo (Kalāheo park site); and 3) levee. The levee is a man-made structure that has been improved (raised) in 1997. No historic properties are associated with this levee.

Kapaʻa Section

CSH conducted a study in 2000 (McDermott, 2000) to aid in planning a trail around Kawainui as proposed in the 1994 Master Plan. The study area was divided into six segments, of which Segment 6 studied the upland area from the vicinity of the Model Airplane Park to the north end of the levee. This area included a former automobile disposal and processing site. No historic properties were identified during the field inspection conducted in 2000.

CSH's current field inspection of this area in 2013 also did not identify any historic properties. The field inspection did identify areas of recent dumping and push piles containing asphalt and debris. The majority of the area consisted of dense vegetation composed of exotic grasses.

Kawainui SPR, Kalāheo Section

CSH conducted a study in 2001 (Mann et al. 2001) for the proposed Kawainui Gateway Park project, which involves the same site as the Kawainui SPR, Kalāheo park site. The pedestrian inspection of the site located no surface historic properties. The site has been heavily modified and consists of fill material from excavation of Kawainui Canal and construction of Mōkapu Saddle Road and Mōkapu Boulevard. The surface contains truckloads of coral and terrigenous fill sediments along with abundant construction remnants, such as gravels, roofing material, concrete fragments, and asphalt.

A drainage ditch feature situated on the southwest end of the Kalāheo park site extends into the Kawainui Canal from Kapaʻa Quarry Road. This ditch was cut down through the overlying fill sediments, to the water level in the Kawainui Canal, and exposed the original marsh sediments that predated the construction-related deposition. Based on the depth of these sediments within the ditch below the current land surface, fill sediments on the Kalāheo park site were likely more than 6 feet thick, and possibly as much as twice as thick in some areas based on the property's topography. The exposed marshy sediments consisted of low energy alluvial deposits, fine sands, and silty clays. Large fragments of coral heads were exposed, presumed to date to the Holocene

period when Kawainui was a marine embayment. The coral heads had undoubtedly been disturbed by the excavation of the drainage feature itself.

Subarea D: Waiʻauia-Ulupō-Mokulana

Discussion of historic properties within this subarea is divided into three sections: 1) Waiʻauia; 2) Ulupō; and 3) Mokulana. Waiʻauia includes the area from Hāmākua Drive up to the St. John Lutheran Church property. The Ulupō section includes the area within the Ulupō Heiau SHP and hillside below the Kūkanono subdivision. The Mokulana section includes the DOFAW research and management station area up to the Mokulana peninsula.

Waiʻauia Section

The Waiʻauia area of Kawainui is famous for the Mākālei, or fish-attracting tree, that was a mythological tree or stick that could summon fish from Kawainui. Reportedly located near the present day Hāmākua Bridge (Site 15 under McAllister in 1933), it was described as a never-failing source of a plentiful supply of food.

No previously historic properties were identified in the Waiʻauia area. This area traditionally known as Waiʻauia is also referred to as the "former ITT site" since it was previously owned by International Telephone & Telegraph (ITT) World Communications and was the location of the Mackay Radio Tower. Evidence of the Mackay Radio Tower was identified during CSH's recent (2013) field inspection conducted. A foundation identified had inscribed "1928" on it, the year the radio tower was installed, and may indicate the location of the radio tower. This foundation was not previously known as a historic property. Other concrete foundations were observed within the open water portion of the wetland, which may be related to the tower construction. The former ITT site location and the surrounding wetland area have been significantly transformed by the development of Kailua Road, the adjacent City wastewater pump station, and Kawainui Canal (Exhibit 4.12). Additional infrastructure present within the former ITT site includes an unpaved roadway running parallel to Kailua Road up to the levee.



Exhibit 4.12. View of Former ITT Site Showing Modern Development and Fill Material Dumping

CSH's study (McDermott, 2000) to aid in planning a trail around Kawainui as proposed in the 1994 Master Plan generally included the area from the levee, to the vicinity of Ulupō Heiau, and eventually up to the vicinity of Castle Medical Center. The following sites were identified.

1. The Waimanalo Irrigation System (SIHP # -4042) consisting of a pump house, pipes, and a canal. The pump house structure was roughly rectangular and constructed predominantly of mortared basalt boulders. The associated canal extended from the pump house out into Kawainui.
2. Stone alignments, ceramic fragments, bottles, and what appeared to be a portion of a historic roadway or trail were observed west of the Waimānalo Irrigation System. The remains were described as "indistinct" and most likely dated to the historic period.

CSH's current fieldwork conducted in 2013 identified the previously recorded Waimānalo Irrigation System (Site # -4042) area extending southwest from the levee to the northeast edge of the Kawainui Vista subdivision. The area contained hau overgrowth and evidence of homeless camps in 2013, which utilized locally available basalt stone to construct low stacked alignments. A line of concrete fence posts was observed within the hau growth extending to a filled rectangular concrete foundation. This foundation was previously identified as a pump house by McDermott (2000). A U-shaped mortared basalt structure on the south side of the foundation extends into the wetland and beneath the water surface. This U-shaped structure contains some large-diameter iron pipes that was used to pump water from Kawainui into the irrigation system.

The area behind St. John Lutheran Church to Kawainui Vista contained numerous abandoned homeless camps littered with modern trash as well as scattered basalt outcrops and boulders. CSH's field inspection of this area also documented the presence of a retaining wall constructed of large stacked basalt boulders in the area beneath the edge of Kailua Road. A collapsed cement and concrete well (Exhibit 4.13) was identified behind St. John Lutheran Church, and a basalt grinding stone surface was observed along the hillside northeast of Kawainui Vista.



Exhibit 4.13. Concrete Well Structure at Waimānalo Irrigation System Site (-4042)

In 2016, CSH conducted background research and a field inspection to support a hau clearing project by DOFAW at Kawainui in the area of St. John Lutheran Church. The previously identified historic property Waimānalo Irrigation System (SIHP # -4042) was identified during fieldwork. During this 2016 study, the concrete pump house foundation with associated pipes and canal that are components of SIHP # -4042 (Exhibit 4.14) were recorded.

In addition, nine potential new historic properties within the area were designated as CSH 1 to 9. CSH 1 to 3 represent remnants of one or more early twentieth century habitation(s) that belonged to one or both of two Japanese families. These features were located approximately 160 feet

south of the pump station foundation. CSH 1 is most likely a remnant portion of a basalt stone walkway that at one time led to the house site. CSH 2 is the remnant of a bathroom with portions of plumbing, concrete foundation, and porcelain fragments still remaining. CSH 3 is a concrete slab of unknown function.

CSH 4 appeared to have been a holding tank of unknown function, possibly a cistern, privy, or cesspool. CSH 5 is a concrete structure of unknown function. The structure appeared to be a foundation, but was thought not to have been part of a house due to the style of construction and materials used. CSH 6 consisted of a broken basalt stone fragment with a single petroglyph on one face. This fragment was observed in a modern stone alignment, most likely built by the homeless living in the area in the twenty-first century, and had been removed from its original context.

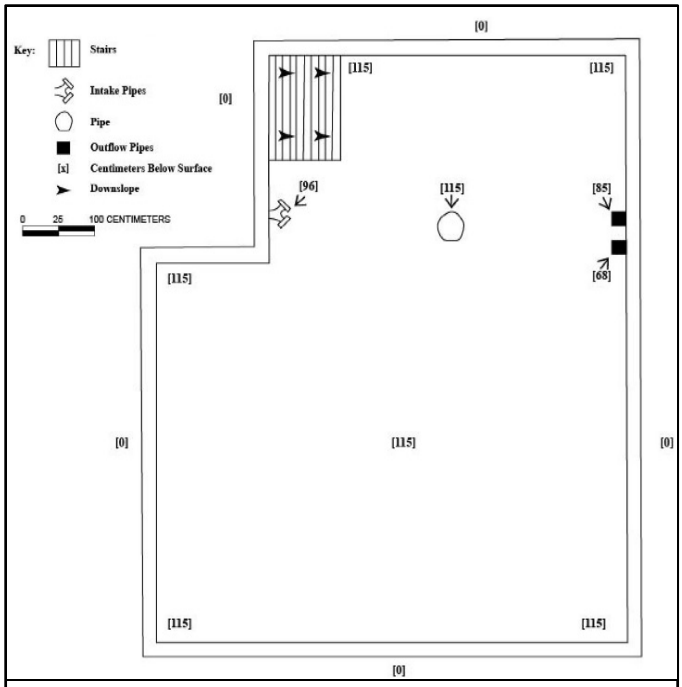


Exhibit 4.14. Waimanalo Irrigation System Pump House Foundation (Site -4042)

CSH 7 and CSH 8 consisted of two large basalt stones that have been hand-flattened and smoothed on the top side (Exhibit 4.15). The stones are interpreted as grindstones used by Native Hawaiians during pre-Contact habitation of the area. CSH 9 consisted of a stairway constructed of placed asphalt pieces and two associated basalt stone alignments. There was no context remaining in the area to place the feature, but it may be associated with those terraced gardens from the Japanese families that occupied the area.



Exhibit 4.15. Basalt Grinding Stone (CSH 8)

Ulupō Section

Earl Neller (1982) conducted archaeological investigations on the Kūkanono slope mauka (southwest) of Ulupō Heiau recovering an abundance of traditional Hawaiian stone artifacts. These were mostly basalt waste flakes, but included adze fragments, abraders, scrappers, and hammer stones, and post-Contact artifacts associated with Japanese activities. These excavations and finds were within Site 50-Oa-G6-32, feature Cluster 4 (Site -3959). Neller noted the presence of a grinding stone, which would become a distinctive artifact type associated with the margins of Kawainui.

Athens (1983) documented archaeological excavations on the Pōhakupu-Kūkanono slope of Kawainui within BPBM Sites # 50-Oa-G6-32 (SIHP # -2022) and 50-Oa-G6-41 (SIHP # -2031). Features included dryland terraces, stone mounds, and flat-topped stone mounds. Excavation revealed that all the surface features were built in the most recent soil layers after A.D. 1900; some features may be quite recent. It was concluded that the surface structures had been built in the early twentieth century by Chinese during the course of intensive gardening after the decline of rice farming in the wetland, with many features posited to post-date AD 1930. One small area of undisturbed pre-Contact deposits (an earth oven) was identified and dated to between the thirteenth and fifteenth centuries.

Chiniago, Inc. (Barrera, 1984) performed an archaeological survey for the Kailua Road interceptor sewer, Maunawili wastewater pumping station and force main, and Kūkanono wastewater pump station. The literature review indicated the Kūkanono site was located on the edge of an old kuleana. No historic properties had been recorded previously at this site. No surface historic properties were observed during this archaeological survey.

CSH's study (McDermott, 2000) in the vicinity of the Kawainui Vista subdivision toward the vicinity of Castle Medical Center identified the following sites.

1. Kūkanono Habitation Site, Feature 3 (SIHP # -2027) is a single basalt boulder rectangular enclosure, and was the only feature that had not been affected by bulldozing in the vicinity associated with construction of the Kawainui Vista subdivision. The Pōhakupu Sewage Treatment Plant was also dismantled in the 1990s and replaced by this subdivision.
2. Near Ulupō Heiau, Kawainui Terraces (SIHP # -2022) consisted of stacked basalt boulder retaining walls constructed prehistorically and utilized historically. The rectangular terraces were actively under cultivation for loʻi, or wetland taro pond fields. Foundations of a historic piggery were also observed.
3. At Ulupō Heiau, the only SIHP # -3958 feature observed was a drainage channel that extended from a spring, both of which were dry at the time (2000).
4. Findings at SIHP # -3957 at Ulupō Heiau consisted of numerous stacked stone features including clearing mounds, enclosures, wall alignments, a historic house site, and irrigation features such as an ʻauwai that dated to the pre-Contact and historic periods.
5. Along the slopes below the Kukanono subdivision, historic properties identified included SHIP #s -2031, -3959, and -3960, consisting of traditional Hawaiian grinding stones for adze manufacture and historic and modest pre-Contact stacked stone features. SIHP # -3961 consisted of six most likely historic agricultural features. SIHP # -2029 was buried pre-Contact and historic agricultural field walls in the level surface of the wetland that were not visible.
6. SIHP # -2024, consisting of five small features, a terrace, and a mound, was not confirmed. However, several large, irregular, linear alignments containing boulders over 3 feet in diameter, the result of bulldozer clearance, were noted.

All or portions of two previously identified historic properties (SIHP # -2022 and -2027) were located on the slopes below the Kawainui Vista subdivision under CSH's 2013 fieldwork. SIHP # -2022 includes a series of terraces, a long retaining wall, ruins of a historic house, and a spring that extends into the Ulupō Heiau SHP area. During this field inspection, SIHP #-2022 could not be located, which is consistent with two other archaeological surveys that had difficulty distinguishing features of this historic property in this area, and indicated the sites had been bulldozed.



Exhibit 4.16. Site -2027 Rectangular Enclosure

Previously identified SIHP # -2027 was found and is a rectangular basalt stone enclosure located at the top of the basalt bluff overlooking the southwest side of Kawainui Vista. This historic enclosure is constructed of one to two courses of basalt boulders, many of which appear to be upright and possibly inset (Exhibit 4.16).

CSH's 2013 field inspection located four previously identified historic properties within Ulupō Heiau SHP (SIHP #s -0371 [Ulupō Heiau], -2022, -3957, and -3958). A summary of findings from this recent inspection is provided.

1. SIHP # -2022. Several features were identified just northeast of Ulupō Heiau, and include the remains of a historic residence identified by a slab inscribed "Oct 18, 1947", a piggery constructed of low walled concrete or mortared basalt enclosures, and other cement slabs.
2. SIHP # -3958. A basalt stone terrace supporting a metal pipe which is a feature of this site was observed downslope of Ulupō Heiau.
3. SIHP # -3957. A "Konohiki Site" within LCA 7147 that was awarded to Kahele, konohiki of Kawainui. Observed features included previously identified stacked basalt stone clearing mounds, basalt stone house platform with paving, and mortared basalt stairs. A polished basalt stone considered to be a possible game piece was observed and collected by DSP after the artifact (Artifact 1) was photographed and its GPS location data recorded.

The area below the Kūkanono neighborhood contains many previously identified historic properties that were examined, and include SIHP #s -2024, -2028, -2029, -2031, -3959, and -3960. A summary of notable findings from this recent inspection is provided.

1. SIHP # -3959. Several features observed and recorded include basalt stone walls, alignments, terraces, and clearing mounds. Basalt grinding surfaces were also observed on boulders near the margin of the wetland.
2. SIHP # -2029. No evidence of the submerged stone walls were observed at this location, however, these walls were observed to the southwest (Mokulana area).

3. SIHP # -2031. This site is contiguous with the southeastern border of SIHP # -3959, but was not identified during this field inspection.
4. SIHP # -2024. A basalt stone mound, terrace, and wall were identified. DSP staff stated that a former AML volunteer and minister at the Faith Baptist Church in Kailua identified one of the SIHP # -2024 mound features as a burial. A basalt adze preform (Artifact 2) was identified on the surface within the site complex and collected by DSP after being photographed and its location recorded.

Mokulana Section

Previously identified historic properties within the Mokulana peninsula to DOFAW management station area consists of SIHP #s -2028, -2029, and -3962. SIHP # -2029 is the Kawainui Marsh Archaeological Cultural Historical Complex. SIHP # -2028 was identified by Clark in 1980 as Cluster 14 ("Ulukahiki" walls), and SIHP # -3962 as Cluster 8 (three historic buildings).

CSH's study (McDermott, 2000) determined that the area in the vicinity of the Castle Medical Center to just before the intersection of Kalaniana'ole Highway with Kapa'a Quarry Road contained a former cattle ranch operation. However, no historic properties were identified during that field inspection. At the intersection of Kalaniana'ole Highway with Kapa'a Quarry Road, no historic properties were identified in this area either.

Part of this section includes DOFAW's management station that is located within the area formerly occupied by a working cattle ranch from 1969 to 2010. Remnants of the cattle ranch were observed around the DOFAW's station (Exhibit 4.17) under CSH's 2013 inspection. Bulldozer push piles were observed in the vicinity of SIHP # -2028, a site complex including basalt stone walls that could not be located during the field inspection (Exhibit 4.18). No evidence of either SIHP #s -3962 (three historic buildings) or -3963 (earthen mounds) were identified either during this field inspection.



Exhibit 4.17. Former Ranch Corrals at DOFAW Management and Research Station

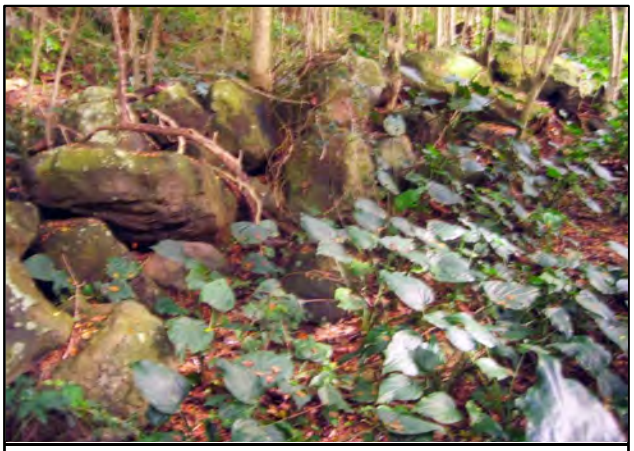


Exhibit 4.18. Bulldozer Push Piles in Vicinity of Site -2028

Subarea E: Hāmākua-Pu‘uoehu

An archaeological survey for the extension of Hāmākua Drive southeast of Hahani Street by Stephen Clark in 1977 described the southern area of Hāmākua as pasture land at the foot of Pu’uoehu. Bulldozing and land fill were observed for the area north of Ka‘elepulu Stream. Disturbance south of the stream included “a large earth mound”, and possible remnants of terrace walls were observed adjacent to the mound. A site survey of the proposed road corridor briefly describes stone alignments, a large earth mound and wall alignments, and a house site (SIHP # -4699). It should be noted that the SIHP numbers referred to in that 1977 study have not been used by archaeologists conducting more recent archaeological investigations.

Clark identified a possible T-shaped heiau (SIHP # -4700) found at the base of Pu’uoehu’s ridge, southwest of the road corridor and Kaelepulu Stream. The site was described as fairly disturbed with areas in extremely deteriorated condition due to cattle grazing. A subsequently study by Quebral et al. in 1992 later documented habitation platforms located at the approximate center of a site complex previously recorded by Clark.

In 1982, Science Management, Inc. conducted an archaeological survey for Hāmākua Drive from Hahani Street to Akoakoa Street, adjacent to the southern portion of the current project area and extending south. Subsurface testing within the terrace identified by Clark (1977) contained recent fill materials. These same recent fill materials were observed on the surface within the vicinity of Clark’s terrace.

Further subsurface testing revealed one potential agricultural feature, a “bund” (embankment used to control the flood of water) thought to be associated with post-Contact rice farming, located along the mauka side of Ka‘elepulu Stream. Several other test pits contained fill materials associated with the construction of the Ka‘elepulu sewer in 1969, and with housing development after 1969. Fill sediments overlie agricultural field sediments that show excellent organic preservation and may contain early historic and pre- historic data concerning ethnobotany. Therefore, it was determined that sites (SIHP #s -4699, -4700) identified by Clark were modern features.

In 1991, IARII conducted an archaeological inventory survey for the proposed Kailua Gateway development that included Hāmākua and Pu’uoehu. Four historic properties were observed as shown on Exhibit 4.19. These properties consist of the following.

1. SIHP # -4428. Site of two habitation platforms (Features 1 and 2). Feature 1 is a roughly square-shaped platform that appeared to have three distinct levels or tiers. The central and uppermost tier of this feature is less than 3 feet by 3 feet in area, having a distinctive basil-like plant at its northwest comer. The platform is constructed of small to medium basalt boulders that line the sides and small to large cobbles of coral and basalt that fill the interior.

Feature 2 is a rectangular-shaped platform with sides aligned with small and medium sized boulders, and the interior is filled mainly with basalt cobbles and a few small boulders. Only a few pieces of coral cobbles were found on this platform at its northwestern comer. The eastern side and northeastern comer are tumbled in that only segments of the east side are visible. A large, mostly subterranian boulder is visible of the northeast comer.

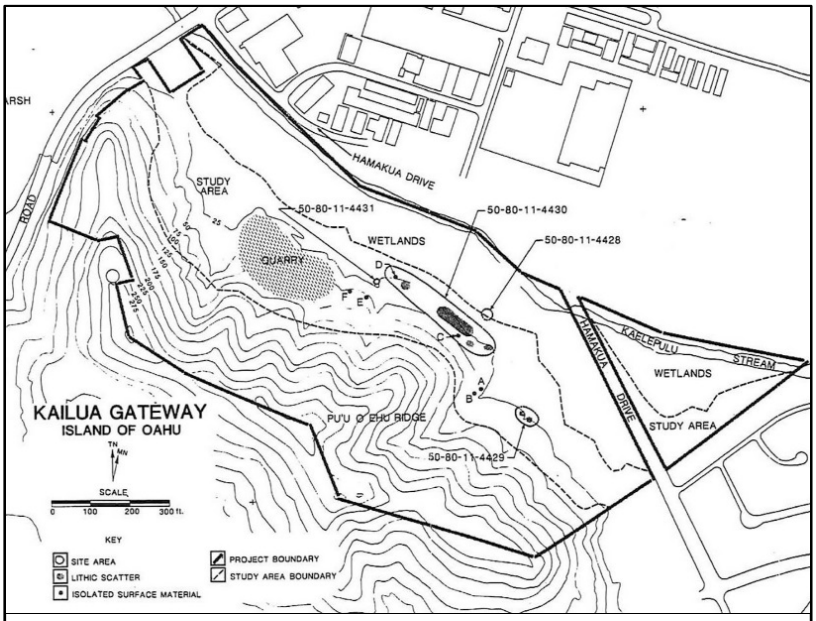


Exhibit 4.19. IARII Map of Sites Recorded at Hāmākua/Pu'uoehu for Proposed Kailua Gateway Project

2. SIHP # -4429. Lithic scatter consisting of two areas concentrated on two ridge toes. The south area contained seven basalt flakes, one of which was removed by the archaeologists. The north area was described as a slightly larger area containing a possible adze fragment.
3. SIHP # -4430. Lithic scatter within an area that consisted of concentrations of volcanic glass flakes and shatter, and basalt flakes. A possible anvil stone or mortar that contained a water-worn pebble pestle was also found.
4. SIHP # -4431. Two enclosures that consisted of adjacent stone structures that extend from the base of a dry channel. The features lacked cultural material, and were thus possibly agricultural features.

A former quarry within the center of the Kailua Gateway project area and an access road were also reported. The road was described as extending from the quarry site toward the south following the base of the ridge then turning toward Hāmākua Drive. Asphalt remnants near the quarry site suggest the probability that the section of the access road adjacent to the quarry site was paved while the remaining sections were gravel-filled. Evidence of cattle grazing within the southern portion of the proposed residential area, included a horse pen, several watering troughs, and extensive fencing.

CSH completed a study in 1993 for the proposed Kailua 272 Reservoir on Pu'uoehu. No historic properties were observed during the survey, and historic research indicated there was probably never any significant utilization (i.e., agricultural or habitation) along the ridgeline. A large stone and cement platform for an old reservoir and an abandoned metal tank reservoir were observed.

Numerous cattle trails extended along the hill line, exposing underlying soil layers that lacked cultural materials.

In 2006, Pacific Consulting Services, Inc. (PCSI) conducted a survey on the slope of Pu'uoehu. Findings included homeless encampments, fence posts made from telephone poles, and a modern road leading to a water tank outside the project area. No cultural material or deposits were found during shovel testing.

CSH's current 2013 inspection identified a section of a faced wall or terrace in the southern portion of Hāmākua near Pu'uoehu, following vegetation clearing as part of DOFAW maintenance activities. This feature was found in the same location as SIHP # -4428, which was previously identified as a habitation complex. The wall or terrace section may be the only current remnants of SIHP # -4428 (Exhibit 4.20).



Exhibit 4.20. Photo of Section of Faced Wall at Hāmākua; Appears to be Same Location as SHIP # -4428

Other stacked walls located adjacent to the east end of the Hāmākua Drive Bridge have also been observed by DOFAW biologists during the dry season. These stacked walls were below water, and not visible during the CSH's 2013 field inspection.

Sections of former unimproved access roads are present within and surrounding Hāmākua. One consists of an unpaved access road routed at a higher elevation generally along the mauka edge of the wetland that was constructed by DOFAW to provide vehicle and maintenance access during the wet season. Another is an abandoned roadway extending roughly north to south through the center of Hāmākua, and continues with switchbacks up the northeastern slope of Pu'uoehu (Exhibit 4.21). Asphalt and rock and mortar remnants that may have supported a bridge or road extension leading from Hāmākua Drive to the abandoned roadway are visible along the northeastern (makai) edge of the wetland near Times Coffee Shop. It has been suggested that the road corridor may have provided access



Exhibit 4.21. Photo of Abandoned Roadway Routed Through Center of Hāmākua's Wetland

to an abandoned quarry that was located on Pu'uoehu. However, there is no supportive documentation of the quarry at this location.

A basalt rock and mortar retaining wall was observed near the DOFAW entrance to Hāmākua. The wall runs along a portion of the northern edge of the unimproved roadway constructed by DOFAW from the site entrance at Hāmākua Drive (Exhibit 4.22). The capped surface of the wall contained the inscriptions "Moli" and "7/2/08". A water drainage feature extends from the intersection of Kailua Road and Hāmākua Drive into the northern portion of Hāmākua, just east of the Hāmākua Bridge on Kailua Road.



Exhibit 4.22. Photo of Basalt Rock and Mortar Retaining Wall Near DOFAW Entrance to Hāmākua.

CSH's 2013 field inspection of Pu'uoehu followed an existing trail that was accessed from a wet drainage that extended uphill from the edge of Kailua Road to and along the ridgeline (Exhibit 4.23). At the top of Pu'uoehu's ridge is a large concrete platform for a former water tank. This structure was previously identified by CSH (1993), and is depicted as a water tank on the 1952 USGS topographic map. The interior of the concrete platform contained sand with some stacked rocks on the sand surface (Exhibit 4.24). A second structure identified by CSH (1993) as an abandoned metal tank reservoir was not found during the current field inspection.



Exhibit 4.23. Photo of Drainage Feature Extending Uphill on Pu'uoehu.



Exhibit 4.24. Photo of Former Water Tank Concrete Platform on Pu'uoehu Ridge.

Vegetation cleared on the eastern ridge of Pu'uoehu exposed a loosely stacked retaining wall along the slope along a recently installed wire fence marking the property line between the State and private property (Exhibit 4.25). A triangulation station was identified at the summit consisting of a concrete base inscribed with "Aug 25 1992" on the northwest edge and "Puu o Ehu" on the northeast edge. The existing trail continued to the south, into dense vegetation. No evidence of a former quarry was found or visible due to the heavy vegetation.



Exhibit 4.25. Photo of Loosely Stacked Retaining Wall Along Pu'uoehu Ridge.

4.1.1.4 Potential Project Impact and Mitigation

No Action Alternative

No adverse impacts to historic properties are anticipated under the No Action Alternative. DOFAW's wetland management and upland vegetation maintenance activities at both Kawainui and Hāmākua would continue. DOFAW's daily management and maintenance activities (e.g. cutting grass, trimming trees, etc.) of trees and vegetation within upland areas should not impact historic properties because it would involve minimal ground disturbance. Existing historic properties would either not be disturbed (e.g. grinding stone) or damaged from landscape maintenance activities (e.g. stone terraces).

Cultural landscape restoration and associated improvements occurring at Ulupō Heiau (SIHP # -371), Nā Pōhaku (SIHP # -2023) and at Pōhakea would also continue under this alternative as permitted by DSP, and should have minimal impact on these historic properties. Non-profit organizations already conducting these activities at these areas have not impacted historic properties. Ongoing cultural landscape restoration would continue to have an overall beneficial effect on these historic sites by restoring cultural and historic features, increasing stewardship of areas, improving public access, and supporting cultural practices that occur there.

Approved Kawainui wetland restoration activities focus on removing existing invasive vegetation, involving little disturbance beyond the surface soil layer. Activities predominantly involve cutting vegetation and also removing the peat mat within a few inches from the surface. No grading activities would occur within the wetland. Wetland restoration activities could affect SIHP # -2029, and possible cultural deposits and remnants of historic cultivation in the form of agricultural field walls or fishpond walls that may be present below the ground surface. These features are more likely present in the southern half of Kawainui based upon the prior studies, where several land commission awards are located as compared to the northern half. However,

such features would be located minimally from 14 to 26 inches below the surface and mat of peat covering the surface. Therefore, restoration activities occurring above the surface (e.g. vegetation cutting) and within a few inches of the sediment under the mat of peat should not impact potential sites.

Upland reforestation activities approved within the Kahanaiki area should not have an adverse effect on historic properties identified from prior surveys. No further work is required for the remnant historic road (SIHP # -7199). SIHP # -2026 (agricultural terrace) and SIHP # -2029 (grinding stone) would be avoided. Reforestation would consist of landscaping activities involving management areas (<5 acres) or smaller "pods" (less than an acre) that are cleared and replanted, and would not include significant site grading that require City permits. Soil disturbance would be limited to clearing vegetation and planting native plants. Drainage culverts and other drainage site improvements (e.g. causeway) are also not expected to impact historic properties. There were no historic properties identified near existing drainage culverts along Kapa'a Quarry Road in the Kahanaiki area, and causeways would be constructed along existing access roads that don't have historic sites.



Exhibit 4.26. Photo of Vegetation Processing Site After Recent Clearing by DOFAW (January 2017).

Construction of a vegetation processing facility next to the model airplane park should not impact historic properties because no previously identified historic properties are known at this site. The site could be part of discharged fill material from upland area development (e.g. industrial park, transfer station), and is relatively level as shown on Exhibit 4.26 that includes a photo of the site after recent clearing by DOFAW. Furthermore, the area was disturbed being formerly used by the City as a vegetation processing area.

The Kawainui SPR, Kalāheo park site could be developed for passive park use with parking, rest rooms, pavilion, pedestrian bridge, and a canoe launch into Kawainui Canal as permitted by DSP that were proposed under the Kawainui Gateway Park concept. A prior archaeological study (Mann et al. 2001) of the site located no surface historic properties. Based on the property's topography, history, and observation of a drainage ditch, fill sediments on the park site would likely be more than 6 feet thick, and possibly as much as twice as thick (12 feet). The site has been heavily modified and consists of fill material from excavation of Kawainui Canal and construction of Mōkapu Saddle Road and Mōkapu Boulevard. Therefore, development of this

site should have no effect on historic sites because site grading needed to level the area would probably occur within the uppermost 2 to 3 feet of fill material present.

Proposed Mitigative Measures

To minimize potential effects on historic properties from the activities under the No Action Alternative, the following mitigative measures are proposed. These measures are based upon entitlement approvals received for these actions that included consultations with SHPD.

1. Kawainui; Kahanaiki Wetland Restoration. An archaeological monitoring plan (AMP) for wetland restoration activities was approved by the SHPD in June 2015. This plan includes full-time on-site archaeological monitoring for ground disturbing work within the wetland.
2. Kawainui; Kahanaiki Upland Reforestation. An AMP for upland reforestation activities was approved by the SHPD in June 2015. This plan includes the following monitoring methods to ensure no adverse impact to any newly-identified historic properties or to SIHP 2029.
    a. An archaeologist would do a surface sweep of each vegetation management area or smaller "pod" with the contractor prior to initiation of vegetation cutting/removal within the pod.
    b. The archaeologist would identify any areas of potential concern and establish a "caution tape" buffer of at least 10 feet around each area of concern.
    c. The contractor would ensure that no work or impacts occur within each buffer.
    d. The archaeologist would complete a 100 percent surface survey of each pod following vegetation cutting/removal.
    e. The archaeologist would document and obtain SIHP numbers for any historic properties newly-identified within each pod.
    f. Should SHPD request data recovery excavations for any newly-identified historic properties, the field work and results would meet the requirements of §13-278, HAR. Data recovery excavations would be guided by the following research objectives:
        1) Refine the timeframe for major vegetation change(s) within Kawainui, and
        2) Synthesize any newly-identified historic property into a broader spatial, temporal, and functional understanding of the Kawainui Marsh Archaeological Cultural-Historical Complex (SIHP 2029).
3. Kawainui SPR, Kalāheo. SHPD determined there will be no effect on significant historic sites if ground disturbance does not exceed the depth of fill material (HHF, 2002). Therefore, design plans associated with site development would be designed to not exceed the depth of fill material.
    a. If site development would require disturbing soils underlying the fill material, an archaeological inventory survey would be conducted for those areas affected.
    b. If the drainage ditch on the southwest end of the parcel is developed, it would be investigated for potential paleoenvironmental deposits.

Proposed Action

Wetland Restoration and Upland Reforestation

The Proposed Action includes the continuation and expansion of wetland restoration and upland reforestation initiatives. Most of the wetland restoration work would occur within Kawainui and include expanding north of the Kahanaiki area and into the open water and pothole zone as previously shown on Figure 2.5. Wetlands at Wai‘auia would also be included in this restoration effort. The northern half of Kawainui, consisting of the peat mat zone and remediation zone, would essentially remain unchanged with the exception of selected removal of trees.

As with the No Action Alternative, wetland restoration activities should not have an adverse impact on historic properties because efforts would continue focusing on cutting vegetation and removing the peat mat that involve little disturbance beyond the surface soil layer. No grading activities would occur within the wetland. Expanded wetland restoration activities could affect possible cultural deposits and remnants of agricultural field walls or fishpond walls (SIHP # -2029). However, the likelihood of impacting such sites should diminish as restoration activities expand further north because land commission awards were primarily located in the southern end and along the Kūkanono area of Kawainui (refer to Exhibit 4.1). Restoration activities occurring above the surface (e.g. vegetation cutting) and within a few inches of the sediment under the mat of peat should thus not impact potential sites that would be located 1 to 2 feet below the surface.

Wetland expansion planned for Hāmākua would involve excavating upland areas along the mauka edge of the wetland to lower the elevation. This change would allow water and wetland vegetation to expand, creating increased habitat for endangered waterbirds. This activity should not have an adverse effect on historic properties because upland areas excavated generally consist of fill material and should avoid most sites previously identified. There are also no recorded land commission awards within Hāmākua as shown on Exhibit 4.1.

Excavation would avoid what remains of the two habitation platforms (SIHP # -4428). A lithic scatter site (SIHP # -4429) and agricultural feature (SIHP # -4431) would be avoided because they are located well inland from the wetland, and excavation would not extend that far inland. Another lithic scatter site (SIHP # -4430) inland of Hāmākua’s wetland may be affected by excavation activities, and mitigative measures discussed later could be implemented as part of data recovery efforts.

Upland reforestation improvements would expand beyond Kahanaiki, and include the areas of Pōhakea, Mokulana, the hillside area from Wai‘auia to Ulupō Heiau SHP, DOFAW management station area, the area along Kapa‘a Quarry Road north of the City’s model airplane park. Reforestation efforts would generally be implemented following the same process as that occurring at Kahanaiki which involves smaller management areas (<5 acres) or smaller “pods” (less than an acre) that are cleared and replanted in phases. Therefore, these improvements should not have an adverse effect on known historic sites.

The stone terrace (SIHP # -3965) at Pōhakea would be avoided, and no sites were identified at the Mokulana peninsula. At DOFAW's management station, no evidence of either SIHP #s -3962 (three historic buildings) or -3963 (earthen mounds) were identified during the field inspection, and the "Ulukahiki" walls would be avoided. Reforestation efforts could avoid bulldozer push piles that were observed in the vicinity of SIHP # -2028 (site complex that could not be located), or the area cleared to support DOFAW management operations.

Within the northern Kapa'a subarea (past airplane park), activities would involve clearing vegetation, removing invasive or diseased trees, selectively replanting with native vegetation, and generally keeping areas open for easier maintenance (e.g. mowing). Along the Ulupō Heiau SHP to Kūkanono hillside, reforestation improvements could be scaled down to mainly keeping areas along pedestrian trails clear due to the number of historic sites present.

Improvements to other drainage culverts along Kapa'a Quarry Road should not impact historic sites because none have been identified along the roadway from Kahanaiki north up to the model airplane park and to its intersection with Mōkapu Saddle Road. Existing drainage culverts would be situated along the roadway and are not likely to have other historic sites in the immediate area. Other drainage site improvements (e.g. causeway) north of Kahanaiki to Pōhakea are also not expected to impact historic properties because such improvements would be constructed along existing access roads. This could include an abandoned road in Pōhakea that extended to the south (toward Kahanaiki), and may be a continuation of SIHP # -7199 (road remnant) that required no further work.

Structures and Trails

The discussion of impacts associated with facilities and trails is provided by subarea. Subarea A (Kawainui Wetland) was previously discussed under wetland restoration improvements. ~~With the exception of boardwalks and an observation deck, N~~n~~o ~~other~~ facilities are planned within Kawainui's wetland. ~~Boardwalk segments and an observation deck should not adversely impact possible cultural deposits and remnants of agricultural field walls or fishpond walls (SIHP # -2029). Archaeological monitoring of construction activities would mitigate potential impacts, and the route of boardwalk segments along with the observation deck can be relocated, if necessary.~~

Although no burials have been identified within the project area, several inadvertent finds of human skeletal remains have been made in the larger Kailua region, particularly within the sandy beach berm of Coconut Grove and at Lanikai. Based on these findings, there is a possibility iwi kūpuna and other burial sites may be present within the project area, and that land-disturbing activities during construction may uncover presently undetected burials or other cultural finds. Mitigative measures are discussed later to address burials should they be encountered.

Subarea B: Kahanaiki-Nā Pōhaku-Kapa‘a. The Kahanaiki section includes facilities supporting public access for passive outdoor recreation and educational programs, such as a parking lot, pavilion, restroom, observation decks, and pedestrian trails. These facilities are relatively small in size and should have no effect on historic sites within this area. Facilities would not be sited were the terrace sites associated with SIHP # -2026 or the grinding stone (SIHP # -2029) are located. There are no historic sites identified within the area near the intersection of Kapa‘a Quarry Road with Kalaniana‘ole Highway where the parking lot would be sited, or a program staging area that already serves DOFAW access and staging activities.

At Pōhakea, the education center and kauhale complex should have no effect on historic properties. The stone terrace (SIHP # -3965) would be avoided along with two retaining walls (SIHP # -2023). The education center, or interim improvements (parking, restroom, pavilion), would be located where the former ranch structures were previously located within disturbed areas that would not affect any historic sites. The kauhale complex would support traditional cultural practices and educational programs integrated with the education center all of which have beneficial effects by restoring the historic character, cultural practices, and use of this area. The structures proposed would be located within an open grass area (Figure 2.9) that would not affect any historic sites. A taro lo‘i being established and eventually expanded at the kauhale complex would not impact these historic sites. Although on a small scale, this lo‘i feature also has a beneficial effect by restoring prior historic and cultural use of Kawainui’s wetland. Taro grown would be used by the non-profit organization managing it for cultural practices and activities along with educational programs integrated with the education center that all contribute to beneficial effects.

Nā Pōhaku o Hauwahine and its various features are located north of these facilities, and would not be impacted by their construction. No improvements are proposed for Nā Pōhaku under the project. However, the education center would provide a safer and improved centralized point for managing visitors and educational programs occurring at Nā Pōhaku. Cultural and educational programs integrated with Nā Pōhaku, the education center, and kauhale complex would have a significant beneficial effect supporting native Hawaiian history and cultural practices.

A pedestrian trail planned from Kahanaiki to Pōhakea would utilize existing unpaved access roads through the area. A section of the trail would utilize a road remnant (SIHP # -7199) that is used for DOFAW maintenance access. The planned trail may keep this access road unpaved or upgraded to include permeable materials such as gravel, and would not negatively impact this road remnant site which requires no further work based upon prior archaeological studies. Other access roads between Kahanaiki and Pōhakea used for the trail would not affect historic properties. Foot trails established within this area would also be designed to avoid impacting existing sites, and would provide a connection between Kahanaiki and Nā Pōhaku. The terrace sites, grinding stone, etc. could be incorporated as interpretive elements along these foot trails providing a beneficial effect supporting cultural and educational programs within the area.

At the Kapa‘a section north of Nā Pohaku, an educational and cultural center planned should have no effect on historic properties because none were previously identified or found during CSH’s field inspection. This upland area across of the City’s Kapa‘a transfer station was formerly used by the City for vegetation processing activities and as a maintenance baseyard. The site consists of fill land that would likely not have been used for pre-contact historical use or structures. This area has also been disturbed from construction and operation of the former City maintenance baseyard and use for vegetation processing activities.

The cultural center is intended to serve as a facility for spiritual, cultural and environmental well-being (e.g. kumu hula, sustainability practitioners, applying native Hawaiian conservation ethic, etc.). It would serve as a place to gather and share knowledge along with supporting stewardship of Kawainui, all of which support traditional native Hawaiian cultural practices and educational programs. This would have a beneficial effect supporting native Hawaiian history of Kawainui and the cultural importance of the area. A taro lo‘i is also planned to be established with this center as part of cultural practices and educational programs. This would have a beneficial effect by restoring prior historic and cultural use of Kawainui’s wetland, and the taro grown would be used by the non-profit organization managing the site for cultural practices and activities that all contribute to beneficial effects.

Subarea C: Kapa‘a-Kalāheo-Levee. The project does not include any new structures or facility improvements to the Kawainui SPR, Kalāheo site with elimination of the hale wa‘a discussed in Section 2.2. Therefore, the project would have no effect on historic sites associated with this site, and no surface historic properties were identified here from prior studies. ~~The only improvements planned in this subarea are modifications to already approved passive park plans for the Kawainui SPR, Kalāheo site under the No Action Alternative (former Gateway Park project). The pedestrian bridge across the Kawainui Canal would be eliminated, and a hale wa‘a structure would be added under the Proposed Action. The improvements should have no effect on historic properties because a prior archaeological study (Mann et al. 2001) of the site located no surface historic properties. The site has been heavily modified and consists of fill material likely be more than 6 feet thick, and possibly as much as 12 feet thick. Therefore, development of this site should have no effect on historic sites because site grading needed to level the area would probably occur within the uppermost 2 to 3 feet of fill material present. The addition of the hale wa‘a would not change this.~~

Subarea D: Wai‘auia-Ulupō-Mokulana. In the Wai‘auia section, a small cultural center is planned for use by a non-profit organization to conduct cultural practices envisioned as a center for Hawaiian studies in the area of performing and literary arts. The improvements should have no effect on historic properties because there are no known historic properties within the site based upon prior studies and CSH’s field inspection. An archaeological inventory survey conducted for the adjacent City wastewater pump station site also found no historic properties. Only evidence of the former Mackay Radio Tower (e.g. concrete foundation) was identified during CSH’s field inspection. A pedestrian trail planned utilizing an unpaved roadway used by

DOFAW for maintenance activities along Kailua Road from the cultural center site to the levee would also not affect any historic properties.

From the levee up to the Ulupō Heiau area, the foot trail previously planned has been eliminated from the project as discussed in Section 2.2. Therefore, the project would have no effect on existing historic properties in this area associated with the Waimanalo Irrigation System (SIHP #-4042), Kūkanono Habitation Site (SIHP # -2027), and Kawainui Terraces (SIHP # -2022). ~~only a foot trail with boardwalk section is planned to be routed along the wetland edge below church properties and the Kawainui Vista subdivision. Several historic properties associated with the Waimanalo Irrigation System (SIHP # -4042) are present within this hillside just past (mauka of) the levee. Further southwest closer to Ulupō Heiau are sites associated with the Kūkanono Habitation Site (SIHP # -2027) and Kawainui Terraces (SIHP # -2022).~~

~~Construction of the foot trail could impact features associated with SIHPs # -4042, -2022, and -2027 if routed further inland up the hillside where remnants of the irrigation system and terraces have been identified. However, the foot trail is intended to be routed along the wetland edge, which should minimize potential effects on sites. Furthermore, a fence planned along the inland side of the trail would manage users restricting them from straying up the hillside and affecting sites. The trail's design would need to consider the location of sites when designing its route so that it would have no adverse effect.~~

At Ulupō Heiau, proposed project improvements only consist of adding a greenhouse and hālau. These structures should have no adverse effect on existing historic properties associated with Ulupō Heiau (SIHP # -371) and associated features (SIHP # -3957 and -3958) because their locations do not impact these sites. The hālau would be situated near the drainage channel (SIHP # -3958), but would not impact that drainage structure. If necessary the design and specific location for these structures can be modified to provide further separation from existing sites. These structures are intended to support on-going cultural landscape restoration activities and educational programs occurring at this site having a beneficial effect. The greenhouse and hālau would further support stewardship of the area and maintenance of restoration improvements.

The proposed foot trail from ~~would connect to existing foot trails at this~~ Ulupō Heiau ~~site and~~ would continue further southwest (mauka) below the Kūkanono subdivision hillside toward DOFAW's management station. This trail should have no adverse effect on sites at Ulupō Heiau since its route can be designed to avoid sites. Ongoing cultural landscape restoration activities in the area of the trail would provide educational and interpretive information for users having a beneficial effect supporting awareness and the history of the area.

From Ulupō Heiau up to DOFAW's management station, the foot trail would pass several other historic properties situated within the Kūkanono hillside (SIHP # -2024, -2031, -3959, -3960, and -3961). These sites consist of terraces, agricultural features, etc., and the trail should have no adverse effect on them. No other structures (e.g. observation deck) are planned along this foot trail. ~~An observation deck and other accessory structure along this trail should not impact~~

~~existing sites because they would be situated on the wetland side of the trail for viewing.~~ The foot trail would be routed along the wetland edge minimizing potential effects on sites located on the hillside. A fence planned along the inland side of the trail would also manage users restricting them from straying up the hillside and affecting sites. Consequently, the trail's design would need to consider the location of sites when designing its route so that it would have no adverse effect.

At DOFAW's management station in the Mokulana section, permanent facilities are proposed to replace temporary structures (e.g. containers) to support their management and operations at Kawainui. In addition, accessory structures and improvements planned (e.g. pavilion, passive park area, observation deck, etc.) would support educational programs and passive outdoor recreational activities in this area, such as foot trails and wetland viewing. Existing historic properties previously identified in this area consist of walls and earthen mounds (SIHP # -2028, -3962, and -3963), but CSH's recent field inspection did not locate~~d~~ them with the exception of bulldozer push piles in the vicinity of site -2028.

DOFAW's permanent structures proposed should not impact historic properties because none are located there. These areas presently consist of existing temporary storage containers or open space. Accessory structures should similarly not impact historic properties because none are present. Remnants of the former cattle ranch that operated in this area from 1969 to 2010 would probably be cleared as part of DOFAW site improvements for this area. No further archaeological work associated with these ranch remnants are planned, but additional documentation could be obtained prior to demolition, if required by SHPD. As improvements are implemented over time, the design phase would include updated inspections of final building sites given the structure's size and footprint requirements. Similarly, pedestrian trails and foot trails established in this area would consider avoiding potential sites, even though there appears to be no remaining evidence of them.

The maintenance road ~~pedestrian trail~~ from DOFAW's station is proposed to then connect to a planned maintenance trail ~~leading to~~ at the Mokulana Peninsula~~ and eventually to Kahanaiki~~. This ~~trail~~ access road is intended to provide access to areas for DOFAW vehicles and equipment~~, and also serve as a pedestrian trail. Two small pavilions planned along this route would provide shade, rest areas, and opportunities for viewing wetland habitat.~~ A short bridge for DOFAW vehicles would be needed to cross over Maunawili Stream. The location of this bridge would not affect known historic properties along that stream bank, and would span over the stream. Parking, an equipment storage building, and program staging areas are also planned. No historic properties have been previously identified within this peninsula area or by CSH's current field work. Therefore, these improvements should have no effect on historic properties.

Subarea E: Hāmākua-Pu‘uoehu. The project proposes expansion of the Hāmākua wetland in this subarea. Outside the wetland area, planned improvements include the establishment of a program staging area, restroom, and storage building to support DOFAW management activities and operations in an open area by the gated entrance. These improvements are not located near previously identified historic properties (SIHP # -4428, -4429, -4430, and -4431) consisting of habitation platforms, lithic scatters, and enclosures. Therefore, proposed structures should have no effect on historic properties.

As part of the wetland expansion, DOFAW's current unpaved maintenance road would likely need to be realigned further inland toward the foot of the Pu'uoehu hillside. The realignment could affect a lithic scatter site (SIHP # -4430) and agricultural enclosure stone structures (SIHP # -4431). The habitation platforms (SIHP # -4428) are situated makai of the existing access road alignment and are within the wetland, and would thus not be affected by a road realignment.

Within the Pu'uoehu hillside, maintenance trails are planned along the ridge and about midway up the hillside. These trails should have no effect on historic properties because no prior sites have been recorded of identified from CSH's field work. However, an inspection of the actual route would be conducted as part of the design phase for the trails, when implemented, to ensure no historic sites are present. The large concrete platform for the former water tank would likely be avoided due to the difficulty of removing that just for a foot trail.

Proposed Mitigative Measures

To minimize potential effects on historic properties from the project's planned improvements, the following mitigative measures are proposed.

1. Kawainui; Wetland Restoration. The existing Kahanaiki area AMP approved by the SHPD in June 2015 would be amended to include additional wetland areas planned for restoration activities. The amended plan may include either a combination of full-time on-site archaeological monitoring or on-call monitoring for ground disturbing work within the wetland.
2. Kawainui; Upland Reforestation. The existing Kahanaiki area AMP approved by the SHPD in June 2015 would be amended to include additional areas for upland reforestation when programmed for implementation. The same monitoring methods (e.g. surface sweep of management areas or smaller "pods") can be implemented if upland reforestation plans use the same methodology as that for the Kahanaiki area. Otherwise, revised monitoring methods would need to be developed in consultation with the SHPD.
3. Hāmākua; Wetland Expansion and Roadway Modification. The lithic scatter site (SIHP # -4430) inland of Hāmākua's wetland may be affected by excavation activities for wetland expansion. Other sites could be affected by realignment of DOFAW's access road. Therefore, an AIS should be conducted for this site to document new and previously identified historic properties to an AIS-level documentation. The AIS scope should be coordinated with SHPD, and should

predominantly consist of a 100 percent coverage survey and documentation of impacted areas, and may include subsurface testing, if warranted. Mitigative recommendations in the AIS could include archaeological monitoring, data recovery, or preservation.

4. Kawainui SPR, Pōhakea. An AIS should be conducted for this site to document new and previously identified historic properties to an AIS-level documentation. The AIS scope should be coordinated with SHPD, and should predominantly consist of a 100 percent coverage survey and documentation of impacted areas, and may include subsurface testing, if warranted. Mitigative recommendations in the AIS could include archaeological monitoring, data recovery, or preservation.
5. Kapa‘a. An AIS should be conducted for the cultural and educational complex site for areas planned for structures or major site development. The AIS-level documentation would document any historic properties, and the scope should be coordinated with SHPD. Work should predominantly consist of a 100 percent coverage survey and documentation of impacted areas, and may include subsurface testing, if warranted.
6. Kawainui SPR, Kalāheo. No measures necessary with elimination of the hale wa‘a because no new improvements are proposed at this site under this project. ~~Design plans associated with the hale wa‘a structure would be designed to not exceed the depth of fill material. If the structure would require disturbing soils underlying the fill material, an AIS would be conducted for this area.~~
7. Ulupō Heiau SHP. ~~This area includes the hillside slopes from St. John’s Lutheran Church up to DOFAW’s management and research station.~~ An AIS should be conducted for areas planned for the pedestrian and foot trails, including accessory structures. The AIS-level documentation would document any previously identified and new historic properties, and the scope should be coordinated with SHPD. Work should predominantly consist of a 100 percent coverage survey and documentation of impacted areas, and may include subsurface testing, if warranted.
8. Mokulana Peninsula Area. An AIS should be conducted for areas planned for DOFAW access roads, staging area and ~~the pedestrian and foot trails, including~~ accessory structures. The AIS-level documentation would document any historic properties, and the scope should be coordinated with SHPD. Work should predominantly consist of a 100 percent coverage survey and documentation of impacted areas, and may include subsurface testing, if warranted.
9. Hāmākua and Lower Pu’uoehu Area. An AIS should be conducted for areas planned for the pedestrian and foot trails, including accessory structures. The AIS-level documentation would document any historic properties, and the scope should be coordinated with SHPD. Work should predominantly consist of a 100 percent coverage survey and documentation of impacted areas, and may include subsurface testing, if warranted.

10. Potential Burials. Should burials (or other cultural finds) be encountered during ground disturbance or via construction activities, all work shall cease immediately and the SHPD notified pursuant to HAR §13-280-3.
    a. In the event that iwi kūpuna are identified, all earth moving activities in the area will stop, the area will be cordoned off, and the SHPD and Police Department will be notified pursuant to HAR §13-300-40.
    b. In the event of an inadvertent discovery of human remains, the completion of a burial site component of the preservation plan and/or the burial site component of the archaeological data recovery plan, in compliance with HAR §13-300-40 and HRS §6E-43.6, is required. Additionally, all lineal and cultural descendants of Kailua shall be contacted.

4.1.2 Cultural Resources

A Cultural Impact Assessment (CIA) for the project was prepared by CSH in 2017, and the report is included in Appendix G. The CIA was prepared to address the State's environmental review process under Chapter 343, HRS, which requires consideration of the proposed project's potential effect on cultural beliefs, practices, and resources. The CIA broadly covers the Kailua ahupua'a and specifically examines the Kawainui-Hāmākua project area. Information discussed in the report was obtained through archival research and cultural consultation efforts. The scope of work for the CIA involved:

1. Examination of cultural and historic resources with the purpose of identifying traditional Hawaiian practices such as resource gathering activities or agricultural pursuits that may be indicated in the historic record.
2. Review of previous archaeological work at or near the project area that may be relevant to the reconstruction of traditional land use activities and to identify cultural resources and practices associated with the property.
3. Consultation with knowledgeable parties regarding cultural and natural resources at or near the project area, present and past uses of the property, and other practices and uses associated with the property.

Archival research conducted for the CIA drew from significant primary and secondary sources such as documents, maps, and photographs. Research centered on Hawaiian activities including ka'ao (legends), mo'olelo (stories), wahi pana (storied places), oli (chants), mele (songs), traditional subsistence activities, and ritual practices associated with the project area and the Kailua ahupua'a. Background research for this study yielded historical and archaeological information that was previously discussed in Section 4.1.1 of this document.

CIA Conformance with Ka Paʻakai Analytical Framework

The State and its agencies have an affirmative obligation to preserve and protect the reasonable exercise of customarily and traditionally exercised rights of native Hawaiians to the extent feasible. State law further recognizes that cultural landscapes provide living and valuable cultural resources where Native Hawaiians have and continue to exercise traditional and customary practices, including but not limited to hunting, fishing, gathering, and religious practices. In *Ka Paʻakai*, the Hawaiʻi Supreme Court provided government agencies an analytical framework to ensure the protection and preservation of traditional and customary Native Hawaiian rights while reasonably accommodating competing private development interests. The analytical framework guiding Ka Paʻakai analyses involves:

1. The identification of valued cultural, historical, or natural resources in the project area, including the extent to which traditional and customary Native Hawaiian rights are exercised;
2. The extent to which those resources, including traditional and customary Native Hawaiian rights, would be affected or impaired by the Proposed Action; and
3. The feasible action, if any, to be taken to reasonably protect Native Hawaiian rights if they are found to exist.

Appropriate information concerning the Kailua ahupuaʻa was collected through archival research and interviews, focusing on project area. Research and interviews allowed identification of cultural, historical, and natural resources in the area and the extent traditional native Hawaiian rights are exercised. The extent the project would affect these resources and native Hawaiian rights was assessed. Results of this assessment allowed identification of feasible actions needed to reasonably protect these resources and rights.

Community Consultation Process

The community consultation component of the CIA involved interviews with individuals and organizations possessing knowledge of or concerns about traditional cultural practices in the project area or the Kailua ahupuaʻa. Individuals and organizations consulted were identified through an existing CSH database. This databases includes kupuna (elders), kamaʻāina (native born individuals), cultural practitioners, lineal and cultural descendants, Native Hawaiian Organizations (NHO), and community groups.

Agencies such as the SHPD, Office of Hawaiian Affairs (OHA), and the Oʻahu Island Burial Council were also contacted. In particular, the Oʻahu Island Burial Council was contacted to obtain its response to the project and to identify lineal and cultural descendants and organizations possessing knowledge or expertise of the study area. CSH initiated outreach efforts in November 2016 with a total of 36 individuals or groups contacted. Of those contacted, 14 responded, and six individuals met with CSH for more in-depth interviews. The following is a list of individuals who shared their manaʻo and ʻike about the project area and Kailua Ahupuaʻa.

1. Jan Becket. Author, photographer, and retired teacher from Kamehameha Schools. Kona Moku Representative, Council of Hawaiian Civic Club's Committee on the Preservation of Historic Sites and Cultural Properties.
2. C. Lehuakona Isaacs. Kamaʻāina of Kailua and current President of ʻAhahui Mālama i ka Lōkahi.
3. Māpuana and Kīhei de Silva. Kamaʻāina and cultural descendants of Kailua.
4. Representative Cynthia Thielen. State representative for the 50th District (Kailua and Kāneʻohe Bay).
5. Herb Lee. Kamaʻāina of Kailua and Executive Director of the Pacific American Foundation.
6. Dr. Charles Burrows. Former Kamehameha Schools teacher and founder of ʻAhahui Mālama i ka Lōkahi.
7. Meredith Speicher. Representative for the National Parks Service providing technical assistance to Hoʻolaulima Ia Kawainui.
8. Donna Wong. Representative for Hawaii's Thousand Friends.
9. Makanani Parker. Kamaʻāina of Kailua and member of Ke Kahua o Kūaliʻi.

4.1.2.1 Existing Conditions

Cultural Landscape

This section presents traditional Hawaiian cultural practices and resources identified within the project area along with the broader cultural landscape of the Kailua ahupuaʻa.

Kaʻao, Moʻolelo, and Wahi Pana

Traditional moʻolelo or stories associated with the Kailua ahupuaʻa include stories of Olomana, who was a 36-foot tall giant that oversaw lands spanning from Makapuʻu to Kaʻōio. In this moʻolelo, a warrior hailing from Kauaʻi named Palila traveled with his war club to Oʻahu. Once on Oʻahu, Palila met the chief of the island named Ahu-a-Pau. The chief promised one of his daughters to Palila if he could slay Kamai-kaahui, a shark-man that terrorized Oʻahu. Ahu-a-Pau sent Palila on a journey around the island without forewarning him of the beings he would encounter. Palila encountered Olomana on this journey, and cut through the giant, casting pieces of his body around the Kailua ahupuaʻa.

One portion of Olomana's body was hurled toward the ocean and became the landform known as Mahinui. The portion of Olomana's body that remained became the large landform closest to Kawainui known as Olomana. The Olomana landform itself is comprised of three peaks, with the tallest peak named Olomana. The middle peak is known as Pāku'i with the remaining peak named Ahiki. Pāku'i ("attached") is the legendary keeper of Kawainui and Kaeʻelepulu fishponds. Ahiki, which overlooks the Waimānalo ahupuaʻa, is named after the konohiki (high chief) of Kaeʻelepulu and Kawainui loko.

Kawainui (also referred to as Kawai Nui Marsh and Kawai Nui Loko) is celebrated in many Hawaiian traditions. Hiʻiaka and her traveling companion Wahine-omaʻo, visited the loko according to various chants. Hauwahine, the moʻo of Kawainui and Paeo Pond in Lāʻie, traveled between both ponds. Hauwahine was the "keeper" of Kawainui and her residency at Kawainui ensured there was an abundance of fish for the residents of the ahupuaʻa. Kawainui was also the site of the mythical Mākālei tree, which had the ability to attract fish. The reported location of the tree is near the present day Hāmākua Bridge.

Hawaiian Habitation and Agriculture

According to Land Commission Award documents, 171 claims were made for land in the Kailua ahupuaʻa. A small number of coastal kuleana claims could be found in the Kaʻōhao/Lanikai area. The remaining claims were in the Kailua town area extending toward the project area and into Maunawili. Kailua, Kāneʻohe, and Waimānalo were considered choice locations for aliʻi and these areas were awarded to the Crown. The entire Kailua ahupuaʻa was awarded to Queen Hakalelepono Kalama. Aliʻi did not specify in claims what their lands were used for. However, Māhele records indicate that makaʻāinana (commoner) lands within and in the vicinity of the project area were used for habitation and agricultural cultivation, specifically for kalo (taro).

Marine and Freshwater Resources

In pre-contact times, the Kailua ahupuaʻa was an attractive area to aliʻi because of its accessibility to natural fishponds. The 450-acre Kawainui Loko was famous for awa (milkfish, *Chanos chanos*), a variety of ʻoʻopu subspecies (general name for fishes in the *Eleotridae*, *Gobiidae*, and *Blennidae* families), ʻamaʻama (mullet, *Mugil cephalus*), jacks, barracuda lizard fish, and various types of limu (general name for plants living under water). In recent times, environmental pollution and invasive species such as tilapia have plagued the pond.

Oneawa Beach is over one mile northwest of the project area. This beach was formerly known as Puʻu Nao and Kuahine beaches, and known for its ʻōʻio (bonefish) running offshore. The offshore island of Mōkōlea is home to the plover, a favored food of Hawaiians. Bird hunters often traveled to Mōkōlea by canoe or boat to catch these plovers. The island is presently a State bird sanctuary.

Kalama Beach is roughly one mile west of the project area. This beach was named in honor of Queen Kalama, wife of King Kamehameha III (Kauikeaouli). Queen Kalama was given the lands of Hakipuʻu, Kāneʻohe, and Kailua after Kauikeaouli's death. She wanted to utilize these lands for sugar cultivation. Unfortunately, there were many competitors and the Koʻolaupoko Moku was not ideal for sugar cultivation. Instead, an area of the Kailua ahupuaʻa was used for coconut cultivation. This area was called Kula o ʻĀlele (Coconut Grove). This coconut cultivation business eventually failed and the land was subdivided and sold for residential development. Some of the coconut trees still exist today.

Kailua Beach is one half mile southwest of the project area. Kailua Beach Park is a 30-acre public park located on the eastern portion of Kailua Bay. A muliwai (brackish water pond) is located in the middle of the park and drains into the bay. Popoiʻa, commonly known as Flat Island, is located offshore from Kailua Beach Park. Popoiʻa translates to "rotten fish" and most likely referred to the offerings that were left on a koʻa (shrine) that was once located in the middle of the island. The koʻa was obliterated during the 1946 tsunami.

Lanikai Beach is well over one mile east of the project area. Lanikai is the improper Hawaiian name for the area, as it was devised by developers to appeal to potential home buyers. The traditional name for the area is Kaʻōhao. The reef that fronts Kaʻōhao was called ʻAʻalapapa and was known for its limu lipeʻepeʻe (a fragrant seaweed). The muliwai where Wailea Stream and the ocean met was often filled with fish.

Trails

The CIA noted that there are several trails in the Kailua ahupuaʻa that range from ancient to modern. All the trails described are located outside the project area, and will not be impacted by the project improvements. However, discussion of these trails is provided which are located at Olomana and Maunawili Falls.

Kiolea is an old trail that began near the Kawailoa Training School (current site of the Olomana High and Intermediate School), which led to Maunawili. Supposedly this trail existed during the time of Ahiki, the third peak of Olomana. The summit of Olomana offers 360-degree views of Kāneʻohe, Kailua, Waimānalo, and Maunawili. There is also a clear view of the Koʻolau Summit from the top of Olomana.

The Maunawili Falls trail is approximately 3 miles long roundtrip and winds along the Maunawili Stream. The trail passes remnant coffee groves, loʻi, mango, monkeypod, and kukui. The Maunawili Trail hike is approximately 10 miles long. The trail begins below the hairpin turn off the Pali Highway, windward bound, snaking to the base of the Koʻolau Mountain Range passing gulches, ridges, streambeds, ravines, switchbacks, waterfalls chutes, waterfall tunnels, streams, and groves of mountain apples before reaching Waimānalo Ahupuaʻa.

Results of Background Research

The CIA discussed specific aspects of traditional Hawaiian culture as they may relate to the project based upon their background research. The Kailua ahupuaʻa and the project vicinity were significant areas to native Hawaiians, and included extensive natural and cultural resources. These included taro loʻi, streams, wetlands, and fishponds. Ulupō Heiau, located within the project area (Subarea D), was a center of religious activity. The vicinity around the heiau included habitation, agricultural, and ceremonial sites which extended into what is now the project area.

In the larger context of Kailua ahupuaʻa, the project area is linked with specific moʻolelo (history) including: a) ʻOlopana and his brother Kahikiʻula who arrived in Oʻahu from Kahiki and who built heiau (places of worship) in Kailua, including Pahukini and Holomakani mauka of Kawainui; b) the famous chief, Kualiʻi, born at Kalapawai, Kailua, and raised in Kualoa and Kailua, who later reigned as the high chief of all Oʻahu; c) chief Kākuhihewa, who built himself a legendary house at ʻĀlele in Kailua; and d) the conquering chief Kahekili, followed by Kamehameha I, who resided in Kailua for a time.

The project area is also connected with moʻolelo about the moʻo (supernatural water spirit) Hauwahine who made her home in Kawainui. Folklore associated with the project area include the wish-fulfilling Mākālei tree, which could summon fish and food at any time, and the legendary accounts of edible mud, or lepoʻaiʻia, found only in Kawainui. Traditional mele (songs) and oli (chants) praise the taro gardens of the area. Legends speak of the goddess, Hiʻiaka, and her companion, Wahine-omaʻo visiting the wetland. Mele about Kawainui tell of the ancient Hawaiian belief that the channel underneath Puʻuoehu, adjacent to the southern portion of the project area, is the coital connection between the male fishpond, Kawainui, and the female fishpond, Kaʻelepulu, giving the area great mana (spiritual or divine power).

Radiocarbon dating of organic soil in Kailua demonstrates human habitation in the area for at least 1,000 years, and perhaps 1,500 years. Archaeological research definitively shows expansion of agriculture in Kailua beginning AD 1200-1300. Radiocarbon dates obtained from the vicinity of the project area demonstrate human occupation at AD 1440 to AD 1520.

An ancient ʻauwai at the edge of Kawainui was used in the 1900s to supply millions of gallons of water to the Waimanalo Sugar mill. A pumping station removed water from the wetland in a wooden pipe and diverted it to the sugar mill, which was the biggest employee on the windward side of the island. Kawainui is also associated with the history of rice farming, at one time hosting three rice mills run by Chinese immigrants.

In post-National years, Kailua was extensively used to cultivate rice, sugar, and other crops. Ranching and dairy farming were also conducted. With the expansion of the Pali Highway connecting Honolulu to windward communities, the post- World War II years brought a development boom to Kailua and neighboring ahupuaʻa. Weekend beach homes and residential developments replaced the agricultural areas of Kailua.

Although no burials have been identified within the project area, over 25 reports of inadvertent finds of human skeletal remains have been made in Kailua, particularly within the sandy beach berm of Coconut Grove and Kaʻōhao (Lanikai). The sandy beach berm of Coconut Grove and Kaʻōhao was utilized as a settlement by indigenous Hawaiians. These burials were located within Jaucas sand sediments. The northern to northeastern portion of the project area (along levee) border Jaucas sand, a variety of sediment known to yield ancient Hawaiian burials. Consequently, there is a possibility iwi kūpuna and other burial sites being present within the project area.

Results of CIA Consultations

CIA participants expressed concerns regarding the protection and conservation of water resources, and the restoration of archaeological and agricultural sites. Consultations recommended the mat currently covering the wetland be managed, and invasive species such as papyrus and bulrush be removed. In addition to the removal of invasive species, participants recommended the replanting of native plants and the reestablishment of loʻi kalo in the vicinity of Kawainui. Overall, consulted parties in the CIA expressed their support for the preservation and restoration of Kawainui and Hāmākua. Participants shared their visions for the area, and recommended the project area remain as resources for educators as well as Hawaiian cultural practitioners. A summary of consultation findings is provided.

1. Kawainui was recognized for the potential it held as both a natural and cultural resource, and as a unique and powerful educational tool.
    a. Cultural resources can function as both an educational and healing tool, in turn allowing for the care and preservation of cultural resources over time.
    b. Scientific work conducted at Kawainui as part of educational programs are based upon a strong cultural foundation. Students acknowledge their connection to ʻāina (land) and follow cultural protocols to honor this connection.
    c. Kawainui was one of the sites selected on the Windward side for the Aloha ʻĀina project that would be the subject of studies for students in 3rd through 8th grades.
2. One cannot separate Hawaiian culture from the environment. Hawaiian culture evolved and depends upon the environment; that's how it came into being as a Hawaiian culture.
3. Kawainui should allow the practice, promotion and perpetuation of a modern native Hawaiian conservation ethic that provides for a healthy Hawaiian ecosystem nurtured by human communities, and serving as a model for local and global resource management.
4. The gap between science, cultural resources and the community should be bridged through education. This bridge can be established by restoring the health to the ʻāina to make it pono. Through that act of restoring (mālama ʻāina), we also heal ourselves. This is the land of our kūpuna. So, it became a very important thing to do then, and it is so important for us to do it now.
5. Concerned with the protection and conservation of water resources, which includes current and future flow of fresh water within the wetland.
6. Concerned with the restoration of archaeological and agricultural sites.
7. Suggested the mat currently covering the wetland be managed, and invasive species such as papyrus and bulrush be removed. Invasive plant species should be replanted using native plants.
8. The project should provide opportunities to preserve both natural and cultural resources, while providing a space where Hawaiian cultural practices can be conducted, taught, performed and practiced.

9. Recommended the reestablishment of loʻi kalo within the Kawainui area.
10. An individual providing technical assistance to Hoʻolaulima ia Kawainui as part of their community workshops on Kawainui provided input and suggestions based upon those efforts.
    a. During community workshops, various Native Hawaiian organizations had expressed a desire to take on responsibilities for the care and restoration of Kawainui.
    b. In addition to restoring the wetland, these groups wanted to establish a place where cultural practices could be perpetuated and wahi pana (sacred or legendary place) safeguarded.
    c. The restoration of loʻi kalo was suggested as a possible cultural practice that should be allowed at Kawainui.
    d. A level of miscommunication on Kawainui had occurred in which people in the community heard things out of context, never bothered to review the plans, and it pitted the community against one another.
    e. Leaving Kawainui alone as it is was seen as somehow more conservation minded, and people were very fearful of more tourists flooding Kawainui and their neighborhoods. However, that mindset to "leave it alone" ignored the fact that Kawainui is not in a natural state, is overrun by invasive species, has been a dumping ground, and has safety issues.
    f. Kawainui is the much-needed location for the practice and perpetuation of Hawaiian culture. Allowing people to practice their culture, restore native habitat, perform cultural arts and crafts, serve as a natural classroom, have volunteers maintain and remove invasive species, and participate in passive outdoor recreation are not going to destroy the area, but has the potential to do the opposite.
    g. Suggested that additional research should be conducted on the carrying capacity of the project area to address potential issues that may arise as a result of increased use.

4.1.3 Potential Project Impact and Mitigation

4.1.3.1 No Action Alternative

The No Action alternative should not result in an adverse impact to traditional Hawaiian cultural resources or practices in the project area. There are actually very limited areas within the Kawainui-Hāmākua project area that now allow traditional Hawaiian cultural practices to occur. These areas are located at Pōhakea (open grass area with hale), Nā Pōhaku (cultural landscape restoration), and at Ulupō Heiau (cultural landscape restoration and heiau stewardship).

Under this alternative, these same areas would continue to support present cultural practices, but no additional areas would be provided for expanding opportunities. Ongoing efforts by non-profit organizations to restore the cultural landscape and utilize these sites for practices would continue to enhance the character of these specific area's cultural resources. Public involvement and education programs associated with these efforts support the cultural history of this area and its supporting resources. However, given the historical and cultural significance of this project area and potential resources available, this continued limitation of use and areas could be viewed as having a negative impact on Hawaiian cultural practices, especially given the input from cultural organizations seeking increased opportunities for stewardship of Kawainui and access to areas to conduct cultural practices.

DOFAW's wetland management and upland vegetation maintenance activities at both Kawainui and Hāmākua would continue under this alternative, and should not impact traditional Hawaiian cultural practices occurring at Pōhakea, Nā Pōhaku, and Ulupō Heiau because DOFAW activities don't occur there. Implementation of wetland management and permitted restoration activities would have a beneficial impact by improving freshwater and aquatic resources along with endangered waterbird habitats associated with the wetlands of Kawainui and Hāmākua, all of which serve as important cultural resources. Archaeological monitoring implemented as part of mitigative measures for Kawainui's wetland restoration activities should minimize potential impacts on the cultural history and resources that may be present consisting of subsurface historic agricultural sites (agricultural field walls or fishpond walls).

Upland reforestation activities within the Kahanaiki area should not have an adverse effect on historic properties identified from prior surveys, and should therefore not impact cultural resources or significance of this area. Drainage improvements should similarly not impact cultural resources of values associated with this upland area. Construction of the vegetation processing facility would also not impact cultural resources, cultural practices since none occur there, or the cultural significance of that Kapa‘a area. Operation of the processing facility would have a beneficial effect on cultural resources by indirectly supporting wetland restoration and upland reforestation activities.

Improvements constructed at the Kalāheo park site under this alternative should not impact historic properties and subsequently not impact cultural resources. Allowing the launching of canoes by permit from DSP for schools and canoe clubs at this site would have a beneficial effect on Hawaiian culture by supporting the sport of canoeing for residents.

4.1.3.2 Proposed Action

Wetland Restoration and Upland Reforestation

The project includes the continuation and expansion of wetland restoration and upland reforestation initiatives. Wetland restoration work within Kawainui would expand north of the Kahanaiki area and into the open water and pothole zone, and include the wetlands at Wai‘auia. Wetland restoration activities would have a beneficial effect on freshwater, avifaunal (endangered waterbirds), and aquatic resources with the wetlands of Kawainui and Hāmākua (expansion of wetland area) that are culturally significant. Restoration activities support CIA findings expressing the need to improve its natural and cultural resources instead of leaving it alone because it is not in a pristine state now.

Archaeological monitoring implemented for Kawainui’s wetland restoration activities should minimize potential impacts on the cultural history and resources that may be present (e.g. (agricultural field walls or fishpond walls). Wetland expansion planned at Hāmākua would also support and improve valued cultural resources consisting of freshwater (wetland), endangered waterbirds, and aquatic resources.

The expansion of upland reforestation activities within Kawainui and Hāmākua should not have an adverse effect on historic properties identified from prior surveys, and should thus not impact cultural resources or the significance of this area. Replacing non-native invasive vegetation with native vegetation supports reestablishing historic environmental conditions and the cultural values associated with this area. In addition, native plants grown in areas could be a resource used by cultural organizations to support cultural practices (e.g. lei making, arts and crafts, etc.). Such opportunities would have a beneficial effect on cultural practices, and would be coordinated and permitted through DOFAW. These reforesting activities thus support CIA input on the need to restore natural resources while providing opportunities for conducting cultural practices.

Expanded drainage improvements within upland areas and along Kapa‘a Quarry Road should similarly not negatively impact cultural resources of values associated with this upland area. Drainage improvements that reduce erosion of upland areas and resulting discharges of sediment and debris into the wetland support restoring this cultural resource. The established archaeological monitoring protocols would be extended into these additional upland areas to avoid adverse impact to historic and cultural properties.

Structures and Trails

The project includes new areas at Kawainui designated to support traditional Hawaiian cultural practices and stewardship of the area and resources by non-profit organizations in partnership with DOFAW and DSP. Increased access and areas proposed for allowing a permanent presence would have a significant beneficial effect by supporting expansion of Hawaiian culture and practices at Kawainui.

There are very limited areas now allowed within the Kawainui-Hāmākua project area for only certain traditional Hawaiian cultural practices to occur. Pedestrian and foot trails planned would have a smaller beneficial effect by supporting access to areas that may be used for cultural practices. These improvements support the CIA consultation findings demonstrating the need to allow opportunities for cultural practices to occur, to provide stewardship opportunities supporting restoration efforts, and support the Hawaiian conservation ethic for resource management.

The project supports the opportunity for non-profit organizations to conduct the traditional practice of teaching and practicing Hawaiian culture of all types such as genealogy, sports, moʻolelo (stories), ritual practices, dance, agriculture, etc. The opportunities provided by designated areas for cultural practices at Kawainui also support Kawainui's history of having an ancient learning center of significant size. Therefore, areas supporting cultural practices around Kawainui are pertinent to and consistent with the history of this area. Discussion of impacts associated with facilities on cultural practices is provided by subarea.

Subarea B: Kahanaiki-Nā Pōhaku-Kapaʻa. The Pōhakea area would include development of a kauhale complex open to the public consisting of several hale of traditional Hawaiian pole and thatch structures for cultural practices and to support educational programs coordinated with the education center. Cultural activities and educational programs associated with this kauhale would supplement activities occurring at both Nā Pōhaku and the education center in this area creating a variety of experiences for visitors.

The cultural and environmental center planned at Kapaʻa would be used for cultural practices and activities with more of an emphasis on agriculture, science, and environmental conservation in addition to other practices (e.g. dance, spiritual, etc.). Although it would not be open to the general public, similar to a City park, the non-profit organization managing the center would support holding and conducting educational programs along with stewardship of the area in coordination with DOFAW and DSP. This would provide opportunities for public participation. Other organizations may also use their facilities for meetings, classes, etc. These activities all support traditional cultural practices and perpetuating knowledge and culture for future generations.

Areas for establishing and maintaining taro loʻi would also occur at both the kauhale at Pōhakea and at the cultural center at Kapaʻa. Loʻi would be maintained as part of cultural practices (agriculture) by non-profit organizations managing the sites. This activity supports Kawainui's historic use for habitation and agricultural cultivation (taro loʻi), and would have a beneficial effect on both cultural resources and practices.

Subarea C: Kapaʻa-Kalāheo-Levee. With elimination of the hale waʻa, there are no new improvements that would support cultural practices proposed for this site under the project. ~~The Kawainui SPR, Kalāheo site would continue allowing the launching of canoes by permit from DSP for schools and canoe clubs under the No Action Alternative. This has a beneficial effect on Hawaiian culture by supporting the sport of canoeing for residents. The project also plans to construct a hale waʻa to store canoes on site that includes a meeting room with covered lanai. This building could be used for educational and cultural programs related to canoe/voyaging studies, canoe repairs, celestial navigation, etc. all of which have a beneficial effect supporting cultural practices in the sport of canoeing.~~

Subarea D: Waiʻauia-Ulupō-Mokulana. Construction of a smaller cultural complex at Waiʻauia would have a beneficial effect on cultural practices by providing another area for use by non-profit organizations. This is envisioned as a center for Hawaiian studies with a focus in the area of performing and literary arts, along with other practices. Although not open to the general public, the non-profit organization managing the center would support holding and conducting educational programs for the public and students in coordination with DOFAW and DSP. The organization would also be responsible for stewardship of the area along with supporting management and maintenance of a reinterment site at this Waiʻauia site. Therefore, stewardship of the area, maintenance of a reinterment site, and cultural practices occurring at this center would have a beneficial effect on cultural practices and perpetuating knowledge and culture for future generations.

At Ulupō Heiau, proposed project improvements only consist of adding a greenhouse and hālau that are intended to support stewardship activities in the area, restoration improvements, and general maintenance of the area. These structures would thus have a beneficial effect by supporting these on-going cultural landscape restoration activities and educational programs.

Improvements at the DOFAW management station, as well as parking areas, storage sheds, and covered rest areas will support DLNR staff and volunteers who are involved in environmental and cultural restoration efforts. These improvements support efforts to provide greater opportunities for school groups and other volunteers to experience meaningful hands-on learning and to participate in caring for natural and cultural resources.

Subarea E: Hāmākua-Puʻuoehu. The project does not include facilities in this subarea that would affect cultural practices or resources.

Under the Ka Pa‘akai analysis conducted as part of the CIA, approval of proposed improvements would not adversely impact traditional and customary native Hawaiian rights identified in the project area. The rights of native Hawaiian cultural practitioners are preserved, protected and would be significantly improved by the project by supporting a permanent cultural presence at Kawainui. Such a presence, with facilities, would support educational programs, cultural practices, stewardship and other activities as identified through the interviews and research conducted of traditional or customary practices.

Proposed Mitigative Measures

To minimize potential effects on cultural resources and practices from the project’s planned improvements, the following mitigative measures are proposed.

1. A clean, safe and culturally appropriate place should be created for iwi kūpuna to be protected and cared for in the event that they have to be disinterred and temporarily stored. Any such storage facility, should it be necessary, should be established, maintained, and monitored in full consultation with cultural and lineal descendants of Kailua. This storage could occur at the cultural center at Wai‘auia since a reinterment site is already there, and the organization maintaining this site would be operating out of this cultural center.
2. Architectural and construction plans and specifications should meaningfully integrate themes and styles that reflect Kailua’s unique “sense of place” that preserve, enhance, and perpetuate the natural resources of Kailua (e.g., use of native and Polynesian-introduced plant species for landscaping); and that preserve, enhance, and perpetuate the cultural resources of Kailua.

4.2 SOCIAL AND ECONOMIC FACTORS

4.2.1 Existing Conditions

4.2.1.1. Kailua Overview

The Kailua community is located on the windward side of the island of Oʻahu, about 12 miles northeast of urban Honolulu. Kailua is a suburban community with established residential subdivisions, and an urban town center. This community has popular beaches that have shaped and influenced the character of this community particularly over the last few decades, such as Kailua Beach that stretches nearly three miles between Kapoho Point to the north and Alala Point to the south. Kailua's established residential community is comprised of a number of mostly single-family residential neighborhoods, with some multi-family developments mostly around the town center and the periphery of the Coconut Grove neighborhood. According to the 2010 U.S. Census, Kailua had a total resident population of 38,635 persons.

Kailua town is the business and commercial center for this community that generally consists of street blocks and associated areas along Hāmākua Drive, Kailua Road, Hahani Street, and a portion of Oneawa Street. Most of its retail establishments are located within walking distance between areas along Kailua Road and Hāmākua Drive. Kailua town has a number of small, local retailers and restaurants that have made it a unique commercial destination for residents and visitors. Changes to this commercial area having been occurring over the past decade with completion of a new Target store, Whole Foods Market, and the closing of Macy's allowing for the current redevelopment of that site. Other smaller commercial centers are found in the residential neighborhoods of Enchanted Lake and Aikahi Park.

Socioeconomically, Kailua is an older and more affluent community in comparison to other Oʻahu communities, and has been a popular community of choice for migrants relocating to Oʻahu for work or to retire. The community has an annual "I Love Kailua" town party which is a fundraiser held in the center of town that includes booths for arts, crafts, and foods along with entertainment. There is also a 4th of July parade and fireworks celebration show that has been a tradition since 1948. An "I Love Hula" event is held monthly that includes performances from differing hālau hula. A "Kanikapila" event also occurs monthly now that consists of music performances by various local artists.

Various periodic community events are also conducted at Kawainui. DOFAW holds a monthly clean-up event for volunteers and the public at the restoration ponds at Kawainui. Regular volunteer workdays also occur at Ulupō Heiau, Nā Pōhaku o Hauwahine, and periodically at Pōhakea. Other intermittently occurring volunteer activities involve trash collection in the upland area of the wetland, removal of invasive vegetation at Kawainui, and removal of graffiti on the flood control levee.

4.2.1.2 Residential Communities

Residential neighborhoods in proximity to the Kawainui-Hāmākua project area are generally located to the south along Kalanianaʻole Highway, to the east makai of the levee, and to the north along Mōkapu Boulevard. These include Maunawili, Olomana, Pohakupu, Kūkanono, and Kawainui Vista on the south end of Kawainui. The Kalāheo neighborhood is located on Kawainui's north end, and Coconut Grove along with the larger Kailua neighborhood is located to the east below (makai) the levee. Figure 4.3 shows the general locations of these neighborhoods, and an overview of them is provided below.

Maunawili

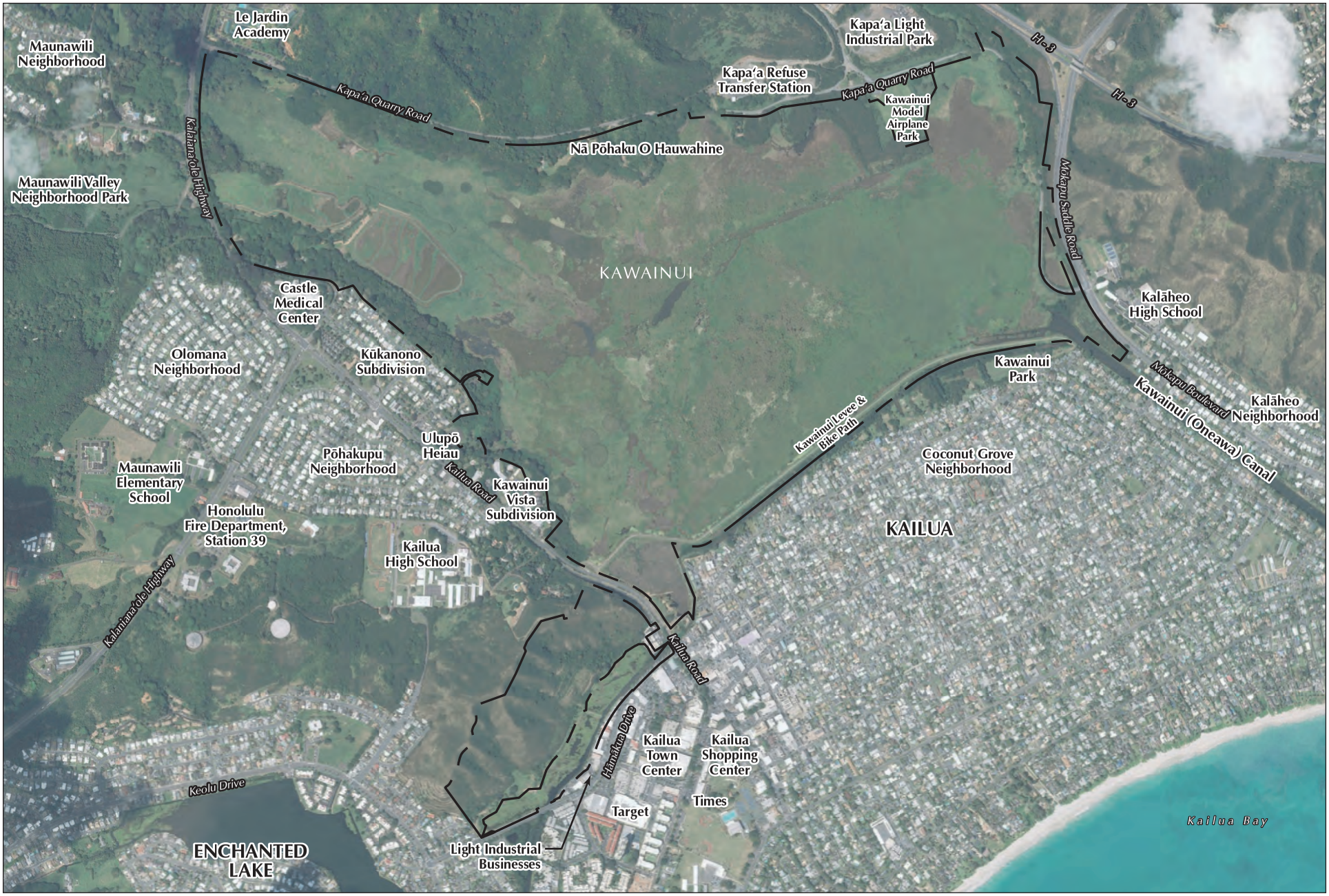
The Maunawili neighborhood is located south of Kawainui across of Kalaniana'ole Highway. Maunawili is generally bounded by the Koʻolau and Olomana mountains on its west, south, and east sides. This residential neighborhood comprised of single-family residences extends into the valley, and is accessed from Auloa Road that connects to Kalanianaʻole Highway. The Royal Hawaiian Golf Club golf course is located next to this subdivision encompassing a large portion of this valley. The Hawaiʻi Agricultural Research Center's Maunawili research substation is an 80-acre farm also located in this valley. The Maunawili Falls Trail is a popular hiking trail for residents and visitor that is access through this neighborhood.

Olomana

The Olomana neighborhood is located makai of the Maunawili neighborhood, and south of Kawainui and Adventist Health Castle (former Castle Medical Center). Near Kawainui, access to this single-family residential area from Kalaniana'ole Highway is off of Uluhala Street, and other streets provide access from Kalaniana'ole Highway after the medical center (traveling to Waimanalo). Maunawili Elementary School is located adjacent to this subdivision along with the Hawaiʻi Youth Correctional Facility.

Pohākupu

The Pohākupu neighborhood is located southeast of Kawainui and across of Kailua Road, and is comprised of single-family residences. Pohākupu is situated within the area makai of the Olomana neighborhood separated by Kalaniana'ole Highway, and across from Kūkanono neighborhood. Kailua High School is situated behind this neighborhood, and Ulumanu Drive serves as the main access to this school through this neighborhood. The State's Women's Community Correctional Center is located adjacent to this neighborhood along Kalaniana'ole Highway.



Source: State of Hawai'i GIS

Kawainui - Hāmākua Master Plan

Figure 4.3 - Kailua Subdivisions

Kailua, O'ahu

0 800 1,600 FEET

HHF PLANNERS places for people

Kūkanono

Kūkanono is a 25-acre residential community developed in 1959 that abuts Kawainui along its southern boundary. Residents living on Manu Mele Street have a common boundary with the Kawainui project area. The neighborhood consists of approximately 125 single-family residences, in addition to three churches: the Christ Church Uniting Disciple and Presbyterians, One Love Windward, and the Faith Baptist Church. The Adventist Health Castle is located on the southwest end of this neighborhood along with DOFAW's Management and Research Station at the end of Ulukahiki Street. The Windward YMCA is situated on the northeast end of this neighborhood next to the Faith Baptist Church. Ulupō Heiau is located in the rear (makai) of the Windward YMCA. Access to the Windward YMCA, Faith Baptist Church, and Ulupō Heiau is through this neighborhood.

Kawainui Vista

The Kawainui Vista subdivision is located northeast of the Kūkanono neighborhood along Kailua Road as one approaches Kailua town. Developed more recently about 2001, the neighborhood consists of 15 single-family residences on approximately three acres of land. It is bordered on the west by the Kailua United Methodist Church, and on the east by the St. John's Lutheran Church. Five family housing dwellings at the end of Hanale Place have a common boundary with the Kawainui project site.

Coconut Grove

The Coconut Grove neighborhood borders Kawainui to the east, and is separated by the flood control levee. Coconut Grove is one of Kailua's older neighborhoods, with some homes dating to the early 1940's, and is one of several subdivisions making up the larger Kailua neighborhood that encompasses the large area from the shoreline up to the levee. This relatively flat area was once the site of a large coconut grove, hence its name. The neighborhood predominantly consists of single-family structures. However, there are a small number of apartment complexes and condominiums in the area closet to Kailua Town. The neighborhood was severely impacted by the New Year's eve 1987/New Year's Day 1988 flood, when storm water from Kawainui overtopped the levee. This event resulted in the raising of the levee and addition of the present wall on top.

Kalaheo

The Kalāheo neighborhood is located on the northern end of Kawainui, and extends along the mauka side of Mōkapu Boulevard. This area includes single-family residences and Kalāheo High School is situated on the southwest end of this subdivision. Access to this high school is from a driveway across of the Kapa‘a Quarry Road intersection with Mōkapu Saddle Road, and via Ilipilo Street that serves this subdivision.

Enchanted Lake

The Enchanted Lake community is a large area that generally begins on the southern end of Hāmākua. This larger community includes single-family residences and low-rise condominiums developed around Kaʻelepulu Pond. Adjacent to Hāmākua, along Hāmākua Drive, are single-family residences within the Hāmākua Place cul de sac.

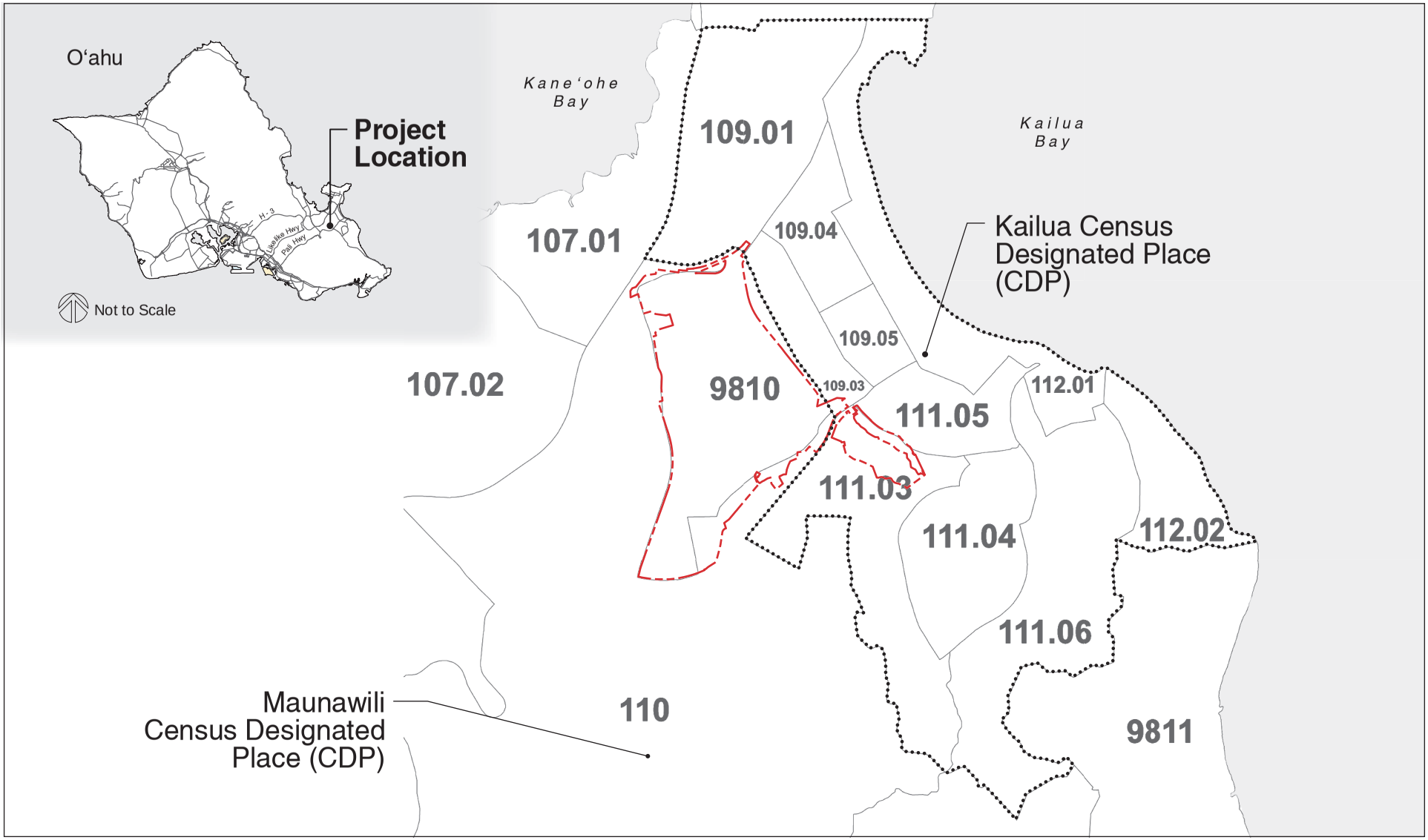
4.2.1.3 Kailua Demographic Profile

Demographic information from the 2000 and 2010 U.S. Decennial Census, the 2014 American Community Survey (ACS), and the City DPP were examined to understand past, present, and future demographic characteristics of the project area. The Kawainui portion of the Kawainui-Hāmākua project area is located within census tract 9810 where demographic data is not available, as shown on Figure 4.4.

In the State of Hawaiʻi, the U.S. Census Bureau does not report data for "incorporated places" (or more commonly called "cities") as it does in most of the U.S. Instead, the Census Bureau, through an agreement with the State of Hawaiʻi, recognizes "census designated places" (CDP). In Hawaiʻi, there are 151 CDPs, including the Kailua CDP and the Maunawili CDP as shown on Figure 4.4.

Kawainui itself is not located within any CDP, but the Hāmākua portion of the project area is located in the Kailua CDP, located immediately east of Kawainui. The Kailua CDP includes tracts associated with numbering beginning with 109 and 111. The Maunawili CDP is also located near Kawainui and is identified as tract 110. Given the proximity of the Kailua and Maunawili CDPs to the project area, data from both CDPs were combined to represent the area around Kawainui-Hāmākua. Discussion of the demographic characteristics of "Kailua" or the "Kailua area" represent these two CDP areas.

Both the Kailua CDP and Maunawili CDPs include households and individuals living in close proximity to Kawainui-Hāmākua, and thus represent the population that would likely be affected by project-related impacts. Table 4.2 provides a summary comparing census data from 2000 to 2014 for the combined Kailua and Maunawili CDPs to show changes that have occurred over the that timeframe. Table 4.3 provides a summary of 2014 data comparing the combined Kailua and Maunawili CDPs with the Honolulu (Oʻahu) County CDP. Demographic trends are discussed in the following sections.



Source: U.S. Census 2010.

Kawainui - Hāmākua Master Plan Project

Figure 4.4 - Census Tracts and Census Designated Places

Kailua, O'ahu

NOT TO SCALE

HHF PLANNERS
places for people

Table 4.2
Comparison of Kailua Community Demographic Data (2000 and 2014)

Description of Demographic Data	Kailua/Maunawili CDPs 2000		Kailua/Maunawili CDPs 2014	
	Number	**Percent**	**Number**	**Percent**
POPULATION	**41,382**		**41,467**	
AGE				
Under 5 Years	2,296	5.5	1,942	4.7
5 To 17 Years	7,640	18.5	6,392	15.4
18 To 64 Years	25,647	62.0	26,000	62.7
65 Years And Older	5,799	14.0	7,133	17.2
Median Age (Kailua CDP Only)	39.1		42.7	
RACE				
White	17,791	43.0	18,497	44.6
Black or African American	304	0.7	313	0.8
American Indian and Alaska Native	113	0.3	202	0.5
Asian	9,095	22.0	9,204	22.2
Native Hawaiian or Other Pacific Islander	3,375	8.2	2,409	5.8
Some Other Race	365	0.9	333	0.8
Two or More Races	10,339	25.0	10,509	25.3
HOUSEHOLDS	**13,712**		**13,641**	
Family Households	10,603	77.3	10,457	76.7
Non-Family Households	3,109	22.7	3,184	23.3
Households With Individuals Under 18 Years	4,387	32.1	3,413	25.0
Average Owner Household Size (Kailua CDP)	3.13		3.12	
Average Renter Household Size (Kailua CDP)	2.67		2.71	
HOUSING OCCUPANCY AND TENURE				
Total Housing Units	14,271		14,307	
Occupied Housing Units	13,687	95.9	13,641	95.3
Occupied Housing Units	13,687		13,641	
Owner-Occupied Housing Units	9,740	71.2	9,989	73.2
Renter-Occupied Housing Units	3,947	28.8	3,652	26.8
EMPLOYMENT STATUS				
Population 16 Years And Older	32,794		34,216	
In Labor Force	22,167	67.6	22,912	67.0
Not In Labor Force	10,627	32.4	11,304	33.0
INCOME				
Total Family Households	13,712		13,641	
Less than $10,000	465	3.4	347	2.5
$10,000 to $49,999	3,354	27.0	2,101	15.4
$50,000 to $99,999	4,552	37.4	3,851	28.2
$100,000 or More	3,897	32.2	7,342	53.8
Median Household Income (Kailua CDP Only)	$72,784		$104,911	

Source: U.S. Census Bureau, Census 2000 and ACS 2014

Table 4.3
Comparison of Kailua with O'ahu Community Demographic Data (2014)

Description of Demographic Data	Kailua/Maunawili CDPs 2014		Honolulu County 2014	
	Number	Percent	Number	Percent
POPULATION	**41,467**		**975,690**	
AGE				
Under 5 Years	1,942	4.7	63,691	6.5
5 To 17 Years	6,392	15.4	149,098	15.3
18 To 64 Years	26,000	62.7	615,048	63.0
65 Years And Older	7,133	17.2	147,853	15.2
Median Age	42.7		37.2	
RACE				
White	18,497	44.6	209,847	21.5
Black or African American	313	0.8	24,169	2.5
American Indian and Alaska Native	202	0.5	1,747	0.2
Asian	9,204	22.2	421,212	43.2
Native Hawaiian or Other Pacific Islander	2,409	5.8	91,544	9.4
Some Other Race	333	0.8	9,197	0.9
Two or More Races	10,509	25.3	217,947	22.3
HOUSEHOLDS	**13,641**		**310,141**	
Family Households	10,457	76.7	217,422	70.1
Non-Family Households	3,184	23.3	92,719	29.9
Households With Individuals Under 18 Years	3,413	25.0	87,168	28.1
Average Owner Household Size	3.12		3.22	
Average Renter Household Size	2.71		2.80	
HOUSING OCCUPANCY AND TENURE				
Total Housing Units	14,307		339,830	
Occupied Housing Units	13,641	95.3	310,141	91.3
Occupied Housing Units	13,641		310,141	
Owner-Occupied Housing Units	9,989	73.2	170,342	54.9
Renter-Occupied Housing Units	3,652	26.8	139,799	45.1
EMPLOYMENT STATUS				
Population 16 Years And Older	34,216		785,129	
In Labor Force	22,912	67.0	519,55	66.2
Not In Labor Force	11,304	33.0	265,575	33.8
INCOME				
Total Family Households	13,641		310,141	
Less than $10,000	347	2.5	15,738	5.1
$10,000 to $49,999	2,101	15.4	85,788	27.7
$50,000 to $99,999	3,851	28.2	101,429	32.7
$100,000 or More	7,342	53.8	107,196	34.5
Median Household Income	$104,911		$73,581	

Source: U.S. Census Bureau, ACS 2014

Population Trends

In the years immediately following World War II (WWII), Kailua experienced significant population growth, with the resident population increasing from 1,540 persons in 1940 to 7,740 in 1950. Over the next ten years, the resident population tripled, and by 1960 was over 25,600 persons. Throughout the 1950s and 1960s, the population expanded as new housing communities such as ʻAikahi, Kaimalino, Kalāheo, Mōkapu, and Olomana were constructed.

In the decade from 1960 to 1970, Kailua's population grew by more than 30%, from 25,600 to nearly 33,800 persons. Since the 1970s through present, population growth has been comparatively slow. Total resident population in Kailua has remained fairly stable over the past 40+ years, and in 2010, was just over 38,600 persons. This reflects an increase of only less than 5,000 persons (less than 0.4 percent annually) over this time period.

Data since the 2010 US census shows a continued relatively stable resident population in Kailua, as the resident population has been essentially the same between 2000 and 2014 as shown on Table 4.2. The slow growth rate is largely due to the fact that the housing inventory has remained fairly level during this period. When the 153-unit Ka Malanai condominium complex opened in 2014, it represented the largest new residential development in Kailua in 20 years.

Demographic Characteristics

Kailua is generally a more stable and established community as compared to newer and growing communities such as in Kapolei or Mililani on Oʻahu. As shown on Table 4.2, the median age for Kailua increased from 39.1 to 42.7 between 2000 and 2014 reflecting a slightly older resident population. The median age for Honolulu County (Oʻahu) is 37.2 as shown on Table 4.3.

Currently, Caucasian (White) residents comprise the largest proportion of Kailua's resident population (45%) as shown in Exhibit 4.27, and this characteristic is consistent and has slightly increased since 2000. Individuals with two or more races (25%) and Asians (22%) comprise the next largest racial categories, and have remained consistent since 2000. Native Hawaiian or other Pacific Islanders has decreased from 8.2% to 5.8% during this time period. In comparison with Honolulu County as a whole, Asians comprise the largest percentage of the population (43%), followed by individuals of two or more races (22%) and Caucasians (22%). Native Hawaiians or other

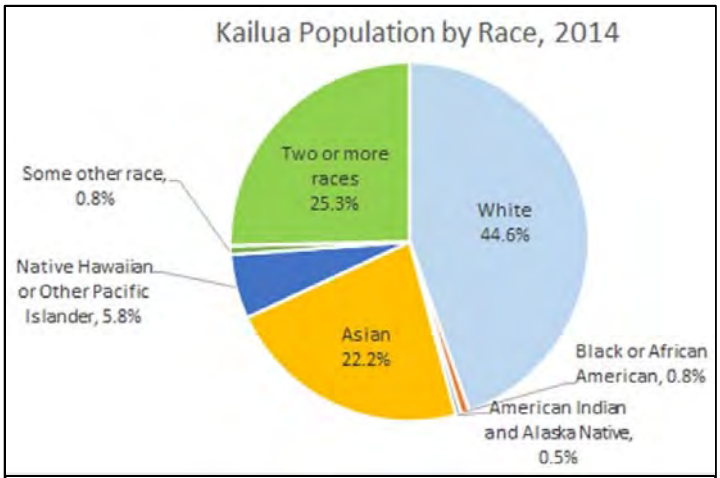


Exhibit 4.27. Demographics for Kailua Community

Pacific Islanders comprise a larger percentage of the island's population at 9.4% compared to only 5.8% within Kailua.

Census data indicates that the resident population in Kailua has increased in age as a whole between 2000 and 2014. A shown on Table 4.2, the median age in 2000 was 39.1, but is now 42.7 in 2014. The resident population age 65 and older has also steadily increased from 14 percent to over 17% in 2014, while those between the ages of 5 and 17 years old have decreased from 18.5% to 15.4%. Exhibit 4.28 graphically compares census data between 2000 and 2014 by age groups. Changes in demographic age groups between 35 and 74 years old are most notable. This reflects the "maturing" of the community since minimal new residential developments have occurred that would support new and younger families from living in Kailua. New families and individuals relocating to Kailua would have to infill existing residences, which are higher in cost making it more difficult for younger families to purchase. The aging of Kailua's existing residents combined with low population growth suggests that the demographics of the region would continue to transition to an older population.

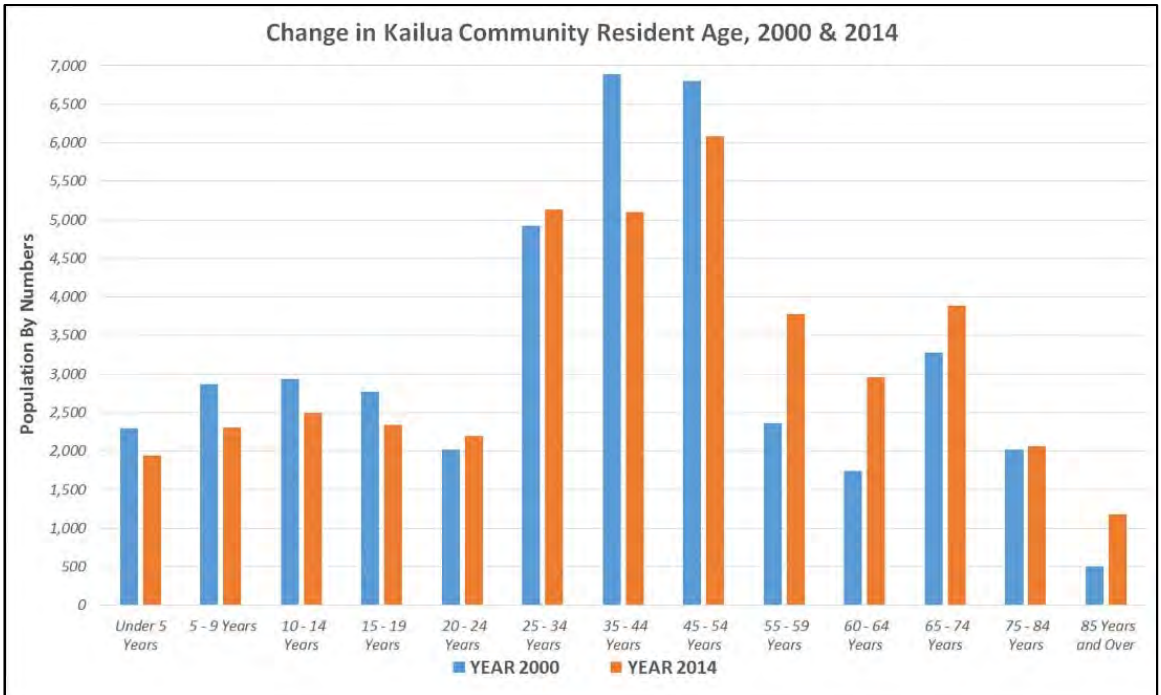


Exhibit 4.28. Kailua Community Age Comparison 2000 and 2014

The resident population in Kailua also tends to be older than the general population of Honolulu County as a whole. In 2014, one third (33%) of Kailua's population was 55 years and older, compared to Honolulu County where one quarter (26%) of the population was in this age group. About one quarter (27.2%) of Kailua residents are 24 years and younger. Within Honolulu County, one-third (32%) of residents are 24 years old and below.

Kailua's demographics reflect a significant influx of new residents moving into this community over the last 15+ years based upon census data. With various factors contributing to the popularity of this community, it also appears many new residents tend to have higher annual incomes and are able to afford the higher housing cost compared to other areas of O'ahu based upon changes to the median household income discussed later. As shown below, there was a 31% increase in new residents moving into Kailua between 2000 and 2009, and this trend was already close to 20% from 2010 up to 2014. This trend appears to have started in the 1990's, and reflects a changing community. With minimal new residential developments occurring within Kailua over the past several decades, this pattern reflects a high turnover of new residents among existing housing units.

YEAR HOUSEHOLDER MOVED INTO UNIT		
Occupied Housing Units	**12,962**	
Moved in 2010 or Later	2,578	19.90%
Moved in 2000 to 2009	4,082	31.50%
Moved in 1990 to 1999	2,217	17.10%
Moved in 1980 to 1989	1,703	13.10%
Moved in 1970 to 1979	1,330	10.30%
Moved in 1969 or Earlier	1,052	8.10%
Source: U.S. Census Bureau, ACS 2014		

Housing Characteristics

Kailua has a total of 14,307 housing units, primarily single family units (73%), and the vast majority are occupied (95.3%). Over 50% of the existing housing stock in Kailua was constructed between 1940 and 1969, and about 38% between 1970 and 1999. More than 73% of housing in Kailua are owner-occupied, with the remaining 27% occupied by renters.

Between 2000 and 2014, this level of housing units and occupation has remained fairly consistent since there was minimal growth (only about 0.25%) in the number of additional housing units (36 units) in Kailua, as shown on Table 4.2. This is in contrast to the Honolulu County, where only about 55% of housing are owner-occupied and about 45% renter-occupied. Islandwide, about 91% of housing units are occupied which is slightly lower than Kailua. This reflects the more dominant residential homeowner character of suburban Kailua, and that new residents moving into Kailua are likely predominantly more affluent being able to purchase the rising costs of housing units.

The average household size for owner-occupied and renter households have also remained consistent from 2000 to 2014 at about 3.12 and 2.71 persons, respectively. However, during this time period, the number of households with individuals under 18 years old has decreased notably (7.1% decrease). In comparison, Honolulu County has a slightly higher number of households with children (28.1%), and higher average owner household size at 3.22 person. This reflects the aging of families and households continuing to live in Kailua, with possibly an increase of

retirees or families without children moving into Kailua given the high number of new households moving in over the past 15 to 20 years.

Over the past 15 years, housing prices in Kailua have skyrocketed. According to data from the Honolulu Board of Realtors, the median sales price for a single family home in the Kailua-Waimanalo area in April 2017 was $1,031,000. This represented an increase of 7% from the previous year (April 2016). In 2010, the median sales price in Kailua was about $660,000. By comparison, the median sales price for a single family home on O‘ahu in April 2017 was $712,000 (Honolulu Board of Realtors, 2017). In 2017, average market rent in Kailua was $3,365 per month (https://www.neighborhoodscout.com/hi/kailua/real-estate).

Employment and Household Income

Of employment age (16+ years) residents in the Kailua area, about 67% were in the labor force in both 2000 and 2014. Over 94% were in the civilian labor force, with the remainder employed by the armed forces. These participation rates are comparable to Honolulu County as a whole that was 66%. Between 2000 and 2014, the proportion of the Kailua population in the work force declined slightly by just over 1%. The unemployment rate in Kailua increased slightly from just over 4.5% to just over 5%, which is similar to the island-wide unemployment rate.

In general, the median household income reported by the 2014 ACS for Honolulu County as a whole increased substantially from the year 2000 to 2014, however, certain CDPs experienced larger changes that others. Between 2000 and 2014, the Kailua CDP had a substantial increase in household income rising from $72,784 to $104,911 (44% increase). The Maunawili CDP similarly had an even larger increase in household income rising from $82,148 to $130,114 (58% increase). In comparison, the median household income for Honolulu County was $51,914 in 2000, and increased to $73,581 in 2014 (42%).

Although, the larger Kailua CDP had a similar percentage increase in household income with the islandwide figures over the 15-year period, the median income amount is substantially higher reflecting this being a more affluent community. Kailua was also ranked the third highest affluent community in the state based upon research reported by Pacific Business News (PBN, 2017). Only the Aina Haina-Niu Valley and Hawai‘i Kai-Portlock communities were ranked higher, and the rating was based upon review of 12 difference areas, such as household income, workers earnings, education, etc.

For both the Kailua and Maunawili CDPs, there were significant increases in the percentage of households earning over $100,000 a year between 2000 and 2014. During this time period, the proportion of households that fell into this income category increased from 3,897 to 7,342 (88%). The number of households with incomes between $10,000 and $99,999 decreased moderately as shown on Table 4.2. Household income in the $10,000 to $49,000 range decreased in Kailua from 27% to 15% in 2014, whereas this range accounted for 28% of households islandwide. Kailua’s $50,000 to $99,999 household income bracket decreased from 37% to 28%,

whereas it is 33% for Honolulu County. Kailua's households with income of $100,000 and above is much higher at 54% than Honolulu County at 34%. This data reflects Kailua's trend of shifting toward the higher end of the household earnings distribution over the past 15 years likely due to the influx of higher earning families into the area. This corresponds to high movement of new households moving into the area during this same period as previously discussed.

4.2.1.4 Future Changes to Kailua's Demographic Profile

Future changes to Kailua's demographic profile would generally be reflective of projected changes to their resident population and housing units. The City DPP develops socio-economic projections for their eight development plan areas based upon the State Department of Business, Economic Development and Tourism's (DBEDT) official long-range projections of socio-economic conditions for the State and the four counties. DPP currently has socio-economic projections to the year 2035, and further develops projections for subareas within each development plan area. Within the Ko'olaupoko development plan area, there are five subareas: 1) Kahalu'u; 2) Kāne'ohe; 3) Kailua; 4) Waimanalo; and 5) Mōkapu (Kāne'ohe Marine Corps Hawai'i). Projections for the Kailua subarea are relevant to this project.

Based upon DPP's projections, the Kailua sub-area shows no growth in the resident population. In fact, a decrease in resident population of 6.8% is projected from the year 2000 to 2035, from 41,607 persons to 38,791 persons. This reflects a relatively stable and maturing community projected over the long term, and is reflective of the population trend over the past 15 years based upon census data. Kailua would also experience a decrease in average household size from 2.99 to 2.64 persons per unit. This again indicates a trend of smaller household family members as children grow.

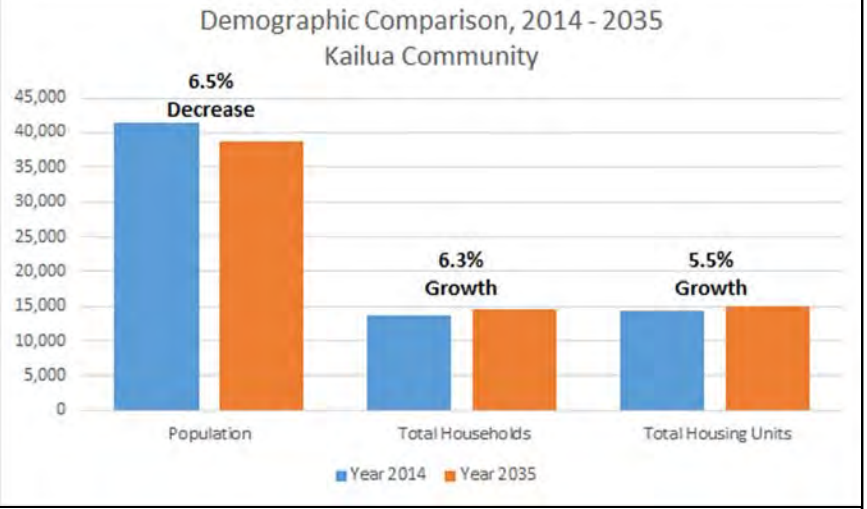


Exhibit 4.29. Demographic Comparison of Projected Kailua Community From 2014 to 2035

Exhibit 4.29 graphically shows a comparison of demographic characteristics for Kailua from 2014 to 2035. The resident population would continue the decreasing trend by 6.5%, and there would be a slight 5.5% increase in housing of 778 units over this 21 year period (37 units a year). The slight increase in housing over this time period and overall decrease in resident population reflects the decreasing average household size. This information supports the projected change and aging of the community with households having fewer residents as children grow and leave pursuing their own careers and families.

This demographic trend in Kailua is also consistent with the projected trend for the entire Ko'olaupoko development plan area. The resident population in Ko'olaupoko is projected to decrease from 117,999 residents in the year 2000 to 111,594 residents in the year 2035, reflective of a 5.4% decrease. Similarly, this region is also projected to have little change to the number of housing units available. Housing is projected to increase a total of only 6.3% over the 35-year period from 36,964 housing units in the year 2000 to 39,280 housing units by 2035.

4.2.1.5 Business and Economic Conditions

Military Uses

The U.S. military has been an important part of the Kailua region's economy throughout the post-WWII period. Marine Corps Base Hawaii (MCBH) Kāneʻohe Bay occupies 2,951 acres on Oʻahu's Mōkapu Peninsula, less than four miles from the northern end of the Kawainui-Hāmākua project area. MCBH Kāneʻohe Bay is the largest of seven installations which comprise Marine Corps Base Hawaii; the other major installation on Oʻahu being Camp H.M. Smith in Hālawa.

The base is a major employer and economic contributor to windward Oʻahu, primarily the Kailua and Kāneʻohe communities. It is the largest civilian employer in windward Oʻahu, and military personnel provide substantial support for local business. A 2012 study of the economic impact of MCBH done for the U.S. Army Corps of Engineers estimated that 93 percent of MCBH's total employment impact on Oʻahu (17,243 jobs), and 86 percent of its total economic impact ($1.26 billion) occurred in its neighboring communities, the main beneficiary being windward Oʻahu (Marstel-Day, LLC, 2014).

Industrial Uses

Industrial uses in the vicinity of the Kawainui and Hāmākua project area include those along Kapaʻa Quarry Road above (mauka) Kawainui and along Hāmākua Drive bordering Hāmākua's wetland. Figure 4.3 shows industrial uses in the project area.

The Kapaʻa Light Industrial Park and the City's Kapaʻa Transfer Station are located along Kapaʻa Quarry Road on the northern end of Kawainui. The privately-owned Kapaʻa Light Industrial Park contains a number of industrial warehouse spaces across a 22.3 acre area that has a variety of tenants. The owner is planning to expand facilities onto two adjacent parcels by constructing additional warehouses, baseyards, a stormwater system, stormwater outfall line, and onsite water treatment system.

The Kapaʻa Transfer Station is a refuse transfer facility managed by the City Department of Environmental Services (DES), and is located at the base of the closed Kapaʻa Sanitary Landfill (R.W. Beck, 2008). The transfer station site is shared by an automotive and equipment services yard and a refuse yard, both under City jurisdiction.

Along Hāmākua Drive are a combination of retail, restaurants, and light industrial businesses within several smaller commercial centers that generally border the northern boundary of Kawainui Stream and Hāmākua. Light industrial businesses include auto body, parts repair, and detailing shops, glass works shop, upholstery, etc.

Commercial Uses

The center of commercial and business activity in Kailua is in the downtown area bordered by Kailua Road, Hahani Street and Hāmākua Drive. There are also a number of commercial outlets and restaurants immediately around this core area. Outside the downtown area, there are neighborhood shopping centers, including the ʻAikahi Park shopping center and Enchanted Lake shopping center, both of which include a large grocery story.

The lands within Kailua's downtown commercial area were acquired in the early 20th century by Harold K.L. Castle. At the time, Kāneʻohe Ranch controlled nearly all the Koʻolaupoko plain for its ranching activity. Kāneʻohe Ranch was subsequently acquired by Castle, and remained the manager and developer of the Castle landholdings, which also included those of the charitable Castle Foundation. In the post-WWII period, former ranch lands were developed for new homes and commercial areas, creating the new suburban community of Kailua, which was marketed to Oʻahu residents.

Over the last 10 to 15 years, there has been significant development within Kailua's commercial core area. In 2004, Kāneʻohe Ranch initiated the redevelopment of commercial properties as their old leases expired. The intent was to transform the area around Kailua Road into a town center, a pedestrian-friendly retail and dining area. The first phase of redevelopment included a new Longs Drug store, retail frontage along Kailua Road and a three-story parking garage. The second phase, completed in 2006, included a Pier 1 Imports, Kainalu Plaza and a fountain. The third phase included 12,000 square feet of retail space, a new location for First Hawaiian Bank, and a Whole Foods Market.

In 2013, ownership of much of the Kailua town center changed hands, with the acquisition of the Kāneʻohe Ranch/Castle Foundation properties by Alexander & Baldwin (A&B), one of Hawaii's Big Five companies. The $373 million sale included most of the commercial areas within downtown Kailua, as well as about 585 acre of mostly preservation-zoned land in Kailua. With that transaction, A&B controlled 70 percent of the commercial-zoned land and 90 percent of the retail property in Kailua.

Also around this time, new multi-family residential uses were added to the development mix. In the fall of 2013, the Ka Malanai project came onto the market with 153 condominium units (Cresenzo, 2014). Developed by D.R. Horton, Ka Malanai was marketed as offering luxurious townhomes in the heart of Kailua, the first major residential development in Kailua in 20 years. As of early 2017, six buildings at Ka Malanai have been completed and are occupied, and work continues on buildings 7 and 8. These last two buildings are scheduled to be completed in the

summer of 2017. Current prices for one-bedroom units start at over $600,000, and three bedroom units are priced in the upper $800,000 to $900,000's.

In March 2015, after years of delay, a Target store opened in a renovated 130,000 square foot store on Hahani Street in the downtown area, in a building formerly occupied by Japanese retailer Don Quijote. The project was delayed for several years due to vocal opposition from some residents who felt that the big box retailer was not compatible with Kailua town. The discovery of burials during construction also delayed the store's opening.

In 2015, Macy's closed its store located in the center of Kailua town. The building was originally constructed in 1946 as a Liberty House department store, and converted to Macy's in 2006. With the closure of Macy's, developer A& B was able to acquire an adjacent parking lot site which had been privately-owned. Current plans are to develop what is being called the Lau Hala Shops, a complex of 48,400 square feet that includes 10 leasable spaces with restaurants and mid-sized retailers. Construction has started and is expected to be complete in late 2017 (Alexander & Baldwin, 2017).

Surrounding the immediate vicinity of Kawainui, the only commercial uses are located in the area of Waiʻauia. There are no other commercial uses for other areas surrounding Kawainui because developed areas consist of residential neighborhoods, light industrial uses, and a medical center. Entering Kailua at the Kailua Road with Hāmākua Drive intersection are several commercial centers and smaller commercial lots, which make up the commercial town center of Kailua. Along Kainehe Street adjacent to Kawainui Stream and the City's wastewater pump station are a small office building with Kimo's Surf Hut, and KFC restaurant. Along Hāmākua Drive bordering Kawainui Stream and Hāmākua are several retail shops and restaurants. On the makai side of Hāmākua Drive are many other commercial centers, office buildings, etc. that make up Kailua town.

Visitor Activities in Kailua

Visitor activities in Kailua are primarily centered around the area's world renowned beaches that support a diversity of ocean recreational activities for visitors and residents along with many businesses providing supporting services and rentals, restaurants for food and drinks, and products and goods. Ocean recreation and shopping are some of the most popular activities for visitors along with hiking trails in Kailua. Such activities are also promoted by various travel websites, Hawaiʻi Tourism Authority, the Kailua Chamber of Commerce, etc. Over the past several decades Kailua has become a popular beach town attracting visitors as an alternative to Waikiki similar to the north shore of Oʻahu. This is partially due to Hawaiʻi's maturity as a visitor destination and a high rate of repeat visitors who go out of their way to seek new or different experiences on return trips.

On the TripAdvisor website, there are several activities or attractions ranked for visitors to Kailua. Of the top 10 attractions ranked, ocean recreational activities accounted for six of them, hiking trails had three, and the only different one was Kailua's farmers market (ranked 6th). Kailua Beach Park was ranked first, followed by Lanikai Beach, then hiking to Lanikai Pillbox, kayaking and canoeing activities, and then scuba and snorkeling activities. Kailua Beach Park and Lanikai Beach clearly receive the most reviews compared to other activities. Of the top eight nature and park attractions in Kailua, both Kailua Beach Park and Lanikai Beach were similarly ranked first and second, respectively. Kawainui was ranked 7th, and Ulupō Heiau ranked 8th, both of which had few reviews.

Lanikai Beach has been described as being one of the most beautiful beaches on O'ahu, and has been ranked as one of the best beaches in the world by several publications. Kailua Beach Park has also been described as being one of the most beautiful beaches on O'ahu, and was ranked as the best beach in the U.S. in 1998 by Dr. Beach. Lanikai Beach was ranked as the best beach in 1996. Therefore, these beaches along with Kalama Beach Park (ranked 7th on TripAdvisor) serve as the main attraction for both visitors and island residents to Kailua. Former President Barack Obama vacationing in Kailua during the Christmas holidays during his terms also contributed to Kailua's popularity.

Hiking trails is another nature-based outdoor recreational activity popular with visitors and residents. This includes the Lanikai Pillboxes hike (ranked 3rd), Maunawili Falls (ranked 8th), and Olomana Three Peaks (ranked 10th) trails. Visiting Kawainui (using the levee) was ranked 14th, and Ulupō Heiau was ranked 18th.

A variety of Kailua businesses have also been supported by the area's popularity and visitors over the past 20+ years. Several businesses are promoted on travel websites such as Kalapawai Market, Cinnamon's, Boots and Kimo's Homestyle Kitchen, and Island Snow. Downtown Kailua has also been undergoing redevelopment over the past 10 to 15 years supported by the area's popularity with visitors. This includes the new retail frontage along Kailua Road and a three-story parking garage that support Longs Drug store, Pier 1 Imports, Whole Foods Market, and a variety of shops and restaurants. In 2010, Japanese tour agency JTB began offering a four-hour daily tour of Kailua several times a day. Tours started at Kailua Beach Park and ended behind Longs Drug Store and the former Macy's where visitors were allowed time to shop and dine in local stores and restaurants.

Area merchants have benefited by the increased business from visitors, and the success of businesses are dependent upon a mixed base of both visitors and residents. In 2013, the Hawai'i Tourism Authority estimated that the estimated economic impact of visitor spending in Kailua at $103 million per year (Blakey, 2013).

Future Projected Business Activities in Kailua

The City DPP socio-economic projections to the year 2035 included economic projections for Kailua along with the Ko'olaupoko development plan area. Employment within Kailua is projected to remain fairly level only increasing by 407 jobs over 35 years from 12,539 jobs in 2000 to 12,946 jobs in 2035. In 2010, the estimated jobs was slightly less than 2000 at 12,324 jobs (215 less). The main sector contributing to this change in employment from 2000 to 2010 was in construction (399 less jobs in 2010). Between 2010 and 2035, an increase of only 622 jobs (5%) is projected over this 25-year span (25 jobs a year).

Within the Ko'olaupoko development plan area, minimal change in employment is also projected from 2010 to 2035. A total of 42,420 jobs are project in 2035 reflecting an increase of 1,442 jobs (3.5%) over the next 25 years. Therefore, this trend of minimal change in employment in Kailua is also reflected over the entire Ko'olaupoko area. Within the Kailua community, the sectors projected to have the most change, although not that significant, are in: 1) transportation, communications and utilities; 2) services; and 3) construction.

4.2.1.6 Community Issues

This section discusses community issues associated with Kailua. Many of the community concerns expressed in comments received on the EISPN are a reflection of what has evolved over the last 20+ years in Kailua. A common theme is a concern with the level of visitor activity in Kailua and opposition to any improvements that may attract more visitors to Kailua. Several news articles published over the last several years have also documented this concern with the level of visitors and associated activities. The Kailua Neighborhood Board (KNB) even adopted a resolution in September 2013 asking that the Hawai‘i Tourism Authority (HTA) stop promoting Kailua as a tourist destination that generated several news articles and responses from HTA.

Several factors have contributed to changes to the neighborhood character of Kailua from the 1970's that are reflected in community issues. These factors include an influx of new residents moving into Kailua and the changing demographics of Kailua's population as previously discussed, the increasing popularity of Kailua and recognition of its well-known beaches, the town's popularity as a visitor destination alternative to Waikiki, increasing bed and breakfast visitor accommodations, renovation of the commercial town center, and the "Obama effect".

While many in the community acknowledge that upgrades to the commercial town center and increased visitor traffic have been positive for the local economy, many believe the changes have contributed to congestion of local roads, overcrowded beaches and public spaces, proliferation of illegal vacation rentals, and a loss of a small town character (Creamer, 2012). The following discussion provides an overview of recent issues that highlight the concerns of the community regarding continued development and visitor activities in Kailua.

Recent Issues and Community Concerns

Kailua's National Recognition. The growth in tourism picked up in the late 1990's, fueled by publicity on travel websites and on social media. In particular, in 1996 Stephen P. Leatherman, director of Florida International University's Laboratory for Coastal Research, also known as "Dr. Beach," named Lanikai the top beach in the U.S. Kailua Beach Park was chosen as the top beach two years later. A decade later, additional exposure was generated by President Barack Obama's highly publicized winter vacations in Kailua, and a 2011 article ("My Kailua", by Lawrence Downes) on the front page of the New York Times Travel section that included a photo of the view from the ridgeline above Lanikai and an enticing story of the daily life in Kailua.

Commercial Activities at Kailua Beaches. As the popularity of Kailua grew, outdoor recreational commercial activities at Kailua and Kalama beaches became a community concern. Many residents were unhappy with the increasing number of beach users, particularly tourists who were dropped off at the beach parks by tour companies. Publicity about Kailua beaches, a proliferation of water sports rental companies, and the initiation of commercial kayak tours to the Mokulua Islands contributed to a boom in the number of visitors and kayaks in offshore waters. Additionally, an influx of wind and kite surfers contributed to the user conflicts. At the request of Kailua residents, the Honolulu City Council introduced and passed Bill 11, CD 1, prohibiting commercial activities at Kailua and Kalama beach parks in 2012. The ban was aimed primarily at tour buses and kayaks, but covered all commercial activities, from kayak rentals to beach based yoga and exercise classes.

Illegal Vacation Rentals. In response to growing concerns over the rapid increase in transient vacation rentals, the KNB adopted a resolution requesting that the HTA no longer promote Kailua as a tourist destination and alternative to Waikiki (Kailua Neighborhood Board, 2013). The neighborhood board's resolution to the state's tourism agency was in response to a page on the HTA website promoting Kailua's short-term rentals for families and large groups. The board stated that its concern was the increase in illegal transient vacation rentals in residential areas, fueled by the popularity of websites like Airbnb and VRBO.

Many local business owners and public officials felt that the neighborhood board's resolution sent an unfortunate message that tourists are not welcome in Kailua. Many agreed that illegal short-term vacation rentals are a problem to be addressed, but that sending the message that Kailua doesn't want visitors was a generalization they wanted nothing to do with (Blakey, 2013). In 2016, the City began a long-awaited crackdown on illegal vacation rentals on O'ahu, after receiving funds to hire five new contact inspectors. In the first few months, most of the violations found were in Kailua.

Target Store Construction. The development of a Target store in downtown Kailua was a major concern to many residents. Prior to its opening, vocal opponents expressed opposition to a big-box retail outlet that would change Kailua's small town charm and bring more people and traffic congestion into the neighborhood. Others voiced concern about the survival of small businesses. In 2010, the KNB adopted a motion opposing the construction of Target, claiming that its development did not conform to the City's *Koʻolaupoko Sustainable Communities Plan's* land use policies (Kailua Neighborhood Board No. 31, 2010). Many residents acknowledged they liked and shopped at Target, but felt it was an inappropriate use for Kailua. Despite the strong opposition, the development project met all government requirements for approval. The store opened in March 2015, and has been popular.

Trail Access to Maunawili Falls. Residents have complained for years about the negative impact of the Maunawili Falls trail access on their neighborhood. Residents of Maunawili Estate have complained of noise, litter, people trespassing on private property, and street congestion. The lack of public restrooms and poor trail maintenance have been widely publicized. The trail access originated as a result of a 1986 agreement between the city and the owner of the nearby Royal Hawaiian Golf Club. At that time, the City granted a special permit allowing the development of the golf course on agriculturally zoned land, provided that public access to the Maunawili Falls trail was maintained. In 2015, neighborhood complaints led to the KNB (Kailua Neighborhood Board, 2015) to request that the City close the trailhead and work with the State to obtain funding for a new trail crossing private lands.

Traffic Congestion. Increased traffic and roadway congestion is a natural outcome of the previously discussed issues. This contributes to concerns that there are too many visitors in Kailua. Problem areas commonly cited include the Kailua town center and the areas near Kailua Beach in the terminus of Kailua Road at South Kalāheo Avenue. Congestion in these areas include increased numbers of vehicles and bicycles. Several years ago, a much publicized choke point was the road leading in and out of Lanikai, where the two-mile drive could take up to an hour or more to navigate on weekends (Creamer, 2012). However, this Lanikai traffic issue could be largely attributed to island residents visiting the area on weekends and holidays, otherwise, this condition would occur on a daily basis if mainly attributable to visitors. On-street parking has since been restricted on holiday weekends, and Lanikai residents say the situation has improved.

Localized traffic concerns have also been expressed within the Kūkanono subdivision. Residents have long-standing concerns related to neighborhood traffic and homelessness, given the proximity of Castle Medical Center, the Ulupō Heiau SHP, and the Windward YMCA. In recent years, Kūkanono residents have expressed concerns to the KNB about the expansion of the Windward YMCA's facilities and membership (Kailua Neighborhood Board No. 31, 2011). Neighborhood residents contend that a lack of parking for YMCA employees and members results in visitors parking along neighborhood streets.

Increase in Homeless Population. The increasing number of homeless individuals is a concern islandwide. The State of Hawai‘i had the highest per capital rate of homelessness of all U.S. states, and the 2016 annual Point-in-Time count reported 4,940 homeless individuals across O‘ahu (City, 2017). The growing and visible presence of homeless individuals in Kailua has been covered by the media. Reports have noted that homeless individuals increasingly occupy Kailua’s neighborhood public spaces and have highlighted tensions between aggressive homeless individuals and Kailua business owners.

It’s been reported that some of the homeless are getting more brazen in their actions, and that business owners have experienced break-ins and assaults, and witness regular drug sales and use (Davis, 2015). Elected officials have appealed to the Honolulu Police Department to keep public spaces clear and safe for the public (Chang, 2014). The KNB has discussed how select City-owned parking lots might be closed during night hours to discourage homeless occupation (Kailua Neighborhood Board No. 31, 2014). The board has also endorsed exploration of how surplus boats might be repurposed on land to create housing for the homeless (Kailua Neighborhood Board No. 31, 2015).

4.2.2 Potential Project Impact and Mitigation

This section addresses the potential social and economic impact from proposed project improvements. The project does not propose new residential subdivisions or visitor units. Therefore, there should be no impact on Kailua’s residential population, housing, or demographic characteristics. Some project improvements may impact employment, economic activity and number of visitors. Some improvements would involve an expenditure of public funds, and as such would have a fiscal impact on both the State and City.

4.2.2.1 No Action Alternative

The No Action Alternative would involve a continuation of ongoing activities within the Kawainui-Hāmākua project area. These include wetland restoration and reforestation work being conducted by DOFAW, and environmental and cultural initiatives by community partners at Nā Pōhaku, Pōhakea and Ulupō Heiau. DOFAW would continue conducting maintenance operations out of its existing management and research station using temporary (storage container) facilities. Construction of a vegetation processing facility next to the model airplane park would support wetland and upland reforestation activities.

Ongoing environmental education programs in partnership with local schools would continue to be conducted by DOFAW and various community organizations. The levee would also be used by the community as a pedestrian trail, but no other new pedestrian trails would be created. The Kawainui SPR, Kalāheo park site could be developed for passive park use with parking, rest rooms, pavilion, pedestrian bridge, and a canoe launch into Kawainui Canal under the Kawainui Gateway Park concept.

Changes to Kailua Demographics

All of the various improvements that could be implemented under the No Action Alternative should not have any effect on the demographic characteristics of Kailua. No residential housing units or visitor units are included, therefore, there would be no effect to the present number of housing units and residential population in Kailua. There would subsequently be no change to Kailua's resident population and characteristics (e.g. race) under this alternative.

DOFAW management activities, wetland restoration, and upland reforestation improvements implemented would improve Kawainui and Hāmākua as resources for endangered waterbird habitat, their function as flood control, etc. These improvements, along with the addition of a vegetation processing facility and passive park at Kalāheo, do not directly impact residential housing and resident population in Kailua.

These improvements should similarly not affect the desirability for living in Kailua, and would not be significant factors that may change the City's long-term demographic projections for the area. Those long-term demographic projections would be more influenced by new residential subdivisions or multi-family developments. Kailua's popularity is largely based upon it being a beach town with convenient access to renowned beaches located nearby, availability of a variety of ocean recreational activities, being a more affluent residential community with a diversity of convenient shops and businesses supporting their town center, and being conveniently located not far from urban and downtown Honolulu. Improvements under this alternative would not affect the "maturing" of this community, influence the aging of Kailua's existing resident population, and projected decreasing population pattern.

Operation of the vegetation processing facility constructed would provide a small number (estimate of about five) of new permanent jobs in Kailua. However, this increase would have minimal effect on the overall employment conditions, future job projections, and overall household incomes for Kailua.

Effects on Business and Economic Conditions

Of all the improvements planned under the No Action Alternative, only the vegetation processing facility would have any noticeable effect on the area's business and economic conditions. Improvements would not affect military uses or facilities or commercial uses and activities. The vegetation processing facility would be considered an industrial use that is located within an established industrial area along Kapaʻa Quarry Road across from the City's transfer station and Kapaʻa Light Industrial Park. This facility would be compatible with surrounding industrial uses and have a minor effect by adding a small number of jobs.

The Kalāheo park improvements would add another recreational amenity for both residents and visitors. This would be a passive park and create additional viewing opportunities of Kawainui for residents and visitors. However, it is expected to have minimal effect on visitors to Kailua because the park would not function as a primary destination source for visitors. Kailua Beach, Lanikai Beach, and ocean recreational activities available are the primary attractions drawing visitors travel to Kailua. Visitors traveling to Kailua for these attractions, or others such as shopping, may stop by this Kalāheo park site. However, the projected numbers should relatively low because there are no popular activities available for visitors at this site. Canoe launch into Kawainui Canal from this site would be by DSP permit only for schools and canoe clubs, and thus have no effect on visitors.

Influence on Community Issues

Improvements implemented under the No Action Alternative should not have much influence on the various community issues previously identified. Wetland restoration and reforestation efforts at Kawainui and Hāmākua should have minimal influence on Kailua's national recognition and popularity, which are predominantly associated with beaches and ocean recreation. Kawainui-Hāmākua is already an internationally recognized wetland (RAMSAR), and restoration efforts would support reversing its condition of being overgrown with invasive species. Educational programs and community service projects could provide some opportunities for tourist to visit Kawainui, however, such programs and participation would have minimal effect on Kailua's national recognition.

Current regulations (Chapter 126, HRS) allow Kawainui to have up to 100 visitors per day as part of commercial activities. Although DOFAW currently has not issued permits for such activities, allowing such activities would contribute to concerns with visitor-related commercial activities. However, this activity is allowed and would be limited to just 100 visitors per day. The regulations thus allow for a managed program of commercial visitors to Kawainui, and should not result in a situation similar to that at Kailua's beaches.

Restoration improvements along with the vegetation processing facility and park at Kalāheo should have no influence on illegal vacation rentals, other commercial development in Kailua town (e.g. Target), or issues with hiking trails such as Maunawili Falls. They would have minimal influence on traffic congestion in Kailua town because restoration work and the vegetation processing facility are located along Kapa'a Quarry Road. Some additional traffic at the Kalāheo park site would occur particularly on weekday afternoons and weekends due to residents and students participating in canoe practices. But, this activity should have minimal, if any, influence on overall traffic congestion concerns within overall Kailua.

Improvements should have a beneficial effect in addressing issues with homeless encampments by reducing areas where they can be established and reducing potential safety issues. DOFAW staff or contractors working on restoration activities would allow them to actively monitor upland areas, and coordinate with DOCARE to enforce regulations, as appropriate. Construction

and operation of the vegetation processing facility would eliminate the possibility for homeless encampments being established in that area, and creates more activity in that industrial area that can serve as a deterrent for homeless activities. Development and operation of the park at the Kalāheo site would similarly eliminate the possibility for homeless encampments being established, which has occurred in this area previously.

Fiscal and Economic Effects

Improvements would have a minor effect on both the City and State's economic and fiscal factors. Construction of improvements would have different effects in relation to the City and the State's finances. Restoration activities would not generate any new permanent full-time jobs. The vegetation processing facility would likely have a small number (about 5 staff) of employees, and could be operated by DOFAW or by private company. There would be no employees needed to operate the Kalāheo park site since it would be managed by DSP, and maintenance activities (e.g. rubbish) would be contracted out. Therefore, the primary economic and fiscal effects would be associated with short-term construction jobs that would generate a small minor positive economic impact.

Construction costs for restoration and facility improvements would create construction jobs during the duration of restoration and construction activities, as well as support industries that service construction activities directly and indirectly. Three broad types of jobs are distinguished below:

- Direct jobs are immediately involved with construction of a project or with its operations.
- Indirect jobs are created as businesses directly involved with a project purchase goods and services in the local economy.
- Induced jobs are created as workers spend their income for goods and services.

Direct construction jobs would typically consist of on-site laborers, landscapers, tradesmen, mechanical operators, supervisors, etc. These new jobs created would also generate additional personal income for construction workers that are the wages paid directly to them or operational employees associated with project improvements. Direct construction jobs created would also stimulate indirect and induced employment and spending of wages within other industries located in the Kailua district and on the island such as retail, restaurants, material distributors, and other related businesses supporting the construction industry. These construction jobs would likely be filled by residents from the O‘ahu employed within the construction industry.

Restoration improvements are estimated to create a total of about 4 to 6 direct new jobs annually during the implementation period, and would be subject to funding by the Legislature and implementation by DOFAW. Restoration activities would be different from a typical development oriented construction project, thus, the number of direct new jobs would not be evenly spread out over the implementation period. Most of the wetland restoration work would

likely be initiated within a 3 to 5 year period with other upland reforestation efforts implemented in phases. In addition, restoration work would be limited during the winter season and spring due to increased rainfall. Therefore, a higher number of jobs would initially be generated within the first few years with a lower number likely generated for other phases. Restoration work could thus generate a range of about 20 to 30 total new direct construction jobs over this period.

The vegetation processing could be constructed and operated by DOFAW, or could be contracted to a private firm to construct and operate. The Kalāheo park site would likely be developed by DSP, and potentially in conjunction with a non-profit organization that could manage the interpretive center. Construction of these facilities would likely occur within a 6 to 12 month time period depending upon its design, phasing, etc. These activities would generate some new direct construction jobs in the range of about 20 to 30 jobs since most of the work involves site improvements with minimal facilities (e.g. restroom, etc.).

Overall, these improvements would generate some indirect and induced jobs over the entire restoration period. The total employment impact (direct, indirect, induced) for restoration work, vegetation processing facility, and park site would be relatively small over the entire implementation period in comparison to the larger island employment. Nevertheless, it would still have a positive impact in employment for the island and residents.

These new construction jobs would generate additional personal income for construction workers over the entire project. Indirect and induced income would also be generated over the entire project. This additional income would have a relatively minor positive impact to residents on O‘ahu that are directly employed or indirectly benefiting from this expenditure. The potential additional jobs created from construction activities would provide additional personal income to individuals that would also support indirect and induced employment within the City from the spending of these wages. However, these indirect and induced effects would be rather minimal and thus not generate a significant effect on the local economy

Fiscal impacts would primarily involve additional tax revenue generated to the State from construction of this project. Tax revenue sources for State government are composed primarily of general excise taxes (GET) on development costs and construction materials, along with corporate income tax, and personal income tax from construction workers. The resulting construction budget and funding allocated for these improvements and restoration efforts would generate some additional tax revenue to the State. Although relatively small compared to total State revenues, these construction-related tax revenues would have a minor positive effect on the State’s fiscal condition because of the short-term increase in revenue associated with construction activities.

City revenues generated are primarily limited to tax revenues on privately-owned property and improvements, and to a lesser extent fees charged for various activities such as water, sewer, permits, etc. The property associated with these areas are all owned by the State, therefore, no property tax is presently paid by the State. Wetland restoration and upland reforestation activities

would not change this. The Kalāheo park site managed by DSP would not generate City property tax revenue, but would include water and sewer fees. The vegetation processing facility could generate some City tax revenue if developed and operated by a private firm.

The restoration improvements, vegetation processing facility and park site constructed may slightly increase the property's assessed value. However, no additional City revenues would be generated because these are State-owned property. Therefore, this project should have minimal effect on the current or future levels of City tax revenues being generated.

4.2.2.2 Proposed Action

Changes to Kailua Demographics

Improvements proposed under the project should have minimal, if any, effect on the demographic characteristics of Kailua. There are no residential housing developments or visitor units proposed, with the exception of a care-takers unit to manage and maintain the cultural and environmental complex at Kapa'a. This unit would not be a typical residential property that can be bought or sold to the general public, because the property would continue to be owned by the State and operated by the non-profit organization constructing and managing this complex. Therefore, the project should have no effect on the present and future number of housing units and residential population in Kailua. There would subsequently be no change to Kailua's resident population, housing units, and resident characteristics (e.g. race) with project improvements.

Expanded wetland restoration, upland reforestation, drainage improvements, etc. are designed to improve Kawainui and Hāmākua as resources for endangered waterbird habitat, their function as flood control, etc., and do not increase or decrease the number of residential housing and the resident population in Kailua. Cultural centers, the education center, pedestrian trails, and accessory improvements (e.g. restrooms, observation decks, greenhouse, etc.) planned would also not increase or decrease residential housing or change Kailua's resident population and demographics.

Improved public access and pedestrian trails for passive outdoor recreation at Kawainui would increase and improve the diversity of recreational amenities available for residents. This would contribute to the desirability of living in Kailua, but it would not affect the number of housing units and demographic characteristics of residents. Project-related improvements do not affect the core factors contributing to the popularity and desirability for living in Kailua. As with the No Action Alternative, Kailua's popularity would continue to be primarily based upon its beach town character, convenient access to renowned beaches and availability of a variety of ocean recreational activities, being a more upscale and affluent residential community, availability and diversity of shops and businesses, and its convenient location from urban and downtown Honolulu.

The project would also not be important factors that may change the City's long-term demographic projections for the community, such as new residential subdivisions or multi-family developments. The project would not affect the likely continued "maturing" of this community over time or influence future resident demographics such as the aging of Kailua's existing resident population and the decreasing projected population trend. Future housing characteristics would not be affected by the project with Kailua continuing to have high median sales prices compared to O'ahu, high owner-occupancy, and decreasing average household size associated with the aging resident population. Household income patterns would not be affected with Kailua continuing to have higher household earnings and employment characteristics.

Effects on Business and Economic Conditions

The project would have no effect on military uses and jobs because improvements are not located within MCBH Kāne'ohe Bay and would not affect business operations occurring within the base. Project improvements would not affect industrial uses or employment within those businesses because there are no industrial uses planned. The vegetation processing facility is already entitled and can be constructed under the No Action Alternative.

Expanded wetland restoration and upland reforestation activities under the project would require an increase in DLNR DOFAW maintenance staff and permanent facilities to replace their temporary facilities. It is estimated that DOFAW operational staff would need to have a phased increase of about 12 persons to a total of 30 staff at their management station in order to support the proposed activities and educational programs conducted. These improvements would expand government uses and activities at Kawainui, but should not affect military and industrial uses or activities.

The project does not include any new commercial uses such as retail stores, restaurants, coffee shops, etc. operated by private businesses. Therefore, improvements would not affect commercial uses or employment within those businesses. The education center planned at Pōhakea would be operated by a non-profit organization, and may include a small gift shop. This gift shop would have minimal effect on commercial uses in Kailua due to its size, merchandise emphasis on educational material and Kawainui, and would be operated by a non-profit organization not competing with other businesses.

Improvements to Kawainui and increased public access would generate a somewhat moderate level of visitors as discussed in Chapter 2. However, the majority of visitors to Kawainui would already be travelling to Kailua for other reasons (e.g. beaches, ocean recreation, etc.) as their primary destination purpose, and may make an incidental stop at Kawainui either on the way into or leaving Kailua. A small percentage (20%) of visitors are anticipated to travel to Kawainui as their main purpose, and could then continue on to Kailua. These new visitors (40 visitors a day) to Kailua due to the project could visit commercial areas resulting in a very small, but positive, effect for retail shops and restaurants.

The cultural centers planned would not be open to the general public and visitors because they would be intended for cultural practices and educational programs as managed and operated by non-profit organizations. However, persons attending classes and activities held at these centers could visit restaurants and other retail establishments in Kailua either before or after their activity. The majority of persons participating in these cultural activities are expected to be Kailua residents or residents of O‘ahu, who are already familiar with Kailua town. Nevertheless, commercial businesses could experience a small, but positive, benefit from participants visiting their establishments, particularly restaurants, coffee shops, fast food establishments, etc.

Influence on Community Issues

The level of visitor activity in Kailua is a major issue with many residents concerned with project improvements due to the potential to attract more visitors to Kailua. However, the concerns with this issue are not reflected by and shared by all residents and the business community who support visitors. As previously discussed, several factors have contributed to changes to the former neighborhood character of Kailua from the 1970’s and concerns with visitors that has become more notable over the past 20 years.

As discussed in Chapter 1, the City Department of Parks and Recreation obtained a CDUP in 1972 allowing for several regional recreation park improvements at Kawainui that included playfields (football, baseball, softball), courts (tennis, basketball, volleyball), and a community recreation center that would raise considerable concerns if implemented in today’s environment. In 1998, the Hawai‘i Audubon Society published a Draft EA proposing an education center on a 5-acre site at Kawainui. The current project’s concept for the education center is similar to that proposed in 1998, but is currently the subject of concern now due to potential visitors.

The majority of the factors contributing to this current sentiment with visitors and changing character of Kailua are not related to improvements proposed by the project. The project would not influence the influx of new residents purchasing homes or moving into Kailua, or change the demographics of Kailua’s population. Kailua’s popularity as a beach town due to its well-known beaches, its more affluent community, and convenient location from urban Honolulu are more important factors influencing the movement into Kailua. Improvements at Kawainui-Hāmākua, such as wetland restoration, upland reforestation, centers for cultural practices operated by non-profit organizations, and pedestrian trails for wildlife viewing, would thus likely not serve as significant factors influencing a person’s decision to relocate to Kailua.

Kailua’s renowned beaches and ocean recreational activities shaping the community’s beach town character are the major factors contributing to the town’s popularity as a visitor destination. Project improvements would not change the popularity of these beaches, the availability of ocean recreational activities, and bed and breakfast visitor accommodations. As discussed in Chapter 2, wildlife viewing, historic sites, and natural landmarks are not as popular with visitors to Hawai‘i as compared to beach-related activities.

Restoration efforts and improved public access at Kawainui would provide visitors to Kailua with another passive outdoor recreational and educational site to visit. However, activities at Kawainui (wildlife viewing) would not serve as a primary destination that attracts most visitors as previously discussed. Activities at Kawainui would likely take only a couple hours to complete, and are not as popular as compared to spending most of the day at the renowned beaches, participating in ocean recreational activities, and shopping at boutiques, other retail shops, and the diversity of available restaurants.

Renovation of the commercial town center providing a diversity of boutique and retail shopping experiences that are popular with visitors would not be changed by the project. Future decisions on commercial redevelopment or tenant mix would be influenced by other economic factors instead of improvements and visitors to Kawainui. As an example, what occurs at Kawainui would have little influence in a decision made selecting a particular restaurant tenant or new boutique shop. The "Obama effect" generating popularity with Kailua (e.g. shave ice) would not be influenced or increased by proposed project improvements, and this Obama influence would likely diminish over time (e.g. 10 years from now).

Much of the visitor-related concerns with the project are also attributable to misinformation distributed throughout the community that leads to misinterpretation of what is actually planned at Kawainui-Hāmākua. As discussed in Section 4.1.2 (cultural resources), a level of miscommunication on Kawainui had occurred in which people in the community heard things out of context and never bothered to review the plans based upon interviews conducted. For example, an October 7, 2013 blog published on The Outdoor Circle's website stated *"… it looks like DLNR might support a visitor destination modeled after Haunama Bay or the Polynesian Cultural Center because they believe development and tourism will attract funding."* ~~the project would support a visitor destination modeled after Hanauma Bay (for education center) or the Polynesian Cultural Center (for cultural centers), which~~ Those developments are significantly different and negatively exaggerates the concept of plans proposed under the project.

Effects from Wetland Restoration and Upland Reforestation

The proposed expansion of wetland restoration and upland reforestation at Kawainui and Hāmākua should have minimal, if any, effect on the social character of Kailua and should not generate significant concerns from the community. The community is generally supportive of restoration efforts recognizing the need to address the expansion of invasive species due to decades of minimal management efforts until DOFAW acquired jurisdiction of these areas. The long-term benefits to wetland functions, waterbird habitat, flood control, and water quality are widely supported by the community. Comments received on the EISPN showed community support for wetland restoration and upland reforestation plans, and recognize its value as a statewide public resource.

Restoration activities would also provide opportunities for school groups and community volunteers to participate in these activities as part of educational programs and community service projects. These activities would allow local school children to participate in restoration activities as part of their curriculum, increase public knowledge of the area and environment, and create more stewardship opportunities with schools and organizations, all of which have a positive community benefit.

Effects from Structures and Trails

Concerns raised by the public on the EISPN were more focused with the social and economic impacts of the proposed structures and trails. As already discussed, comments echoed the concerns with additional visitors and effect on the character of Kailua. The concerns raised with respect to the proposed structures and trails are discussed below in the following major categories:

1. Potential for over-commercialization;
2. Potential to attract more tourists to Kailua;
3. Traffic impacts, especially on residential areas;
4. Security and crime issues; and
5. Long-term maintenance and management of proposed improvements.

Over-Commercialization. A common concern raised was the potential for the proposed pedestrian trails and other facility improvements to become commercialized and additional tourist attractions. Concerns accused the state of wanting to create "another Polynesian Cultural Center or Hanauma Bay," or of wanting to "make money off of the marsh." Fears were envisioned of parking areas becoming large-scale visitor drop-off spots for commercial tour operators. Others acknowledged that the desire to improve public access and areas for cultural practices may be well intentioned, but feared that over time, commercialism could grow out of control in the same way it did at Lanikai, Kailua and Kalama beaches. Others cited the need for clear rules about allowable activities and the importance of enforcement.

Existing State regulations for Kawainui (Chapter 126, HAR) already allow DLNR to permit up to 100 visitors per day as part of commercial activities (subject to DOFAW authorization), even without the project. DLNR and DOFAW have currently not permitted any such commercial activities, but could do so in the future if warranted under a permit system. Therefore, the project would not change this regulatory limit on commercial visitors, and the regulation prevents Kawainui from becoming over-commercialized if DOFAW does decide to allow this.

Proposed pedestrian trails and the education and cultural centers (structures) would not support or be impacted by over-commercialization, such as commercial tours, because commercial activities are not permitted at these uses. The areas designated for cultural centers would be operated by a non-profit organization to support their cultural practices conducted. Programs and activities conducted at these cultural centers would not be open to the general public, would not be allowed to have commercial or retail businesses, and would not be allowed to have

commercial tours visiting. These cultural centers would not be privately-owned and operated as for-profit businesses accommodating commercial tours, such as the Polynesian Cultural Center. Cultural centers would have limited public access by supporting DOFAW and DSP educational and cultural programs.

The education center would also be operated by a non-profit organization, and commercial tours would not be allowed unless permitted by DSP. The non-profit organization managing the center would likely have resources for sale as part of educational and cultural materials associated with Kawainui, such as books, crafts, or food products. However, proceeds from these activities would be used to support the non-profit's operation of the center along with educational and cultural programs occurring. The educational center would accommodate non-commercial visitors to Kawainui that would consist of both Kailua residents, O'ahu residents, and visitors to the island. As a result, the potential commercialization of this center feared should not occur.

Pedestrian trails would be open the public, but commercial tours or other related operations would not be permitted to utilize these trails. Similarly, other existing DSP lands, such as Ulupō Heiau and Nā Pōhaku, would continue to be open to the public and used by authorized non-profit organizations for educational and cultural activities.

An important mitigative measure to ensure commercial activities don't illegally occur within the project area would be effective enforcement of these restrictions. DOCARE would be responsible for the enforcement of these regulations, and would need to work in partnership with DOFAW, DSP, and non-profit organization(s) operating the education center or conducting programs in the area to observe and report violations. To support this, additional permanent DOCARE staff would be necessary to effectively patrol and enforce regulations as discussed in Chapter 2. Another measure would be DOFAW's ability to restrict opening additional areas to the public if they cannot manage it, or closing access to previously opened areas, if required. DSP also has the ability to manage access by not implementing improvements or providing public access if management of areas is not possible, such as the hillside area along the Kūkanono subdivision and adjacent to Ulupō Heiau.

Potential to Attract More Tourists to Kailua. As already discussed, the level of visitor activity in Kailua is a major issue with many residents who feel that their quality of life and lifestyle from the 1970s has been threatened. However, this position is not reflected by and shared by all residents along with the business community who support visitors. Therefore, there is concern with project proposals that could attract more "outsiders" to Kailua, whether from other communities on O'ahu or out of state. The majority of the factors contributing to this current sentiment are not related to improvements proposed by the project because other factors contribute to Kailua's popularity as a beach town with visitors, such as its well-known beaches, ocean recreational activities, and diversity of shopping (e.g. farmer's market, boutiques, etc.). This section addresses the potential for project improvements to attract additional tourists.

Project improvements would support increased public access for both residents and visitors within Kawainui at several designated activity areas as previously shown on Figure 2.16 in Chapter 2. The activity areas include: 1) Kahanaiki, Pōhakea, Nā Pōhaku upland area; ~~2) Kalāheo park site;~~ 2~~3~~) ~~Mokulana peninsula and~~ area by DOFAW's management station; and 3~~4~~) Ulupō Heiau. Exhibit 4.30 identifies these areas for Kawainui based upon the revised plans (reduced trails).

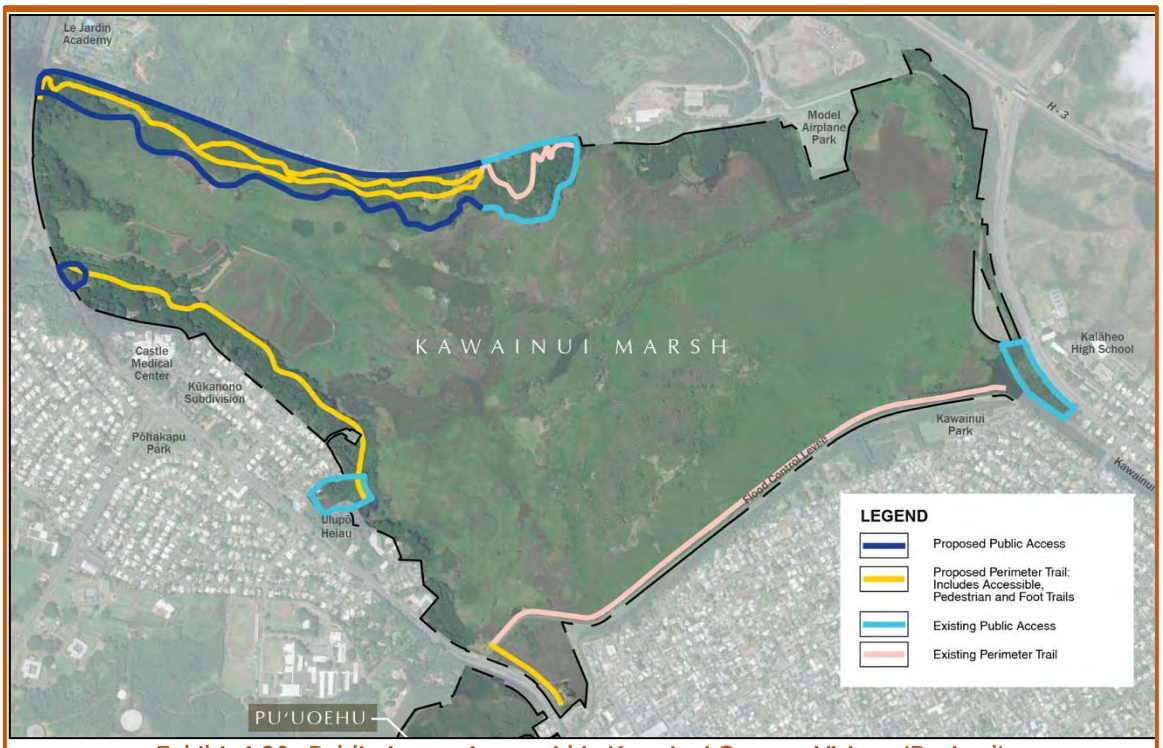


Exhibit 4.30. Public Access Areas within Kawainui Open to Visitors (Revised)

Nā Pōhaku and Ulupō Heiau are areas already open to the public, and these sites currently accommodate a relatively low number of visitors. Kalāheo park could already be improved without this project (No Action Alternative)~~, and the only difference under this project is the addition of a hale wa'a to store canoes and elimination of the pedestrian bridge over Kawainui Canal. Addition of the hale wa'a would not attract more visitors to Kailua because this structure would be used by schools and/or canoe clubs~~.

The two cultural centers at Kapa'a and Wai'auia would not be open to the general public and subsequently not available for daily visits by tourists or island residents. These areas would be used for cultural practices and would be constructed and operated by non-profit organizations. These organizations would also be responsible for supporting DOFAW in the stewardship of their areas (e.g. managing vegetation growth). Therefore, these two cultural centers would not attract more tourists to Kailua. Therefore, only the proposed education center at Pōhakea would serve as an activity node supportive of attracting visitors.

The education center and adjacent kauhale complex at Pōhakea are intended to support visitors to Kawainui by providing a centralized location and center for receiving visitors along with persons participating in educational and cultural programs. The education center would serve as the point-of-entry for persons before participating in educational and cultural programs, nature-viewing, and passive recreation along the Kahanaiki area trails and Nā Pōhaku. The center would support management activities with increased public access provided within this upland area along Kapa‘a Quarry Road.

Projected monthly visitors to the education center is about 6,000 visitors per month, which translates into 200 visitors a day. It is estimated that 80% of these visitors would be making an incidental stop to Kawainui while already on their way to or from visiting Kailua as part of their main trip purpose (e.g. beaches). Therefore, only 20%, or about 40 visitors per day, would be making a trip to Kawainui specifically for that reason. It is reasonable to estimate that most of these “new” additional visitors (20 to 30 persons) would then travel into Kailua town to visit shops, beaches, etc. These new visitors to Kawainui would also include some residents of Kailua and O‘ahu, especially on weekends, further reducing the number of new tourists to Kailua. Consequently, the impact of the education center with surrounding pedestrian trails attracting additional tourists to Kailua would be rather small, or about 20 to 30 additional visitors a day.

The ~~Mokulana peninsula and~~ passive park area near DOFAW’s management station is ~~are~~ intended to support passive outdoor recreation and provide additional wetland and wildlife viewing areas for the public. Visitors to Kawainui could utilize these areas and associated pedestrian trails. However, these visitors are included in the 200 visitors per day total at the education center because most first-time visitors would visit this education center and would not be familiar with the ~~Mokulana peninsula and~~ DOFAW management station area. There is no public parking provided at Mokulana.

Most visitors to ~~Mokulana and the park area by~~ DOFAW’s station would likely be residents of Kailua and the island, who are more familiar with the area. Areas and associated trails would be used for walking, jogging, and wildlife viewing. About ~~500~~ 200 persons are projected to utilize these trails a month, or about ~~17~~ six to seven persons per day given the reduction in pedestrian trails. Therefore, these areas and associated pedestrian trails should not have a significant effect attracting more visitors. Tourist using the area would already be accounted for in the visitor projections for the education center.

Project improvements planned for Ulupō Heiau include a green house and hale to support restoration activities, management of the area by the non-profit organization, and education and cultural programs occurring. These improvements would not attract more tourist to this site because they don’t significantly increase the primary purpose and attractiveness for visiting the site, which is to view the heiau. At Nā Pōhaku, there are no project improvements planned that would influence attracting more visitors to Kailua. However, visitors to the adjacent education center would support having more visitors to Nā Pōhaku.

Effective management of Kawainui is a priority for both DOFAW and DSP that would be implemented to address potential effects from an unexpectedly significantly greater number of visitors to the education center. The non-profit organization operating the education center would be able to monitor activities and coordinate any concerns with DSP and DOFAW. Within the wildlife sanctuary, DOFAW is able to restrict public access if warranted ranging from no access to conditional access during established times (e.g. weekends only, or only through programs). DOFAW thus has the regulatory ability to effectively manage public access if visitor activity is too high.

DSP also has the ability to close or restrict public use of their jurisdictional areas when necessary for the protection of an area or for the safety and welfare of the public under Chapter 146, HAR. Therefore, public access at visitor levels can be restricted or limited if DSP believes warranted. Restrictions on visitors can range from no access permitted to conditional access during established times, such as scheduled visiting hours. Another potential option to manage visitor levels could be implementing a web-based program requiring visitors to sign-up before visiting which could limit the number of visitors on a daily basis.

Traffic Impacts on Residential Areas. Increased traffic congestion within Kailua town is another issue that has been attributed to the many visitors to Kailua. Localized problem areas have also been identified at Lanikai and within the Kūkanono subdivision. The proposed education center and cultural centers are not expected to have much effect on these traffic issues because these conditions are the result of other factors. As discussed in Chapter 5, the project would not generate a significant amount of daily traffic impacting these areas. Traffic from the education center would consist primarily of visitors who are already visiting Kailua for other reasons (e.g. beaches). An estimated 40 new visitors a day (10 to 15 vehicles) to Kailua resulting from this education center and public access to Kawainui should have minimal effect on congestion within Kailua town.

Traffic issues within Kailua town could be partly attributed to visitor activity particularly around beaches, but it is also likely due to the developed urban town center that's comprised of several businesses, restaurants, shops, etc. that generate a lot of activity from both residents and visitors. State DOT 24-hour traffic count data at the Pali Highway tunnels actually showed a decrease (8%) in vehicles from the year 2000 to 2015, from 45,700 vehicles to 41,900 vehicles, respectively. Between 2013 and 2015, traffic was very consistent ranging between 41,600 and 41,900 vehicles. Therefore, traffic congestion within Kailua town may be a more localized issue associated with the town center activity rather than a larger regional condition as indicated by historic traffic data. Increased visitor activity alone also cannot be solely attributable to the increased traffic congestion in town.

Lanikai traffic issues are likely attributable to island residents visiting the area on weekends and holidays. Otherwise, this condition would occur on a daily basis if mainly caused by visitors to Kailua. On-street parking restrictions within Lanikai, which have only been applied on holiday weekends, also reflect the congestion largely caused by residents who now need to park outside

the subdivision. The project should not affect traffic conditions at Lanikai because there are no improvements or project-generated activities occurring in that area. The small number of new visitors attributable to Kawainui's education center would have minimal, if any noticeable, effect on traffic conditions at Lanikai.

Traffic concerns within the Kūkanono residential area are also largely the result of non-project related factors. The Windward YMCA generates far more daily traffic than the Ulupō Heiau, and churches in the area generate a fair amount of traffic, particularly on weekends. Castle Medical Center employees parking within the neighborhood and patient visitor traffic are also factors not associated with the project. Ulupō Heiau only averages about 15 visitors a day, which should not change with the project because only a green house and hale would be added. DOFAW staffing would increase with the project to support long-term management and maintenance of Kawainui. However, the 12 additional staff projected should have minimal effect on traffic within the subdivision because they would park ~~at~~ within DOFAW's management station using Ulukahiki Street. There would not be a need for staff to drive through the subdivision on a daily basis.

Security, Crime and Homeless Issues. There are concerns about the security of residences along the project area and potential crimes that could occur along the proposed trails and around Kawainui. The Kūkanono subdivision is the only residential area where project improvements consisting of the pedestrian trail would occur in their vicinity. At Ulupō Heiau, only a green house and hale are proposed that would not change existing conditions with respect to potential security and crime in the area. ~~Residences are located near the Kalāheo park site, however, the only project improvements to this site from already entitled plans are adding the hale waʻa to store canoes and eliminating the pedestrian bridge over Kawainui Canal.~~ Other issues concern homeless encampments becoming established, such as one in the hau bushes off Kailua Road near St John Lutheran Church that was recently cleared by DOFAW.

In general, crime and homeless issues would be improved by the project because DOFAW and DSP would have additional partners (non-profit organizations) to support monitoring, management and stewardship of various areas. Increased activities and the presence of DOFAW staff, DOCARE officers, and visitors in areas reduce the potential for illegal activities to occur unnoticed or opportunely, or for homeless encampments to become established.

~~Development and operation of the park at the Kalāheo site could occur already based upon existing entitlements. Proposed project improvements adding the hale waʻa to this site would increase stewardship and general security of this park by schools and canoe clubs storing their canoes and conducting activities. These activities would eliminate the possibility for homeless encampments to be established, which has previously occurred in this area. Active use of the site also creates an increased level of monitoring and security due to the presence of people and activities occurring, as compared to its present undeveloped condition that is more secluded. Eliminating the pedestrian bridge across Kawainui Canal under the project would also have a beneficial effect for residences of the Coconut Grove subdivision by eliminating potential security and crime concerns from increased access to areas by their homes using the bridge.~~

Development of cultural centers at Waiʻauia and Kapaʻa would increase stewardship and security of these areas that are presently undeveloped and secluded. Use of the Waiʻauia site for cultural practices would ensure the reinterment site established there can be properly maintained and secured. Potential use of this site by homeless would be eliminated, and the facilities and daily activities occurring there eliminates the potential for illegal activities to occur because the site would no longer be somewhat isolated. New facilities constructed at Waiʻauia, along with other areas of Kawainui, could be subject to property crimes (e.g. burglary, vandalism) as is any residence or business in the area, but the security of facilities would be the responsibility of the non-profit organization operating there.

The Kapaʻa site for the cultural center is presently undeveloped, secluded, and generally hidden by being overgrown with vegetation. Thus, there is the potential for homeless encampments or other illegal activities to be occurring there now. With development of the cultural center, these security issues would be eliminated by the site's use by a non-profit organization similar to that occurring at Waiʻauia. A caretaker's residence is also planned for this site that would provide a daily presence monitoring the security of the site. Increased stewardship and monitoring of activities in this area by such non-profit organization partners would support DOFAW's management of the Kawainui area. Use of this Kapaʻa site together with the adjacent vegetation processing facility and City's model airplane park would create cohesive and daily use of this entire Kapaʻa upland area along Kapaʻa Quarry Road improving security by reducing isolated and secluded areas that are difficult to monitor.

The education center and kauhale complex at Pōhakea would utilize an undeveloped site that is somewhat hidden by the row of trees and vegetation along Kapaʻa Quarry Road. Similar to the cultural centers, this education center and the activities occurring would improve security of the area by eliminating areas where illegal activities can occur unnoticed or where potential homeless encampments can occur. The non-profit organization(s) operating the education center and kauhale complex provide a daily presence monitoring activities and the security of the site, increases stewardship, and support DSP and DOFAW's management of the area.

Improvements to DOFAW's management station providing permanent facilities for operations would support the agency's ability to increase staff working at Kawainui and Hāmākua. Increased staff, along with permanent DOCARE officers, support an expanded daily presence around Kawainui, increased monitoring of activities, and improved security.

There are concerns with pedestrian trails and accessory structures (e.g. observation decks, small shelters) potentially serving as gathering places for homeless individuals. Increased activity areas and personnel operating around Kawainui, such as cultural centers and DOFAW's management station, should significantly reduce the potential for homeless encampments from becoming established. This is because less areas around Kawainui would be isolated, secluded, and hidden by restoration activities and use of areas. This greatly reduces areas where encampments can become established and continue unnoticed, and importantly increases monitoring of areas by

DOFAW personnel, DOCARE officers, and non-profit organization partners. Any sightings of such camps would be reported to DOFAW and DOCARE ~~for~~ to respond~~ing~~ to.

Constructing the pedestrian trail within upland areas around Kawainui would increase public access that could contribute to increased property crime and security concerns for residences, churches, and other existing developments. However, the increased presence of DOFAW staff conducting restoration, management, and maintenance activities around Kawainui would deter such activities from occurring. DOCARE officers would be available to respond to suspicious or inappropriate activities, enforce regulations, and ultimately increase security in the area.

Furthermore, national studies of public trails provide considerable evidence that similar trails do not attract or increase crime. A comprehensive study of criminal activity on 372 trails across the U.S. was conducted by the Rails-to-Trails Conservancy in cooperation with the National Park Service. That study concluded:

> *[Trails] are not crime-free. No place on earth can make that claim. However, when compared to the communities in which they exist, compared to highways and parking lots, and compared to many other public and private places, [trails] have an excellent public safety record.* (Rails-to Trails Conservancy, 1998).

Thus, a trail designed to be highly visible, combined with the consistent presence of recreational users should deter unwanted or illegal activity. Keeping the trail clean and well-maintained would increase a sense of community ownership and reduce incidents of litter, graffiti and vandalism. The dedication of sufficient maintenance personnel and resources for trail upkeep would also be important. Other improvements or design details are planned to minimize potential security issues associated with pedestrian trails, and are identified below.

1. Pedestrian and foot trails along the Kūkanono ~~and Kawainui Vista~~ residential subdivision~~s~~ have been sited to be a significant distance away from residences.
   a. ~~Along the Kawainui Vista, about a 100-foot buffer away from residences is planned resulting in the need for a boardwalk across the wetland. An alternative route is outside of the wetland that would bring the trail closer to residences.~~
   ~~b.~~ Along the Kūkanono subdivision, a buffer of about 250 feet or greater is generally provided from the trail using the steep vegetated hillside. Residences are located on the bluff at elevations about 60 to 80 feet above the trail.
2. No access to the trail would be provided through the Kūkanono ~~and Kawainui Vista~~ residential subdivision~~s~~. Therefore, access to the trail within this section would only occur at ~~Waiʻauia,~~ Ulupō Heiau~~,~~ and DOFAW's management station.
3. Fencing along the southern edge of the trail from ~~Waiʻauia, past~~ Ulupō Heiau~~, and~~ up to DOFAW's management station is planned. This fence would restrict persons from venturing up the hillside toward residences.

4. Fencing is also planned to be constructed along the State's property boundary separating residences and churches within the Kūkanono to Wai'auia section. This fencing would serve as another deterrent for persons using the trail and increase security for residences.
5. Motorized vehicles and bicycles would be prohibited from using the trail. Only the levee would be available for use by bicyclists.
6. Necessary signage would be posted at appropriate locations to educate and inform trail users of restrictions.

Management and Maintenance. Concerns have been expressed with the State's ability to adequately manage and maintain areas developed or opened for public access over the long-term. Criticism and skepticism are expressed whether the State could adequately maintain and patrol new trails and public areas, citing limited their staff and resources. Questions also concern whether rules would be adequately enforced, and whether trails would be maintained and kept safe for users.

Management of Kawainui and Hāmākua's resources is a priority for both DOFAW and DSP, and managing public access is an important component of this due to the large area under the state's jurisdiction. Effective management of areas requires cooperation and coordination among DOFAW, DSP, DOCARE and non-profit organizations operating at Kawainui to ensure appropriate monitoring of activities and enforcement action are implemented, as warranted. To address these concerns, the following management practices would be implemented that focus on addressing public access: 1) phased approach in opening areas to the public; 2) restricting access; and 3) increasing stewardship partnerships.

1. Phased Approach. DOFAW and DSP would implement a phased approach by incrementally opening up areas for public access, and would only allow such access of areas if they are able to manage them. To accomplish this, DOFAW and DSP would need support from DLNR and the Legislature to fund: 1) physical improvements supporting management activities; 2) additional DOFAW positions; and 3) permanent DOCARE officers assigned to Kawainui.
    a. Areas opened to the public would be monitored over time to assess the level of activity, identify any issues arising, and evaluate modifications needed to better manage each area. If warranted, these agencies can restrain from opening up additional areas for public access until they are better able to manage existing areas, or close or place restrictions on existing areas.
    b. Funding support for both physical improvements and additional operational staff are needed, and increasing public access would be dependent up the funding support provided. Otherwise, areas would continue to have limited or no public access. Funding would also include the daily maintenance of facilities (e.g. rubbish removal, restroom cleaning) to ensure they are safe, clean, and do not impact the environment.
    c. Additional DOCARE officers would need to be funded to support security and enforcement of areas opened for public access.

2. Restricting Access. DOFAW is able to restrict public access in accordance with regulations under Chapter 126, HAR. Such restrictions on public access can range from no access permitted for areas to conditional access during established times (e.g. weekends only, or only through programs). DOFAW would assess the effectiveness in managing access based upon their evaluation of the types of activities occurring and level of visitation.
   DSP has the ability to close or restrict public use of their jurisdictional areas when necessary for the protection of an area or for the safety and welfare of the public under Chapter 146, HAR. Therefore, public access at Pōhakea (education center and kauhale), Nā Pōhaku, and Ulupō Heiau SHP~~, and the Kalāheo park~~ can be restricted or limited if DSP believes warranted. Restrictions can range from no access permitted to conditional access during established times, such as scheduled visiting hours.
3. Stewardship Partnerships. Partnerships with non-profit organizations participating in stewardship activities within Kawainui is another important component to support DOFAW and DSP management of public access. Non-profit organizations already serving as curators of areas along with new partners for the cultural centers and education center would contribute to stewardship efforts for those areas, and also support monitoring public access and activities there in coordination with DOFAW and DSP. Increasing partnerships with non-profit organizations serve as an "extension" of staff for both DOFAW and DSP that support monitoring of activities in the area. Input received by DOFAW and DSP from these organizations also help in their evaluation of activities, visitation levels, and subsequent management decisions for the area.

Fiscal and Economic Effects

Project improvements proposed would have a relatively minor effect on both the City and State's economic and fiscal factors. Construction of improvements would have different effects in relation to the City and the State's finances. The primary economic and fiscal effects would be associated with short-term construction jobs that would generate a small minor positive economic impact over the several years for which phased improvements are implemented.

Construction costs for expanded restoration activities and facility improvements would be funded by State funds and private funds by non-profit organizations for the cultural centers and possibly the education center. Funding for these improvements would create construction jobs during the duration of restoration and construction activities, as well as support industries that service construction activities directly and indirectly (indirect jobs and induced jobs).

As already described under the No Action Alternative, direct construction jobs would typically consist of on-site laborers, landscapers, tradesmen, mechanical operators, supervisors, etc. New jobs created would also generate additional personal income for construction workers from wages paid to them or operational employees associated with activities. Direct construction jobs created would also stimulate indirect and induced employment and spending of wages within

other industries. These construction jobs associated with both State-funded work and private (non-profit organizations) would likely be filled by residents from the O‘ahu employed within the construction industry.

Overall, implementation of these improvements would also generate some indirect and induced jobs throughout the entire phasing period. The total employment impact (direct, indirect, induced) would be relatively small over the entire phasing period in comparison to the larger island employment. Nevertheless, it would still have a positive impact in employment for the island and residents.

These new construction jobs would generate additional personal income for construction workers along with indirect and induced income. This additional income would have a relatively minor positive impact to residents on O‘ahu that are directly employed or indirectly benefiting from this expenditure. Additional jobs created from State or privately funded construction activities would provide additional personal income to individuals that would also support indirect and induced employment within the City from the spending of these wages. However, these indirect and induced effects would be rather minor, especially being spread out over time in phases, but would generate a minor beneficial effect on the local economy.

Expanded Wetland Restoration and Upland Reforestation. Wetland restoration and upland reforestation improvements are estimated to create a total of about 4 to 6 direct new jobs annually during the phased long-term implementation period. Implementation is expected to occur over some time because it would be subject to funding availability by the Legislature, and is also subject to DOFAW receiving additional personnel to support executing the work, operations, and maintenance activities.

As with work implemented at Kahanaiki (No Action Alternative), the number of direct new jobs would not be evenly spread out over the implementation period because restoration activities are different from a typical construction project. Most of the expanded wetland restoration work would likely be initiated within a 5 to 10 year period with other upland reforestation efforts implemented in phases. Restoration work would be limited during the winter season and spring due to increased rainfall. Thus, a higher number of jobs could be generated within the first several years of restoration activity with a lower number likely generated for later phases as work shifts more toward vegetation management and maintenance.

Structures and Trails. At Ulupō Heiau, only a green house and hale would be constructed under the project. These structures could be funded by DSP or by the non-profit organization serving as curators for the site. In any event, the costs for these improvements would generate a very minimal number of jobs, and could be constructed by volunteers to minimize costs. Maintenance of these structures would be performed by the non-profit organization.

Development of the cultural centers designated at Wai‘auia and Kapa‘a would be privately funded and constructed by non-profit organizations. Construction costs for these facilities could be fairly significant depending upon their design, and would likely be implemented in phases over time. However, they would generate a small number of construction jobs annually throughout its implementation as different crews work on the site (e.g. site preparation, utilities installation, structures construction, interior work). Portions of these centers could also be constructed by volunteers to minimize costs depending upon its design and complexity. Maintenance of these cultural centers would be the responsibility of the non-profit organizations.

Development of the educational center at Pōhakea could be either privately funded by the non-profit organization operating it or funded by the State (DSP). Construction and management of the kauhale complex would be performed by a non-profit organization. Construction costs for this education center could be fairly significant depending upon its design, and could be implemented in phases over time. This improvement would generate a small number of construction jobs throughout its implementation as different crews work on the center. Portions of this center could also be constructed by volunteers to minimize costs depending upon its design and complexity, especially if funded privately. Maintenance of the education center and kauhale complex would be the responsibility of the non-profit organizations.

~~At the Kalāheo park site, the only project improvements would be constructing a hale wa‘a and not constructing the pedestrian bridge. Construction of the hale wa’a would be the responsibility of the non-profit organization managing and maintaining that structure. This building would likely be constructed by volunteers to minimize costs depending upon its design. If not, it would generate a small number of construction jobs and likely be completed over a short time period (e.g. 3 to 6 months).~~

Construction of pedestrian trails and accessory structures (e.g. observation decks) would be funded by either DOFAW and/or DSP depending upon the agency’s area of jurisdiction at Kawainui. Construction costs for these trails and structures could be fairly moderate depending upon their design and route ~~(e.g. boardwalks)~~, and would likely be implemented in phases over a long time. Pedestrian trails involve predominantly site work that would not require other types of skilled workers, such as electricians. Because trails and structures would be implemented in phases over time, they would generate a small number of construction jobs throughout its implementation. Construction of a DOFAW access road bridge~~s~~ across Maunawili ~~and Kahanaiki~~ Stream~~s~~ would generate a larger number of jobs depending upon its design.

Improvements to DOFAW’s management station would similarly generate a small number of jobs annually because structures would be implemented in phases over time. Improvements at Hāmākua (restrooms and storage) should be completed over a relatively short time (2 to 4 months), and would generate a small number of construction jobs during that period.

Fiscal Effects. Fiscal impacts would involve additional tax revenue generated to the State from project construction. Tax revenue generated for the State in the form of GET, corporate income tax, and personal income tax from construction workers would be relatively minor in comparison to the overall State revenue because work would be implemented in phases over several years. Nevertheless, this revenue would have a minor beneficial effect on the State's fiscal condition because of the short-term increase in revenue associated with construction activities.

City revenues generated are primarily limited to tax revenues on privately-owned property and improvements, and to a lesser extent fees charged for various activities such as water, sewer, permits, etc. The property associated with these areas are all owned by the State, therefore, no property tax is presently paid by the State. Project improvements would not change this. However, certain improvements, such as the education center and cultural centers, would include some water and possibly sewer fees depending upon their design. Therefore, these improvements should have minimal effect on the current or future levels of City tax revenues being generated.

4.3 AGRICULTURE

4.3.1 Existing Conditions

4.3.1.1 Historic Agriculture Use

The Kawainui basin may have been one of the first areas colonized by Polynesian settlers on O'ahu, and was one of the most important areas of food production prior to and following European Contact (Guinther et al., 2006). Kawainui was an important focus of integrated agriculture and aquaculture. As discussed in Section 4.1, historic records document the pre-contact Kailua area as consisting of a thriving cultural landscape of garden areas clustered along its approximately 18 permanent and intermittent streams. The Maunawili/Kahanaiki Stream delta was a large, marshy low-lying area, with fertile soils along streambeds with many taro lo'i (CSH, 2016).

The earliest recorded use of the area was that a fishpond was in use by the late 1700s. The pond was abandoned during the early 19th century accompanying the post-contact decline in the native population, due primarily to western disease (Guinther et al., 2006). During the mid-1800s, the Kawainui-Hāmākua area was dominated by irrigated agriculture, with hillslopes above the wetland utilized for dryland agriculture of both traditional Hawaiian economic plants and Western-introduced fruit trees. By the late 1800s, agriculture in the project area was changing from taro to commercial rice farming. By the early 1900s, almost all the former taro lo'i in the project area had been converted to rice paddies, although mauka areas continued to be cultivated in taro.

Rice farming declined rapidly in the first part of the 20th century due to both competition from California rice growers and the prohibition of Chinese immigration beginning in 1876. Subsequently, truck farming of taro, avocado, papaya, and Western crops followed. In the early 1900s, Kāneʻohe Ranch converted much of the former agriculture land to ranch and grazing use. The ranch, however, also grew some pineapple and sugarcane in the area.

Agricultural land use in surrounding areas has also had an impact on the project area, specifically on its water resources. Sugar cultivation in the adjacent community of Waimānalo led to the diversion of water from area streams, resulting in decreased inflow into Kawainui. Water from Kawainui was also pumped to a reservoir in Waimanalo via an extensive system of tunnels, flumes and ditches. This pumping of water continued until the early 1950s.

Presently, no commercial agriculture or aquaculture activity occurs within the project area. However, there are a few locations where taro loʻi are grown for educational and cultural purposes. These sites are located at Ulupō Heiau, Nā Pōhaku, and at Pōhakea located adjacent to the future education center site. The agricultural activities are conducted by non-profit organizations and cultural groups under lease or caretaker agreements with the DSP. Water from Kawainui's wetland is utilized for irrigation at Nā Pōhaku and Pōhakea. At Ulupō Heiau, water from a spring is used.

4.3.1.2 Agriculture Land Use Classifications

Although agricultural activity has long occurred in the project vicinity, the majority of the project area is now comprised of wetland, which is not suitable for cultivation. As discussed in Section 3.1.4, the USDA NRCS classified almost all of the wetland area as Marsh (MZ) soils with large areas of Hanalei silty clay (HnA) and Pearl Harbor clay soils (Ph) common with both wetland and upland areas. These soil types are not considered to be productive.

The Hawaiʻi Soil Atlas soil maps have also described the project area as "Not suitable for farming." The fertility of the Kawainui wetland areas is described on the interactive soil maps as *"Rich in organic matter (Fertility Class=Organic Soil). Moderate nutrient holding capacity. Soil with brackish water are rich in salts, which are often detrimental to plant growth. Not recommended for farming."* (http://gis.ctahr.hawaii.edu/SoilAtlas).

Land Study Bureau Classification

The University of Hawaiʻi Land Study Bureau's (LSB) Detailed Land Classification-Island of Oahu, classifies soil by land type in which classifications are provided for an overall crop productivity rating, with and without irrigation. Overall LSB ratings range from A to E, with A representing the class of highest productivity and E the lowest.

Figure 4.5 graphically shows the LSB ratings established for the project area. As shown on the figure, most of the upland areas of Kawainui, Waiʻauia, and Hāmākua are not classified. This is likely due to areas being within the State's Urban District classified lands, or are not suitable for agriculture. The majority of Kawainui's wetland has a LSB rating of "E" representing land with the lowest productivity. The southern half of Kawainui's wetland comprised of the Kahanaiki subarea and restoration ponds have a "C" rating indicating areas having fair suitability. The hillside of Pu'uoehu also has a LSB rating of "E".

Agricultural Lands of Importance to the State of Hawai'i.

The State Department of Agriculture's Agricultural Lands of Importance to the State of Hawai'i (ALISH), established a classification system for identification of agriculturally important lands to the State of Hawai'i. Three classes of lands are established which are: 1) prime, 2) unique, and 3) other. Lands not included under this system are "unclassified." Figure 4.6 graphically shows the ALISH ratings established for the project area.

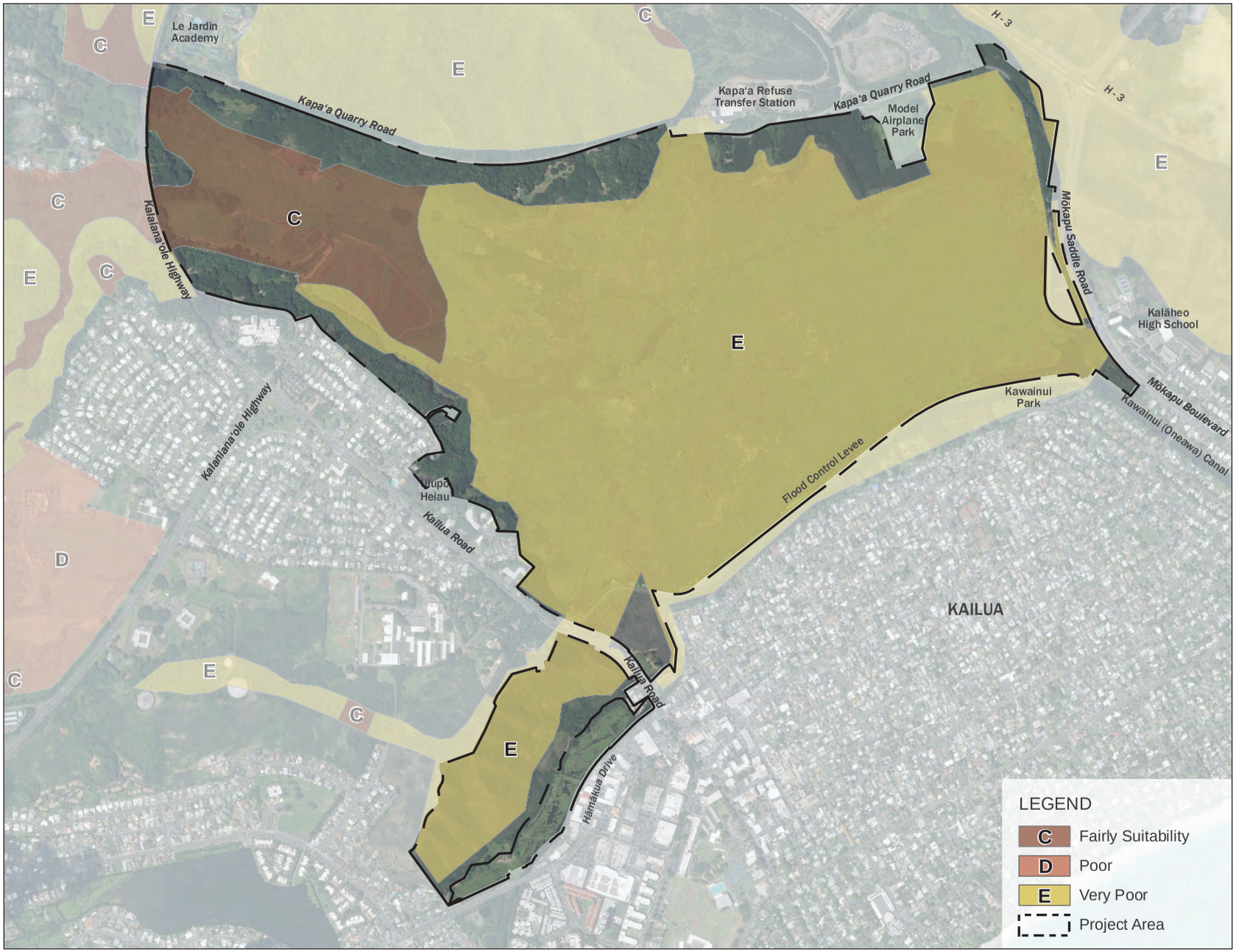
As shown on the figure, the majority of the Kawainui project area is classified as "Other Lands" which are not prime or unique agricultural land. A small portion of the northern section of upland area is classified as "Prime Land." Hāmākua and Pu'uoehu are unclassified.

4.3.2 Potential Project Impact and Mitigation

There has been interest by non-profit organizations and individuals in conducting agricultural or aquaculture activities within Kawainui's wetland given its history of being used for food production as a fish pond, taro loʻi, and rice paddies. The desire is to introduce agricultural production at Kawainui in order to provide a food source for the community. The issue of food security and a desire for food self-sufficiency for Hawai'i has been discussed at many levels, and in 2012, the State Office of Planning, Department of Business, Economic Development and Tourism (DBEDT) prepared a strategic/functional plan addressing this topic (Office of Planning 2012). The three strategic objectives of the "Increased Food Security and Food Self-Sufficiency Strategy" are:

1. Increase demand for and access to locally grown foods.
2. Increase production of locally grown foods.
3. Provide policy and organizational support to meet food self-sufficiency needs.

However, commercial agriculture or aquaculture production are not allowed within Kawainui because these wetland areas are designated Conservation District under the State's land use district. Under the Protective Subzone designation for this Conservation District area, these commercial agricultural activities are not permitted land uses. Kawainui's wetland is also a wildlife sanctuary under DOFAW's jurisdiction that is intended to support waterbird habitat. Therefore, commercial agricultural or aquaculture activities as part of larger scale food production cannot be included as part of the project.



Source: State of Hawai'i GIS Data

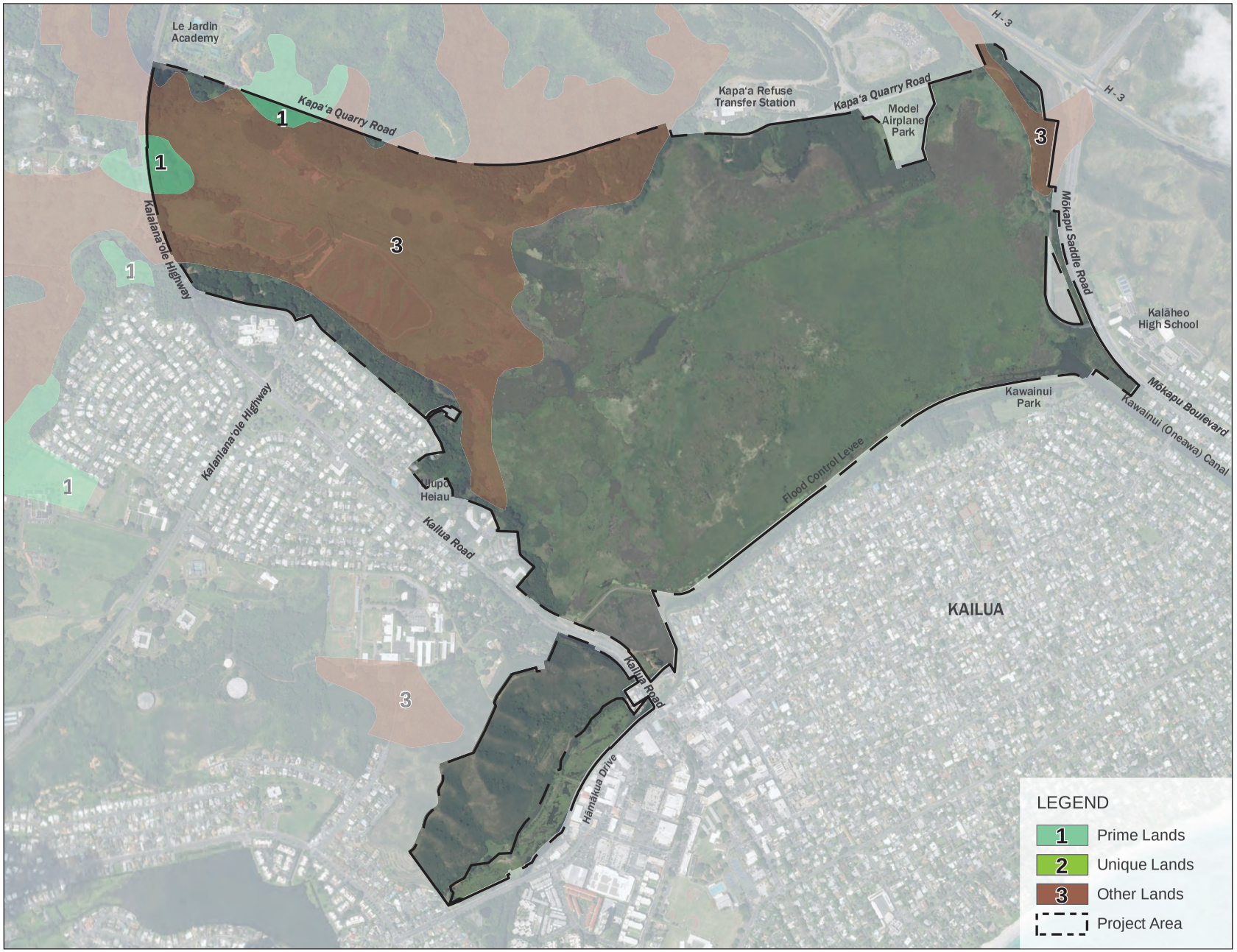
Kawainui - Hāmākua Master Plan Project

Figure 4.5 - Land Study Bureau Soil Classification

Kailua, O'ahu

0 800 1,600 FEET

HHF PLANNERS places for people



Source: State of Hawai'i GIS Data

Kawainui - Hāmākua Master Plan Project

Figure 4.6 - ALISH Classification Map

Kailua, O'ahu

0 800 1,600 FEET

HHF PLANNERS places for people

Fishponds are an allowable use within the Protective Subzone designated for Kawainui's wetland, and the State Office of Conservation and Coastal Lands has a streamlined permit process for fishpond restoration (Hoʻāla Loko Iʻa). Thus, fishpond repair or restoration used for cultural practices can be permitted. However, DOFAW is not planning to include fishpond restoration at Kawainui at this time, but some areas could be considered in the future based upon wetland restoration progress.

4.3.2.1 No Action Alternative

Under this alternative, no commercial agriculture or aquaculture activity would occur within the project area. Only the ongoing taro loʻi cultivation as part of cultural practices implemented by non-profit organizations would continue at Ulupō Heiau, Nā Pōhaku and Pōhakea.

The continuation of ongoing wetland restoration and reforestation activities within the Kawainui-Hāmākua project area would not impact existing taro loʻi sites. Ongoing educational and cultural programs in partnership with DOFAW, DSP and non-profit organizations would continue to utilize taro lo'i sites as part of those program activities. Construction of a vegetation processing facility next to the model airplane park and improvements at the Kalāheo park site should similarly have no effect on activities occurring at taro loʻi sites.

4.3.2.2 Proposed Action

No commercial agriculture or aquaculture activity are planned under the project, and ongoing taro loʻi cultivation as part of cultural practices would continue at Ulupō Heiau, Nā Pōhaku and Pōhakea.

Expansion of wetland restoration and upland reforestation activities would not negatively impact existing taro loʻi sites or activities conducted at them. Wetland restoration would improve water flow throughout the wetland and water quality by reducing invasive vegetation and peat mat. This should have a beneficial effect and support taro loʻi sites at Nā Pōhaku and Pōhakea, which utilize water from Kawainui's wetland.

A diversity of native vegetation grown as part of upland reforestation activities could be used as a resource for supporting Hawaiian cultural practices and stewardship of upland areas in partnership with DOFAW. Such native vegetation could support medicinal practices, serve as resources for traditional arts and dance, for creating instruments, or include the cultivation of traditional crops such as taro, sweet potato, yam and breadfruit as part of cultural or educational activities. Therefore, upland reforestation activities would have a minor beneficial effect supporting agricultural activities for cultural practices.

Construction and operation of the education center and kauhale complex at Pōhakea should have minimal impact to the taro lo‘i present at this site. The education center would be sited a sufficient distance away from and above (inland) the lo’i site, and BMPs would be implemented during its construction to minimize effects from discharges of stormwater runoff during periods of heavy rain. Pedestrian trails and the kauhale complex constructed would also have minimal effects, and BMPs would be implemented during their construction. These improvements at Pōhakea would have a beneficial impact by supporting educational and cultural programs conducted, of which the taro lo‘i would be a part of.

The cultural center designated for the Kapa‘a area would include existing wetland area along this site that can be used for restoring taro lo’i as part of cultural practices and educational programs at this center. Wetland restoration is not planned by DOFAW in this northern area of Kawainui. Thus, restoring lo’i use of an area by a non-profit organization would support DOFAW’s restoration efforts because invasive vegetation and peat mat now present and impacting the wetland would be removed. The lo‘i would create more open water and now include non-invasive native vegetation being grown and managed supporting stewardship of the area. These beneficial activities would support adding more culturally-based agricultural use and activities in this area.

Other project improvements such as those at ~~Kalāheo park,~~ Wai‘auia, Hāmākua, Pu’uoehu, and pedestrian trails would not increase culturally-based agricultural activities in the project area, but would not impact existing taro lo‘i sites and activities.

4.4 NOISE

Noise Standards

Various State and federal agencies have established guidelines and standards for assessing environmental noise impacts and set noise limits as a function of land use. A brief description of common acoustic terminology used in these guidelines and standards is presented.

1. State of Hawai‘i, Community Noise Control. This regulation defines three classes of zoning districts and specifies corresponding maximum permissible sound levels due to stationary noise sources such as air-conditioning units, exhaust systems, generators, compressors, pumps, etc. It also regulates noise related to agricultural, construction, and industrial activities, which may not be stationary. The maximum permissible noise levels are enforced by the State DOHA for any location at or beyond the property line and shall not be exceeded for more than 10 percent of the time during any 20-minute period. The specified noise limits that apply are a function of the zoning and time of day as shown in Exhibit 4.31.

2. Community Response to Change in Noise Level.

Human sensitivity to changes in sound pressure level is highly individualized. Sensitivity to sound depends on frequency content, time of occurrence, duration, and psychological factors such as emotions and expectations. However, the ability of an individual to perceive changes in noise levels is documented, and the following guidelines shown permit estimation of an individual's probable perception of changes in noise levels.

Another commonly applied criterion is the "community response scale" proposed by the International Standards Organization (ISO) of the United Nations. The scale shown below relates changes in noise level to the degree of community response, and allows for direct estimation of the probable response of a community to a change in noise level. The values stated in these two tables are not regulatory requirements, but are very useful in assessing the human perception to changes in sound levels.

Zoning District	Day Hours (7 AM to 10 PM)	Night Hours (10 PM to 7 AM)
CLASS A Residential, Conservation, Preservation, Public Space, Open Space	55 dBA (Exterior)	45 dBA (Exterior)
CLASS B Multi-Family Dwellings, Apartments, Business, Commercial, Hotel, Resort	60 dBA (Exterior)	50 dBA (Exterior)
CLASS C Agriculture, Country, Industrial	70 dBA (Exterior)	70 dBA (Exterior)

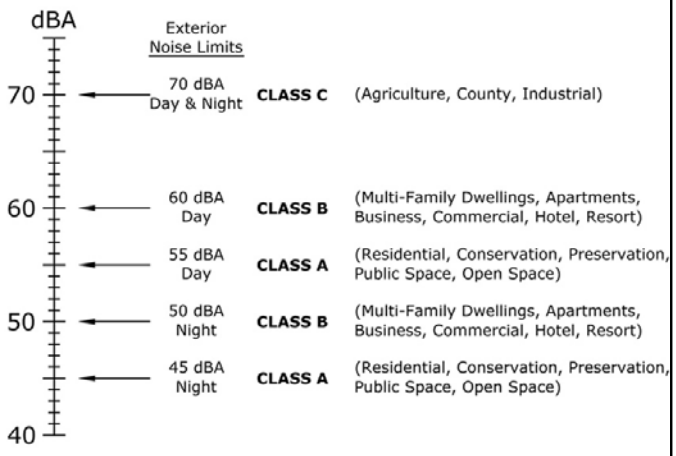


Exhibit 4.31 State DOH Community Noise Control Standards

Community Response to Increases in Noise Levels		
Sound Level Change (dB)	**Category**	**Response Description**
0	None	No observed reaction
5	Little	Sporadic Complaints
10	Medium	Widespread Complaints
15	Strong	Threats of Community Action
20	Very Strong	Vigorous Community Action

Average Ability to Perceive Changes in Noise Level	
Sound Level Change (dB)	**Human Perception of Sound**
0	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	Two times (or 1/2) as loud
20	Four times (or 1/4) as loud

4.4.1 Existing Conditions

A variety of activities and land uses surrounding the project area are currently sources of ambient noise. The project area is bounded by major roadways such as Kapaʻa Quarry Road, Kalanianaʻole Highway, Kailua Road and Hāmākua Drive, and traffic on these roads are presently the primary generators of noise. Other noise is generated by industrial uses along Kapaʻa Quarry Road, commercial activities near Kailua town, and to a lesser extent, recreational, residential uses, churches, and schools.

In the vicinity of the Kapaʻa Light Industrial Park, the main sources of noise on Kapaʻa Quarry Road are vehicular traffic, industrial and commercial activities and remote controlled (R/C) model airplanes operated at the Model Airplane Park. Noise from the Kapaʻa refuse transfer station operation is minimal, buildings are over 250 feet away from Kawainui, and operations occur only during business hours. Audible noise from the Kapaʻa industrial park is also insignificant because it is located about 1,000 feet away from Kawainui. Distant noise such as traffic from the H-3 Freeway and overflying aircraft are also minimal. Traffic noise levels just north of the project area at the intersection of Kapaʻa Quarry Road with Kapaʻa Quarry Access Road (leading into the industrial area) were evaluated as part of the Final EIS for the Kapaʻa Light Industrial Park project (SD&C, 2011). Based on peak traffic volume for cars and heavy trucks on Kapaʻa Quarry Road, at an average speed of 30 mph (cars) and 25 mph(trucks), noise levels were estimated at 60 decibels (dB) Ldn, (average calculated day-night level) comparable to an average urban residential area (SD&C, 2011).

Similar noise levels are likely to be found along the southern half of Kapaʻa Quarry Road or slightly lower due to the absence of developed uses (only Le Jardin Academy). Le Jardin Academy, a K-12 school, is located mauka of Kapaʻa Quarry Road and the Kawainui project site. Any noise generated from educational activities occurring there should be minimal due to the distance between the nearest classrooms and activity areas from the Kawainui (about 250 to 300 feet away).

Kalanianaʻole Highway and Kailua Road, which border the Kawainui project area on its southwest side, have greater volumes of traffic, some commercial uses, but predominantly residential uses. Background noise levels would thus be higher than along Kapaʻa Quarry Road. Similarly, noise levels on Mōkapu Saddle Road would be higher than Kapaʻa Quarry Road due to the higher volume of traffic.

The U.S. Department of Housing and Urban Development (HUD) has a simplified Day/Night Noise Level Electronic Assessment Tool (provided on HUD's website) that can be used to generally estimate approximate day/night traffic noise levels (Ldn) along a property. Ldn is the average noise level over a 24-hour period, measured by the relative intensity of sound, or decibels (dB), on the "A" weighted scale (dBA). This scale most closely approximates the

response characteristics of the human ear to sound. The higher the number on the scale, the louder is the sound.

Traffic data (2015) obtained from the State Department of Transportation, Highways Division, for Kalaniana‘ole Highway and Kailua Road show a relatively heavy volume of 24-hour traffic of 49,000 and 29,360 vehicles, respectively. Mōkapu Saddle Road near Kalāheo High School had volumes of about 27,010 vehicles. Hāmākua Drive near the entrance to DOFAW’s Hāmākua wetland had volumes of about 15,260 vehicles.

Based upon these volumes, the HUD model estimates the southern end of Kawainui from Kapa‘a Quarry Road to the Adventist Health Castle medical center likely has noise volumes in the range of 72.2 Ldn, which is common along major highway corridors such as Kalaniana‘ole Highway. This area of Kawainui is presently undeveloped and unoccupied, and ongoing wetland restoration and upland reforestation activities would not be distracted by existing noise volumes along the highway. Noise volumes appear to decrease significantly toward the Wai‘auia end due to considerably lower traffic volumes along Kailua Road. An estimated noise level in the range of 67.8 Ldn would also be common along major arterial roadways such as this. Traffic volumes along Mōkapu Saddle Road are similar to Kailua Road, and estimated noise volumes are in the range of 67.4 Ldn. Along Hāmākua Drive, estimated noise levels would be in the range of 63.6 Ldn due to the lower number vehicles.

4.4.2 Potential Project Impact and Mitigation

Noise from construction activities is regulated under Title 11, Chapter 46 (Community Noise Control) of the State DOH’s Administrative Rules (State of Hawai‘i, 1996). The zoning district classification and maximum permissible sound levels are summarized in Table 4.4 below. The project falls under the Class A zoning district category that applies to properties zoned for preservation and conservation types of land uses. The maximum permissible noise level for this site under Class A is 55 dBA at the property line during daytime and 45 dBA during nighttime.

Table 4.4
State DOH Community Noise Level
Classification of Zoning Districts and Maximum Permissible Sound Levels

Zoning District	Maximum Permissible Sound Levels (dBA)	
	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
Class A: Includes all areas equivalent to lands zoned residential, conservation, preservation, public space, open space, or similar type.	55	45
Class B: Includes all areas equivalent to lands zoned for multi-family dwellings, apartment, business, commercial, hotel, resort, or similar type.	60	50
Class C: Includes all areas equivalent to lands zoned agriculture, country, industrial, or similar type.	70	70

4.4.2.1 No Action Alternative

Under the No Action Alternative, existing noise-generating activities in and around the project area should continue. However, noise from surrounding land uses are not significant because vehicular traffic along roadways are the main source for noise levels.

The expansion of the Kapa‘a Light Industrial Park is proposed to occur over a span of 18 years, and is not expected to have a significant noise impact on the project area. The Final EIS for that expansion noted that noise impacts would be short-term, and largely associated with construction activities. It noted that no sensitive noise receptors are located within the range of construction noise. The increased noise impacts due to the expected increase in traffic would be below the threshold discernable to the human ear, and typical for industrially zoned land (SD&C, 2011).

Wetland Restoration and Upland Reforestation

Under this alternative, DOFAW maintenance activities, wetland restoration, and upland reforestation at the Kahanaiki subarea would continue. These activities would generate some short-term noise associated with the movement of trucks and vehicles, operation of mowers, chainsaws (tree trimming), other maintenance equipment, and contractor related-activities. No long-term impacts on noise levels would occur from wetland restoration and reforestation activities. Maintenance activities would generate some noise (e.g. periodic mowing), but would not have significant long-term noise effects on surrounding uses.

Noise generated by these activities should have minimal effect on other existing surrounding uses because of the distance away. In the Kahanaiki area, only Le Jardin Academy is located in the immediate vicinity, and nearest classrooms are located on the hillside over 300 feet away from areas where upland reforestation would occur. There are no other existing uses along Kapa‘a Quarry Road where wetland restoration activities would be occurring.

Restoration improvements would generate some minor short-term noise associated with activities during the day, but they would not be scheduled at night. Such activities would temporarily increase ambient noise levels within the vicinity of the work area. The project would generate some noise primarily from equipment used for restoration activities (e.g. mowing, grubbing, etc.) along with construction activities that may be audible at the property line. Actual noise levels produced would depend on the methods employed throughout restoration and reforestation activities. Equipment used would not require jackhammers or other loud earthmoving equipment.

Restoration and other construction-related activities would be limited to regular workday hours (7:30 a.m. to 4:30 p.m., Monday through Friday). Therefore, these activities should not result in a significant noise impact on surrounding uses that predominantly consist of undeveloped land except for Le Jardin Academy. Measures to control construction noise include the use of mufflers on power equipment and vehicles. If necessary, a community noise permit for construction activities would be obtained from the State DOH to allow these activities. This

permit includes restrictions to help mitigate the potential noise impacts resulting from short-term construction activities.

Vegetation Processing Facility and Kalāheo Park

Construction of the vegetation processing center would generate some minor short-term noise from activities during the day. No night work would occur. Construction activities should not have a significant impact on adjacent uses that consist of industrial uses (Kapa‘a Transfer Station) and the model airplane park.

Kalāheo park improvements would likely consist of predominantly site work because minimal facilities would be constructed there. Construction of the pedestrian bridge over the canal would likely generate some noise based upon its design. Residential lots are located on the northeast (makai) side of this property, and Kalāheo High School is located across the street.

None of the noise from these construction activities should be high enough to cause hearing loss for nearby residents, park users, etc. However, people may need to occasionally raise their voice or reduce the talker-to-listener distance in order to communicate effectively. The severity of the speech interference would depend on how close persons are to the sites where construction activities are occurring. Although this noise disruption would likely occur over the duration of the construction period, the impact of these disruptions are minor and of a short-term duration. Noises would not prevent or significantly disrupt persons from flying model airplanes at the park, which are not noise sensitive activities.

Construction activities would thus result in short-term, but insignificant noise impacts. The extent of these impacts at any of the receptor locations would vary depending on the stage of construction, specific equipment being used, distance to the receptor, and the duration of each activity. Therefore, the ability to control construction noise levels relates primarily to the duration and time of construction activity in any one day.

The actual noise levels produced during construction activities would be a function of the methods employed during each stage of the construction process by the contractor. Measures to control construction noise would include the use of mufflers on power equipment and vehicles as part of BMP measures. If necessary, a community noise permit for construction activities would be obtained from the State DOH.

Vegetation processing operations and recreational activities at the Kalāheo site would generate some noise in the long-term. This noise would likely be intermittent and only occur during normal daylight hours. Vehicular traffic along Kapa‘a Quarry Road and Mōkapu Saddle Road would be the primary source of background noise that should screen some of the noise generated from activities at these sites. Vehicle noise on these roadways should have little impact on activities conducted. Increased noise levels generated from these sites could be loud enough to be perceived (3 to 6 dB change), but should not be loud enough to generate widespread

complaints (10 dB sound level change). Vegetation processing operations should have minimal effects on activities occurring at the airplane park or refuse transfer station.

Noise-generating sources associated the Kalāheo park site would primarily be human voices resulting from activities conducted. Paddlers calling out instructions, loading and unloading canoes from vehicles, etc. would generate some noise from human voices. Paddling activities along the canal could also be audible, but should not significantly impact activities occurring in homes along the canal, which also generate their own form of noise (e.g. human voices, dog barking, televisions, etc.). Paddling activities would not occur during early morning hours, and other restrictions could be included as part of permit conditions issued by DSP.

4.4.2.2 Proposed Action

Wetland Restoration and Upland Reforestation

Expanded wetland restoration and upland reforestation activities by DOFAW would generate similar types of noises as activities conducted under the No Action Alternative. Short-term noise would be associated with the movement of trucks and vehicles, operation of mowers, tree trimming, other maintenance equipment, and contractor related-activities. No long-term impacts on noise levels would occur from these wetland restoration and reforestation activities.

Noise generated by these activities should have minimal effect on other existing surrounding uses along Kapaʻa Quarry Road and Mōkapu Saddle Road because most adjacent areas are undeveloped. Other existing uses are mainly industrial related that include the refuse transfer station, industrial park, airplane park, and future vegetation processing facility. The area adjacent to the southern Mokulana section of Kawainui is undeveloped. The hillside area between the medical center and Waiʻauia would essentially remain with the exception of the some upland reforestation. Restoration activities at Hāmākua and Pu'uoehu include inland areas that should not effect a commercial boating business and a few residents situated at the north and south ends of this area.

Restoration and reforestation improvements would generate some minor short-term noise associated with activities during the day, but they would not be scheduled at night. Such activities would temporarily increase ambient noise levels within the vicinity of the work area. Actual noise levels produced would depend on the methods employed throughout restoration and reforestation activities. These activities would be limited to regular workday hours (7:30 a.m. to 4:30 p.m., Monday through Friday). Measures to control construction noise include the use of mufflers on power equipment and vehicles. If necessary, a community noise permit for construction activities would be obtained from the State DOH to allow these activities.

Structures and Trails

Construction Period. Construction of trails~~, boardwalks~~ and structures will generate temporary, short-term noise. Site preparation, particularly for more sloping sites such as the education center, would involve the use of heavy machinery such as backhoes and trucks for clearing, grading, and excavation. The construction of buildings would also include the use of other equipment and skilled laborers (e.g. carpenters) that would generate noise from activities.

Grading and earthmoving equipment such as bulldozers and diesel-powered trucks would probably be the loudest equipment used during construction. Typical ranges of construction equipment noise vary between 70 and 80 dBA at a distance of 50 feet from the source. With increasing distance from the noise source the noise level declines. As a general rule, the noise level decreases approximately 6 dBA with the doubling of the distance. This means that a truck generating 72 dBA at a distance of 50 feet would generate 66 dBA at a distance of 100 feet (SD&C 2011).

~~With the exception of the Kalāheo site, n~~None of the proposed buildings for the education center or cultural centers are situated near a residential area or other locations with sensitive noise receptors. The sites for the education center with kauhale complex and the cultural center at Kapa‘a are located on Kapa‘a Quarry Road. Nā Pōhaku is located adjacent to the education center at Pōhakea, and no existing uses are present in the vicinity. At the Kapa‘a site, the future vegetation processing facility would be adjacent to it, and the industrial refuse transfer station is located across the street. The Wai‘auia site is located near a busy intersection with nearby land uses consisting of commercial development such as a boat business is located across the street. The City’s wastewater pump station is also situated next to this site. Therefore, construction of these cultural centers and the education center should not have a significant short-term noise impact on any sensitive uses.

Construction of improvements to DOFAW’s management station should not impact the medical center located above the hillside on Ulukahiki Street. The nearest medical center building is over 150 feet away from the management station, and their buildings are air conditioned further reducing any human perception of noises from outside areas. At Hāmākua, the restroom and storage structure would be located next to existing residences. Short-term construction of these minor structures would likely be audible, but should not significantly impact residences. ~~At Kalāheo park, the project includes adding a hale wa‘a and eliminating the pedestrian bridge over the canal. While some short-term construction noise would be generated by the hale wa‘a construction, eliminating the pedestrian bridge reduces a fair amount of noise that would be associated with its construction. Ulupō Heiau only includes a green house and hale that would likely be constructed in a short time, and not generate significant construction noise.~~

Pedestrian trails would primarily involve limited site work that wouldn't include large machinery such as bulldozers, reducing noise effects. Accessory structures along the trails would be small and also not require large equipment for their construction, since it would more likely involve more carpentry type of work. Most trail segments are located away from residential areas, with the exception of proposed trails within the Ulupō Heiau SHP area near Ulupō Heiau. The closest residences along Manu Mele Street are approximately 150 feet away from the proposed trails.

None of the noise from these construction activities should be high enough to cause hearing loss for nearby residents, business employees, etc. People may need to occasionally raise their voice or reduce the talker-to-listener distance in order to communicate effectively. Most of these sites are located considerable distances away from existing uses, residences, etc. Therefore, the impact of these disruptions from construction activities should be minor and of a short-term duration.

Measures to control construction noise include the use of mufflers on power equipment and vehicles. Other BMPs would be developed as part of the design plans for these various project improvements. If necessary, a community noise permit for construction activities would be obtained from the State DOH to allow these activities. The permit would include restrictions to help mitigate the potential noise impacts, and could include the following mitigations:

- Limit the type of noise to certain times during the day;
- Temporary noise barriers to shield sensible receptors or noises sources that are operating close to occupied buildings;
- Schedule operations that are especially noisy operations to occur at the same time during the day; and
- Use low noise emission equipment, such as encapsulated compressors.

Operations and Activities. Once completed, the use of new pedestrian trails, ~~boardwalks,~~ education and cultural centers, etc. would allow increased public access to areas. Activities conducted would generate additional noise primarily in the form of human voices as part of conversations and vehicles entering and exiting sites.

Activities occurring at the education center, cultural center at Kapa‘a, and pedestrian trails along the Kapa‘a Quarry Road corridor should have minimal effect on existing surrounding uses. As previously discussed, these consist mainly of industrial uses and activities, Le Jardin Academy where campus buildings are located a considerable distance away, and the model airplane park. Noise from activities in these areas (primarily be human voices) would likely be intermittent and only occur during normal daylight hours. Vehicular traffic along Kapa‘a Quarry Road and Mōkapu Saddle Road would be the primary source of background noise that should screen some of the noise generated from activities. Since most activities at these sites would occur within buildings and are located considerable distances away from other uses, the level of noise perceived would likely be imperceptible or just barely perceptible (0 to 3 dB change).

The cultural center at Waiʻauia should similarly have minimal noise impacts on surrounding uses due to the type of uses present (wastewater pump station), background noise from vehicle traffic along Kailua Road, and distance away from other uses. Most activities would occur within buildings, and the level of noise potentially perceived from surrounding areas would likely be imperceptible or just barely perceptible (0 to 3 dB change).

~~Project improvements at the Kalāheo park site should involve minimal change to noise from activities because of the hale waʻa constructed. Paddlers calling out instructions, loading and unloading canoes, etc. would continue to generally generate the same amount of noise. Paddling activities along the canal would continue to be audible, but should not significantly impact activities occurring in homes along the canal. Paddling activities would not occur during early morning hours, and other restrictions could be included as part of permit conditions issued by DSP. This would not change with the project improvements.~~

Activities already occurring at Ulupō Heiau would continue and have a relatively small increase in participation with the project. Voices from these activities should have minimal effect on the Windward YMCA operations, church operations, and existing nearby residences. Persons using the pedestrian and foot trails from ~~Waiʻauia to Mokulana Peninsula~~ Ulupō Heiau to DOFAW's management station should generate minimal noise that would mainly consist of human voices, and would only occur during the day.

Additional personnel operating out of DOFAW's management station should have no effect on the nearby medical center or residences of the Kūkanono subdivision. This station is located a considerable distance away from these uses, and most activities would occur within buildings or involve staff working within the field at Kawainui. Activities occurring would likely be imperceptible at the medical center. At Hāmākua, the restroom and storage facility would generate minimal noise from present management and maintenance activities already occurring there. Therefore, adjacent residences should not be impacted by activities occurring at Hāmākua.

4.5 AIR QUALITY

4.5.1 Existing Conditions

Ambient concentrations of air pollution are regulated by both National and State ambient air quality standards (AAQS). National AAQS are specified in Section 40, Part 50 of the Code of Federal Regulations (CFR), while State of Hawai'i AAQS are defined in Chapter 11-59, HAR. National and State AAQS have been established for six criteria pollutants: carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), lead (Pb), ozone (O_3), and concentrations of particulate matter (less than 10 microns (PM_{10}) and less than 2.5 microns ($PM_{2.5}$)). The State has also set a standard for hydrogen sulfide (H_2S). National primary standards are designed to protect the public health with an "adequate margin of safety." National secondary standards, on the other hand, define levels of air quality necessary to protect the public welfare from "any known or anticipated adverse effects of a pollutant." Table 4.5 summarizes both the National and the State AAQS.

Table 4.5
State and Federal Ambient Air Quality Standards

Air Pollutant	Averaging Time	Hawai'i AAQS	Federal (NAAQS)	
			Primary	Secondary
Carbon Monoxide (CO)	8-hour 1-hour	4.4 ppm 9 ppm	9 ppm 35 ppm	-- --
Lead (Pb)	Quarter 3-months	1.5 µg/m^3 --	1.5 µg/m^3 0.15 µg/m^3	1.5 µg/m^3 0.15 µg/m^3
Nitrogen Dioxide (NO_2)	Annual 1-hour	0.04 ppm --	0.053 ppm 0.100 ppm	0.053 ppm --
Ozone (O_3)	8-hour	0.08 ppm	0.075 ppm	0.075 ppm
Particulate Matter <10 microns in diameter (PM_{10})	Annual 24-hour	50 µg/m^3 150 µg/m^3	-- 150 µg/m^3	-- 150 µg/m^3
Particulate Matter <2.5 micrometers in diameter ($PM_{2.5}$)	Annual 24-hour	-- --	15 µg/m^3 35 µg/m^3	15 µg/m^3 35 µg/m^3
Hydrogen Sulfide (H_2S)	1-hour	0.035 ppm	--	--
Sulfur Dioxide (SO_2)	Annual 24-hour 3-hour 1-hour	0.03 ppm 0.14 ppm 0.50 ppm --	-- -- -- 0.075 ppm	-- -- 0.50 ppm --

Source: State Department of Health, 2008

Secondary public welfare impacts may include such effects as decreased visibility, diminished comfort levels, or other potential injury to the natural or man-made environment. State AAQS are designed "to protect public health and welfare and to prevent the significant deterioration of air quality." Each of the regulated air pollutants has the potential to create or exacerbate some form of adverse health effect or to produce environmental degradation when present in sufficiently high concentration for prolonged periods of time. The AAQS specify a maximum allowable concentration for a given air pollutant for one or more averaging times to prevent

harmful effects. Averaging times vary from one hour to one year depending on the pollutant and type of exposure necessary to cause adverse effects. In the case of the short-term (i.e., 1- to 24-hour) AAQS, both National and State standards allow a specified number of exceedances each year.

Present Air Quality in Area

Much of the manmade particulate emissions originate from area sources, such as the mineral products of industrial and agricultural activities. Manmade sulfur oxides are emitted almost exclusively by point sources, such as power plants and other fuel-burning industries that are not present in the Kailua region. Nitrogen oxides emissions emanate predominantly from area sources (mostly motor vehicle traffic), although industrial point sources contribute a significant share. The majority of carbon monoxide emissions occur from area sources (motor vehicle traffic), while hydrocarbons are emitted mainly from point sources.

Air quality in the State can be generally characterized as relatively clean and low in pollution. The Island of O‘ahu was in attainment of all National and State ambient air quality standards in 2014 (DOH, 2015). Tradewinds predominant throughout the year typically carry emissions and other air pollutants from inland areas out toward the ocean.

Vehicular-related emissions would be in the form of carbon monoxide (CO) generated by traffic along major roadways. Vehicular traffic along Kalaniana‘ole Highway is fairly heavy particularly during commuter peak periods, but traffic flows fairly well past the highway’s intersection with Kapa‘a Quarry Road, Auloa Road, and Kailua Road. Similarly, traffic along Kailua Road is fairly heaving during commuter peak periods but flows fairly well up to the main Hāmākua Drive intersection. Mōkapu Saddle Road has less traffic than Kailua Road and flows fairly well past Kawainui. Therefore, significant traffic congestion does not typically consistently occur at intersections along these roads that would generate increased concentrated emissions of CO. Any emissions are not expected to exceed the State’s one hour AAQS for CO (9 ppm), and should be well within the National AAQS. Therefore, present carbon monoxide emissions from vehicular traffic should not be an issue affecting air quality associated within the project area.

4.5.2 Potential Project Impact and Mitigation

4.5.2.1 No Action Alternative

Wetland restoration and upland reforestation activities by DOFAW could generate minor short-term construction-related impacts on air quality associated with fugitive dust emissions. Fugitive dust emissions would likely arise from dirt moving activities associated with vegetation clearing, replanting of upland areas, and drainage improvements. Less dust emissions would occur from wetland restoration activities due to the wet soil.

These emissions are expected to be limited because upland reforestation would be implemented in phases of smaller areas, would not include large scale grading activities, and mainly consist of landscaping type activities. Only Le Jardin Academy is located in the Kahanaiki subarea that could be affected, and no other uses are in the area. School buildings and classrooms are located a considerable distance away from Kawainui and upslope making the transport of potential fugitive dust to these facilities even less likely.

Development of the vegetation processing facilities and park improvements at Kalāheo would include some site clearing and grading activities that could generate fugitive dust emissions. At the vegetation processing site, only industrial uses (refuse transfer station) are located across the street and the model airplane park adjacently north. Kalāheo High School is located across of the Kalāheo park site and residences are located to the east. These facilities, residences, and activities occurring there should not be adversely impacted from fugitive dust emissions from short-term site preparation activities.

State air pollution controls prescribed under the State DOH's rules (Chapter 11-59, HAR "Ambient Air Quality Standards" and Chapter 11-60.1, HAR "Air Pollution Control") prohibit visible emissions of fugitive dust from construction activities at the property line. Therefore, a dust control plan could be prepared for upland areas, and implemented by the contractor in compliance with these regulations, if required. This would also apply to the construction of the vegetation processing site and Kalāheo park site. Dust control measures may involve implementation of a watering program or use of windscreens. Other measures include best management practices at the job site (i.e. road cleaning or tire washing programs), and use of temporary rock pavers for heavily traveled areas with exposed soils. Exhaust emissions from construction vehicles can be minimized through the proper operation and maintenance of all equipment.

The vegetation processing site is located on Kapa‘a Quarry Road next to the City's Model Airplane Park. Other nearby land uses include the Kapa‘a Light Industrial Park and the Kapa‘a Refuse Transfer Station. There are no residential units in the immediate vicinity with the nearest being from the Coconut Grove subdivision over a half mile away from the vegetation processing site, and located upwind of the prevailing southeasterly trade winds. Vegetation processing activities should thus not result in significant nuisance effects associated with odor from composting. Composting is a three month long process that does not produce harmful byproducts that could leach into the wetland and is generally odorless. The process consists of: 1) grinding material into smaller pieces to speed the process; 2) piling material into windrows to keep green waste moist, and building heat to kill weed seeds and pathogens; and 3) turning windrows every 3 to 7 days to keep green waste exposed to oxygen.

Existing plans to expand the existing 22-acre Kapa‘a Light Industrial Park, located to the west of Kawainui is proposed over a span of 18 years. This would include the addition of additional industrial space, and increase the workforce by approximately 600 new employees. According to that development's Final EIS, there would be an increase in vehicle traffic from the industrial park. However, the increase in traffic and heavy vehicles along Kapa‘a Quarry Road is not

expected to significantly impact air quality in the area. Recent regulations for diesel engines exhaust and cleaner diesel would also reduce the air quality impact of heavy vehicles over time (SD&C 2011).

Increases in vehicle emissions as a result of population growth and development in the future is not expected to be an issue because long-term projections show Kailua's resident population decreasing 6.8% from the year 2000 to 2035 due to the relatively stable and maturing community. Employment within Kailua is also projected to remain fairly level increasing by only 407 jobs over 35 years (2000 to 2035). The major signalized intersections around Kawainui and at Hāmākua Drive are all projected to operate at acceptable levels-of-service (LOS D or better) during the afternoon peak hour. Therefore, excessive congestion at these intersections should not occur that could result in CO emissions from cars waiting at these intersections exceeding the State's one hour AAQS (9 ppm), and should be well within the National AAQS (35 ppm).

Additionally, federal air pollution control regulations require new motor vehicles to be equipped with emission control devices that reduce emissions significantly. Amendments to the Clean Air Act require further emission reductions that have been phased in since 1994. The added restrictions on emissions from new motor vehicles would lower average emissions each year as a greater number of older vehicles leave the state's roadways. This would further reduce the potential for incidences of carbon monoxide concentrations exceeding state standards.

4.5.2.2 Proposed Action

Wetland Restoration and Upland Reforestation

With the project, DOFAW's wetland restoration and upland reforestation improvements would expand to additional areas, but continue utilizing the general methodology, equipment, and phased implementation as discussed under the No Action Alternative. Processing and disposal of vegetation and maintenance debris would involve methods that would not generate air pollutants exceeding State or National standards. Vegetation cut and removed would typically be left within established upland areas, and allowed to dry out and decompose naturally, or taken to the vegetation processing facility.

Expanding the wetland at Hāmākua would require excavating some upland area along the mauka edge of the wetland. Material excavated would generate some fugitive dust emissions. This, material would be spread out and filled over inland areas likely along the lower slope of Pu'uoehu. Fortunately, there are no existing uses on the mauka side of the wetland where excavation activities would be occurring that can be impacted.

Some fugitive dust emissions would likely arise from dirt moving activities associated with vegetation clearing, replanting of upland areas, and drainage improvements. Less dust emissions would occur from wetland restoration activities due to the wet soil. As previously discussed, State air pollution controls prohibit visible emissions of fugitive dust from construction activities

at the property line. Therefore, a dust control plan for upland areas would be prepared and implemented by the contractor in compliance with these regulations, if required. Dust control measures could involve implementation of a watering program or use of windscreens, and other best management practices would be implemented at the job site (i.e. road cleaning or tire washing programs), and use of temporary rock pavers for heavily traveled areas with exposed soils.

Structures and Trails

Construction of trails~~, boardwalks~~ and structures associated with the education center and cultural centers, etc. would involve some site preparation grading and earthwork activities that would generate some fugitive dust. Operation of diesel construction vehicles and machinery would also generate some emissions. Existing residences and other land uses in the immediate area could be affected by short-term nuisance effects primarily from these short-term site preparation activities. Construction of structures, interior improvements, etc. would not generate issues with fugitive dust emissions. Implementation of BMPs and compliance with state air pollution controls should minimize the potential for significant or adverse effects.

Construction of the education center and cultural center along Kapaʻa Quarry Road would not impact sensitive uses, such as residences, because there are none located in the vicinity. These sites are located about a mile away from the Coconut Grove subdivision, and are downwind of the prevailing tradewinds. ~~At the Kalāheo park site, the project would include constructing a hale waʻa and eliminate plans for the pedestrian bridge over the Kawainui Canal. Therefore, these improvements would not generate fugitive dust emission issues for the adjacent residential areas along Mōkapu Saddle Road.~~

At Waiʻauia, existing surrounding uses consist of the sewage pump station and some commercial uses. Given the existing generally flat topography of this site, minimal site preparation work (e.g. grading) would likely be required that may cause fugitive dust emissions. Ulupō Heiau would only include constructing a greenhouse and hale that should generate minimal fugitive dust emissions. DOFAW's management station's site is relatively flat and located downslope of the medical center and Kūkanono residences. Therefore, construction of permanent facilities would require minimal site preparation work, and should generate minimal fugitive dust emissions that may impact surrounding uses. At Hāmākua, some minor site work would occur at the entrance to level the area that may generate some fugitive dust. But, the restrooms and storage facility constructed should not cause emissions.

Construction of pedestrian trails should not generate significant fugitive dust emissions because minimal to minor site preparation activities would be required. Trails are intended to follow natural paths so that minimal changes to existing topographic and site conditions would be required. Foot trails would not be improved, and follow existing natural trails with some clearing of vegetation to improve and clearly designate trail routes. Along the ~~Waiʻauia~~ Ulupo Heiau to DOFAW management station ~~to Kahanaiki~~ section, the trail would be located at the foot of the

hillside and along Kawainui's wetland. These areas are fairly level and would require minimal site preparation work. Accessory structures, such as observation areas, would not require much site preparation work. Therefore, residences of the Kūkanono subdivision area, located high on top the hillside, should experience minimal nuisance effects from fugitive dust during construction activities.

State air pollution controls prohibiting visible emissions of fugitive dust from construction activities at the property line would be followed by the contractor. Other BMPs would also be incorporated into design plans, as appropriate, for implementation by the contractor. This could include a dust control plan specifying implementation of various measures, such as a watering program or use of windscreens. Other measures may include:

- Provide an adequate water source at the site prior to start-up of construction activities.
- Pave or vegetate work areas as soon as possible to reduce dust.
- Provide adequate dust control measures during weekends, after hours, and prior to daily start-up of construction activities.
- Control dust from debris being hauled away from the project site.
- Move construction equipment to and from the work sites during non-peak traffic periods, to the extent possible, in order to minimize disruption to area traffic.
- Implement proper operation and maintenance of all equipment to minimize exhaust emissions from construction vehicles and equipment.

Operation of the education center and cultural centers and implementation of other activities under the project would generate a relatively small increase in vehicular traffic during the weekday afternoon peak hour. However, this increase would not contribute to excessive congestion at major signalized intersections and would not result in CO emissions from cars waiting at these intersections exceeding the State's one hour AAQS (9 ppm). CO emissions should also be well within the National AAQS (35 ppm). The major signalized intersections around Kawainui and at Hāmākua Drive are all projected to operate at acceptable levels-of-service (LOS D or better) during the afternoon peak hour. The intersection of Kailua Road with Hāmākua Drive would operate at LOS E due to delays from the Kainehe Street approach. But such conditions should not cause issues with CO emissions, and would improve considerable outside of this commuter peak hour.

As already discussed under the No Action Alternative, federal air pollution control regulations require new motor vehicles to be equipped with emission control devices that reduce emissions significantly. Amendments to the Clean Air Act require further emission reductions that have been phased in since 1994. The added restrictions on emissions from new motor vehicles would lower average emissions each year as a greater number of older vehicles leave the State's roadways. This would further reduce the potential for incidences of carbon monoxide concentrations in Kailua exceeding state standards, which are considerably more stringent that federal standards.

4.6 VISUAL RESOURCES

4.6.1 Existing Conditions

4.6.1.1 Visual Resource References

References for identifying existing visual resources within and around the project area consist of two City planning documents, *Coastal View Study* (Chu and Jones, 1987) and the *Koʻolau Poko Sustainable Communities Plan* (DPP, 2016). These City planning documents identify important visual resources associated with the project area.

Coastal View Study

The *Coastal View Study* was completed for the City's Department of Land Utilization (now known as the Department of Planning and Permitting) in 1987. The study inventoried significant coastal views and coastal land forms which together make up the scenic shoreline resources on Oʻahu. The study identified views from public viewing points and coastal roadways within the City's Special Management Area (SMA). Within the Koʻolaupoko area, which covers approximately 30 miles of windward Oʻahu coastline, three "viewsheds" were identified. The Kailua Bay viewshed includes the Kawainui and Hāmākua project area. The study identifies two significant roadway views associated with Kawainui:

1. (KP-9) Mauka and makai view corridors at Kawainui Canal.
2. (KP-10) Lateral views into Kawainui from the highway.

The mauka and makai view corridor identified as KP-9 in the study consists of mauka views toward Kawainui at the Kalāheo Avenue Bridge crossing Kawainui Canal. However, the Kawainui project area cannot be seen from this viewing location because it is over one mile away, and this view is only of the canal (Exhibit 4.32).

Lateral views of Kawainui identified as KP-10 are from Kailua Road generally between the Kawainui Vista subdivision and Waiʻauia area before the Hāmākua Drive intersection. Views along this corridor are presently only visible from levee to Waiʻauia. Development of the Kawainui Vista subdivision now prevents views of Kawainui that were likely available when the study was conducted in 1987, and thick vegetation along Kailua Road further prevents views (Exhibit 4.32).

Kawainui is identified as an important open space resource. A significant stationary view of Kawainui looking makai is also identified from the H-3 Freeway and Mōkapu Saddle Road intersection. However, no stationary views are currently available in this area due to the highways. No important views were identified for Hāmākua and Pu'uoehu.



Mauka View of Kawainui Canal from Kalāheo Avenue View of Kawainui from Kailua Road

Exhibit 4.32. Photos of Viewsheds Associated with Kawainui

Source: Google Earth

Koʻolau Poko Sustainable Communities Plan

The *Koʻolau Poko Sustainable Communities Plan,* adopted in April 2016, provides general policy guidance for land use actions by the City. This plan identifies the general orientation and vantage points of major panoramic views within the Koʻolaupoko ahupuaʻa, including the Kawainui-Hāmākua project area. Kawainui is identified as a prominent land feature on the Plan's Open Space Map. There are no special designations identified for Hāmākua and Puʻuoehu. Continuous views of Kawainui are identified from three sections of highways as identified below:

1. Along a stretch of Mōkapu Saddle Road past the H-3 Freeway up to Kalāheo High School.
2. Along a stretch of Kalanianaʻole Highway between Kapaʻa Quarry Road and Adventist Health Castle medical center.
3. Along Kailua Road between the John Lutheran Church and Waiʻauia.

From Mōkapu Saddle Road, there is a short segment where views of Kawainui is visible over vegetation along the roadway from the H-3 on-ramp merge with this road down to the intersection with Kapaʻa Quarry Road (Exhibit 4.33). Along Kalanianaʻole Highway, there are no clear views of Kawainui due to the thick and tall vegetation present along the roadway. Some glimpses of Kawainui may be available through openings within the vegetation. There are views of Kawainui from Kailua Road from the area of the levee down to Waiʻauia (Exhibit 4.33).



View of Kawainui from Mōkapu Saddle Road View of Kawainui from Kailua Road Near Wai'auia

Exhibit 4.33. Photos of Viewsheds Associated with Kawainui
Source: Google Earth

4.6.1.2 Scenic Stationary Viewing Locations

Within the project area, there are some accessible locations from roadways or trails (levee) that currently provide scenic views of Kawainui or the surrounding landscape. Several of these views also have cultural significance in Hawaiian legend. Within the project area, noteworthy views can be seen from behind Adventist Health Castle, and from several locations off of Kapa'a Quarry Road, particularly at Nā Pōhaku o Hauwahine. The elevated rocky promontory at Nā Pōhaku offers a sweeping makai panorama view of the entire wetland. As discussed in Section 4.1, Hawaiian legends associated with this area give this viewing site cultural significance.

To a lesser extent, good mauka views of the wetland are available from walking along the flood control levee. The scenic views from this area are readily appreciated by many community members who walk along the levee for exercise and recreation. The wide expanse of green open space is enhanced by the backdrop provided by the Ko'olau Mountain Range. Due to the vegetation clearing and restoration work being undertaken at Ulupō Heiau, views of the wetland from behind the Heiau are now readily accessible to the public. In general, areas providing views of the open water areas of the wetland are generally perceived by the public as desirable since the open water greatly enhances the aesthetic value of the viewplanes.

Although Pu'uoehu Hillside above Hamākua is not currently accessible to the public, it offers dramatic views of the entire Kawainui and Hāmākua project area, and overlooks an area with great cultural significance. Oral history relates that the stones overlooking Kawainui on Pu'uoehu are sacred to Hauwahine and her companion. This interpretation is connected to the ancient Hawaiian belief that the channel/canal beneath Pu'uoehu connects Kawainui and Ka'elepulu, considered to be the coital connection between the two fishponds, giving the area great mana or spiritual and divine power (CSH, 2017).

Hawaiian legend also speaks of the interconnection of the viewplanes between three Heiau; Ulupō Heiau within the project area and Pahukini and Holomakani, both located outside the project area. Although this visual connection has been emphasized orally, no written documentation exists to confirm the interconnection of viewplanes between the Heiau (WOAI, 1994).

4.6.2 Potential Project Impact and Mitigation

The concepts established in characterizing visual quality from the *Coastal View Study* (Chu and Jones, 1987) were used to assess the visual impacts resulting from this project. Visual qualities associated with scenic resources were evaluated using three factors that were: 1) visual vividness, 2) unity, and 3) intactness. These criteria are briefly described below:

1. Visual Vividness. The memorability of a landscape is derived from contrasting landscape components as they combine to create striking and distinctive visual patterns, taking into account form, line, texture and color.
2. Visual Unity. The degree to which the visual resources of a landscape scene join together to form a coherent, harmonious and visual pattern; a balanced composition between manmade and natural elements.
3. Visual Intactness. The extent to which the landscape is free from visually encroaching features.

Using these criteria, the visual impact of the project was evaluated based upon the degree of change to an existing view or alteration of a scenic resource.

4.6.2.1 No Action Alternative

Wetland restoration and upland reforestation activities by DOFAW would improve the scenic qualities of Kawainui by restoring the natural character of this resource and habitat for waterbirds. Wetland restoration efforts would remove existing invasive vegetation and peat mat to create more open water and seasonal mud flats. Native plants would be used to replace non-native and invasive plants, and themed plantings would be implemented as transition areas from the wetland to upland areas. These efforts would create views of a more native Hawaiian character associated with Kawainui.

Upland reforestation improvements would similarly improve and restore the natural character of a healthy Kawainui because existing non-native and invasive vegetation and trees would be replaced with native vegetation. Vegetation would still be continued along the major roadways of Kalaniana‘ole Highway, Kailua Road and Kapa‘a Quarry Road to serve as partial screens and visual buffers. However, viewing corridors would be created as the thickness of present invasive vegetation particularly along Kapa‘a Quarry Road would be thinned providing views of the wetland and area that are now essentially non-existent. Scenic views from viewing locations within Kawainui (e.g. Nā Pōhaku) would be enhanced with this restoration efforts.

Restoration improvements should thus have a beneficial impact by improving this wetland as a scenic resource, improving available views of it from the highways and Kapa‘a Quarry Road, and enhancing existing views from scenic viewing points. The visual vividness of the wetland should be improved because the contrast of open water, mud flats, and wetland vegetation with themed native plantings on upland areas would create a more striking and distinctive visual pattern than currently exists. Improvements should create a more memorable landscape of the wetland supporting its international designation as a Ramsar Wetland.

The visual unity of the wetland and upland area should also be enhanced by restoration and reforestation concepts planned to create a more harmonious visual pattern of the wetland leading to a transitional area and then to native upland forest areas. Finally, the visual intactness of Kawainui would be enhanced as views of the wetland area are improved by removal of invasive vegetation that visually encroaches on Kahanaiki Stream.

Construction of the vegetation processing facility would not create a new enhanced view of this upland area that is currently overgrown with invasive species. However, it does support restoration efforts across the larger Kawainui area that improve the overall scenic values and qualities of this larger resource. Public access is not provided at this site and no additional scenic viewing points created because it would be processing facility. Therefore, visual impacts associated with this site would be more centered on views of it. Vegetation along Kapa‘a Quarry Road and perhaps around the site’s border could be retained or modified to provide a visual screen and buffer from these activities.

Construction of recreational improvements at the Kalāheo park site would change current views of this particular area from one of overgrown invasive vegetation to a landscaped passive recreational park. With this improvement, public access would be created at this site that would provide additional viewing locations of Kawainui and the canal. Park improvements would generally be minor with limited structures, the site would create an open space view, and allow views of Kawainui from Mōkapu Saddle Road. However, the pedestrian bridge over the canal would be a significant structure possibly contrasting with the more natural and scenic environment.

Thus, the visual vividness of this park would be improved creating an open space park view compatible while slightly contrasting with the background of Kawainui. This would be an improved distinctive visual landscape pattern compared to present views of overgrown invasive vegetation. The visual unity would be somewhat improved by the park creating a harmonious and visual pattern and balanced composition between manmade and natural elements. However, the pedestrian bridge would be the only element impacting the visual unity along with the visual intactness of the site.

4.6.2.2 Proposed Action

Overall, the project would have a beneficial effect by improving the scenic character of Kawainui and Hāmākua through wetland restoration and upland reforestation improvements. Other improvements, such as pedestrian trails, would increase stationary public viewing locations of the scenic resources associated with Kawainui. The education center and cultural centers established in designated areas would increase public views of Kawainui, and support the educational experience and cultural significance of the area.

Wetland Restoration and Upland Reforestation

Expanded wetland restoration and upland reforestation would have beneficial visual and aesthetic impacts by improving this wetland as a scenic resource. As discussed under the No Action Alternative, continued restoration efforts would improve the visual vividness, unity and intactness of the resource that support Kawainui being an important open space resource identified under the *Coastal View Study*.

The visual vividness of the wetland would continue to be improved with the contrast of open water, mud flats, and wetland vegetation with themed native plantings on upland areas. The visual unity of the wetland and upland area would be further enhanced by restoration activities to create a more harmonious visual pattern of the wetland leading to a transitional area and then to native upland forest areas. The visual intactness of Kawainui would also be enhanced as views of the wetland area are improved by removal of invasive vegetation. Project improvements would create a more striking and distinctive visual pattern than currently exists, create a more memorable landscape, and supporting its international designation as a Ramsar Wetland.

Expanded upland reforestation improvements with the project would similarly improve and restore the natural character of a healthy Kawainui with phased removal of existing non-native and invasive vegetation and trees. Vegetation would still be continued along the major roadways to serve as partial screens and visual buffers.

Structures and Trails

The education center at Pōhakea would not prevent or impact views of Kawainui from existing scenic viewing locations at Nā Pōhaku or the levee. However, the center would create a new scenic viewing location for the public to view Kawainui having a beneficial effect because available public access within Kawainui is presently limited.

The education center’s design would be compatible with this upland site that was formerly used for ranch activities and included various structures, and would be reviewed and approved by DSP. Being situated within upland areas and sufficiently setback from the wetland’s periphery, this center would not negatively impact the scenic character of Kawainui’s wetland. It would create a contrasting landscape view with the upland vegetation surrounding it. However, its

design can ensure it creates a coherent and harmonious visual pattern balancing man-made and natural elements. Existing vegetation and the possibility of improving landscaping of this site along Kapa‘a Quarry Road would screen views of the center from the roadway. As a result, the education center should not have a significant impact on views of Kawainui or the scenic character of this resource.

Cultural centers designated at Wai‘auia and Kapa‘a should similarly not have a significant negative impact on views of Kawainui or the scenic value of the wetland. Although not open to the general public, these centers would still create new areas where Kawainui can be viewed by participants of cultural practices and activities occurring there, along with students and the public as part of educational and cultural programs conducted in partnership with both DOFAW and DSP. The design of buildings and structures should be compatible with the surrounding environment because they would serve as cultural centers. Landscaping can be provided at these sites to screen views of the structures from roadways. Therefore, the visual vividness and unity of the sites could be enhanced with appropriately designed cultural center structures contrasting with surrounding upland vegetation and the wetland in the background to provide a unique and harmonious visual pattern.

~~Project improvements at the Kalāheo park site includes adding a hale wa‘a for canoe storage. Depending upon the structure’s design, it should not have a significant impact to views of the improved passive recreational park and supports the cultural diversity and enrichment of Kawainui. It would be a single-story structure, and should be designed to be culturally distinctive while compatible with the site. Addition of the hale wa‘a should not adversely impact the visual vividness created by the open space view of this park. Other hale wa‘a constructed at other City parks have been appropriately designed and compatible with the environment. Eliminating the pedestrian bridge contrasting with the more natural and scenic surrounding environment would improve views of this park site. Removing the bridge improves the distinctive visual landscape pattern of the park, and improves the park’s visual unity by having a more harmonious visual pattern and balanced composition between manmade and natural elements.~~

Permanent facilities added to DOFAW’s management station would not impact views of Kawainui because they would not be visible from roadways. At Hāmākua, the restroom and storage structure would have minimal impact on views of that particularly corner of Hāmākua. These structures would not prevent or impact views of Hāmākua’s wetland from Hāmākua Drive or commercial uses along that roadway. The greenhouse and hale constructed at Ulupō Heiau would have minimal impact on views of the heiau or Kawainui’s wetland. These structures are small and would be situated in appropriate locations within the site.

The proposed construction of trails, ~~boardwalks,~~ observation decks, etc. would provide new viewing opportunities for the public which currently do not exist. ~~Improvements at the Mokulana peninsula would provide scenic views overlooking Kawainui below, and p~~Passive park improvements at DOFAW’s management station would provide views of Kawainui along with the restoration ponds for the public. Trails would consist of foot trails (unimproved trails) and

pedestrian trails (improved trails) ~~including boardwalk structures~~ that would be unobtrusive in appearance and blend into the surroundings.

Observation decks, restrooms, and covered shelters are important accessory structures supporting trails, public access, and the public's ability to enjoy views of the wetland and wildlife. These structures would not be large or significantly block views of the wetland from upland areas. Structures would not be visible from major roadways because they are located at a lower elevation along the wetland or within upland areas, or are screened behind existing vegetation along roadways. Structures would be appropriately designed and reviewed by either DOFAW or DSP for approval, and are compatible and customary features associated with nature parks. Therefore, they would not significantly impact the visual vividness, unity or intactness of Kawainui.

4.7 HAZARDOUS MATERIALS

4.7.1 Existing Conditions

The following background and information on existing conditions is from a Phase I Environmental Site Assessment (ESA) conducted for the U.S. Army Corps of Engineers (USACE) in 2009 for about 693 acres of Kawainui (WCP, 2008). The study area for the Phase I ESA included most of the current Kawainui project area. The purpose of the Phase I ESA was to identify "recognized environmental conditions" (REC), defined as the presence or likely presence of hazardous substances or petroleum products under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, ground water, or surface water of the property (WCP, 2008).

The Phase I ESA included an extensive history of land use within and around the project area. Past land modification and land use was verified through historical aerial photographs, historical topographic maps, Sanborn Fire Insurance Company maps, previous environmental reports, City and County tax information, and interviews with people knowledgeable about Kawainui.

4.7.1.1 Background/Historical Context

Over the past 70 years, the lands immediately adjacent to Kapa'a Quarry Road, have been modified extensively and subject to uses that may have resulted in a release of hazardous materials and petroleum products. Significant land modification within the Kawainui wetland began with the construction of a raised road bed (i.e., Kapa'a Quarry Road) in the early 1950s, resulting in the separation of approximately 35 acres of wetland from the main Kawainui Marsh. In 1966, the original 9,470-foot-long Oneawa Channel and a 6,850-foot-long earth levee were constructed to provide flood control.

By 1963, continued expansion of the Kapa‘a Quarry operation resulted in partial filling of land in the present vicinity of the model airplane park. By 1965, the enclosed 35 acres of wetland on the west side of Kapa‘a Quarry Road (outside of the Kawainui-Hāmākua project area) had been converted to a refuse dump. Overburden from the quarry was used to cover the refuse, which in turn raised the level of the land an estimated 6 to 20 feet over the entire 35-acre area (HHF, 2006). The landfill which existed on the current site of the model airplane park site was closed following World War II, and in 1974 was developed into the model airplane park.

Another dump site existed within the project area along the northern end of Kapa‘a Quarry Road. This dump site was in operation from 1945 through 1978, and at one time, this site reportedly contained numerous abandoned vehicles. This use continued until 1978 when the no dumping prohibition was enforced and all the solid waste was removed.

From 1945 to 1952, the area west of Kapa‘a Quarry Road was a quarry operated by Ameron HC&D (AHD). This site is now the Kapa‘a Sanitary Landfill Facility. During its use as a quarry, it was reported that AHD buried petroleum based solvents in this location. A CERCLA site inspection conducted by the U.S. Environmental Protection Agency (EPA) in June 1987 recommended further investigation of AHD’s former location due to the documented on-site disposal of solvents.

In 1970, the Kapa‘a Sanitary Landfill Facility began operation at the former quarry site. The landfill stopped receiving waste in 1979, and operations expanded southwest to a new cell that began receiving solid waste in 1979 and ceased operation in 1982. The third and final landfill cell, located southwest of the previous site, began receiving solid waste in 1982 and ceased operation in 1997 (WCP, 2008).

Other areas along Kapa ‘a Quarry Road in the vicinity of the project area continue to be used for light industrial uses. Light industry began along Kapa‘a Quarry Road in 1975 when two warehouse buildings were constructed. In the late 1990s, several 2,000-square-foot Quonset huts were developed in this same area along Kapa‘a Quarry Road.

4.7.1.2 Phase I ESA Records Review Results

The Phase I ESA included a search of standard Federal and State government databases of known or potential sources of hazardous materials or waste. The sites identified were predominantly associated with businesses and sites located within the Kailua commercial town area.

1. EPA National Priorities List (NPL). The NPL report is the U.S. Environmental Protection Agency (USEPA) registry of the nation’s worst uncontrolled or abandoned hazardous waste sites, also known as “Superfund” sites. No NPL or proposed NPL sites were found within 1.0 mile of the study area.

2. Resource Conservation and Recovery Act (RCRA) Corrective Actions Facilities (CORRACTS). This database contains information concerning RCRA facilities that have conducted, or are conducting a corrective action in response to a release of hazardous waste or constituents. No RCRA CORRACTS sites were found within 1.0 mile of the study area.
3. RCRA-Treatment, Storage, & Disposal (TSD) Facilities. USEPA's RCRA program identifies and tracks hazardous waste from point of generation to disposal. This database is a compilation of facilities reporting generation, storage, treatment or disposal of hazardous waste. No TSD facilities were found within 0.5 mile of the study area.
4. RCRA-Large and Small Quantity Generators. This USEPA database is a compilation of facilities that report generation, storage, transportation, treatment or disposal or hazardous waste. One Large Quantity Generator was identified within 0.25 mile and there were no reported violations listed. Twenty Large Quantity Generators were identified within 0.25 miles, and only two generators had violations recorded but posed no realistic threat to the study area.
5. Comprehensive Environmental Response, Compensation & Liability Information System (CERCLIS). This database is a comprehensive listing of known or suspected uncontrolled or abandoned hazardous waste sites. No CERCLIS sites were found within 0.50 miles of the study area.
6. State Hazardous Waste Sites (SHWS). SHWS records are the State's equivalent to CERCLIS. SHWS list indicated there were seven sites located within 1.0 mile of the study area. Three sites had a status of "no further action" and were not suspected to have an adverse environmental impact on the study area. Three of the remaining four sites were not suspected to have an adverse environmental impact on the study area due to their distance away and location down gradient from the marsh. The remaining facility was not suspected to have an adverse environmental impact on the study area due to the nature of the reported release (i.e., soil only).
7. Permitted Solid Waste Landfills. This list is compiled by the State DOH. One permitted solid waste landfill was identified within 0.5 mile of the study area. The Kapa‘a Sanitary Landfill, located mauka (west) of the marsh across Kapa‘a Quarry Road is a municipal solid waste landfill owned and operated by the City. This landfill is currently closed. The City needed to implement a groundwater monitoring and leachate characterization plan in accordance with the recommendations of a groundwater task force.
8. Leaking Underground Storage Tank (LUST). This State DOH database identified nineteen LUST sites within 0.5 mile of the study area. Fourteen of the sites have a status of "Site Cleanup Completed", and are therefore not suspected to have an adverse environmental impact on the study area. One site has a status of "Disconfirmed Release", and therefore does not adversely impact the study area. The remaining four sites have a status of "LUST Cleanup Initiated – Petroleum". These

sites were not suspected to have an adverse environmental impact on the study area due to their relative position away from the marsh. Two of them had a status of no further action, and one site had remedial actions properly put in place.

9. Underground Storage Tank (UST). Thirty-one facilities with registered USTs were identified within 0.25 mile of the study area. Of these UST sites, 13 also appear on the LUST database and were previously addressed. None of the remaining UST sites were suspected to have an adverse environmental impact on the study area based on the absence of a reported release.
10. Emergency Response Notification System (ERNS). This database compiles information on the sudden and/or accidental release of hazardous substances, including petroleum, into the environment. The database search revealed that the study area is not a listed ERNS site.
11. Brownfields and Voluntary Response Program (VRP) Sites. This database includes commercial and industrial sites that have been included in the Brownfields Revitalization Program. No Brownfields or VRP sites were identified within 0.5 mile of the study area.
12. State Spills List. These three databases include sites the DOH has earmarked for additional investigation. There were no reported hazardous material releases at the marsh property.
13. Drinking Water Wells. This database is maintained by the State Department of Land and Natural Resources (DLNR) and includes physical characteristics of each well installed in the state. The database identified five (5) wells, although none were drinking water wells, within a 1.0 mile radius of the property. No public water system was located within 1.0 mile (WCP, 2008).

The records review also included a review of previous environmental reports of the subject property and surrounding areas, historical aerial photos and historic topographic maps. Interviews were conducted with people knowledgeable about the current and past practices of the subject property and adjoining properties.

4.7.1.3 Site Reconnaissance Results

As part of the 2008 Phase I ESA, site reconnaissance was conducted in November 2007 to visually and physically observe the property and any existing structures. The reconnaissance noted the general site setting and indications of current and past uses of the subject property and adjoining properties. The intent was to identify potential CERCLA hazards that could affect Kawainui Marsh and surrounding areas.

The current uses of properties adjoining the project area were surveyed. Land uses to the north include Kapa‘a Quarry road and Mōkapu Boulevard. Across Mōkapu Boulevard is Kalāheo High School and undeveloped land. To the south of the project area are Kailua Road, Adventist Health

Castle, the Windward YMCA and two residential subdivisions. Land use to the east of the project area includes the Coconut Grove subdivision. To the west of the project area are Kapa‘a Quarry Road, Kapa‘a Stream, the City’s model airplane park, and one residential property. Across Kapa‘a Quarry Road are the City’s Kapa‘a Transfer Station, Kapa‘a Stream, Kapa‘a Quarry, and multiple light industrial businesses along Kapa‘a Quarry Road. At the time of the 2008 Phase I ESA, there were 27 structures and 40 tenants in the light industrial area. LeJardin Academy is an independent pre-K to Grade 12 school that is located north of Kapa‘a Quarry Road. No evidence of adverse environmental conditions was observed anywhere in the properties adjoining the project area.

The site reconnaissance determined that no potential on-site contamination sources were present within Kawainui. No evidence was found of hazardous materials storage, storage tanks, unidentified substance containers, or petroleum, oil, and lubricant substances. There was no visual evidence of hazardous solid waste disposal in the study area. There were no pole-mounted electrical transformers present on the site, although two Hawaiian Electric Company (HECO) transformers were observed on adjacent streets. These HECO facilities were on Ulukahiki Street and at the Kapa‘a Quarry Road intersection with Mōkapu Boulevard. Both transformers were PCB-free, and were in good condition with no visible evidence of leakage or staining (WCP, 2008).

4.7.1.4 Phase I ESA Findings

The records review conducted as part of the Phase I ESA determined that Kawainui was generally not subject to adverse environmental impact from known or potential sources of hazardous materials. Of those sources identified from various databases, the majority of them were located within the Kailua town area, have been addressed, and situated down gradient from the marsh. The site reconnaissance also concluded that no potential on-site contamination sources existed.

The Phase I ESA identified two sites with recognized environmental conditions (REC): 1) the City’s Kapa‘a Street Light Storage Yard; and 2) Kapa‘a Sanitary Landfill Facility. The site of the former Kapa‘a Street Light Storage Yard is within the project area along Kapa‘a Quarry Road, across the Kapa‘a refuse transfer station. This City’s use of this site for a storage yard has since ended, and the site cleared of most structures with the exception of a chain-link fence.

City Storage Yard

The storage site was used by the City for over 30 years for open storage of construction materials and equipment. In July 2006, the City removed 71 electrical transformers and oil switches, and during removal, one transformer tipped over, releasing an unknown volume of dielectric fluid to bare soil. Matrix sampling by the emergency response contractor detected PCBs in three wipe samples and a soil sample at the site. Following this incident, 42 electrical transformers and oil switches were stored on site. These transformers have since been removed.

The 2008 Phase I ESA noted that the "potential exists for contaminants as PCBs, TPH-d and heavy metals to extend over a larger are than impacted by the 2006 dielectric fluid release." A remedial investigation work plan was prepared, which proposed multi-increment soil and groundwater sampling to characterize the lateral and vertical extent of contaminants of concern. The State DOH concurred with the sampling plan in 2007 and recommended additional quality control/assurance sampling and proper subsample collection and processing that should have been completed by the City.

Kapa'a Sanitary Landfill Facility

The second site with REC is the former Kapa'a Sanitary Landfill Facility (KSLF), located outside and west of the project area. This site, formerly a quarry, was purchased by the City in 1972 and used as an incinerator and ash landfill until its closure in 1997. Following the detection of several volatile organic compounds (VOC) in a monitoring well, groundwater monitoring efforts were conducted at the site in 2000-2001. Five additional monitoring wells were installed in July 2000 to expand the monitoring well network. Following eight rounds of sampling between August 2000 and May 2001, the consistent detection of chlorinated VOCs in two of the six wells led to the conclusion that groundwater may have been impacted by releases from the landfill and may require corrective action. Estimated groundwater movement for all eight rounds of testing consistently trended in an easterly to southeasterly direction.

At the time of the 2008 Phase I ESA, the extent of the chlorinated VOC contamination had not yet been determined, and it was noted to be a REC for the subject property. A 2005 landfill site inspection report (The Environmental Company, 2005) stated that the City was preparing a groundwater monitoring and leachate characterization plan in accordance with the recommendations of a groundwater task force. In its findings, the Phase I ESA concluded that "While the data indicate there to be minimal risk to human health by contaminants of concern originating from the former areal landfills, there is insufficient information to corroborate *de minimis* ecological risk" (WCP, 2008).

Other Sites

The Phase I ESA also identified data gaps, defined in the federal regulations as the "lack or inability to obtain information required to identify conditions indicative of releases or threatened releases of hazardous substances at a site." One data gap identified was the lack of information regarding a former abandoned vehicle dump site along Kapa'a Quarry Road at the north end of Kawainui.

The dump site was reportedly in operation from about 1945 and contained thousands of derelict vehicles that were believed to be removed in the late 1970's. However, no City documentation could be found to corroborate the removal, or a release or threatened release of a hazardous substance. An aerial photograph from 1975 depicted what appeared to be a portion of this dump site at the north end of the wetland. Visual observations of the site conducted as part the Phase I

ESA revealed no physical evidence of environmental stress associated with the former dump site (WCP, 2008).

Sediment Samples

Sediment samples from Kawainui were collected under a 1989 study by AECOS, Inc. conducted for the City's Kawainui flood damage mitigation project as documented in their Final EIS (M&E Pacific, Inc., 1990). The sediment samples indicated that the wetland contained the presence of heavy metals including chromium (Cr), lead (Pb), and mercury (Hg). With the exception of cadmium (Cd) and mercury, both of which occur generally in same concentrations in the samples, the heavy metal presence in the upper wetland sediment (southern end of Kawainui) was substantially greater than that in the lower wetland sediment (northern end of Kawainui). However, nickel (Ni) was found in greater concentration at a particular station in the northwest area of the wetland.

Table 4.6 shows the results of the sediment samples collected which also include arsenic (As), copper (Cu), silver (Ag), and Zinc (Zn). Samples of vegetation mat, consisting of stems, leaves, and roots of wetland vegetation and debris in various stages of decomposition, were also analyzed for various heavy metals, and the results are included in Table 4.6.

Table 4.6
Results of Sediment Heavy Metals from Kawainui (mg/kg)

Sampling Stations	As	Cd	Cu	Cr	Hg	Ni	Pb	Ag	Zn
2. Kahanaiki Stream by Highway	0.50	0.35	9.2	9.8	0.03	17.0	6.0	0.36	6.8
3a. Streams Confluence (April)	1.44	0.34	35.9	56.7	0.08	53.0	12.4	0.28	35.2
3b. Streams Confluence (March)	1.42	0.35	34.8	53.3	0.06	48.0	12.0	0.34	30.8
8. Northwest Area of Marsh	0.40	0.38	41.4	48.5	0.03	86.6	6.8	0.45	33.2
Vegetation Mat Samples									
Sample 1	0.13	0.20		10.2	0.032		13.9	0.20	
Sample 2	0.016	0.20		14.9	0.016		7.5	0.49	
Sample 3	0.063	0.30		34.4	0.024		8.0	0.23	

Source: M&E, 1990

Sediment samples were also analyzed for a variety of other chemical properties that are shown on Table 4.7. These include pesticides and PCBs, and for polynuclear aromatic hydrocarbons (PAH) and phenols using EPA methodologies. The results of pesticides and PCB analyses on the samples were all less than reporting limits. Therefore, none of these potentially hazardous organic compounds was detected in the sediment samples (M&E Pacific, Inc., 1990).

Table 4.7
Miscellaneous Analyses of Sediments from Kawainui (mg/kg)

Sampling Stations	TOC	Total CN-	Total S-	Oil & Grease	Pet. HydroC
2. Kahanaiki Stream by Highway	96,000	<1	17	<100	<100
3a. Streams Confluence (April)	86,000	<1	33	<100	<100
3b. Streams Confluence (March)	38,000	<1	32	180	<100
8. Northwest Area of Marsh	11,000	1.4	81	320	<100

Source: M&E, 1990

A number of metals do occur naturally in the environment at relatively high concentrations. Usually, these metals are combined in insoluble forms and are therefore not very mobile in that they do not move readily into solution in the aquatic environment. The toxicity of these adsorbed forms is not very great under normal circumstances encountered in aquatic environments because they remain bound to the sediment so long as the pH is neutral or slightly basic. They become soluble only if the pH shifts to acidic. These metals would tend to release more into solution at a pH 5 as compared to a pH range of 6 to 8, which is typical of the waters in Kawainui.

In comparison with other O‘ahu watersheds, this was not considered unusual due to heavy metals being naturally present in weathered basalt and would be expected in sediments derived from erosion of this material. As an example, chromium appears to be naturally concentrated in weathered basalt, becoming less concentrated as soil is eroded and carried into streams and then added as coastal deposits. Lead is complexed in the fine deposits of stream and particularly estuarine sediments, where its concentration rises.

The State DOH’s *2006 State of Hawai‘i Water Quality Monitoring and Assessment Report* found a relative abundance of nickel, zinc, chromium, lead, and copper in estuarine sediments, and concluded that metal concentrations in general appear to be influenced by soil mineral composition and weathering of Hawaiian basalts (M&E Pacific, Inc., June 1990). Sediment sample data found that the levels of heavy metals were lower than the maximum concentration of contaminants for characteristics of EP Toxicity, CFR 40-261 (COE, 2008).

4.7.2 Potential Project Impact and Mitigation

4.7.2.1 No Action Alternative

The 2008 Phase I ESA found that Kawainui was generally not subject to adverse environmental impact from known or potential sources of hazardous materials. Known releases of hazardous materials have been located outside the project area and situated down gradient from the wetland. Continuation of wetland restoration and upland reforestation activities are not expected to have an impact on hazardous materials. Wetland restoration activities would involve cutting and removing existing invasive vegetation. Most of these activities will occur at or below less than a foot from the surface.

These activities would disrupt some sediment at the surface that likely contain heavy metals based upon a 1989 study. However, the levels of heavy metals were lower than the maximum concentration of contaminants for meeting the definition of EP Toxicity (being characterized as a regulated hazardous material). This was found to be comparable to other O‘ahu watersheds, given that heavy metals are naturally occurring in weathered basalt and expected in sediments derived from erosion of this material. Metals are entombed in the wetland sediments and concentrated through plant uptake into fibrous tissue in the biomass. Therefore, disturbing this sediment as part of wetland restoration activities should not have a significant impact on Kawainui Marsh or downstream (northbound) areas.

Proposed reforestation of the upland areas involves removing invasive trees and vegetation, and replacing them with native vegetation. These types of landscaping activities are not expected to expose the wetland to hazardous materials that may significantly impact the environment. Contractors would implement best management practices in accordance with regulatory requirements that will further minimize effects on the environment.

Improvements also include development of recreational facilities at the Kalāheo Park site and construction of vegetation processing facilities at Kapa‘a. These activities are not expected to have any impacts on hazardous materials, as these sites were not identified in the Phase I ESA as having recognized environmental conditions.

4.7.2.2 Proposed Action

Wetland Restoration and Upland Reforestation

Expansion of the wetland restoration and reforestation activities should have minimal additional exposure and impacts from hazardous materials as that already being conducted under the No Action Alternative. Wetland restoration activities would continue generally implementing the same methodology involving cutting and removing existing invasive vegetation, with most activities occurring at or below less than a foot from the surface. Heavy metals found are comparable to other O‘ahu watersheds because they naturally occur in weathered basalt and are expected in sediments derived from erosion of this material. Therefore, disturbing this sediment as part of wetland restoration activities should not have a significant impact on Kawainui or downstream (northbound) areas

Expanded reforestation of upland areas would continue to involve removing invasive trees and vegetation, and replacing them with native vegetation. These types of landscaping activities are not expected to expose the wetland to hazardous materials that may significantly impact the environment. Contractors would implement best management practices in accordance with regulatory requirements that will further minimize effects on the environment.

Structures and Trails

The construction of trails, ~~boardwalks,~~ parking areas and buildings (and foundations) would involve some excavation and disturbance of soils below the surface. None of the proposed structures or trails are sited at or near the two sites identified in the Phase I ESA as having environmental concern.

The 2008 ESA Phase I focused on areas where structures remained or once stood. Given the use of the project area for illegal dumping, particularly along Kapa‘a Quarry Road, there is always a possibility that clearing, grubbing and grading could uncover potentially hazardous waste or petroleum products. Any contractor working in the area should be made aware of this, and contingency plans prepared in the event of an inadvertent discovery as part of the design phase and BMP measures.

Finally, the Phase I ESA identified a data gap, or lack of information regarding a former abandoned vehicle dump site along Kapa‘a Quarry Road at the north end of Kawainui. This area is within what is referred to as Subarea C: Kapa‘a-Kalāheo, and is identified in the project for fencing and restoration of upland vegetation. Prior to initiating work in this area, DOFAW would coordinate with DSP to evaluate the need for further investigation of potential hazardous materials. This could include conducting another Phase 1 ESA for this area, and determining if further study or remediation activities are required.

CHAPTER 5: INFRASTRUCTURE AND PUBLIC FACILITIES



5.1 WATER FACILITIES

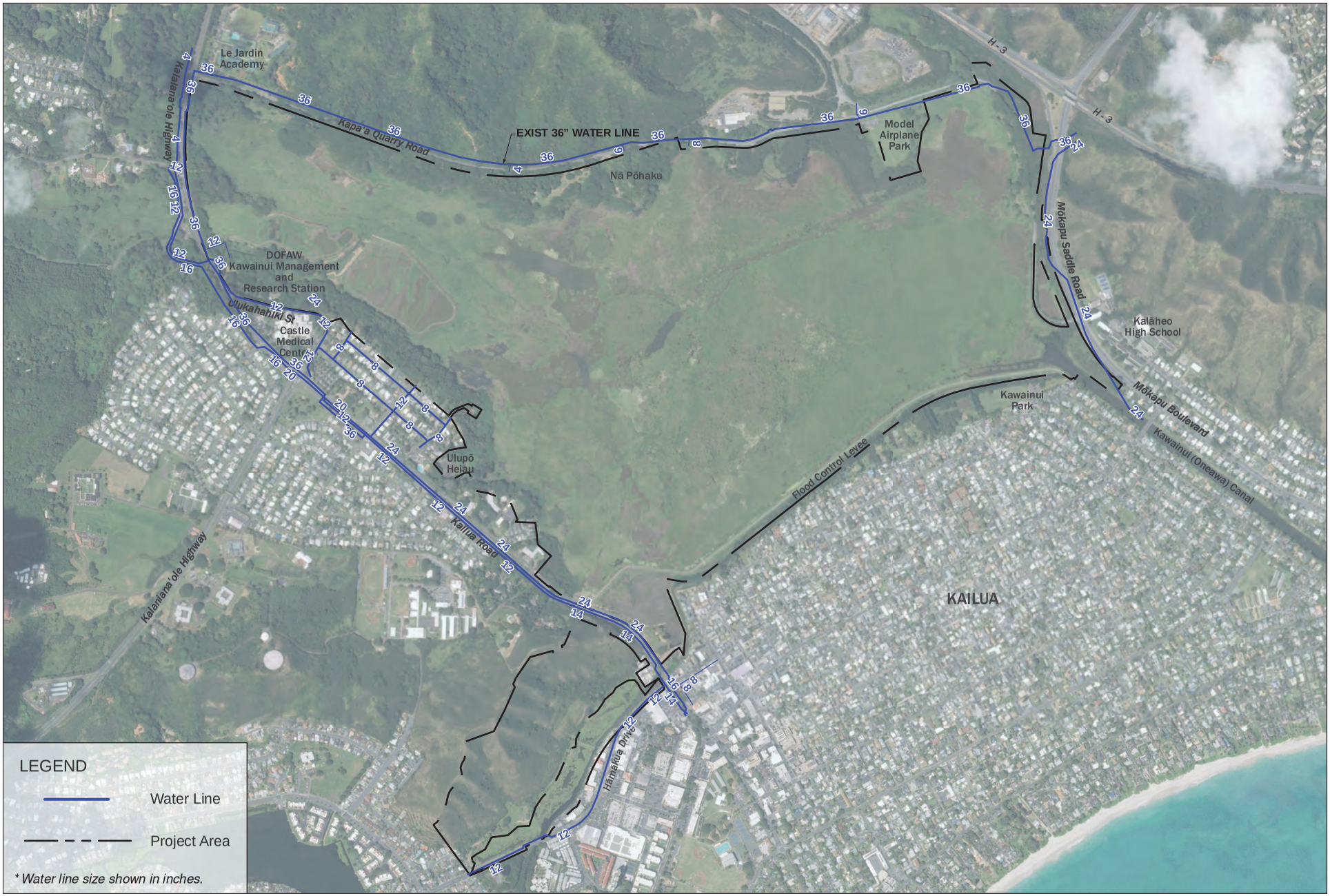
5.1.1 Existing Conditions

The City Board of Water Supply (BWS) provides potable water service on Oʻahu. The Windward Oʻahu region is serviced by several water systems, one of which is the Maunawili water system servicing the project area. The system provides potable water service to residences in the Maunawili community, and extends to Olomana and northward towards Kawainui. There is municipal water service and infrastructure surrounding the entire project area due to the variety of uses located within areas on the fringe of the project area.

The general location of existing water lines are shown in Figure 5.1. Existing municipal water infrastructure that serves the project area include a 36-inch water transmission main along Kapaʻa Quarry Road, a 36-inch main on Kalanianaʻole Highway that transitions to a 24-inch main on Kailua Road, and a 24-inch main on Mōkapu Saddle Road. Near Hāmākua, there is a 12-inch main along Hāmākua Drive.

An existing 12-inch water transmission main running along Ulukahiki Street provides potable water service in the area of DOFAW's management station site where a service lateral provides direct connection for facilities. Smaller service water mains from the 36-inch transmission main along Kapaʻa Quarry Road are provided in the Pōhakea area (4-inch), across of Nā Pōhaku (6-inch), and the area north of Nā Pōhaku (8-inch). An 8-inch main provides service to the City's model airplane park for a fire hydrant and their restroom facility. An existing fire hydrant is located along Hāmākua Drive fronting a residence situated next to DOFAW's gated entrance into Hāmākua. There are no other existing fire hydrants within the project areas for potential new activities.

Currently, the DOFAW management station is the only land use within the project area that generates a demand for potable water. Activities at this management station is estimated to generate an average daily demand of only about 360 gallons per day (gpd) based upon about 18 staff. There is no potable water demand being generated at Ulupō Heiau or at Nā Pōhaku.



Source: State of Hawai'i GIS and AECOM

Kawainui - Hāmākua Master Plan Project

Figure 5.1 - Water Lines

Kailua, O'ahu

0 800 1,600 FEET

HHF PLANNERS places for people

5.1.2 Potential Project Impact and Mitigation

Projected daily potable water demand was based either on the estimated total users daily and average daily demand, or domestic consumption guidelines from the BWS *Water System Standards* (BWS, 2002). Average daily demands were calculated based on estimated usage by visitor or full-time employee. The average daily demands were based on U.S. Geological Service (USGS) Water Science School information, BWS *Water System Standards*, and Title 11, Chapter 62; Wastewater Systems, Appendix F, HAR.

An average daily demand of 5 gallons per day (gpd) was used for visitors or students using the restroom once per trip/visit. Per USGS information, hand washing uses a gallon and a toilet flush uses 3 gallons. The USGS data also indicates that a minute of showering uses 5 gallons of water. Under §11-62, Appendix F, HAR, an average daily demand for cottages and small dwellings is 100 gpd, and 20 gpd for employees working an 8-hour shift.

5.1.2.1 No Action Alternative

Wetland restoration and upland reforestation activities occurring under this alternative would not directly generate a demand for potable water and water infrastructure improvements.

Upland reforestation activities do require some water for irrigation purposes as newly planted vegetation becomes established during the first year. At the Kahanaiki area, a 500-gallon rain catchment system with drip irrigation lines was created to service an acre of upland area that had established reforestation improvements. Irrigation of the area is conducted about twice a month during the dry season (wet season requires less irrigation). About 1,000 gallons of water per month (about 33 gpd) is needed to irrigate an acre of area for the first year. After one year, the rain catchment system can be relocated and reused to irrigate additional areas undergoing upland reforestation, or new catchment systems can be constructed. Therefore, non-potable water would be used to irrigate upland reforestation areas.

DOFAW would like to add a service lateral to provide a more reliable source of water to support upland reforestation efforts in the Kahanaiki area. Coordination with the BWS would be conducted to determine additional demand and service requirements as upland restoration is implemented. Service lateral connections would be designed in accordance with water system standards, and submitted to BWS for review and approval. Because upland reforestation areas would be implemented in phases, likely only a few acres at a time, the additional potable water demand to support irrigation of newly established areas should not have a significant impact on the BWS water system. Reforested areas would only need irrigation during the first year as they become established.

Facility improvements at DOFAW's management and research station would include additional temporary storage containers to support operations and would not generate additional potable water demands. Water demand from DOFAW's operations would continue at existing levels, generating about 360 gpd for existing staff. Operation of the vegetation processing site is estimated to generate a demand of about 100 gpd. Table 5.1 summarizes the projected demand under the No Action Alternative by Subarea, which totals 1,110 gpd for the project area.

This projected demand should not have a significant impact on the current water system or supply capacity. A service lateral connection for the vegetation processing site facilities would be designed in accordance with water system standards, and submitted to BWS for review and approval. The existing fire hydrant at the adjacent model airplane park is believed to be close enough to support fire protection requirements for this facility (400 feet distance from hydrant). The facility's final design would require confirmation of this assumption.

Table 5.1
Projected Water Demand Under No Action Alternative

Description of Project Subarea	Total Users (Daily)	Average Daily Demand (gpd)	Daily Demand (gpd)
Subarea B: Kahanaiki-Nā Pōhaku-Kapa'a			
Vegetation Processing Facility	5	20	100
Subarea C: Kapa'a-Kalāheo-Levee			
Kalāheo Park at Kawainui SPR 1. Restroom 2. Showers/Hose Bib (Canoe Wash Down) *Note: 1 minute shower uses 5 gallons*	 40 90 min.	 5 5	 200 450
Subarea D: Wai'auia-Ulupō-Mokulana			
DOFAW Management & Research Station (Existing) 1. Restroom (Employees)	 18	 20	 360
Total Projected Demand			**1,110**

Construction of a comfort station and accessory improvements (e.g. showers and hose bib) at the Kalāheo Park site will generate additional demand requiring potable water service. It is estimated that activities at this site should use about 650 gpd of water to support visitors using restroom facilities and showers/washing down of canoes after practices.

In participation with a non-profit organization(s), DSP would be responsible for constructing improvements to provide potable water for restrooms, showers, and the hose bib for washing down canoes. Improvements would be connected to a BWS water line north of the site adjacent to Mōkapu Boulevard. The design and implementation of necessary improvements would not have an adverse impact on water systems, and construction plans would be coordinated with the BWS. DOFAW would also coordinate with the BWS during the design phase of improvements to address applicable resource development and water system facility charges. BWS Cross-Connection Control and Backflow Prevention requirements would be complied with prior to the issuance of building permits.

5.1.2.2 Proposed Action

Wetland Restoration and Upland Reforestation

Expansion of ongoing wetland restoration and upland reforestation activities would have a negligible impact on potable water systems or resources because non-potable water would be used as discussed under the No Action Alternative. Non-potable water using rain catchment systems with drip irrigation lines would be used to irrigate additional upland areas as part of reforestation activities. Irrigation of areas is conducted about twice a month, during the dry season, resulting in about 1,000 gallons of water per month for an acre of area during the first year. Use of rain catchment systems would not impact the area's existing water system.

DOFAW may want to add a service lateral(s) for other areas besides Kahanaiki to provide a more reliable source of water to support upland reforestation efforts. Additional potable water demand to support irrigation requirements of newly established areas should not have a significant impact on the BWS water system because reforestation areas would be implemented in phases and likely only a few acres at a time. Coordination with the BWS would be conducted to determine additional demand and service requirements, and improvements would be designed in accordance with water system standards and submitted to BWS for review and approval.

Structures and Trails

The pedestrian trails and accessory structures (e.g. observation decks, pavilion) would not impact the water system and supply because no water service is required (e.g. hose bib, showers). Additional potable water demand would be generated by new facilities established within the project area. Discussion of projected water demand and improvements for these facilities and activities are provided by subarea.

A summary of the total projected average water daily demand generated by the Proposed Action is 2,650 gpd, and is shown on Table 5.2. This total increase is not expected to have a significant impact on BWS's water system. The City BWS indicated that the existing water system is adequate to accommodate proposed improvements in an October 28, 2016 letter included in Appendix A. However, the availability of water serving individual sites will be confirmed during the design phase for these improvements, and when building permit applications are submitted to BWS for approval. On-site system improvements would also need to meet BWS design standards. This total demand generated would also be serviced by different BWS transmission mains (Kapa'a Quarry Road, Kailua Road, and Mōkapu Boulevard) reducing the overall demand being generated from each transmission main.

Table 5.2
Projected Water Demand With Proposed Action

Description of Project Subarea	Total Users (Daily)	Average Daily Demand (gpd)	Daily Demand (gpd)
Subarea B: Kahanaiki-Nā Pōhaku-Kapa'a			
Kahanaiki (Restroom)	10	5	**50**
Education Center, Pōhakea			**1,160**
1. Restroom (Employees)	5	20	60
2. Restroom (Educational Program Visitors)	220	5	1,100
Kapa'a Cultural Center			**380**
1. Cultural Center Facilities	14	20	280
2. Caretaker's Cottage	1	100	100
Subarea D: Wai'auia-Ulupō-Mokulana			
Wai'auia Cultural Center			**335**
1. Restroom (Employees)	3	20	60
2. Restroom (Cultural Program Visitors)	55	5	275
DOFAW Management & Research Station			**630**
1. Restroom (Employees, Including Existing)	30	20	600
2. Restroom (Educational Program Visitors)	6	5	30
Subarea E: Hāmākua-Pu'uoehu			
Hāmākua			**95**
1. Restroom (Employees)	2	20	40
2. Restroom (Educational Program Visitors)	11	5	55
Total Average Daily Demand			**2,650**

Source: AECOM, 2017

Subarea B: Kahanaiki-Nā Pōhaku-Kapa'a. In this subarea, new facilities that will require potable water service include the proposed education center at Pōhākea, a cultural center at Kapa'a, and a restroom serving the Kahanaiki area. On a daily basis, the Kahanaiki restroom should not generate much demand (50 gpd) from use because it is planned to be a small, modest facility. It would primarily service DOFAW staff working in the area and occasional students and adults participating in educational and community service project activities. The vast majority of potential visitors are expected to use restroom facilities at the education center instead. A service lateral connecting to the existing 36-inch transmission main would need to be added to provide water service to this restroom. This restroom should have minimal impact on the BWS water system serving this area due to the low average daily demand generated.

At the education center, potable water will be needed for restrooms, administrative office use, and some irrigation, although non-potable water sources are intended for vegetation. The majority of demand would be from visitors using restrooms at the center. About 1,160 gpd is projected for the education center. At the Kapa'a Cultural Center, potable water demand would similarly be generated from restrooms, administrative office use, occasional kitchen use for activities, and the caretaker's cottage. Average daily demand for users is based upon a rate of 20 gpd for employees working an 8-hour shift (§11-62, Appendix F, HAR). However, cultural and educational programs are not expected to occur on a daily basis.

Potable water for these uses would be provided from the existing 36-inch line along Kapaʻa Quarry Road. Existing smaller lateral service water mains provided in the Pōhakea area (4-inch) and the area north of Nā Pōhaku (8-inch) would likely be used to provide water service directly to the education center and Kapaʻa Cultural Center. Water demand generated from these facilities will not have a significant impact on the existing water system because projected average daily demands are modest, and there are existing water mains already serving the area. The City BWS indicated that the existing water system is adequate to accommodate proposed improvements (October 28, 2016 letter in Appendix A). However, the availability of water will be confirmed during the design phase for these improvements, and when building permit applications are submitted to BWS for approval.

There are no existing fire hydrants near Pōhakea and the Kapaʻa Cultural Center. The design of these facilities will include evaluation of on-site fire protection requirements and improvements. As an alternative, an interior sprinkler system for buildings can be evaluated to address HFD building fire protection requirements. Coordination with appropriate agencies will occur during the design phase to ensure this interior sprinkler system is compliant with requirements. DOFAW and DSP would also coordinate with the non-profit organizations developing these facilities to determine payments for water use along with any applicable water system facilities charges. BWS Cross-Connection Control and Backflow Prevention requirements would be complied with prior to the issuance of building permits.

Subarea D: Waiʻauia-Ulupō-Mokulana. DOFAW's management and research station is already served by the BWS for their restrooms, and some service could be extended to new permanent facilities added to replace temporary storage containers. Therefore, demand generated would be associated with staff use of restrooms and general office use, based on a 20 gpd factor (employees working an 8-hour shift). Persons participating in occasional educational programs or community service learning projects (e.g. restoration ponds) at this management station site are also accounted for in the projections. A total of 630 gpd is estimated, which is an increase of 270 gpd over existing conditions.

The proposed Waiʻauia Cultural Center would also require water service, and would connect to the BWS's 24-inch water transmission main on Kailua Road. Potable water demand for the center is estimated to be 335 gpd, and would be generated from restrooms and administrative office use. Projected average daily demand for users is based upon both employee use and program participants (restroom).

Water demand generated by proposed uses in Subarea D is not expected to have a significant impact on the BWS's system serving this area or their water supply. DOFAW's management station is already serviced by a smaller main, and the Waiʻauia site is located along existing mains. The total water demand generated for these uses is 965 gpd, and would reflect a small increased demand of 605 gpd.

There are no existing fire hydrants serving DOFAW's management station and fronting the Wai'auia site. The design of these facilities will include evaluation of on-site fire protection requirements and improvements. An interior sprinkler system for buildings can also be evaluated to address HFD building fire protection requirements. Coordination with appropriate agencies will occur during the design phase to ensure this interior sprinkler system is compliant with requirements. DOFAW would coordinate with the non-profit organization developing facilities at Wai'auia to determine payments for water use along with any applicable water system facilities charges. BWS Cross-Connection Control and Backflow Prevention requirements would be complied with prior to the issuance of facility building permits.

Subarea E: Hāmākua-Pu'uoehu. At Hāmākua, water service is only required for restrooms planned at the program staging area. To support the facility, a service lateral will be connected to the existing line on Hāmākua Drive. A potable water demand of only 95 gpd is projected for this site to accommodate DOFAW staff working in the area, and persons participating in occasional educational programs or community service learning projects. This small increase in demand is expected to have minimal effect on the water system serving this area. DOFAW would coordinate with the BWS to determine payments for water use along with any applicable water system facilities charges. BWS Cross-Connection Control and Backflow Prevention requirements would be complied with prior to the issuance of building permits for this restroom facility.

5.2 WASTEWATER FACILITIES

5.2.1 Existing Conditions

The City Department of Environmental Services (DES) provides municipal wastewater collection and treatment in the Kailua district via a system of wastewater pump stations and sewer lines. Figure 5.2 shows the locations of pump stations and main collection lines serving the project area. The municipal collection system conveys wastewater from the project area to the Kailua Regional Wastewater Treatment Plant (WWTP), located along Kāne'ohe Bay Drive in the 'Aikahi community (see Figure 5.2 inset).

Wastewater Collection System

Within the project area vicinity, there is a sewer main running along Kailua Road that collects wastewater from the Maunawili, Olomana, and Kūkanono subdivisions~~,~~; the Windward YMCA; and Le Jardin Academy~~,~~. The sewer main ~~and~~ transports wastewater collected to the Kailua Road Wastewater Pump Station (WWPS). This sewer main varies from 8 to 15-inches in size from Maunawili to the Ulupō Heiau area. Along Wai'auia, this main increases to 18-inches. A sewer collection system also serves the Kawainui Vista subdivision, and transports wastewater toward the sewer main in Kailua Road. There is no sewer service along the length of Kapa'a Quarry Road.



Source: State of Hawai'i GIS

Kawainui - Hāmākua Master Plan Project

Figure 5.2 - Sewer Lines

Kailua, O'ahu

0 800 1,600 FEET

HHF PLANNERS places for people

Along Mōkapu Boulevard, an 8-inch sewer main begins fronting the residences and collects and transports wastewater in the makai (eastbound) direction toward the treatment plant. However, there is no sewer main along the Kalāheo park site and area further mauka toward the H-3 Freeway within Mōkapu Saddle Road. A 30-inch sewer main along Hāmākua Drive collects wastewater from residences and businesses in the area, and transports it in a northwest direction toward Kailua Road.

~~Some residences in the Kūkanono subdivision and non-residential uses in this area along Kailua Road, such as the Windward YMCA and several churches, are not connected to the municipal sewer system, and are likely on individual (e.g. septic tank) systems based upon City GIS data.~~ Along Kapa‘a Quarry Road, the Kailua light industrial subdivision and model airplane park are serviced by individual systems.

The only existing land use and activities within the project site that currently generates wastewater is the DOFAW maintenance station. Wastewater generated from DOFAW’s facility is estimated to be about 360 gpd based upon estimated water use, mainly from restrooms by staff working there. Wastewater is serviced by a septic tank and leach field system at this site.

Wastewater Pump Stations

The Kūkanono wastewater pump station (WWPS) is located on a separate parcel at the end of Manu O‘o Street, west of Ulupō Heiau, and below the Kūkanono subdivision. This pump station was built in 1988, has an average design flow of 0.186 mgd, and collects wastewater from residences of the Kūkanono subdivision and Castle Medical Center. Wastewater is then pumped toward an 18-inch sewer main on Kailua Road.

The Kailua Road WWPS is located on a parcel next to the Wai‘auia site along Kawainui Stream. This pump station was built in 1966, has an average design flow of 5.60 mgd, and collects wastewater from the sewer main within Kailua Road. Wastewater is then pumped toward a sewer main in Kihipai Street that eventually transports wastewater to the Kailua Regional WWTP.

Kailua Regional Wastewater Treatment Plant

The Kailua Regional WWTP was originally built in 1965 to serve the town of Kailua and surrounding communities. In 1994, the former treatment plans at Āhuimanu and Kāne‘ohe were converted to preliminary treatment facilities, and the Kailua Regional WWTP was expanded to accommodate these flows. This change was done to allow the Kailua Regional WWTP to provide regional treatment and eliminate discharge of treated wastewater into Kāne‘ohe Bay. The Kailua Regional WWTP now serves the island’s Ko‘olaupoko District extending from Kahalu‘u, Kāne‘ohe, Kailua, and Maunawili (USEPA, 2010).

Treated effluent is discharged though a 48-inch outfall located over 5,000 feet offshore at an average depth of 110 feet. The WWTP has an average daily flow design capacity of 15 million gallons per day (mgd), with a peak hourly maximum of 30 mgd. The facility was operating at about 12 mgd based upon a 2010 study by the U.S. EPA (USEPA, 2010). Average daily flows are projected to increase to about 13.9 mgd in 2020. The volume of average daily flow could decline slightly by 2035 based upon the City's population projections for the Koʻolaupoko district that project a 3.5% population decline (WOC, 2011).

The City is currently in the process of constructing a new three-mile-long wastewater treatment tunnel that will connect the Kāneʻohe pretreatment facility with the Kailua Regional WWTP. The tunnel is the largest sewer project in state history, according to the City, and will replace an older force main that has been subject to numerous failures. It is part of Honolulu's ongoing efforts to eliminate sewer overflows and spills.

Individual Wastewater Systems

Wastewater generated by facilities that are not connected to the municipal wastewater system can be serviced by individual wastewater systems (IWS). These systems provide a means of on-site wastewater disposal when connection to municipal infrastructure is not available or infeasible. IWS vary in the level of wastewater treatment provided.

Septic tank systems provide a primary method of wastewater treatment by digesting organic matter while allowing floatable matter and solids to separate. Treated wastewater, now referred to as effluent, is discharged into a subsurface leach field via piping. Leach fields generally consist of an arrangement of subsurface trenches containing porous material (e.g. gravel) covered by soil to avoid human or animal contact with effluent. The effluent percolates outward from the trenches into the surrounding soil that filters out pollutants before treated waters reach surface or underground water bodies. Secondary treatment is also possible in some systems where effluent percolates into a media that neutralizes and removes pollutants (e.g. sand or a constructed wetland) before waters travel into the surrounding soil.

Another type of treatment system involves restroom facilities (e.g. park use) consisting of a self-contained facility utilizing green technology for treatment that is more efficient with regard to energy consumption and water utilization (water use reduction up to 70%). Section 2.2.3 discussed such systems. Such facilities are modular buildings featuring vault toilets that can be constructed with or without utilities, with options to utilize solar power and rainwater collection. Wastewater is stored in the sealed sewage vault below the floor, and would need to be pumped by a disposal service similar to other individual treatment systems.

Some residences in the Kūkanono subdivision along with non-residential uses (e.g. churches) in this area along Kailua Road presently use IWS. Along Kapaʻa Quarry Road, the Kailua light industrial subdivision and Model Airplane Park utilize IWS. Wastewater generated from DOFAW's management and research station is serviced by a septic tank and leach field system.

The management and research station is the only land use with activities within the project site that currently generates wastewater. Wastewater generated by these DOFAW management and operational activities is estimated to be about 360 gpd based upon estimated water use, mainly from restrooms by staff working there.

5.2.2 Potential Project Impact and Mitigation

5.2.2.1 No Action Alternative

Wetland restoration and upland reforestation activities occurring under this alternative would not generate wastewater requiring treatment and sewer system improvements. The vegetation processing site would generate about 100 gpd of wastewater from restroom facilities for persons working there. Wastewater treatment for this facility would require a small septic tank with leach field system. Based upon a manual for septic tank practice, a septic tank volume of 150 gallons would be required (septic tank volume = 1.5 x daily demand) (AECOM, 2017).

The size of a leach field is generally determined by the daily wastewater volume that must be accommodated and the water percolation rate of the surrounding soil. State DOH wastewater system guidelines (§11-62, HAR) governing the design of soil absorption systems such as leach fields were used to calculate the preliminary sizing of the leach field needed for septic systems. Based on these guidelines, a leach field with an absorption area of 350 SF would be needed. The leach field would be subject to further design informed by a percolation test conducted in compliance with applicable DOH requirements. The approximately 13.8-acre vegetation processing site has sufficient area to accommodate this system. Being situated next to the City Model Airplane Park and restroom facility, the vegetation site is likely comprised of similar fill material as that at the Airplane Park. Consequently, there should not be absorption issues with the soil material, and the site has more than enough area to accommodate this IWS. The location of the IWS would be determined during the design phase of this improvement. ~~The size of the leach field would be subject to further design because the absorption bed area is dependent on the soil percolation rate. However, this vegetation processing site has sufficient area to accommodate this system.~~

There will also be restrooms constructed at Kalāheo Park requiring wastewater treatment for an estimated 200 gpd. Wastewater treatment of this facility would likely use a septic tank system (300 gallon tank volume) because connection to the municipal system would require a long lateral connection or additional improvements to the sewer main in Mōkapu Boulevard located over 750 feet away. A leach field with an absorption area of 200 SF would be needed to accommodate projected septic tank effluent flows. The eventual wastewater system implemented by DSP would be developed during the design phase for park improvements and would be designed in compliance with applicable DOH requirements if not connected to the municipal system. ~~and could~~ include other environmentally sustainable methods (e.g. self-contained vault facility ~~constructed wetland~~). The 4.7-acre Kalāheo Park site has enough area to accommodate an IWS and the system's location would be determined during the design phase. Wastewater

generated from this restroom facility should have minimal impact on the City's municipal system, and no impact if a separate septic system is used.

Individual Wastewater Systems ~~(IWS)~~, such as individual septic system, resulting from project implementation must comply with applicable State and City requirements. IWS are regulated by the DOH under HAR 11-62. Individual septic system that may be constructed must comply with applicable DOH requirements governing design and development of these systems. As discussed in HAR 11-62, all areas of the State are considered Critical Wastewater Disposal Areas (CWDA), indicating that wastewater disposal in these areas may have an adverse effect on human health or the environment. As a result, the State DOH may impose additional wastewater disposal standards when septic system are developed. The project is not located in the City's "No Pass Zone" that was established to protect inland water resources. As a result, City BWS approval is not required for construction of IWS in the project area. Individual septic system constructed under the No Action Alternative will be compliant with applicable State and City requirements.

5.2.2.2 Proposed Action

Wetland Restoration and Upland Reforestation

Continuation and expansion of ongoing restoration and upland reforestation would have no impact on existing municipal sewer systems because no wastewater would be generated requiring treatment and sewer system improvements.

Structures and Trails

Pedestrian trails and accessory structures (e.g. observation decks, pavilion) would not impact the sewer system because no wastewater would be generated. Facility improvements proposed would generate wastewater from restrooms and activities conducted. Table 5.3 shows the projected wastewater generated by these facilities, ~~and~~ septic tank volumes ~~volume~~ needed, and preliminary sizing of leach fields that would receive effluent. ~~Most septic tank sizes start from 1,000 gallons.~~ Typically, the smallest septic tanks used for residences in Hawai'i start at 1,000 gallons. Such tanks would likely be utilized for these new systems. Of these improvements proposed, most would need to utilize an individual septic system or other green alternative system (e.g. self contained vault) for wastewater treatment because there are no sewer mains within Kapa'a Quarry Road or near these sites. Connection to the municipal sewer system is available for the following: 1) Wai'auia Cultural Center; and 2) restroom at Hāmākua.

Overall, projected wastewater would be about 2,650 gpd, and should have minimal impact on the City's municipal system because the majority of wastewater would be treated by individual septic systems. Additional demands placed on the sewer system from the restroom at Hāmākua and cultural center activities at Wai'auia should not have a significant impact due to the relatively low average daily volumes projected. ~~At the Kalāheo park site (Subarea C), the only~~

~~addition under the Proposed Action would be adding a hale wa'a structure, which would not generate wastewater.~~ For the education center, the septic tank volume was calculated based upon the State DOH's §11-62, HAR for wastewater because flows would be greater than 1,000 gpd (septic tank volume = 1,000 + (daily demand - 800) x 1.25).

Associated leach fields would be designed with consideration of site characteristics (e.g. soil percolation rates) and wastewater volumes that must be accommodated. This ensures the leach field developed is appropriate for the site so adverse impacts to the surrounding environment are avoided. The dimensions of proposed leach fields were calculated in compliance with DOH wastewater system design guidelines (§11-62, HAR) for soil absorption systems. These design guidelines take into consideration the water percolation rate of site soils as well as anticipated wastewater flows that must be accommodated to aid the design of a leach fields that are appropriate for site conditions.

Table 5.3
Projected Wastewater Flows With Proposed Action

Description of Project Subarea	Average Daily Demand (gpd)	Septic Tank Volume (Gallons)	Leach Field Dimensions (SF)
Subarea B: Kahanaiki-Nā Pōhaku-Kapa'a			
Kahanaiki (Restroom)	80	**120**	**200**
Education Center, Pōhakea			
1. Restroom (Employees)	60	**1,740**	**1,500**
2. Restroom (Educational Program Visitors)	1,100		
Kapa'a Cultural Center			
1. Cultural Center Facilities	280	**570**	**600**
2. Caretaker's Cottage	100		
Subarea D: Wai'auia-Ulupō-Mokulana			
Wai'auia Cultural Center			
1. Restroom (Employees)	60	**503***	**500***
2. Restroom (Cultural Program Visitors)	275		
DOFAW Management & Research Station			
1. Restroom (Employees, Including Existing)	600**	**945**	**800**
2. Restroom (Educational Program Visitors)	30		
Subarea E: Hāmākua-Pu'uoehu			
Hāmākua			
1. Restroom (Employees)	40	**143***	**300***
2. Restroom (Educational Program Visitors)	55		
Total Average Daily Demand	**2,650**		

Source: AECOM, 2017
Note: "*" Connection to Municipal System Possible
"**" Includes existing demand of 360 gpd for 18 DOFAW staff present now

~~Table 5.3~~
~~Projected Wastewater Flows With Proposed Action~~

~~Description of Project Subarea~~	~~Average Daily Demand (gpd)~~	~~Septic Tank Volume (Gallons)~~
~~**Subarea B: Kahanaiki-Nā Pōhaku-Kapa'a**~~		
~~Kahanaiki (Restroom)~~	~~50~~	~~**50**~~
~~Education Center, Pōhakea~~ ~~1. Restroom (Employees)~~ ~~2. Restroom (Educational Program Visitors)~~	~~60~~ ~~1,100~~	~~**1,450**~~
~~Kapa'a Cultural Center~~ ~~1. Cultural Center Facilities~~ ~~2. Caretaker's Cottage~~	~~280~~ ~~100~~	~~**570**~~
~~**Subarea D: Wai'auia-Ulupō-Mokulana**~~		
~~Wai'auia Cultural Center~~ ~~1. Restroom (Employees)~~ ~~2. Restroom (Cultural Program Visitors)~~	~~60~~ ~~275~~	~~**503***~~
~~DOFAW Management & Research Station~~ ~~1. Restroom (Employees, Including Existing)~~ ~~2. Restroom (Educational Program Visitors)~~	~~600~~ ~~30~~	~~**945**~~
~~**Subarea E: Hāmākua-Pu'uochu**~~		
~~Hāmākua~~ ~~1. Restroom (Employees)~~ ~~2. Restroom (Educational Program Visitors)~~	~~40~~ ~~55~~	~~**143***~~
~~**Total Average Daily Demand**~~	~~**2,650**~~	

~~Source: AECOM, 2017~~
~~Note: "*" Connection to Municipal System Possible~~

The design phase occurring for improvements when implemented would evaluate wastewater flows and treatment requirements in greater detail. This would include evaluating the size needed for the absorption bed area that is dependent on the soil percolation rate. The eventual wastewater system implemented by DOFAW, DSP or non-profit organization for respective improvements could also include incorporating other environmentally sustainable methods (e.g. constructed wetland). All individual septic system constructed would be designed and developed in compliance with State DOH requirements governing IWS discussed in HAR 11-62. Discussion of wastewater effects by subareas is provided.

Subarea B: Kahanaiki-Nā Pōhaku-Kapa'a. Proposed project improvements that will generate wastewater demand include: 1) restrooms at Kahanaiki; 2) restrooms and administrative office use (e.g. sink) at the education center at Pōhākea; and 3) the Kapa'a Cultural Center. The education center generates the greatest wastewater flows projected at 1,160 gpd primarily due to restroom use by visitors. None of these areas will be connected to the municipal wastewater system, as there is no existing sewer main along Kapa'a Quarry Road. Extending sewer lines from either Kalaniana'ole Highway or Mōkapu Saddle Road would be cost prohibitive. These facilities would be served by a septic tank and leach field system, similar to what exists at the Model Airplane Park.

As indicated in Table 5.3, the septic system proposed for the education center would consist of a septic tank sized to accommodate 1,740 gallons of daily wastewater and require a 1,500 SF leach field. The preliminary sizing of the leach field accounts for anticipated wastewater flows as well as the moderate permeability of site's existing soils. The area needed for such as system would be relatively confined and encompass less than 5,000 square feet of area. This Pōhakea program area is about 10 acres in size, and has sufficient area for a septic system serving the education center. The system location would be determined during the design phase.

Kapa'a Cultural Center restroom facilities are expected to generate about 380 gpd of wastewater due to use by the non-profit stewarding organization and their guests. A septic system consisting of a 570 gallon septic tank with a 600 SF leach field would be needed to accommodate anticipated daily wastewater flows. It is likely a 1,000 gallon tank would be used since that is typically the smallest size available from local manufacturers and is what's used for residences. An area of less than 5,000 square feet would thus be sufficient to accommodate this system, and there is more than enough area at this site.

Subarea D: Wai'auia-Ulupō-Mokulana. The existing DOFAW management station is currently served by a septic tank and leach field system. The existing system should be adequate to accommodate new permanent facilities to replace existing trailers, and the estimated future capacity of 30 staff working there. There are presently 18 staff operating there now.

The Wai'auia Cultural Center is projected to generate about 335 gpd of wastewater from restrooms and administrative office use. A connection to the City's system would likely occur because the existing sewer main is located adjacent to the Wai'auia site. The sewer main runs along the access road leading to the Kailua Road WWPS, and the additional demand should have minimal effect on the overall system and wastewater pump station operations.

Subarea E: Hāmākua-Pu'uoehu. At Hāmākua, the proposed restroom near the program staging area would likely be connected to the City's 30-inch sewer main on Hāmākua Drive. Additional wastewater generated from this improvement (95 gpd) should have minimal impact on the sewer main and municipal system.

5.3 DRAINAGE FACILITIES

5.3.1 Existing Conditions

Existing City drainage facilities surrounding the Kawainui project site are predominantly provided within urbanized areas developed as part of residential subdivisions, Le Jardin Academy, Kapa'a transfer station, and Castle Medical Center. At Hāmākua, drainage facilities are provided within Hāmākua Drive and along existing businesses. The drainage system generally consists of storm drains of various sizes within roadways conveying storm water, inlets

(curb, grate, etc.) and catch basins for collecting runoff from streets, and outlets serving as discharge points for storm water.

Currently, the only impervious surfaces located within the project site are at the existing DOFAW management station (parking areas, paved areas, building roof tops), Pōhakea (paved roads from former ranch use), a shelter at Nā Pōhaku, paved areas in Kapaʻa from the former City maintenance baseyard (across transfer station), and the existing levee walkway. Figure 5.3 shows existing drainage facilities surrounding the project area based upon the City's GIS data and other sources (e.g. site visits). Discussion of existing facilities are provided by subareas.

Subarea B: Kahanaiki-Nā Pōhaku-Kapaʻa. The majority of this area does not have drainage facilities along Kapaʻa Quarry Road. Therefore, stormwater runoff from upland areas generally sheet flows across Kapaʻa Quarry Road following low lying areas eventually discharging into Kawainui's wetland. Runoff from the State's Kalaniana'ole Highway in this area is collected within the highway system and discharged into Kahanaiki Stream or other low lying areas.

Le Jardin Academy has a drainage system collecting storm water runoff from the school site, then channels it under Kapaʻa Quarry Road, and then discharges runoff into a gully within the Kahanaiki area via a box culvert along the road. This drainage culvert was improved by DOFAW a few years ago. Two additional drainage culverts are located within the Kapaʻa Quarry Road easement corridor across of the school and further north of the school (not in City GIS data and thus not shown on Figure 5.3). The most northern culvert is still in pretty good condition, but has some erosion occurring at the outfall. The other culvert is in poor condition with a broken headwall and separated from the culvert (HHF, 2012).

At the City's Kapaʻa transfer station, the site's drainage system serving the main baseyard complex collects runoff and discharges it through two outlets located on the mauka side of Kapaʻa Quarry Road. This runoff likely discharges across or under this road via unknown drainage culverts into Kawainui. Along both the southern end and middle section of the upland area where the Kapaʻa Cultural Center is planned (former City baseyard) are drainageways~~.~~ leading into the wetland that appear to receive discharges from this transfer station. The City's drainage outlet serving the transfer station is generally located in the area inland of the southern drainageway. The driveway entrance into the transfer station is also close (mauka of) to the middle drainageway.

The drainage system serving the Kapaʻa light industrial subdivision discharges storm water into Kapaʻa Stream which eventually disperses into Kawainui (north of the airplane park) and the Kapaʻa Stream canal along the mauka side of Kapaʻa Quarry Road generally up to Kapaʻa Quarry Place (SD&C, 2011). Flooding along Kapaʻa Quarry Road and surrounding areas between the transfer station and light industrial park occurs occasionally during heavy rains.



Source: State of Hawai'i GIS

Kawainui - Hāmākua Master Plan Project

Figure 5.3 - Drain Lines

Kailua, O'ahu

0 800 1,600 FEET

HHF PLANNERS places for people

Subarea C: Kapa‘a-Kalāheo-Levee. There is no drainage system serving the Kapa‘a (north end of Kawainui) area and Kalāheo park site. Surface runoff from the State’s Mōkapu Saddle Road likely discharges into the area below the highway, situated mauka of Kapa‘a Quarry Road and into a remnant low-lying parcel owned by the City near the Mōkapu Saddle Road with Kapa‘a Quarry Road intersection. Runoff from this highway and upland areas sheet flow across Kapa‘a Quarry Road during heavy rainfall, occasionally flooding sections of this road and surrounding low-lying areas.

At the Kalāheo park site, runoff sheet flows across Mōkapu Saddle Road onto the site and eventually discharges into Kawainui Canal. A strip parcel bordering the northern side of this park site is undeveloped, and serves as a drainageway for runoff from Mokapu Boulevard. A drainage outlet structure is located at the end of this drainageway allowing runoff to discharge into Kawainui Canal. Along the makai side of the levee is Kawainui Stream that flows toward Hāmākua. This stream receives storm water runoff from several drainage outlets at the end of roadways serving the Coconut Grove subdivision.

Subarea D: Wai‘auia-Ulupō-Mokulana. There are no drainage systems serving the Wai‘auia area. Runoff from Kailua Road is collected and discharged into Kawainui Stream near this area. A short drainageway is located along the northern boundary of this Wai‘auia site that appears to collect runoff from Kailua Road (Exhibit 5.1). Storm water is then transported under the City’s Kailua Road WWPS access road, and discharged into Kawainui Stream. Within the majority of the Wai‘auia site, storm water runoff sheet flows across the property into the wetland.



Exhibit 5.1 Wai‘auia Drainageway Along Kailua Road WWPS Access Road

Toward Ulupō Heiau, the Kawainui Vista subdivision has a drainage system that collects runoff from Hanale Place and discharges storm water into Kawainui at two outlet locations. The undeveloped area mauka (southwest) of the levee and churches in the area do not have improved drainage systems. Therefore, storm water runoff sheet flows across lower lying areas within these properties and eventually discharges into Kawainui.

At Ulupō Heiau, a large drainage culvert situated below the Windward YMCA’s rear parking lot discharges storm water collected from Kailua Road and directs it around the heiau (Exhibit 5.2). Storm water runoff from remaining areas of this DSP property sheet flow across the site and discharge into Kawainui.

Within the Kūkanono subdivision, the City's drainage system collects runoff within roadways, and eventually discharges storm water at drainage outlets situated at the end of Ulu'oa Street and between residences. At Castle Medical Center, runoff is collected from their parking lots and discharged at two outlets above Ulukahiki Street. Storm water then sheet flows across this road and through DOFAW's management station.



Exhibit 5.2 Drainage Culvert Below Parking Area Discharging Runoff Around Ulupō Heiau

Within DOFAW's management station, a drainage culvert with concrete-lined channel transports runoff from Ulukahiki Street across the site, under their access road, and eventually discharging into Maunawili Stream (Exhibit 5.3). Storm water runoff from other upland areas along Ulukahiki Street discharge across low-lying areas of the DOFAW site generally following two drainageways that discharge into Maunawili Stream.



Exhibit 5.3 Drainage Culvert and Lined Channel within DOFAW Management Station

There are no other improved drainage systems within the project site for areas mauka of the DOFAW management station, within Mokulana Peninsula, and toward Kahanaiki. Storm water runoff thus follows low-lying areas and natural drainage patterns that eventually discharge into Maunawili Stream, Kawainui's wetland, and Kahanaiki Stream. The drainage system within the State's Kalaniana'ole Highway would be the primary source for managing and directing storm water discharge points for these areas.

Subarea E: Hāmākua-Pu'uoehu. At Hāmākua, there are no improved drainage systems within the project site or on the Pu'uoehu hillside. Storm water runoff sheet flows across low-lying areas following natural drainage patterns that eventually discharge into Hāmākua's wetland. Along Hāmākua Drive and existing businesses, the City's drainage system collects runoff from upland areas within roadways and discharges water into Kawainui Stream at several outlets. These outlets are across the Foodland marketplace center, Hekili Street, a commercial site along Hāmākua Drive where a former road extended into Hāmākua, through a commercial area across of Hahani Street, and near the Hāmākua Drive Bridge over Kawainui Stream.

5.3.2 Potential Project Impact and Mitigation

5.3.2.1 No Action Alternative

Wetland restoration and upland reforestation activities occurring under this alternative would not include major drainage system improvements within the project area because the majority of activities would occur within the wetland. No permanent drainage structures would be constructed within wetland areas. Therefore, only best management practices would be implemented as part of wetland restoration activities to minimize short-term sediment discharges during periods of heavy rainfall (e.g. compost filter socks).

Upland reforestation activities would not require constructing new permanent drainage system improvements because this mainly involves landscaping work. However, some drainage improvements would occur as part of erosion control improvements under the Kahanaiki restoration project. This includes repairing or replacing two of three existing drainage culverts along Kapaʻa Quarry Road and adding causeways along access roads to increase detention of storm water runoff before it enters the wetland (HHF, 2012).

Facility improvements to the vegetation processing site would result in an estimated 370 cfh of runoff. Improvements would also include site drainage improvements around new buildings and for operational areas. No off-site drainage improvements are planned for the Kapaʻa Stream canal segment located along the mauka side of Kapaʻa Quarry Road which fronts the City's model airplane park. On-site drainage improvements could include detention basins to reduce increased runoff due to impervious structures added to this vegetation processing site. Specific drainage improvements would be determined as part of the design phase when DOFAW implements establishment of this processing site.

Facility and parking improvements to Kawainui SPR, Kalāheo site would increase impervious surface areas onsite, generating an estimated 450 cfh of runoff. The parking lot would utilize pervious material to minimize surface water runoff increases. To reduce runoff increases resulting from proposed improvements, on-site drainage improvements, such as detention basins, infiltration trenches, etc., would be considered as part of site improvements. Specific drainage improvements would be determined as part of the design phase when DSP implements construction of this park site.

5.3.2.2 Proposed Action

Wetland Restoration and Upland Reforestation

Continued and expanded wetland restoration activities to areas further north from Kahanaiki would occur within the wetland and not include major drainage system improvements. This includes expanding wetland area at Hāmākua by excavating adjoining inland areas. BMPs would be implemented as part of expanded wetland restoration activities to minimize short-term effects from sediment discharges during periods of heavy rainfall (e.g. compost filter socks).

Upland reforestation activities mainly involves landscaping work that would not require constructing new permanent drainage system improvements. However, some drainage improvements would occur within upland areas as part of continued erosion control improvements around Kawainui beyond that already permitted for the Kahanaiki area, such as drainage areas across the City's transfer station. Projects could involve replacement or reconstruction of existing drainage culverts or other measures to detain stormwater runoff such as creating terraced walls downstream of drainage culverts, causeways, detention areas, etc.

Other drainage culverts may be present along Kapa'a Quarry Road, however, their locations are not known due to lack of available information or may have been covered with vegetation and sediment over the decades. Therefore, DOFAW would conduct more detailed site inspections along the roadway as additional upland areas are phased for implementation of reforestation improvements to assess whether repairs or improvements are necessary. This includes other areas around Kawainui, such as along the Mokapu Peninsula, that would need to be coordinated with the State Department of Transportation that owns the highway right-of-way and associated drainage system improvements.

At Hāmākua, only vegetation maintenance activities would occur along Hāmākua Drive or along the makai side of Kawainui Stream. Upland reforestation improvements are not necessary along this narrow embankment. Upland reforestation and vegetation clearing activities on the inland side of Hāmākua and within the lower hillside of Pu'uoehu would not require permanent drainage system improvements. Work mainly involves landscaping and improving the pervious (e.g. gravel) access road for DOFAW maintenance activities. Surface runoff would be allowed to continue sheet flowing across the area following low-lying areas and natural drainage patterns, that eventually discharge into Hāmākua's wetland. However, DOFAW will continue to monitor conditions to identify if erosion problems do occur that may require some inland improvements, such as causeways along the access road, detention basins, infiltration trenches, etc.

Therefore, these drainage repairs and improvements to address erosion control would have a positive effect in reducing discharge of sediment into the wetland, increase infiltration from storm water detention, and improve the wetland's water quality.

Structures and Trails

The construction of facilities proposed through the project would increase the area of impervious surfaces within the project area. An increase in impervious surface has the potential to increase the volume of storm water runoff produced and may require improvements to drainage facilities or natural drainage patterns. Table 5.4 summarizes runoff estimates in cubic feet per hour (cfh) for project area improvements under the Proposed Action without the current reduction of project improvements discussed in Section 2.2 (e.g. reduced trail segments, buildings). Reduction of improvements would result in a small decrease in the projected runoff volumes shown on Table 5.4. Thus, this table reflects higher projected runoff volumes and a more conservative assessment of effects. Most of the reductions would occur for runoff associated with pedestrian paths and buildings. With elimination of the hale wa‘a at the Kalāheo site, there would be no new project initiated improvements occurring there. Consequently, runoff shown for that section under Table 5.4 would be eliminated because such volumes are no longer project related.

Trails account for about 40 percent of estimated runoff attributable to site improvements for public access. Runoff estimates are especially high for foot trails in part because they were assumed in calculations to be compacted soil trails with a high runoff coefficient. Trails and other proposed improvements would need to incorporate necessary BMPs into site planning and design to detain storm water runoff and minimize the impact of runoff to receiving wetlands.

Table 5.4
Summary of Runoff (cfh) Estimates by Subareas from Project

Section	Paths	Trails	Parking	Building	Road
Kahanaiki	607	1,322	243	0	0
Nā Pōhaku	283	1,376	211	300	0
Kapa‘a	283	0	306	1,006	531
Kapa-Kalāheo	42	0	410	164	0
Mokulana	0	315	602	395	889
Ulupō	184	687	245	140	94
Wai‘auia	0	156	102	286	0
Hāmākua-Pu‘uoehu	58	1,292	131	55	0
Totals	**1,457**	**5,148**	**2,250**	**2,346**	**1,514**
Percent	**11%**	**40%**	**18%**	**18%**	**12%**

Source: AECOS, 2017b

Source control BMPs and treatment control BMPs that would be implemented would help control pollutants at their source, filter sediment, and remove storm water pollutants prior to discharge into receiving waters. The project site includes hundreds of acres of landscaped area that could act as an effective source control BMP, and LID elements can be incorporated into the design of improvements to further reduce effects. LID elements could include greywater gardens, bioswales, rain gardens, bioretention areas, rain catchment systems, and infiltration trenches.

Improvement design would incorporate BMPs to minimize short-term effects from construction activities in the event of a significant storm. Source control and treatment control BMPs will be implemented to control pollutants at their source, filter sediment, and remove storm water pollutants prior to discharging into receiving waters. If applicable, NPDES permits (for construction activities greater than one acre) would be obtained from the State DOH. NPDES permits would include conditions and design measures to address short-term construction activities. Therefore, construction activities for proposed improvements should not have a significant impact on drainage conditions. A discussion of runoff volumes by subareas is provided.

Subarea B: Kahanaiki. Runoff estimates for this subarea are shown below. Predicted runoff from paths and trails account for the majority of estimated infrastructure runoff at about 12 percent. Incorporation of LID elements during the design phase of these improvements could mitigate anticipated runoff increases. The parking area would be constructed of pervious material, such as gravel or grass, which could minimize potential increases to runoff volumes. Ongoing reforestation and proposed drainage improvements would reduce storm runoff compared to existing conditions. The elimination of a section of the path with bridge over Kahanaiki Stream along with the boardwalk and observation deck would result in a small decrease in runoff (about 160 cfh) from that shown below.

Subarea B – Kahanaiki Runoff Estimates

Components	Area (acres)	Runoff (cfh)	Runoff (%)
Woodlands/Grass	46.76	14,309	87
Paths	0.99	607	4
Trails	1.35	1,322	8
Parking/Staging	0.40	243	1
Building	0.00	0	0
Road	0.00	0	0
Total	**49.50**	**16,481**	**100%**

Subarea B: Nā Pōhaku. Trails account for the largest percentage of runoff from improvements at about six percent. Incorporation of LID elements during the design phase of path and trail improvements could mitigate anticipated increases in runoff. Although proposed facilities at the education center and kauhale complex at Pōhakea result in minimal contributions to site runoff, incorporation of LID elements into the design of structures and site improvements would minimize effects on surrounding drainage conditions. Structures associated with these improvements are spread out over the areas as opposed to being concentrated within a confined area.

The elimination of a section of the pedestrian and foot trail from the kauhale complex toward Kahanaiki, a path section routed mauka of the hale from the education center, and reducing three hale buildings at the kauhale, would result in a small decrease in runoff (about 500 cfh) from that shown below. Reduced runoff would be mainly associated with the elimination of some trail sections.

As a result, existing site drainage patterns should not be significantly altered or negatively impact adjacent areas. At Pōhakea, storm water would continue to sheet flow across Kapa‘a Quarry Road onto the site, and toward the wetland. There would be sufficient space within the area to include site design BMP measures such as detention basins or other measures to mitigate increased runoff volumes. Additionally, constructing improvements proposed for the traditional kauhale complex at Pōhakea with traditional construction methods and materials would also reduce any runoff estimated.

Subarea B: Nā Pōhaku Runoff Estimates

Components	Area (acres)	Runoff (cfh)	Runoff (%)
Woodlands/Grass	52.61	22,539	91
Paths	0.46	283	1
Trails	1.32	1,376	6
Parking/Staging	0.34	211	1
Building	0.26	300	1
Road	0.00	0	0
Total	**55.00**	**24,709**	**100%**

Subarea B: Kapa‘a. Buildings account for the dominant percentage of subarea runoff attributable to improvements at about 13 percent. The building and parking totals also include about 370 cfh (5% of total runoff percentages) for the vegetation processing site structures and parking area that are already permitted under the No Action Alternative. Thus, the project would contribute only about 12 percent of the site’s total runoff volumes. Elimination of: 1) a section of the pedestrian trail from Nā Pohaku to the City Model Airplane Park; and 2) three buildings at the cultural center at Kapa‘a would result in a slight decrease in total runoff (about 300 cf) from that shown below. Elimination of the trail would reduce most of the runoff shown for that use.

Structures at the Kapa‘a Cultural Center are spread out over the area they are proposed for rather than clustered together. As a result, the dispersed siting of these facilities should not significantly alter or negatively impact existing site drainage patterns. Use of traditional native Hawaiian construction methods in the design of the cultural center, such as thatched roofing would likely reduce estimated runoff. In addition, the cultural center site would be designed to detain increased runoffs (e.g. bioswales) that would further decrease runoff from this site.

Subarea B: Kapa‘a Runoff Estimates

Components	Area (acres)	Runoff (cfh)	Runoff (%)
Woodlands/Grass	19.20	5,876	73
Paths	0.46	283	4
Trails	0.00	0	0
Parking/Staging*	0.50	306	4
Building*	0.86	1,006	13
Road	0.87	531	6
Total	**21.90**	**8,003**	**100%**

* Includes 370 cfh for vegetation processing site (No Action Alternative)

Subarea C: Kapa‘a-Kalāheo. With the proposed reduction in project improvements discussed in Section 2.2, there would be no new project initiated improvements occurring at the Kawainui SPR, Kalāheo site. There would subsequently be no change to runoff at this site from that already permitted under the No Action Alternative. ~~The project would add a hale wa‘a to the Kawainui SPR, Kalāheo site, contributing about 124 cfh of runoff. Other building and site improvements are already permitted under the No Action Alternative. Of all improvements proposed, the largest percentage of runoff can be attributable to parking at about 18 percent. Incorporation of LID elements into the design of parking improvements during the design phase could reduce estimated runoff volumes. Ongoing reforestation and proposed drainage improvements would also reduce existing storm runoff volumes. LID elements incorporated in the design of already permitted improvements would be able address the increased runoff from the hale wa‘a structure.~~

~~**Subarea C: Kapa‘a-Kalāheo Runoff Estimates**~~

~~Components~~	~~Area (acres)~~	~~Runoff (cfh)~~	~~Runoff (%)~~
~~Woodlands/Grass~~	~~5.62~~	~~1,720~~	~~74~~
~~Paths~~	~~0.07~~	~~42~~	~~2~~
~~Trails~~	~~0.00~~	~~0~~	~~0~~
~~Parking/Staging*~~	~~0.67~~	~~410~~	~~18~~
~~Building*~~	~~0.14~~	~~164~~	~~7~~
~~Road~~	~~0.00~~	~~0~~	~~0~~
~~**Total**~~	~~**6.50**~~	~~**2,336**~~	~~**100%**~~

~~* Includes 450 cfh for Kalāheo Park Improvements (No Action Alternative) for building and parking~~

Subarea D~~E~~: Wai‘auia. Runoff from this portion of the subarea would flow directly into Kawainui Stream. Buildings account for the largest proportion of estimated runoff attributed to improvements at about 27 percent. The design for this center would incorporate LID elements into the design of structures and site improvements, which would minimize effects on surrounding drainage conditions. Existing drainage pattern within this site should not significantly alter or negatively impact adjacent areas, such as the City Kailua Road WWPS access road. Site runoff would likely be partially directed into both the existing drainageway along this access road, sheet flowing across the site into the wetland. BMP measures incorporated in the site's design would likely utilize underground structures such as detention basins, infiltration trenches, or other measures to mitigate increased runoff volumes due to the smaller area associated with this site.

Subarea D~~E~~: Wai‘auia Runoff Estimates

Components	Area (acres)	Runoff (cfh)	Runoff (%)
Woodlands/Grass	1.62	496	48
Paths	0.00	0	0
Trails	0.15	156	15
Parking/Staging	0.17	102	10
Building	0.25	286	27
Road	0.00	0	0
Total	**2.19**	**1,040**	**100%**

Subarea D~~E~~: Mokulana. Road improvements account for the dominant percentage of runoff attributable to improvements at about nine percent of total estimated runoff. Incorporation of LID improvements into the design of proposed roads could reduce runoff generated beyond estimated volumes. Construction of permanent facilities to replace existing temporary storage containers at DOFAW's management station would result in a comparatively smaller increase in storm water runoff because most of the site is already being used. Management station parking areas would continue to be pervious (e.g. gravel), and would not alter runoff volumes or drainage patterns. Elimination of: 1) a few sections of the pedestrian trail at Mokulana; 2) two small pavilions at Mokulana; and 3) a pavilion at DOFAW's management station would result in a small decrease in runoff from that shown for buildings and trails.

BMP measures can be incorporated as part of facility improvement site design to detain increased runoff. Existing site drainage patterns would continue that sheet flow in a northwest direction toward Maunawili Stream. Site and facility improvements at this management station would not alter or impact the existing concrete-lined drainage channel routed through the northern end of this site because these improvements are located south of the channel and the access road bridge crossing it.

Subarea D~~E~~: Mokulana Runoff Estimates

Components	Area (acres)	Runoff (cfh)	Runoff (%)
Woodlands/Grass	18.55	7,949	78
Paths	0.00	0	0
Trails	0.30	315	3
Parking/Staging	0.98	602	6
Building	0.34	395	4
Road	1.32	889	9
Total	**21.50**	**10,149**	**100%**

Subarea D~~E~~: Ulupō. Trails and parking account for about five percent of total improvement related runoff in this portion of the subarea. Runoff generated by proposed trails and parking could be reduced beyond estimates if LID improvements were incorporated in the design phase of these improvements. Proposed structures, such as the nursery and hālau, are small and would generate minimal additional runoff within the site. Thus, no drainage improvements would be necessary to accommodate this change, and there would no change to existing drainage patterns within the site.

Incorporation of traditional thatched roofing and other native Hawaiian design and construction elements in the design of proposed buildings could also reduce runoff past volumes estimated. Additional taro lo‘i being created in the site should already provide a form of cultural-based storm water runoff detention, addressing additional runoff volumes estimated. These improvements would not impact or alter the concrete drainage outlet and drainage flow around the heiau toward the wetland.

Subarea D~~E~~: Ulupō Runoff Estimates

Components	Area (acres)	Runoff (cfh)	Runoff (%)
Woodlands/Grass	42.38	18,156	93
Paths	0.30	184	1
Trails	0.66	687	4
Parking/Staging	0.40	245	1
Building	0.12	140	<1
Road	0.14	94	<1
Total	**28.90**	**19,504**	**100%**

Subarea E~~E~~: Hāmākua-Pu‘uoehu. Trails account for the largest percentage of runoff estimated from improvements at about four percent. Implementation of LID elements in the trail design phase could reduce runoff volumes beyond those estimated. The proposed restroom building at the program staging area by the entrance would generate minimal additional surface runoff. Thus, drainage improvements would not be necessary to accommodate this improvement, and there would no change to drainage patterns within the site. The roadway entrance to this site and program area would create minimal increases to site runoff with no drainage improvements required. However, improvements will utilize pervious material to minimize any additional runoff produced. Drainage from the site in this area would be designed to continue sheet flowing into Hāmākua’s wetland. If feasible, BMP measures such as infiltration trenches could be incorporated into the staging area’s site design to detain runoff before it enters the wetland.

Subarea E~~F~~: Hāmākua-Pu‘uoehu Runoff Estimates

Components	Area (acres)	Runoff (cfh)	Runoff (%)
Woodlands/Grass	64.07	27,445	95
Paths	0.06	58	<1
Trails	1.24	1,292	4
Parking/Staging	0.21	131	<1
Building	0.05	55	<1
Road	0.00	0	0
Total	**65.63**	**28,981**	**100%**

5.4 SOLID WASTE FACILITIES

5.4.1 Existing Conditions

The City Honolulu Department of Environmental Service (DES) Refuse Division provides curbside collection of municipal solid waste and recyclables for single-family residences. The DES also provides this service for a limited number of multi-family properties, non-residential customers, and City agencies on O‘ahu. Bulky items are collected by the DES on a monthly basis and items are disposed of at the Waimānalo Gulch Sanitary Landfill, O‘ahu’s only municipal solid waste landfill located in west O‘ahu.

Recyclable materials like glass bottles and aluminum cans are sorted and shipped to remanufacturing facilities to be made into new products (Recycling and Disposal Guide for Oʻahu, 2015). Low-grade papers and plastic that were not disposed of as recyclables are processed at the Honolulu Program of Waste Energy Recovery (H-POWER) waste-to-energy facility. The H-POWER energy recycling plant is located in Campbell Industrial Park in west Oʻahu. Construction and demolition debris are taken to the privately-owned PVT Nānākuli Construction and Demolition Material Landfill.

The City DES operates 10 waste processing areas on Oʻahu that include six drop-off convenience centers, three refuse transfer stations, and a landfill. Only residential waste is accepted at convenience centers. This waste includes municipal solid waste, green waste, batteries, and bulky items. Combustible refuse is sent to the H-POWER waste-to-energy plant, while noncombustible waste is sent to the landfill. Bulky items including appliances, tires, and auto batteries are sent to recycling facilities.

Current Waste Processing in Project Area

Transfer stations are open to commercial and residential waste. Rules and procedures for drop off convenience centers are applicable to City DES transfer stations. The Kapaʻa Refuse Transfer Station, located on Kapaʻa Quarry Road, adjacent to the project area, is the closest City DES waste processing facility to the project area. The Kapaʻa transfer station is one of the two largest facilities operated by the City, and is operational every day of the week except for a few holidays. The transfer station has a receiving limit of 500 tons of municipal solid waste per day. (Beck, 2008).

The project area is located within the City's Koʻolaupoko collection district which serves the area along the entire windward coastline from Waimānalo to Kahuku. At present, there are no residential waste generators within the project area, although the area has a common boundary with the Kūkanono and Kawainui Vista neighborhoods. Some commercial waste is generated from operations occurring at DOFAW's management station. This waste would typically consist of organics (food), paper, and plastics from daily activities by staff. Waste collection at this management station is coordinated by DOFAW through a private waste hauler, and is taken directly to City disposal facilities at H-POWER or the Waimānalo Gulch Sanitary Landfill.

For many years, areas along Kapaʻa Quarry Road were used for illegal dumping, in part because of the area's isolation, lack of human activity, and lack of enforcement. Some of the items known to have been disposed include construction waste, oil products, abandoned automobile and auto parts, furniture, household trash and yard waste. In recent years, the State, City, and community groups have worked together to address this problem through education, enforcement and collaboration. Although illegal dumping has been reduced, it remains a concern.

Green Waste Processing

The City provides curbside green waste collection for single-family residences. City collected green waste is transported to an offsite green waste processing facility, Hawaiian Earth Products (HEP). HEP has three facilities on O‘ahu, with one facility located in Waimanalo. These facilities process green waste from homeowners, commercial yard services, and government and commercial sources into compost and mulch. Households can also deposit green waste at City DES waste drop-off convenience centers and transfer stations, which are then transported to HEP.

Green waste generated by commercial and governmental sources are not collected by the City. Therefore, governmental agencies, such as DOFAW, must transport green waste themselves or contract out to a private hauler. Although City transfer stations collect green waste from commercial and governmental sources, transport trucks are limited to a maximum of 10 percent green waste per load at these facilities. Green waste generated from commercial and governmental sources is banned from landfill disposal.

Maintenance contractors are required to move all green waste produced from clearing and grubbing operations to a designated vegetation processing area. Currently, much of the green waste generated from DOFAW maintenance activities is allowed to decompose on site. Vegetation left in trash bins or on site can lose about 50 percent of its volume within 6 months, with about 75 percent of the volume decomposing within a year’s timeframe (HHF, 2012).

Within the project area, there is a vegetation processing site located on Kapa‘a Quarry Road, adjacent to the City’s Model Airplane Park. This processing site was established by the City in 1992 for green waste processing, and was used for several years when the property was under City control. Vegetation that was processed at this site was transported to the appropriate City refuse disposal site. The site is currently unused and overgrown with vegetation.

5.4.2 Potential Project Impact and Mitigation

5.4.2.1 No Action Alternative

Wetland Restoration and Upland Reforestation

Under this alternative, ongoing wetland maintenance and restoration activities along with upland reforestation activities would continue. These activities would generate solid waste, primarily in form of green waste (vegetation cuttings and debris) that would need to be processed for disposal. Upland areas near wetland restoration or reforestation activities occurring would be established as part of staging and processing areas by the contractor or by DOFAW if work is performed using their staff. It is likely that a contractor would be used to transport green waste to HEP’s facility for processing.

Staging areas established within upland areas of the project site would be used to temporarily store vegetation removed before they are taken to the vegetation processing site next to the Model Airplane Park for processing or directly to HEP's facility for processing. These upland areas could also be used to allow smaller amounts of green waste to decompose before being transported to HEP's commercial facility for composting. BMPs would be included in design plans for the contractor to establish protective areas around the perimeter of these staging areas (e.g. silt curtains, gravel snake bags) to prevent vegetation, debris, and water from flowing back into the wetland as it dries.

For routine grass cutting or vegetation trimmings as part of maintenance activities, clippings may continue to be placed in adjacent upland areas to decompose. DOFAW will sometimes leave debris from clearing and grubbing on site to naturally dry and turn to compost. Debris from these activities are not placed within streams, wetlands, water courses, or locations that could impede the flow of natural drainage.

The vegetation processing site is planned to support these wetland restoration and upland reforestation activities. Establishing this vegetation processing site was part of the 1994 Kawai Nui Marsh Master Plan and was approved for use as part of DLNR's Management Plan for Kawainui (DLNR LD, 2000). The site was formerly a sanitary landfill and at one time was used by the City as a staging area for channel clearing and vegetation maintenance activities within Kawainui. The vegetation processing site is approximately 14 acres in size, and would be adequate to accommodate processing green waste from the Kawainui-Hāmākua project area. As described in Chapter 2, the vegetation processing area would include an office building, maintenance building, equipment shed and staging areas to support its operations. There would also be staging areas for receiving and disposing of green waste, and areas for windrows and other processing activities. DOFAW could construct and operate this facility or contract an operator such as HEP to build and operate this facility.

Wetland vegetation removed from the marsh and pond areas, and larger vegetation and trees will be trucked to the site. Vegetation will be chipped as needed, dried to reduce water content, and mixed with soil or other green wastes to produce a recyclable product. The byproducts can be utilized within reforestation areas as a groundcover to conserve moisture around plants and reduce the growth of weeds. The organic material can be used to revitalize soil and promote healthy plant growth within the project area. Any excess compost or mulch could be made available for use at other State or City parks or facilities. The vegetation processing area may be operated by the DOFAW or by a third party under contract with the state (DLNR LD, 2000).

Waste from Construction and Activities

Construction of facilities at the Kalāheo Park site would generate some construction debris that would need to be taken to the privately-owned PVT Nānākuli Construction and Demolition Material Landfill for disposal. This also includes construction debris generated from development of facilities at the vegetation processing site. The amount of construction debris

generated from construction of these facilities is not expected to be significant because these facilities are relatively small.

Construction of a comfort station, interpretive shelter and canoe launch facilities at the Kalāheo Park site would bring people to the area and result in an increase in trash that requires pick up and disposal. Operation of facilities at Kalāheo park would generate typical solid waste from park sites generally consisting of organics (food), paper, and plastics. Operation of the vegetation processing site and continued activities at DOFAW's management station would generate similar solid waste. The quantity of solid waste generated should be minimal, and therefore, there should be no adverse impact on municipal collection or disposal facilities.

The park would include trash receptacles for pick-up and disposal. Waste collection from these sites would be coordinated by DOFAW and DSP, or the non-profit organization managing facilities at Kalāheo park, for collection and disposal through a private waste hauler. Waste would then be taken to City disposal facilities at H-POWER or the Waimānalo Gulch Sanitary Landfill. This park site may also require some landscape maintenance that will generate some green waste, primarily grass cuttings. Depending on volume, the clippings may be left on site to mulch naturally or taken to the vegetation processing area for disposal.

5.4.2.2 Proposed Action

Wetland Restoration and Upland Reforestation

Expanded wetland restoration and upland reforestation activities would increase the volume of vegetated debris generated within the project area. Green waste would be processed and disposed in the same manner as that described under the No Action Alternative. This consists of establishing staging areas within upland areas for temporarily storing green waste before it is taken to the vegetation processing site or directly to HEP's facility for processing.

Upland areas could also be used to allow smaller amounts of green waste to decompose before being transported to HEP's commercial facility for composting. The location of staging areas would be determined during the design phase when DOFAW is able to implement phased restoration work. BMPs would be included as part of design plans for the contractor to establish protective areas around the perimeter of these staging areas to prevent vegetation, debris, and water from flowing back into the wetland as it dries. Routine grass cutting or vegetation trimmings as part of maintenance activities may result in clippings continuing to be placed in adjacent upland areas to decompose. Debris from these activities would not be placed within streams or wetlands near these additional areas or within locations that could impede the flow of natural drainage.

The vegetation processing site is planned to support wetland restoration and upland reforestation activities for expanded areas under this Proposed Action. The processing site should also be sufficient to process green waste generated because such activities would occur over time in

phases. Thus, there may be periods where no restoration activities are occurring due to funding availability, or only smaller areas are implemented as phases, such as 10 to 20 acres. DOFAW anticipates that eventually, the vegetation site would accommodate, reuse and recycle all green waste generated by maintenance activities conducted for wetlands and upland areas. The vegetation processing area would reuse green waste in a productive manner, resulting in a positive long-term impact on the environment and on the City's solid waste system. The project could also reduce the cost of solid waste transport, and minimize reliance on the City's or private processing facilities.

The composting process generally takes about three months and does not produce byproducts that are harmful to the environment or humans. However, unpleasant odors are a potential impact associated with any large scale composting facility, as also discussed in Chapter 4 (Air Quality). There are no existing sensitive land uses in the vicinity, and surrounding uses on Kapa'a Quarry Road are primarily light industrial or refuse-related (transfer station) that generates its own source of odors. The nearest residential neighborhoods are located near the ~~proposed~~ Kalāheo Park, about a half-mile upwind. The adjacent model airplane park is the closest public venue, and may be impacted by occasional odors. It is located upwind of the vegetation processing area. The proposed Kapa'a Cultural Center could be impacted by odors, but is located about one-fourth mile south and typically downwind of the vegetation processing site. Preventing and minimizing excessive odors at the processing site can be accomplished through management activities, and are discussed in Chapter 4 (Air Quality).

Structures and Trails

Solid waste would be generated from both short-term construction activities and long-term operations of facilities proposed. Construction of pedestrian trails, accessory structures (e.g. restroom, observation decks, staging areas), cultural centers, education center with kauhale, etc. would generate debris that would need to be properly disposed of at the PVT Nānākuli Construction and Demolition Material Landfill. Solid waste generated from construction of these improvements would be typical of construction-related activities. Construction waste generated would have a short-term impact, and consist primarily of vegetation, rocks, lumber, plastics, etc. which the contractor would need to properly dispose of.

Construction waste from improvements would increase the amount of material being disposed and processed at the privately-owned Nānākuli landfill site. However, construction waste would be generated over time in phases, as DOFAW and DSP allow and are able to implement these developments. Non-profit organizations constructing cultural centers planned along with the education center would also likely occur over time, and may require their own phasing program due to funding limitations. The PVT Land Company should be able to process this additional waste, as the company has implemented a new recycling system that can process three times more debris than the existing smaller system it replaced. The majority of debris entering the facility is separated, crushed, or shredded for reuse or recycling. Up to 80 percent of debris

processed is recycled, and much of it turned into feedstock that can be burned as a fuel to produce electricity.

The proposed pedestrian trails, viewing areas, and interpretive shelters would not be permanently occupied, but the increased presence of visitors and volunteers would generate some trash that will need collection and disposal. Trash generated from persons viewing the area or participating in educational programs would likely be minimal on a daily basis, especially since educational programs would only occur occasionally. Waste would typically consist of organics (food), paper, and plastics associated with eating or drinking. Trash receptacles would be provided at selected locations, and DOFAW and DSP would contract with a vendor to collect and dispose of waste.

The proposed educational center with kauhale and the cultural centers at Kapa‘a and Wai‘auia would increase activities at these sites and generate waste that must be collected and disposed. The non-profit organizations operating these cultural centers would have control over the activities conducted there, and would be responsible for managing and disposing their waste. Waste could be taken to the nearby Kapa‘a transfer station for disposal by organization members, or have it picked up and taken by a private waste hauler. Recycling containers would likely be provided at these centers and encouraged through the organization’s management. Non-profit organizations operating education and cultural centers on Kapa‘a Quarry Road would also aid DOFAW and DSP in monitoring and deterring ongoing illegal waste dumping on this road. These organizations in partnership with DOFAW, DSP, and DOCARE would help minimize the potential for such activities to occur.

The addition of a green house and hale at Ulupō Heiau should not significantly change the level of waste presently being generated, which is minimal. DSP would continue coordinating with the non-profit organization managing this site to address proper collection and disposal of trash. ~~The hale wa‘a added to the Kalāheo park site would only be used for storing canoes, and occasional educational programs conducted there should not negatively disrupt normal waste collection activities serving the park site.~~

At the education center, waste would be generated from staff working at the facility and visitors to the center and area. Typical waste is expected to consist of paper, aluminum cans, plastic and glass bottles, food waste, cardboard, and mixed packaging. Recycling containers would be provided and encouraged through the environmental education programs. Trash and recycling receptacles would also be placed at other strategic locations such as parking areas and trail heads, as well as within buildings. Waste collection would likely be handled by a private waste hauler or by non-profit organization members managing the center. The Kapa‘a transfer station or other City disposal facilities should be able accommodate this increased waste.

As the number of people within the project area increases, the management of solid waste will become more important to both DOFAW and DSP. DOFAW will monitor activities within their wildlife sanctuary to determine whether proper trash disposal and collection from visitors using

pedestrian trails is becoming an issue. If necessary, DOFAW would be able to restrict public access within upland areas of the wildlife sanctuary by closing access or only allowing access during certain periods (e.g. only weekends). DOFAW would also coordinate with DSP to better educate visitors or implement other measures to ensure proper trash disposal.

5.5 ELECTRICAL AND COMMUNICATION FACILITIES

5.5.1 Existing Conditions

Electrical service is provided to the project area by the Hawaiian Electric Company (HECO) via overhead subtransmission lines located on utility poles. These lines are suspended from utility poles usually routed along roadways within and surrounding the project area. Primary subtransmission lines in the project area provide between 4,000 and 12,000 volts of power (4 to 12kV) to areas. Secondary, or distribution, lines are located on utility poles below the primary lines, and bring electrical power to smaller customers (e.g. residences, businesses).

Subtransmission lines within the Kawainui project area are routed along Kalaniana‘ole Highway and Kailua Road along the project site’s southern boundary. Along Ulukahiki Street, there are distribution lines routed down this road providing electrical service to the DOFAW Management and Research Station and lower area where a former ranch site was located. DOFAW’s facility and a few temporary storage containers situated below this facility being used for a research project are the only uses that currently require electrical service.

HECO also has subtransmission lines along Ulukahiki Street that cross over DOFAW’s management station and travel across Kawainui’s wetland toward Le Jardin Academy. There are existing utility poles located within Kawainui’s wetland serving these lines, as shown on Exhibit 5.4, located at the following: 1) a pole situated within a restoration pond near (west of) Maunawili Stream; 2) a pole situated just outside (west) the restoration pond; 3) a pole situated near Kahanaiki Stream; and 4) a pole situated near the transition from wetland to upland area in the Kahanaiki area.

There are no subtransmission or distribution lines routed along the southern half of Kapa‘a Quarry Road. As a result, there is no electrical service currently provided to the Kahanaiki area, Pōhakea, and Nā Pōhaku. On the northern end of Kawainui, primary subtransmission lines generally routed from Mōkapu Saddle Road extend into the project vicinity near the Kapa‘a light industrial and Kapa‘a Stream area. Lines are then routed on utility poles situated mauka of Kapa‘a Quarry Road to provide service to and terminate in front of the City’s Kapa‘a Transfer Station facility. Electrical service from these subtransmission lines provide service to industrial uses located in this valley. Subtransmission lines are located along Mōkapu Boulevard fronting the Kalāheo park site



Exhibit 5.4 Existing HECO Utility Poles Within Kawainui Wetland and Restoration Pond

Subtransmission lines are routed along Kailua Road past Ulupō Heiau and Wai‘auia providing electrical service to surrounding uses and into Kailua town. Subtransmission lines headed east toward Kailua Town continue in part along Hāmākua Drive and travel generally southeast along this roadway. A segment of these lines is routed within Hāmākua's wetland once they reach Hahani Street, eventually exiting the wetland area near Hāmākua Drive Bridge. Exhibit 5.5 shows utility poles located within Hāmākua and are identified as follows: 1) a pole situated above Kawainui Stream bank by commercial area parking lot; 2) a pole situated within wetland; and 3) a pole situated along Kawainui Stream along Hāmākua Drive. Another utility pole is located along Hāmākua Drive Bridge, which appears to be outside of Hāmākua and within the roadway's right-of-way.



Exhibit 5.5 Existing HECO Utility Poles Within Hāmākua Wetland

Telephone and cable service is provided to surrounding urbanized areas by Hawaiian Telcom and Spectrum, respectively. These utilities are provided via overhead lines typically routed on utilities poles shared with the HECO utility lines. Lines for these communication providers are usually strung below electrical lines on utility poles. Along Kapa‘a Quarry Road, communication

lines are routed on different utility poles from HECO. These poles and communication lines are routed on the makai side of Kapa‘a Quarry Road from the City’s transfer station northbound, and then later crosses over to the mauka side of this road traveling to Mōkapu Saddle Road.

Within the Kawainui-Hāmākua project site, communication service is only currently provided to DOFAW’s management station. Communication lines are not located on utility poles crossing Kawainui’s wetland or Hāmākua’s wetland.

5.5.2 Potential Project Impact and Mitigation

5.5.2.1 No Action Alternative

The continuation of DOFAW’s wetland restoration, upland reforestation, and maintenance operations would not generate a demand for electrical, telephone or cable service requiring new utility infrastructure improvements. Cell phone use by contractors or DOFAW staff at the site would be used for communication requirements, and equipment used would probably be diesel powered. If necessary, the contractor could bring in portable generators to the site use for any short-term electrical requirements.

Facilities constructed at the vegetation processing site would require electrical power and telephone/cable communication service to support operations. Electrical service is already provided to the City’s transfer station located across the vegetation processing site via utility poles along Kapa‘a Quarry Road. Therefore, coordination would be conducted with HECO to extend electrical service to this site. The additional electrical demand generated from these facilities would be small, and should be able to be accommodated by HECO. The design phase for this processing site would coordinate with HECO to determine necessary site improvements to extend electrical service. Similarly, coordination would be conducted with Hawaiian Telcom and/or Spectrum to provide communication service to facilities. Operation of the vegetation processing site would thus have minimal impact on electrical or communication services and infrastructure in the area.

Improvements at the Kalāheo park site would require electrical service for possible security lighting, restrooms, and the interpretive shelter. Additional electrical demand generated by these facilities would be minimal, and should be accommodated by HECO. Solar or battery-powered lighting could also be considered as an alternative (HHF, 2002) that would further reduce demand. Coordination would be conducted with HECO during the park’s design phase to extend electrical service to this site from subtransmission lines routed along Mōkapu Boulevard. Similarly, coordination would be conducted with Hawaiian Telcom and/or Spectrum during the design phase to determine whether communication service to the interpretive shelter is required. Operation of the park site would have minimal impact on electrical or communication services and infrastructure in the area.

DOFAW would also like to have existing utility poles within Kawainui's wetland and restoration pond relocated outside of the wildlife sanctuary in the future. Prior entitlements included authorizing the relocation of these utility poles and associated subtransmission lines, which would have a positive effect by eliminating potential hazards to seabird and waterbirds present within the wetland. Coordination would be conducted with HECO to determine the relocation of these utility poles from Kawainui's wetland.

5.5.2.2 Proposed Action

Wetland Restoration and Upland Reforestation

The expansion of DOFAW's wetland restoration, upland reforestation, and maintenance operations to additional areas would not generate a demand for electrical, telephone, or cable service requiring new utility infrastructure improvements. As under the No Action Alternative, cell phone use by contractors or DOFAW staff at the site would be used for communication requirements, and mechanical equipment used would probably be diesel powered. If necessary, the contractor could bring in portable generators to the site use for any short-term electrical requirements.

Structures and Trails

The pedestrian trails and accessory structures (e.g. observation decks, restrooms) would not generate a demand for electrical, telephone or cable service requiring new utility infrastructure improvements. The restrooms at Kahanaiki and at DOFAW's Hāmākua staging area should not require electrical service because it would be modest facilities that would only be available during the day.

Electrical and communication service would be required for permanent facilities, such as the education center and cultural centers, constructed within the Kawainui-Hāmākua project area. Overall, the total additional electrical demand generated by these facilities would be small and should be accommodated by HECO. Most areas already have existing electrical service provided in the area, and would just require extending electrical service to facilities within the sites. However, some areas don't have nearby electrical subtransmission lines, and may require extension of lines and additional poles along roadways. A discussion of effects by subareas is provided.

Subarea B: Kahanaiki-Nā Pōhaku-Kapa'a. The education center at Pōhakea would generate electrical demand to operate the facility. The kauhale structures are not planned to require electrical service at this time, subject to further design. The actual demand required for the education center would be determined as part of its design phase, and is not expected to be significant. The use of photovoltaic power could also be incorporated to reduce electrical demand. There are presently no electrical lines in the immediate vicinity of this site, therefore, electrical lines would likely need to be extended to provide service to this site. If required, it is

likely that existing poles and lines at the transfer station would be extended toward the Pōhakea area. However, necessary improvements would be coordinated with HECO and communication service providers during the design phase for this educational center.

The planned Kapa‘a Cultural Center along Kapa‘a Quarry Road would generate demand for electrical service and would also probably utilize photovoltaic power to the extent possible to reduce this demand. Electrical demand required for facilities would be for lighting and activities supporting administrative and program activities similar to office uses that should be accommodated by HECO. However, there may still be a need to connect to HECO’s existing subtransmission lines to extend electrical service into the site and to facilities. There are subtransmission lines already serving the transfer station located across the street from this site, and electrical service could be extended into the site. Communication lines are also located along this site, and could provide service. The non-profit organization developing this cultural center would be responsible for coordinating electrical and communication service with HECO and communication service providers during its design phase.

Subarea C: Kapa‘a-Kalāheo-Levee. With elimination of the hale wa‘a at the Kalāheo site, there are no project improvements proposed within this subarea that would affect electrical and communication facilities. ~~The only project-related change in this subarea is adding a hale wa‘a and not constructing a pedestrian bridge over Kawainui Canal at the Kalāheo park site. The addition of the hale wa‘a structure would generate a small demand for electrical service to support a meeting room used for educational or cultural programs, and possibly lighting for canoe storage area. Communication service should not be required. The additional electrical demand generated should have minimal effect on HECO’s system, and service could be provided by extending electrical connection into the site from existing subtransmission lines along Mōkapu Boulevard.~~

Subarea D: Wai‘auia-Ulupō-Mokulana. Electrical and communication service required for the permanent facilities constructed at DOFAW’s management station to replace temporary storage containers would be provided from existing electrical distribution lines serving this site. Additional electrical demand generated by these facilities should be relatively small, and should be accommodated by HECO. Coordination would be conducted with HECO during the design phase of facilities implemented to extend electrical and communication service to permanent structures constructed.

At Ulupō Heiau, project improvements only include the green house and hale that would not require electrical or communication service.

The planned cultural center at Wai‘auia would require electrical and communication service that can be provided from existing lines on Kailua Road. Additional electrical demand generated should be minimal given the type of facilities envisioned at this site and should be accommodated by HECO. The largest structure is a hale intended for programs that would

mainly require electrical service for lighting. Other structures supporting administrative and program activities would generate electrical demand similar to small office use.

Subarea E: Hāmākua-Puʻuoehu. At Hāmākua, the proposed restrooms at the program staging area should not require electrical service because it would likely be a modest structure, and only available for use during the day. Other improvements in this subarea would be mainly upland reforestation and wetland expansion and maintenance that would not require electrical or communication service.

5.6 TRANSPORTATION FACILITIES

Julian Ng, Inc. conducted a traffic impact analysis study for this project, and this report is included in Appendix H of this document. Traffic counts were taken at selected study intersections to determine existing traffic operations during the weekday afternoon peak hours of traffic. Future traffic projections without the project and with the project were generated for the study year 2037, and analysis of traffic conditions performed. The study intersections include the following:

1. Mōkapu Boulevard and Kapaʻa Quarry Road (signalized);
2. Kalanianaʻole Highway and Kapaʻa Quarry Road (signalized);
3. Kalanianaʻole Highway, Kailua Road and Ulukahiki Street (signalized); and
4. Kailua Road, Hāmākua Drive and Kainehe Street (signalized).

The methods for calculating volume to capacity ratios and delays prescribed under *The Highway Capacity Manual; Special Report 209* (HCM, 2000) was used. The analysis methodology also used Level of Service (LOS) as a qualitative measure to describe traffic flow conditions at study intersections. LOS values range from free-flow conditions (LOS A) to congested conditions (LOS F).

For signalized intersections, the results of the analyses include utilization (volume/capacity ratio), average delay, and LOS for each lane group, as well an overall condition for the intersection. The LOS are based on the average delay per vehicle described below. LOS D or better is usually considered adequate for peak hour conditions, however, individual lane groups, especially those for minor movements, often will have poor levels of service due to the long signal cycles that may be needed to either provide overall capacity or to accommodate pedestrian crossings).

Average Delay (seconds per vehicle)	General Description of Delay	LOS
≤ 10	Little or no delay	A
> 10 and ≤ 25	Short traffic delays	B
> 25 and ≤ 35	Average traffic delays	C
> 35 and ≤ 55	Long traffic delays	D
> 55 and ≤ 80	Very long traffic delays	E
> 80	Very long traffic delays	F

5.6.1 Existing Conditions

Major roadways near the project area include State highways, City roadways, and a predominantly privately-owned road (Kapa‘a Quarry Road). Figure 5.4 identifies these major roadways along with existing bus routes and bus stops along the project site.

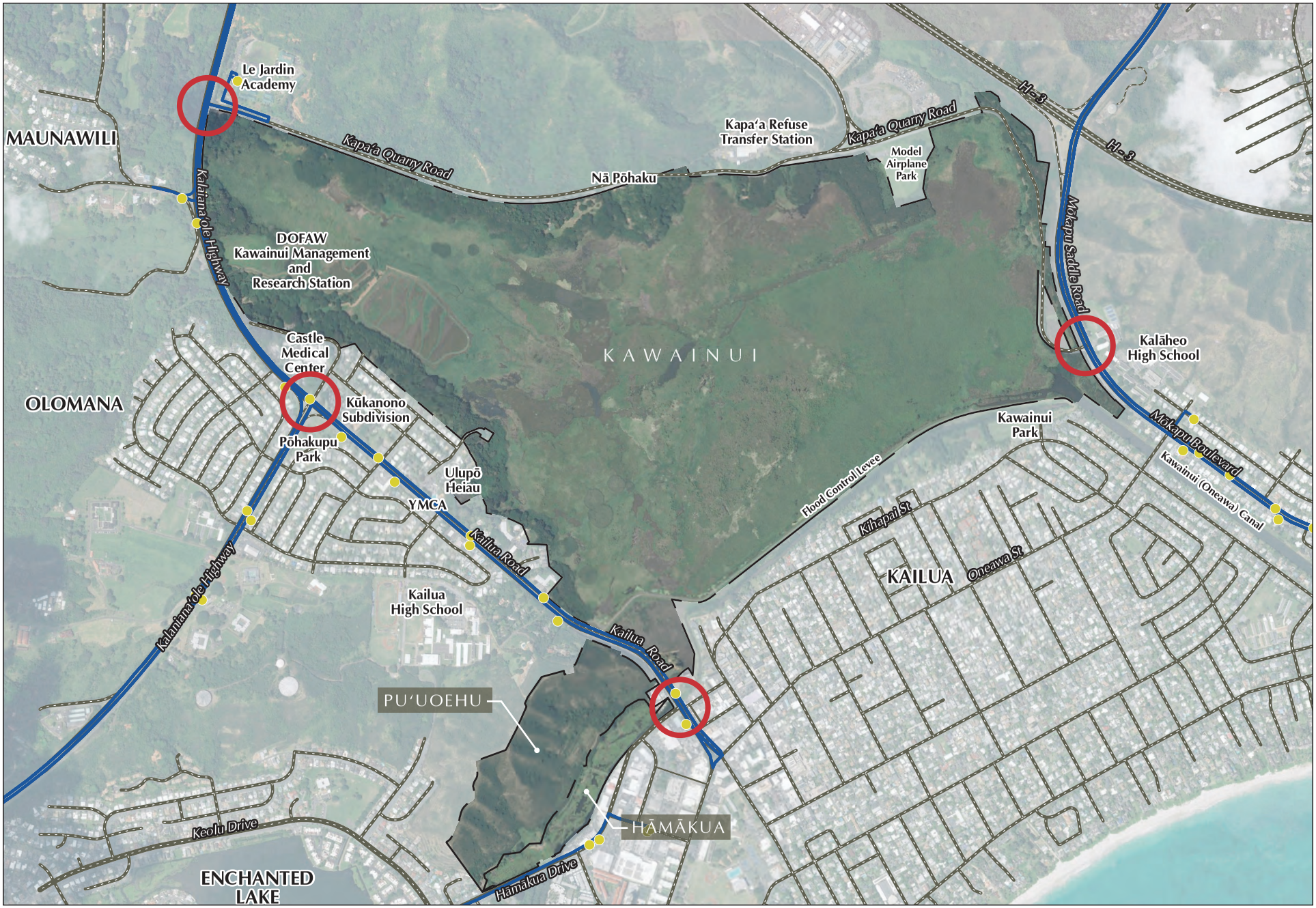
5.6.1.1 Existing Roadway System

State Roadways

Mōkapu Saddle Road is a divided four-lane urban arterial roadway that is part of Route 630 under the jurisdiction of the State Department of Transportation (DOT), Highways Division. This roadway generally runs in an east-west direction in the vicinity of the Kawainui’s northern end (Kalāheo) providing vehicle access between the communities of Kāne’ohe and Kailua. Mōkapu Saddle Road ends at the western end of its signalized intersection with Oneawa Street where it changes to Mōkapu Boulevard. It also forms a signalized intersection with Kapa‘a Quarry Road and Kalāheo High School’s driveway entrance. The posted speed limit within this project area is 35 miles per hour (mph) on the H-3 Freeway side that reduces to 30 mph near Kalāheo High School.

Mōkapu Boulevard is a divided four-lane minor arterial roadway that is part of Route 65. This road starts at the end of Mōkapu Saddle Road on the eastern end of its intersection with Oneawa Street, and runs about 0.9 miles northeast towards North Kalāheo Avenue where it ends. The posted speed limit along this road is 30 mph.

Kalaniana‘ole Highway is a divided four-lane urban arterial roadway in the project area that is part of the State’s Route 61. It generally runs in an east-west direction providing vehicular access connecting Honolulu with Kailua. It forms a signalized T-intersection with Kapa‘a Quarry Road at the southern end of Kawainui. At the road’s intersection with both Kailua Road and Ulukahiki Street (by Adventist Health Castle), Kalaniana‘ole Highway proceeds in a southeast direction toward Waimanalo as Route 72. Kailua Road then continues into Kailua town as Route 61. The posted speed limit along Kalaniana‘ole Highway in this project area is 45 mph.



Source: State of Hawai'i GIS

Legend

- Bus Stop
- Bus Routes (Near Project Area)
- Roadways
- Study Intersections

Kawainui - Hāmākua Master Plan Project

Figure 5.4 - Major Roadways and Transportation Routes

Kailua, O'ahu

0 800 1,600 FEET

HHF PLANNERS places for people

Kailua Road is a divided four-lane urban arterial roadway in the project area that is part of Route 61. It generally runs for about 1.3 miles in a mauka-makai (southwest-northeast) direction from the intersection with Kalaniana‘ole Highway and Ulukahiki Street toward its terminus at the intersection with Hāmākua Drive and Kainehe Street. This road provides access to residential subdivisions, commercial areas, and churches along this stretch. Kailua Road includes several unsignalized intersections along this stretch providing access into the subdivisions. The posted speed limit on this road is 35 mph.

City and Private Roadways

Hāmākua Drive is a four-lane minor urban arterial roadway along Hāmākua that is part of Route 6010 under the jurisdiction of the City and County of Honolulu. It generally runs for about 0.9 miles in a southeast direction from its intersection with Kailua Road and Kainehe Street toward Keolu Drive. This road provides access to commercial uses within Kailua Town and to the Enchanted Lake community. There are several signalized intersections along Hāmākua Drive providing access within this business and commercial area. The posted speed limit on this road is 25 mph.

Kapa‘a Quarry Road is a two-lane roadway that is mostly privately-owned and approximately 2.6 miles in length. Portions of this road are owned by the City near the Kapa‘a Transfer Station and the State DLNR, DSP near Nā Pōhaku. Kapa‘a Quarry Road consists of an access (road) and utility (water) easement about 80 feet wide that runs through portions of the privately-owned, State and City properties. The road provides a connection between Kalaniana‘ole Highway to the south and Mōkapu Boulevard to the north of Kawainui. The road runs along the mauka boundary of Kawainui and provides access to Le Jardin Academy, Kapa‘a Transfer Station, and Kapa‘a light industrial subdivision. The posted speed limit on this road is 25 mph.

Ulukahiki Street is a two-lane City roadway at the intersection with Kalaniana‘ole Highway and Kailua Road that provides access to the Adventist Health Castle medical center, residences of the Kūkanono subdivision, and to DOFAW’s research and management station at the end of the road. The posted speed limit on this road is 25 mph. Other local roads that provide access to the project area include Manu O‘o Road in the Kūkanono neighborhood. Manu O‘o Road is accessed from Kailua Road. This road provides access to the Ulupō Heiau State Historical Park.

Bus Routes

The City provides municipal bus service for the public throughout O‘ahu under The Bus, which is a privately-managed operation by the O‘ahu Transit Services, Inc. under a public-private partnership with the City Department of Transportation Service. As previously shown on Figure 5.4, there are existing bus routes running near the project area along major roadways with several bus stops along these routes.

There are existing bus routes along Kalaniana'ole Highway generally providing service between Honolulu and Kailua town and Waimanalo. This includes bus routes 56, 57, 57A, 70, 77, 85, and 89. Routes 85 and 89 and peak hour express routes (occurs for select times during the morning and afternoon commuter periods). Along Mōkapu Saddle Road and Mōkapu Boulevard, there are bus routes 85 and PH5 that are only peak hour express routes. Along Hāmākua Drive, there is only bus route 57A. No bus service is provided along Kapa'a Quarry Road.

5.6.1.2 Existing Traffic Conditions

Existing traffic count data for roadways in the project area was obtained from the State DOT, Highways Division. Data was collected along Mōkapu Saddle Road, Mōkapu Boulevard, Kalaniana'ole Highway, and Kailua Road. DOT traffic count data are shown in Table 5.5.

Table 5.5
Existing State DOT Traffic Count Data

Description of Project Subarea	Eastbound	Westbound	Eastbound	Westbound
Mōkapu Saddle Road (Route 630); West of Kapa'a Quarry Road	December 11, 2013		December 12, 2013	
24-Hour Total	8,496	12,578	9,979	12,560
Morning Peak Hour	1,065	990	1,056	1,051
Afternoon Peak Hour	433	926	842	663
Mōkapu Boulevard (Route 65); East of Kapa'a Quarry Road	July 23, 2014		July 24, 2014	
24-Hour Total	14,364	7,856*	14,512	13,256
Morning Peak Hour	821	2*	749	1,067
Afternoon Peak Hour	1,459	844	1,481	878
Kalanianaole Highway (Route 61); West of Kapa'a Quarry Road	December 10, 2013		December 11, 2013	
24-Hour Total	23,839	24,905	23,442	23,898
Morning Peak Hour	1,199	2,099	1,223	2,080
Afternoon Peak Hour	2,126	1,504	2,095	1,489
Kalanianaole Highway (Route 61); Near Maunawili Stream	December 4, 2013		December 5, 2013	
24-Hour Total	23,271	24,552	24,120	24,115
Morning Peak Hour	1,416	1,809	1,293	1,844
Afternoon Peak Hour	1,768	1,574	2,061	1,500
Kailua Road (Route 61); Near Kailua Baptist Church	December 10, 2013		December 11, 2013	
24-Hour Total	14,863	15,473	14,972	15,250
Morning Peak Hour	910	1,207	884	1,158
Afternoon Peak Hour	1,155	1,049	1,220	1,040

Source: State of Hawai'i, Department of Transportation, Highways Division, Highway Planning Survey Section: Stations B72006500234, B72006500296, B72006100768, B72006100872, B72006100950

** Data reported for westbound taken before 10:00 AM on July 23 do not appear correct*

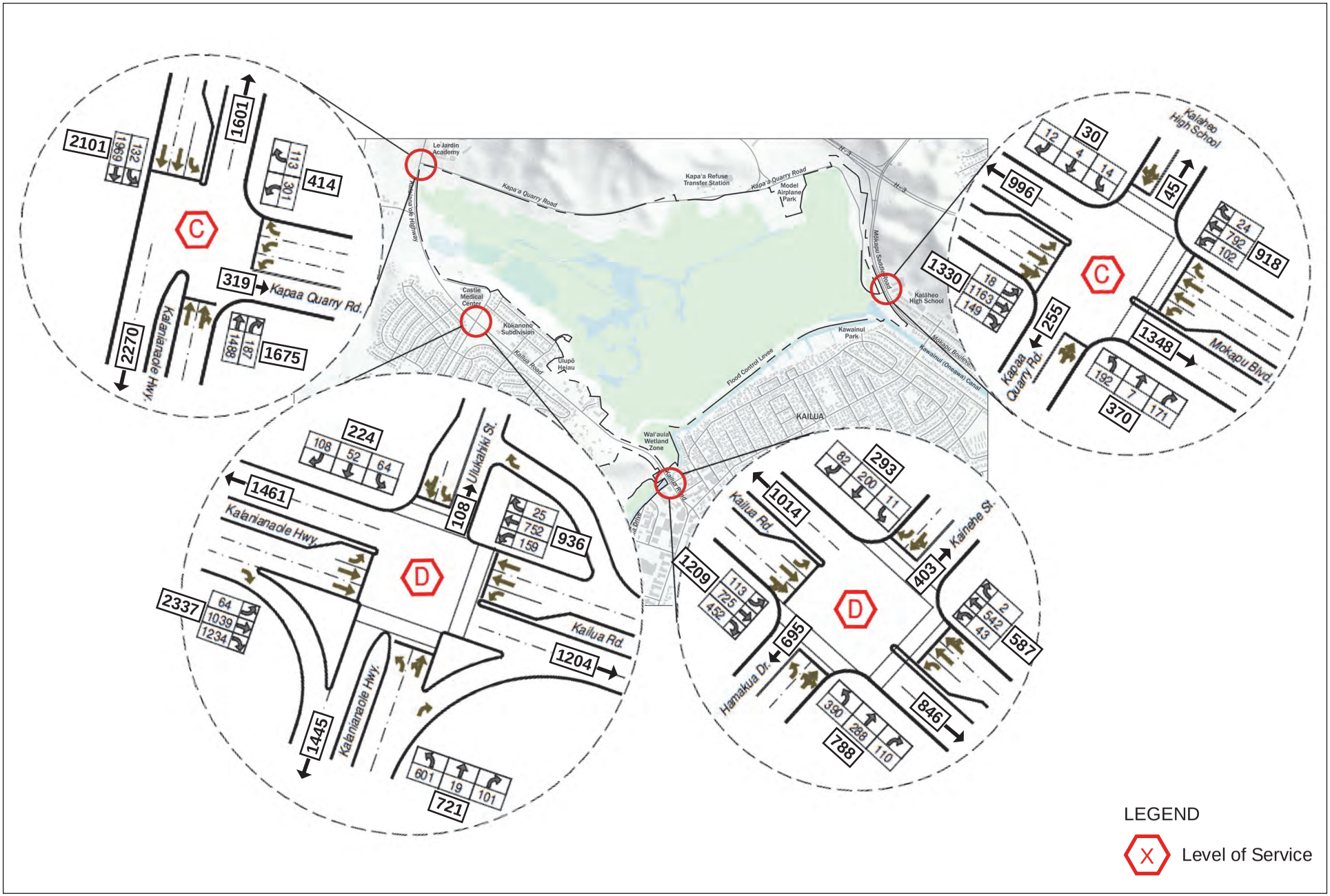
Due to the types of activities planned by project improvements, traffic impacts are expected to occur throughout the day, but after the morning peak commuting period. The greatest impacts on traffic conditions, therefore, would occur during the afternoon peak hour. Weekday afternoon peak hour turning movement data was subsequently collected from 2:00 p.m. to 6:00 p.m. on Wednesday, November 9, 2016 at the intersections of Mōkapu Saddle Road with Kapa‘a Quarry Road (across Kalāheo High School) and at Kalaniana’ole Highway with Kapa‘a Quarry Road. Traffic counts were also taken on Monday, November 4, 2016 at the intersections of Kalaniana’ole Highway with Kailua Road and Ulukahiki Street, and at Kailua Road with Kainehe Street and Hāmākua Drive. Details on the traffic counts are included in the traffic report in Appendix H.

Based on these traffic counts, the afternoon peak hour of traffic was determined to occur from 3:30 p.m. to 4:30 p.m. for intersections along Kapa‘a Quarry Road, and from 4:00 p.m. to 5:00 p.m. at the remaining two study intersections. However, the traffic counts also show that a fairly similar number of vehicles occur throughout this period up to about 5:45 p.m. The resulting peak hour traffic count data is graphically shown on Figure 5.5.

Comparison of Traffic Counts with DOT Data

The 2013 and 2014 DOT traffic count data for the afternoon peak hour along Mōkapu Saddle Road was between 1,360 to 1,500 vehicles west of Kapa‘a Quarry Road, and between 2,300 to 2,360 vehicles east of Kapa‘a Quarry Road. The 2016 traffic counts had between approximately 2,270 and 2,330 vehicles traveling along Mōkapu Saddle Road at the intersection with Kapa‘a Quarry Road, which is similar to the DOT 2014 counts taken. Kapa‘a Quarry Road had 370 vehicles approaching the intersection (northbound) and 255 vehicles traveling southbound. Daily volume on Mōkapu Boulevard, therefore, should be similar to vehicles per day counted by DOT in 2014.

The 2013 and 2014 DOT traffic count data for the afternoon peak hour along Mōkapu Saddle Road was between 1,360 to 1,500 vehicles west of Kapa‘a Quarry Road, and between 2,300 to 2,360 vehicles east of Kapa‘a Quarry Road. The 2016 traffic counts had between approximately 2,270 and 2,330 vehicles traveling along Mōkapu Saddle Road at the intersection with Kapa‘a Quarry Road, which is similar to the DOT 2014 counts taken. Kapa‘a Quarry Road had 370 vehicles approaching the intersection (northbound) and 255 vehicles traveling southbound. Daily volume on Mōkapu Boulevard, therefore, should be similar to vehicles per day counted by DOT in 2014.



Source: Kawainui-Hāmākua Master Plan Kailua, O'ahu, Hawai'i, Traffic Impact Analysis Report (May 2017)

Kawainui - Hāmākua Master Plan Project

Figure 5.5 - Existing Peak Hour Traffic Volumes

Kailua, O'ahu

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Near the intersection of Kalaniana‘ole Highway with Kapa‘a Quarry Road, the 2013 DOT counts had about 2,100 vehicles traveling eastbound into Kailua town and about 1,500 vehicles traveling westbound toward Honolulu during the afternoon peak hour. The 2016 traffic counts showed similar but slightly higher counts with about 2,270 and 1,600 vehicles traveling eastbound and westbound, respectively. At Kalaniana‘ole Highway’s intersection with Kailua Road (further east), there were about 2,340 vehicles approaching eastbound, and 1,200 vehicles approaching from Kailua Road (westbound). Over 50% of these eastbound approaching vehicles (over 1,200) turned right at this intersection continuing on Kalaniana‘ole Highway toward Waimanalo.

The 2013 counts on Kailua Road east of the intersection with Kalaniana‘ole Highway and Ulukahiki Street had about 1,200 vehicles traveling eastbound into Kailua town and about 1,050 vehicles traveling westbound toward Honolulu during the afternoon peak hour. The 2016 traffic counts at the Kailua Road intersection with Hāmākua Drive and Kainehe Street had somewhat similar results with the 2013 data. On Kailua Road, there were about 1,300 eastbound vehicles approaching this intersection and 1,020 vehicles traveling westbound past this intersection (includes left-turns from Hāmākua Drive).

The comparisons of prior DOT traffic data with 2016 intersection traffic counts discussed above suggest that traffic demand has been fairly stable with some slight increase with the passage of time. Some sections of roadways appear to be fairly stable over the past three years, with other sections experiencing some increases. Therefore, the turning movement data from the 2016 counts was used as the baseline for evaluating existing conditions.

5.6.1.3 Analysis of Existing Traffic Conditions

Analysis of the study intersections were conducted for existing conditions based upon the traffic data collected. Table 5.6 shows these results, and a summary is provided.

1. Mōkapu Saddle Road and Kapa‘a Quarry Road. A five-phase operation of the traffic signal provided left turns from Mōkapu Saddle Road leading protected phases when more than two vehicles were queued. Left turns, however, are also permissive (i.e., can be made against oncoming traffic when the through movements on Mōkapu Saddle Road have a green light). Results of the level-of-service analysis assuming two-phase operation indicate this overall intersection operates at LOS C with all approaches operating at LOS C or better during the afternoon peak hour.
2. Kalaniana‘ole Highway and Kapa‘a Quarry Road. The traffic signal at this T-intersection has three-phase operation with protected left turns from eastbound Kalaniana‘ole Highway. While there is a right turn lane on the westbound approach, it is short, and that approach was considered to have a shared through and right turn lane in the analysis. The overall operation of this intersection was LOS C. The southbound approach from Kapa‘a Quarry Road and left turns from Kalaniana‘ole Highway onto Kapa‘a Quarry Road operated at LOS D.

Table 5.6
Existing Traffic Analysis Results (Signalized Intersections)

Description of Intersection	X	Delay	Level-of-Service
Mōkapu Saddle Road and Kapa'a Quarry Road			
Kalāheo High School driveway (southbound)	0.07	17.1	C
Westbound approach on Mōkapu Blvd.	0.70	13.0	B
Eastbound approach on Mōkapu Blvd.	0.81	16.0	C
Kapa'a Quarry Road (northbound)	0.69	27.7	C
Overall Intersection	**0.85**	**16.9**	**C**
Kalaniana'ole Highway and Kapa'a Quarry Road			
Kapa'a Quarry Road approach (southbound)	0.65	39.1	D
Westbound approach on Kalaniana'ole Highway	0.91	23.9	C
Eastbound left turns on Kalaniana'ole Highway	0.62	44.6	D
Eastbound approach on Kalaniana'ole Highway	0.79	8.6	A
Overall Intersection	**0.77**	**17.4**	**C**
Kalaniana'ole Highway, Kailua Road and Ulukahiki Street			
Ulukahiki Street (southbound)	0.69	67.7	E
Westbound approach on Kailua Road	0.53	27.0	C
Westbound left turn from Kailua Road	0.71	64.2	E
Eastbound left turn from Kalaniana'ole Highway	0.58	72.0	E
Eastbound approach on Kalaniana'ole Highway	0.91	49.9	D
Northbound approach on Kalaniana'ole Highway	0.85	52.4	D
Overall Intersection	**0.82**	**46.4**	**D**
Kailua Road, Hāmākua Drive and Kainehe Street			
Kainehe Street approach (southbound)	0.97	88.1	F
Westbound approach on Kailua Road	0.39	23.3	C
Eastbound approach on Kailua Road	0.93	44.2	D
Hāmākua Drive approach (northbound)	0.92	58.9	E
Overall Intersection	**0.94**	**48.3**	**D**

X = Utilization (Volume/Capacity Ratio);
Delay = Average Delay Per Vehicle, Expressed In Seconds
LOS = Level of Service

3. Kalaniana'ole Highway, Kailua Road and Ulukahiki Street. The traffic signal at this intersection has six-phase operation with protected left turns from eastbound Kalaniana'ole Highway and westbound Kailua Road, and split operation for the northbound and southbound approaches. Access to separate right turn lanes on the eastbound and westbound approach are far enough back of the approach that those movements were not considered to be part of the signal in the analysis. While a separate right turn lane is provided for the northbound approach, access to it was often blocked by the queue of northbound traffic, so northbound right turn volumes

were included in the analysis. The overall operation of this intersection was LOS D. The Ulukahiki Street approach, and left turns from both Kailua Road and Kalaniana‘ole Highway operated at LOS E.

4. Kailua Road, Hāmākua Drive and Kainehe Street. The traffic signal at this intersection has three-phase operation with permissive left turns from the eastbound and westbound approaches of Kailua Road, and split operation for the northbound and southbound approaches. Access to separate right turn lanes on the eastbound and westbound approach are far enough back of the approach that those movements were not considered to be part of the signal in the analysis. While a separate right turn lane is provided for the northbound approach, access to it was often blocked by the queue of northbound traffic, so northbound right turn volumes were included in the analysis. The overall operation of this intersection was LOS D. The Kainehe Street approach operated at LOS F, while the Hāmākua Drive approach operated at LOS E.

Localized Traffic at Kūkanono Subdivision

The Kūkanono subdivision includes the residential community situated between Kawainui and Kailua Road, in the area between Castle Medical Center and Ulupō Heiau. Access to this subdivision from Kailua Road is available from Uluoa Street and Ulukahiki Street. Within this neighborhood Manu Aloha Street and Manu Mele Street generally provide vehicle access. Visitors to Ulupō Heiau SHP, the Windward YMCA and area churches utilize Uluoa Street and Manu Aloha Street for access. At the south end of Manu Aloha Street, Adventist Health Castle (formerly Castle Medical Center) employees regularly park along the residential streets.

Kūkanono residents have expressed concerns about the Windward YMCA’s facilities and membership due to increased traffic along with employees and members parking along neighborhood streets. Other concerns were with tour buses traveling within the neighborhood taking visitors to Ulupō Heiau SHP. Information obtained from the YMCA of Honolulu indicates the Windward YMCA has about 10,500 visitors a month (August 2016); resulting in about 350 visitors a day. Ulupō Heiau SHP has about 620 visitors a month (visitor and program participants) or about 21 visitors a day. During the afternoon peak hour, visitors to Ulupō Heiau SHP would be minimal since educational programs are typically over and visitors would typically visit the site earlier in the day. However, some level of vehicles would enter and exit the Windward YMCA during the afternoon peak hour (e.g. visiting after work, completion of after school programs).

5.6.2 Potential Project Impact and Mitigation

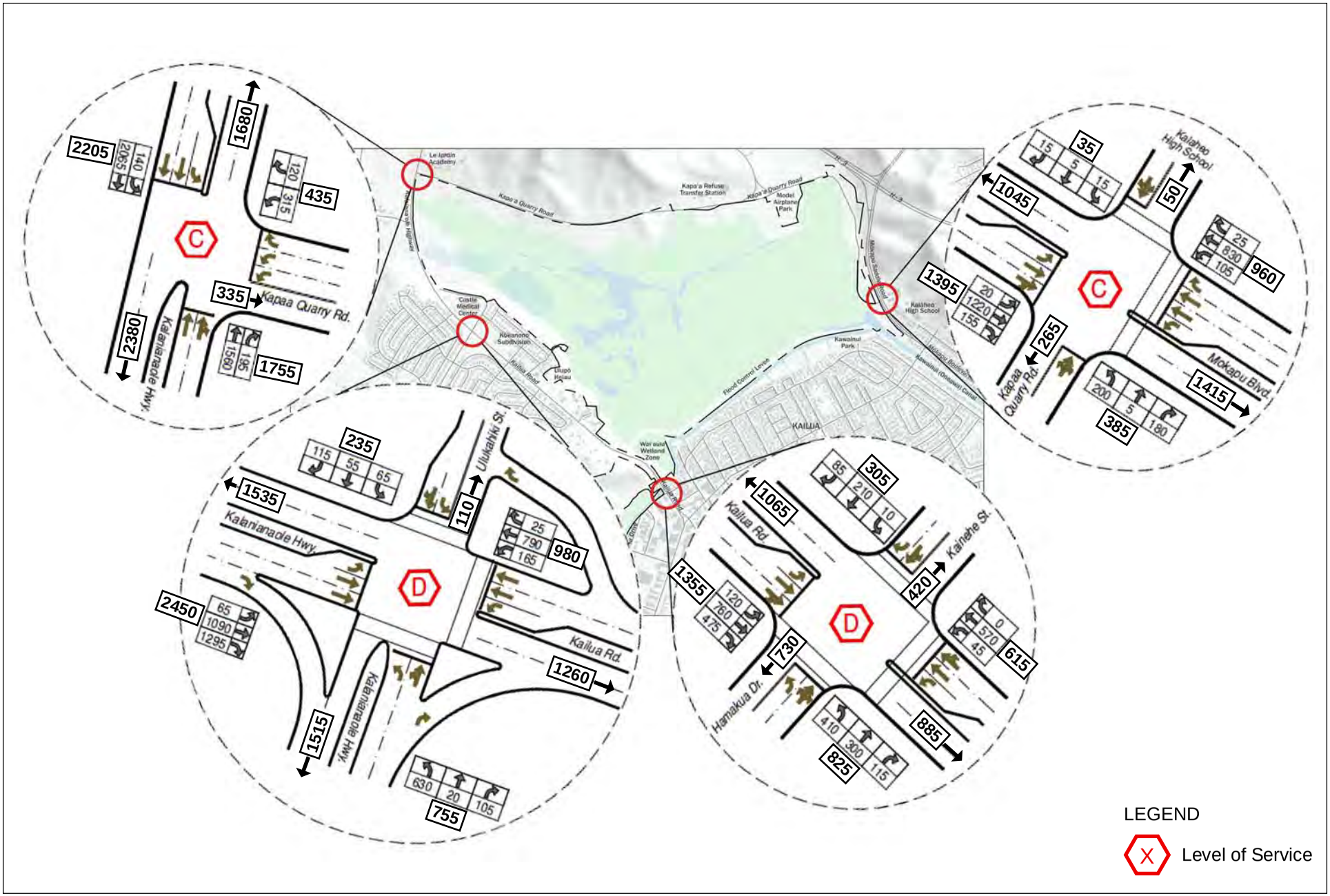
The year 2037 was used as the study year to project future traffic conditions with the project and without the project (No Action Alternative). Future conditions without the project were first projected to establish baseline conditions. Changes with the project could then be assessed to determine project-related impacts.

5.6.2.1 No Action Alternative

The City DPP's socioeconomic projections for the Kailua development plan sub-area project shows no growth in the resident population. In fact, a decrease in resident population is projected from the year 2000 to 2035, from 41,607 persons to 38,791 persons. This reflects a stable community that would also experience a decrease in average household size from 2.99 to 2.64 persons per unit. Employment within Kailua is also projected to remain fairly level only increasing by 407 jobs over 35 years from 12,539 jobs in 2000 to 12,946 jobs in 2035. The City's updated *Koolau Poko Sustainable Communities Plan* (updated April 2016) under City review and processing states that this region experienced an average annual population decline between 2000 and 2010, and that declining trend was projected to continue through 2035. Therefore, Kailua's declining trend is similar and reflective of what is projected to occur throughout the windward region.

Although the City's socioeconomic projections for Kailua show a decrease in population and minimal change to jobs by 2035, a 5 percent increase to existing peak hour volumes was applied to conservatively forecast future traffic conditions under the No Action Alternative (without project scenario). Projected traffic volumes without the project are shown on Figure 5.6. Table 5.7 shows the analysis results with these projected volumes. A comparison of the analyses results between existing conditions and future conditions without the project indicate that, while average delays will slightly increase, future conditions would generally remain unchanged.

Without the project, DOFAW would continue to conduct its ongoing maintenance, approved restoration work, and management activities within the project area, which includes the use of trucks, heavy vehicles and machinery. Vehicles and equipment are stored at the existing baseyard, and wetland restoration and maintenance work would have minimal effect on traffic. Activities would continue to involve the movement of a few trucks transporting staff and equipment to access areas of Kawainui and Hāmākua that would have minimal effect on roadways, especially during the afternoon peak hour. No major increases in staff would occur under this scenario, and staff usually return to the baseyard by 3:30 p.m. to clean-up before leaving after work.



Source: Kawainui-Hāmākua Master Plan Kailua, O'ahu, Hawai'i, Traffic Impact Analysis Report (May 2017)

Kawainui - Hāmākua Master Plan Project

Figure 5.6 - Future Peak Hour Traffic Volumes Without Project

Kailua, O'ahu

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Table 5.7
Analysis Results of Future Conditions Without Project (Signalized Intersections)

Description of Intersection	X (Utilization)	Delay	Level-of-Service
Mōkapu Saddle Road and Kapa'a Quarry Road			
Kalāheo High School driveway (southbound)	0.08	17.2	C
Westbound approach on Mōkapu Blvd.	0.75	14.3	B
Eastbound approach on Mōkapu Blvd.	0.85	17.8	C
Kapa'a Quarry Road (northbound)	0.72	29.1	C
Overall Intersection	**0.89**	**18.5**	**C**
Kalaniana'ole Highway and Kapa'a Quarry Road			
Kapa'a Quarry Road approach (southbound)	0.69	40.2	D
Westbound approach on Kalaniana'ole Highway	0.96	29.1	C
Eastbound left turns on Kalaniana'ole Highway	0.65	46.5	D
Eastbound approach on Kalaniana'ole Highway	0.83	9.7	A
Overall Intersection	**0.81**	**20.3**	**C**
Kalaniana'ole Highway, Kailua Road and Ulukahiki Street			
Ulukahiki Street (southbound)	0.73	70.4	E
Westbound approach on Kailua Road	0.56	27.5	C
Westbound left turn from Kailua Road	0.74	66.3	E
Eastbound left turn from Kalaniana'ole Highway	0.58	72.6	E
Eastbound approach on Kalaniana'ole Highway	0.96	56.4	E
Northbound approach on Kalaniana'ole Highway	0.89	56.0	E
Overall Intersection	**0.85**	**50.0**	**D**
Kailua Road, Hāmākua Drive and Kainehe Street			
Kainehe Street approach (southbound)	1.01	95.9	F
Westbound approach on Kailua Road	0.41	23.6	C
Eastbound approach on Kailua Road	0.98	52.4	D
Hāmākua Drive approach (northbound)	0.96	66.0	E
Overall Intersection	**0.98**	**54.7**	**D**

X = Utilization (Volume/Capacity Ratio);
Delay = Average Delay Per Vehicle, Expressed In Seconds
LOS = Level of Service

Establishment of the vegetation processing site should similarly have minimal traffic impact along Kapa'a Quarry Road. Additional vehicles would consist of some employees and trucks associated with operations. Most operational traffic would likely occur during the day, and not during the afternoon peak hour since daily operations would probably be closing for the day during that time period.

Improvements necessary for the driveway entrance into this processing site would be determined as part of the project's design phase when implemented. However, the proposed access location at the intersection with Kapa'a Quarry Place should not negatively affect Kapa'a Quarry Road because there should be sufficient sight distance at this location. Vegetation along Kapa'a Quarry Road at this entrances would likely need to be cleared to improve views for cars exiting.

At Nā Pōhaku, visitors would continue to primarily park along the mauka shoulder area of Kapa'a Quarry Road because only a few stalls are available within the site. This condition should continue to have minimal effect on traffic flow along Kapa'a Quarry Road.

Visitors to Ulupō Heiau SHP would continue at about the same level as presently occurring. In general, day visits by visitors or as part of educational programs should continue to have minimal impact on traffic conditions along Kailua Road due to the low volume of daily vehicles, particularly during the afternoon peak hour. Localized traffic issues within the Kūkanono subdivision would continue, and be primarily associated with Windward YMCA members that is not part of this project.

Under the No Action Alternative, improvements at the Kawainui SPR, Kalāheo park site could occur (former Kawai Nui Gateway Park). Previously-approved improvements include a parking lot, comfort station, educational pavilion, open canoe storage and canoe launch that would generate visitors and residents to the park site, predominately for permit-issued canoe-launch practices and activities. About 35 to 40 individuals per day (1,200 persons a month) are estimated to use this park site, which is projected to generate about 25 vehicle trips (total entery and exit) to the site during the afternoon peak hour. DSP plans to only issue permits for schools to launch from the Kalāheo site for canoe practices. Therefore, the number of visitors and activities at this site would decrease considerably, and was projected to be about 50% less (600 persons) than the 1,200 persons projected monthly. Nevertheless, the traffic analysis results reflect the higher, and more conservative estimate of impacts for assessment purposes.

This additional traffic should have minimal effect along Mōkapu Saddle Road and Kapa'a Quarry Road, and access to the site is limited to only right-turns in and out. An approximately 42 25 stall parking lot is proposed which would be sufficient to accommodate vehicles anticipated. A pull off area for buses transporting students for recreation and education activities is not provided. Therefore, schools would need to coordinate with DSP to schedule bus arrivals as part of programs. Commercial tour buses would not be allowed to use the parking lot, and would need commercial permits for which DSP is not planning to issue under this project. Permanent DOCARE officers assigned to Kawainui included as part of the project's program operations would support enforcement of unauthorized commercial activities at this site.

5.6.2.2 Proposed Action

The Proposed Action includes project-related improvements that would generate additional traffic to the area. A summary of the projected traffic generated during the weekday afternoon peak hour with the project is shown on Table 5.8, and are based upon the likely increase in visitors to the project area. This projected traffic does not reflect reductions in project improvements proposed (e.g. less trails, building) as discussed in Section 2.2 that would slightly decrease traffic. For example, the monthly visitors to Wai'auia to Mokulana would be reduced to only 200 persons. However, it does reflect a more conservative (higher) estimate of impacts for assessment purposes. Overall, only about 40 additional trips would be generated by the Proposed Action. Exhibit 5.6 shows the distribution of project generated traffic by turning movements at the study intersection. The total projected traffic volumes with the project (added to without project volumes) are shown on Figure 5.7. Table 5.9 shows the analysis results with these projected volumes.

Table 5.8
Project Generated Traffic

Description of Subarea	Monthly Visitors	Visitors Peak Day	Visitors Peak Hour	Vehicles for Peak Hour
1. Kahanaiki-Nā Pōhaku-Kapa'a	5,750	290	60	30
2. Wai'auia-Ulupō-Mokulana	500	30	20	10
Totals	**6,250**	**320**	**80**	**40**

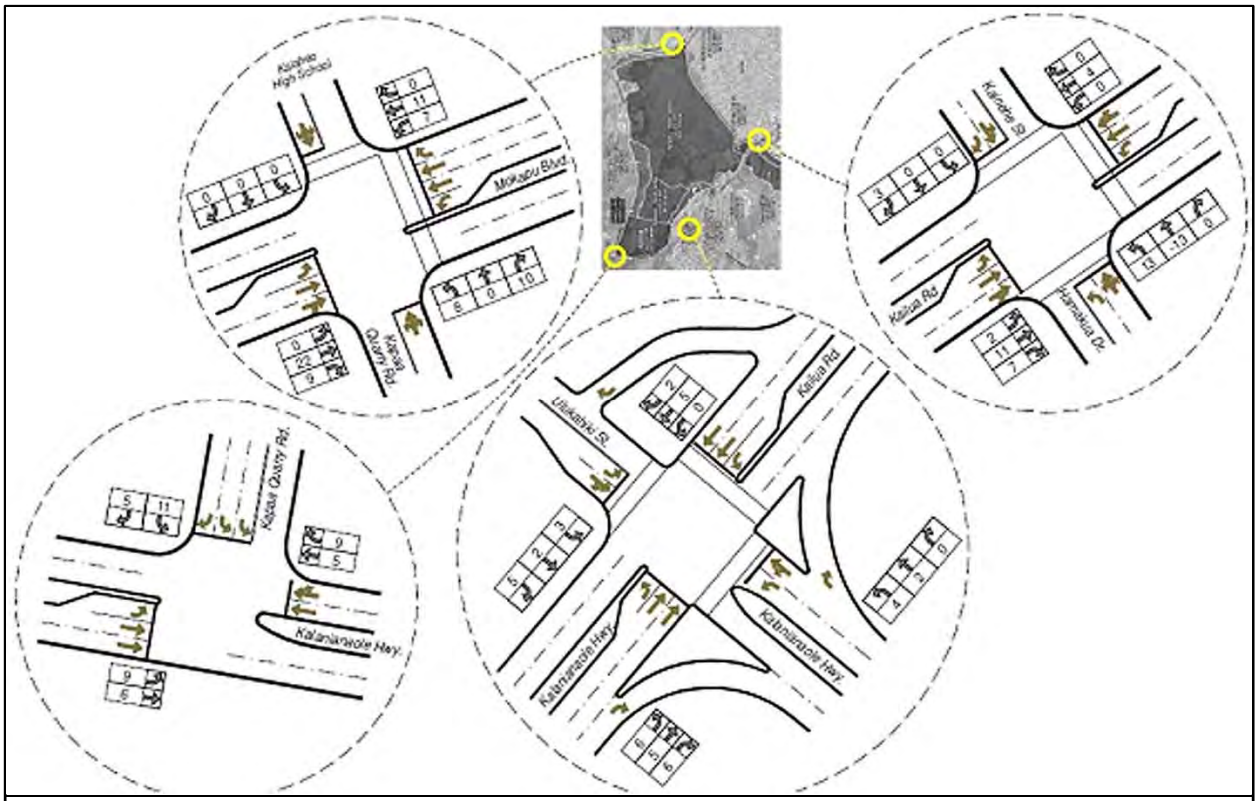


Exhibit 5.6 Project Generated Traffic Volumes



Source: Kawainui-Hāmākua Master Plan Kailua, O'ahu, Hawai'i, Traffic Impact Analysis Report (May 2017)

Kawainui - Hāmākua Master Plan Project

Figure 5.7 - Future Peak Hour Traffic (with Project)

Kailua, O'ahu

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Table 5.9
Analysis Results of Future Conditions With the Project (Signalized Intersections)

Description of Intersection	X (Utilization)	Delay	Level-of-Service
Mōkapu Saddle Road and Kapa'a Quarry Road			
Kalāheo High School driveway (southbound)	0.08	17.2	C
Westbound approach on Mōkapu Blvd.	0.79	15.6	C
Eastbound approach on Mōkapu Blvd.	0.87	18.8	C
Kapa'a Quarry Road (northbound)	0.75	30.7	C
Overall Intersection	**0.92**	**19.8**	**C**
Kalaniana'ole Highway and Kapa'a Quarry Road			
Kapa'a Quarry Road approach (southbound)	0.71	41.2	D
Westbound approach on Kalaniana'ole Highway	0.97	30.5	C
Eastbound left turns on Kalaniana'ole Highway	0.69	49.1	D
Eastbound approach on Kalaniana'ole Highway	0.83	9.8	A
Overall Intersection	**0.83**	**19.4**	**C**
Kalaniana'ole Highway, Kailua Road and Ulukahiki Street			
Ulukahiki Street (southbound)	0.76	73.0	E
Westbound approach on Kailua Road	0.56	27.6	C
Westbound left turn from Kailua Road	0.74	66.3	E
Eastbound left turn from Kalaniana'ole Highway	0.64	76.8	E
Eastbound approach on Kalaniana'ole Highway	0.96	57.3	E
Northbound approach on Kalaniana'ole Highway	0.90	56.7	E
Overall Intersection	**0.86**	**50.7**	**D**
Kailua Road, Hāmākua Drive and Kainehe Street			
Kainehe Street approach (southbound)	1.01	95.6	F
Westbound approach on Kailua Road	0.41	23.6	C
Eastbound approach on Kailua Road	1.00	56.8	E
Hāmākua Drive approach (northbound)	0.98	69.6	E
Overall Intersection	**0.99**	**57.6**	**E**

X = Utilization (Volume/Capacity Ratio);
Delay = Average Delay Per Vehicle, Expressed In Seconds
LOS = Level of Service

Overall, the level of service did not change at three of the study intersections with the additional traffic generated by the project. Increased delay at the intersection of Kailua Road, Hāmākua Drive and Kainehe Street changed the level of service from "D" to "E". The average delay increased 2.9 seconds from 54.7 to 57.6 seconds per vehicle, or 5.3%, compared to projected conditions without the project. Therefore, the project is anticipated to only have a minor impact on the study intersections with little change to delays for various movements. No improvements to study intersections should be required as part of mitigative measures.

Wetland Restoration and Upland Reforestation

The Proposed Action includes continuation and expansion of DOFAW's ongoing wetland restoration and upland reforestation efforts at Kawainui and Hāmākua, along with regular maintenance and management activities within the project area. Improvements at DOFAW's research and management station would allow additional staff (12 staff) to be operating from there, which will slightly increase the number of daily traffic entering and exiting the site (e.g. staff traveling to and from home). The movement of staff and equipment on vehicles between DOFAW's management station and the project area would increase slightly, but should have little, if any noticeable, effect on roadways and intersections. For example, three or four staff could be transported using a DOFAW vehicle to the work area.

The movement of slow-moving heavy construction vehicles and equipment may cause temporary disruptions to traffic along Kapa'a Quarry Road, Kalaniana'ole Highway, and other surrounding roadways. However, the movement of large equipment would typically done during off peak traffic hours. There would thus be little impact to the State's highway facility and privately-owned Kapa'a Quarry Road from DOFAW operations. If required, a permit will be obtained if any oversized and overweight equipment/loads that need to be transported on State highways.

Structures and Trails

The project includes improvements and new facilities that could have some localized effects on traffic conditions that are discussed.

Kahanaiki Section. The proposed visitor parking lot at the Kahanaiki section will serve visitors accessing pedestrian paths and foot trails while functioning as a staging area for educational programs (i.e. bus parking) and management activities. This parking lot can be accessed from a gated entrance on Kalaniana'ole Highway and would only be open during daylight hours. Based upon projected activity levels, an estimated 16 individuals per day would utilize this parking lot. These individuals are primarily anticipated to be Kailua or island residents traveling to the site for recreational usage of nearby trails. Travel by these individuals to the parking lot would generate about 16 vehicle trips per day (8 entering and 8 exiting), presuming two persons per vehicle. Spread out over the entire day, this level of vehicle activity would be minor have negligible effects on traffic along Kapa'a Quarry Road.

Education Center. The proposed education center with kauhale at Pōhakea would attract visitors on a daily basis and accommodate educational programs on several days throughout the week. Visits can be characterized as being predominantly wildlife viewing related recreational activities along with some educational and cultural programs. The majority of visitors would already be traveling to Kailua for ocean recreational activities, shopping, and other activities as part of their main purpose for visiting. Visits to the education center would likely predominantly consist of passby trip for these visitors as they travel to and from Kailua for their primary intended destinations.

The education center and kauhale would likely result in the vast majority of vehicle trips projected within this Kahanaiki–Nā Pōhaku–Kapa‘a area. Based upon projected visitors, this would be about 190 visitors per day. During normal daylight hours operation of this center, this averages about 24 visitors per hour. Assuming 2 persons per vehicle, this is estimated to generate about 12 cars entering and 12 cars exiting the education center per hour (1 car entering/exiting every 5 minutes onto Kapa‘a Quarry Road). Visitations would likely last between 1 to 2 hours on average since the majority of visitors would typically be making a passby stop to this site on their way to/from Kailua for other ocean recreational or shopping activities. This level of vehicle trips should easily be accommodated along Kapa‘a Quarry Road and have minimal impact on traffic conditions.

As shown on Table 5.8, visitors to this Kahanaiki–Nā Pōhaku–Kapa‘a area are estimated to contribute a total of about 30 additional vehicle trips for the subarea during the typical weekday afternoon peak hour. Because this afternoon peak hour occurs toward the end of the day, it is anticipated that the majority of trips would be leaving the education center site (12 enter, 18 exit). This afternoon traffic generated from the site should similarly have minimal impact on traffic conditions along Kapa‘a Quarry Road.

The education center with kauhale at Pōhakea attracts the largest portion of educational and cultural activity participants with about 600 persons per month estimated. Since most educational programs would occur during weekdays, this activity level results in about 150 program visitors a week. Students would likely account for the majority of these visitors and travel by bus. Smaller program groups could travel by cars. Thus, about three buses a week would accommodate most of these visitors (35 to 40 persons), while remaining program visitors traveling by car may account for 10 to 15 additional cars a week. Therefore, traffic generated by program related activities would be minimal on a daily basis and have negligible effect on traffic conditions along Kapa‘a Quarry Road. Furthermore, buses for programs would be traveling after the morning commuter peak and before the afternoon peak hour since students need to return to school.

A few larger cultural events may occur at the kauhale complex up to twice a year. These infrequent events could attract up to 200 to 300 participants and would typically occur on weekends. To minimize vehicle trips and associated traffic impacts, the non-profit organizing these events might encourage participants to carpool or organize bus transportation. About five buses would be needed to transport participants for these events if bus service is retained. Bus parking would be coordinated with DSP and should not be an issue since these events would typically occur on weekends when other site activities are not occurring. This traffic should not adversely impact Kapa‘a Quarry Road traffic since travel would occur in discreet instances when participants are dropped off and picked up. Overall impacts to site roadways from these events would be minimal since the events would occur intermittently.

The parking lot serving the center would prevent cars from parking along Kapa‘a Quarry Road and would also serve Nā Pōhaku. Thus, it would have a beneficial effect of eliminating the need for visitors to Nā Pōhaku from having to park along the roadway’s shoulder creating a safer environment for vehicles and visitors, and reduce obstructions along this roadway shoulder. Open space areas within Pōhakea would support overflow parking, if necessary.

Buses transporting persons participating in educational programs would be accommodated at this parking lot, further minimizing project generated traffic in the area. Commercial tour buses would not be allowed to use the on-site parking lot and would not be allowed to unload passengers on the side of the road. Permanent DOCARE officers assigned to Kawainui included as part of the project’s program operations would support enforcement of unauthorized commercial activities at this site.

The driveway entrance into this center would be designed when the project is implemented as part of the design process. There appears to be sufficient sight distance at the proposed entrance because the roadway is fairly level and straight. Vegetation along Kapa‘a Quarry Road at this entrance would need to be cleared to create a more easily recognizable location, and to improve views for cars exiting. Other driveway entrance improvements (e.g. signage) would be determined as part of the project’s design.

Education and Cultural Center at Kapa‘a. The cultural center planned at Kapa‘a would be operated by a non-profit organization for cultural practices, and would not be open to the general public. Site users will consist of individuals associated with the site non-profit steward and their guests participating in programs and activities. An anticipated 300 to 400 persons would utilize the facility on a monthly basis equating to about 13 persons traveling to the facility each day. Even if assuming each guest or staff drive their own vehicle to this center, it would only generate about 13 vehicles daily for program activities (13 vehicles entering, 13 vehicles exiting). Such daily vehicle trips would have negligible effect on traffic conditions along Kapa‘a Quarry Road.

Three larger, single day events would be held yearly at the site. Events would have limited public attendance or would be accessible only by invitation. Guests would range from 200 to 500 persons per event with a total of about 1,000 guests each year. The non-profit organizing these events could encourage guests to carpool to minimize the number of vehicles traveling to the site or retain the service of buses to transport participants.

Assuming bus services were retained, an estimated seven buses would be required to transport participants to these events. The non-profit organizing these events must coordinate with DOFAW to arrange bus parking. If buses are used, an estimated 14 vehicle trips would be generated (seven entering and seven exiting). Entry and exit rates would have minimal traffic impacts on Kapa‘a Quarry Road since travel into and out of the site would occur only when participants are dropped off and picked up. Overall traffic impacts would also be minimal since these events would occur only a few times a year.

Two parking lots are proposed, with 20 and 12 stalls each that are accessible from Kapa‘a Quarry Road by three gated entrances. Parking would be limited to non-profit staff members operating the site and their guests and partners. The driveway entrances into this cultural center should have sufficient sight distance since the road is fairly level and generally straight except for a slight bend in the road. Vegetation along Kapa‘a Quarry Road at these entrances would likely need to be cleared to improve views for cars exiting. However, these and other necessary driveway entrance improvements would be determined as part of the project’s design when implemented.

Cultural Center at Wai‘auia. The cultural center planned at Wai‘auia is situated near the intersection of Kailua Road, Hāmākua Drive, and Kainehe Street. Vehicle access into the parking lot is from Kailua Road via an existing driveway to the City’s sewage pump station. This cultural center would be operated by a non-profit organization for cultural practices, and would not be open to the general public. The cultural center has the largest portion of projected users for education and cultural related activities in the subarea (about 57 individuals daily).

Parking would be limited to site users, and the center’s students and guests would be encouraged to bike, use public transportation, or park in Kailua Town and walk to the site minimizing on-site drop offs. Assuming half of the 57 estimated daily users were able to travel to the site without parking on site, about 10 vehicle trips (2-3 persons per vehicle) would be required to accommodate remaining site users. This would generate an estimated 20 vehicle trips on a daily basis (10 vehicles entering and 10 exiting the site). Entry and exit rates when site users arrive for programs and leave when they conclude should not impact traffic at the nearby intersection. Most program activities would likely occur after work in the late afternoon (after 5:00 p.m.) and early evenings. Consequently, these activities should generate minimal traffic during the peak afternoon hour along Kailua Road and in the immediate area.

The proposed parking lot would only have 14 available spaces, minimizing traffic in and out of the driveway. Only right turns into and out of the driveway along Kailua Road would be provided further minimizing traffic conflicts and delays. Necessary driveway entrance improvements would be determined as part of the project’s design when implemented.

Kawainui SPR, Kalāheo Park. With elimination of the hale wa‘a at the Kalāheo site, there are no project improvements proposed within this subarea that would affect traffic facilities. ~~The only changes to plans for this park site with the project is adding a hale wa‘a structure and eliminating the pedestrian bridge over Kawainui Canal. Providing the hale wa‘a to store canoes would reduce the type of larger vehicles needed to transport canoes to this site for launching (practices as permitted by DSP), but would not significantly change the projected number of visitors or trips generated to this site from the No Action Alternative. Removal of the pedestrian bridge would also likely reduce the number of visitors comprised of persons that would have otherwise visited this park site to conduct passive outdoor recreational activities (walking, jogging using bridge to access levee). Therefore, project improvements should have a minimal change to future projected traffic conditions along Mōkapu Saddle Road.~~

Ulupō Heiau SHP. With the project, only a nursery and hālau is proposed for the Ulupō Heiau SHP. Visitors to this site are projected to remain the same as current. However, an increase in educational and cultural program participants at this site is projected at about 2 individuals a day. This increase would likely occur from about one to two additional programs (10 to 20 persons) being conducted a week. Growth in vehicle trips resulting from the increase in Ulupō Heiau SHP program participants would be negligible and would have minimal impact on major roadway conditions, including roadways serving the Kūkanono subdivision.

Bus Route Effects

The project is expected to have minimal impact on existing bus operations in the project area, and would not impact current routes. There could be a slight increase in passengers using The Bus for transportation to and from areas at Kawainui and Hāmākua, however, the amount of additional passengers should be very small. Bus routes are only along Kalaniana‘ole Highway to Kailua Road, and along Mōkapu Saddle Road and Mōkapu Boulevard. Therefore, convenient access at bus stops are only located near Wai‘auia, Ulupō Heiau, Mōkapu Peninsula (at Auloa Road), near Oneawa Street, and near Hāmākua.

These bus routes could potentially serve persons attending activities at the cultural center at Wai‘auia, accessing the levee for walking, or visiting Ulupō Heiau~~, Mōkapu Peninsula, or Kalāheo park~~. Hāmākua and the Mokulana peninsula are ~~is~~ not open to the general public, so potential visitors using the bus to access that site would only occur as part of occasional functions or educational programs scheduled by DOFAW.

Short-Term Construction Effects

There would be some short-term effects on roadways resulting from construction-related activities, such as contractors conducting wetland restoration, upland reforestation, or drainage improvements. Contractors working on site improvements (e.g. education center, cultural centers, etc.) could also have temporary effects associated with the movement of larger equipment and worker vehicles traveling to and from construction sites during the morning and afternoon. Construction workers would also typically arrive at and leave the construction site before weekday commuter peak traffic hours.

The number of vehicles occurring in the area would be dependent upon the size, or work quantity, of construction activities that would determine workers required. Most of the proposed restoration and site improvements occur along Kapa‘a Quarry Road, and would thus minimize short-term effects on major roadways, such as Kalaniana‘ole Highway and Kailua Road. ~~Only the construction of Kalāheo park improvements would affect traffic along Mōkapu Saddle Road.~~

Construction work crews for a particular task would likely be in the range of 5 to 10 persons a day given the relatively small to modest scale of improvements proposed (e.g. education center, trails, drainage improvements, etc.). Crew size would be dependent upon the phase of construction occurring at that time such as site preparation, building construction, or interior improvements, and such work would be implemented in phases. Therefore, short-term traffic effects from additional construction workers commuting to sites should be minor and not adversely impact the operation of study intersections. Staging areas established for contractors would include provisions for providing vehicle parking.

During construction activity, traffic impacts would be mitigated by avoiding transport of large cargo and heavy equipment during peak traffic periods. Equipment and materials is planned to be staged close to the site to avoid multiple vehicle trips. Lane closures are not anticipated during construction of any improvements. A permit will be obtained if any oversized and overweight equipment/loads needs to be transported on State or City roadways. Other agency requirements and best management practices would be determined during the design phase of improvements implemented.

5.7 RECREATIONAL FACILITIES

5.7.1 Existing Conditions

There are existing public recreational facilities available within the Kawainui-Hāmākua project area and in the immediate surrounding vicinity and that are used for outdoor recreation or cultural activities (viewing). Figure 5.8 (Existing Public Facilities) illustrates the location of these existing recreational facilities. These recreational assets are described below in greater detail by those within the project area and in the general vicinity.

Recreational Sites Within the Project Area

A discussion of existing public recreational facilities within the Kawainui-Hāmākua project area by subareas is provided.

Subarea B: Kahanaiki-Nā Pōhaku-Kapa‘a. Within this subarea, the Pōhakea and Nā Pōhaku O Hauwahine sites are used for public recreational activities and cultural practices. Nā Pohaku, located within the State DSP’s Kawainui State Park Reserve, is a culturally significant 12-acre site used by the public as a recreational site for walking and viewing (Exhibit 5.7). Nā Pōhaku O Hauwahine (the rocks of Hauwahine) is a unique setting of volcanic rock formations located on Kapa‘a Quarry Road, overlooking Kawainui’s wetland. It is a place of unique geological and cultural features, where plants native to the Hawaiian Islands have been planted for the education and enjoyment of visitors. The park is open for easy day hiking and passive enjoyment. This State park is ungated and officially open only during daylight hours.



Source: State of Hawai'i GIS

Kawainui - Hāmākua Master Plan Project

Figure 5.8 - Existing Public Facilities

Kailua, O'ahu

0 800 1,600 FEET

HHF PLANNERS places for people

The park only has a small parking area in front of the main entrance for a few cars, and additional parking occurs along the shoulder of Kapa‘a Quarry Road. An informal weekday survey of site visitors conducted by HHF in November 2016 found that the site has about 250 visitors a month (8 per day). Educational and cultural programs also occur occasionally resulting in about 50 additional visitors a month. Visitors typically arrive by car, and bike use is rare to infrequent, likely due to site location along Kapa‘a Quarry Road. There are no bus stops along Kapa‘a Quarry Road, and no pedestrian traffic along this road.



Exhibit 5.7 Parking Area in Front of Nā Pōhaku

The Nā Pōhaku site contains educational program areas, unpaved foot trails, and viewing areas that allow visitors opportunities for passive recreational enjoyment of the area (Exhibit 5.8). The site is curated by AML, with the non-profit organization conducting restoration work and educational programs at the site under a Memorandum of Agreement with the BLNR and Right-of-Entry Permit with DOFAW. Similar to the Ulupō Heiau State Historical Park, the parcel (TMK 4-2-013:010) that Nā Pōhaku is located on was purchased using LWCF funds, which require that the site be protected for public outdoor recreational use.



Exhibit 5.8 Panoramic View of Kawainui from Nā Pōhaku

The Pōhakea area located adjacently south of Nā Pōhaku is currently used by the Ke Kahua O Kūali‘i ~~(Ke Kahua)~~ non-profit organization for traditional native Hawaiian cultural practices under a December 2016 short-term curatorship agreement permit (5-years) from DSP (Exhibit 5.9). Their responsibilities include: 1) maintaining the site by removing select vegetation to be replanted with native vegetation; 2) delineating parking areas and trails for public



Exhibit 5.9 Pōhakea Site Used for Cultural Practices

visitation; and 3) installing passive park facilities and providing educational and interpretive programs with approval from DSP.

Subarea C: Kapa'a-Kalāheo-Levee. Recreational sites within this subarea include a portion of the Kawainui Canal fronting the Kalāheo park site and existing levee.

Kalāheo Park and Kawainui Canal. The Kalāheo park site off Mōkapu Boulevard has been used as a canoe and kayak launching area into Kawainui Canal as permitted by DSP (Exhibit 5.10). Recreational canal users use this waterway as a practice site and a means of accessing Kailua Bay. In the past, the DSP has issued short-term Special Use Permits (SUP) to various non-profit organizations, including the Lanikai Canoe Club and Le Jardin Academy. SUPs for canoe use at the site have included specific conditions regulating hours of use. Access to the launch area is also controlled by a gated entrance and large boulders that serve as a barrier to site access.

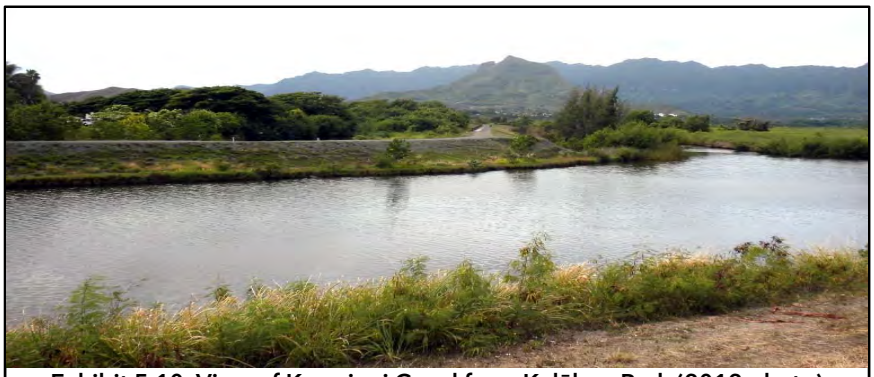


Exhibit 5.10 View of Kawainui Canal from Kalāheo Park (2012 photo)

There are no bus stops near this site along Mōkapu Boulevard (refer to Figure 5.4), and no existing bike or pedestrian traffic associated with this undeveloped site. Mōkapu Boulevard in this area has shoulder space to accommodate bicyclists. Any pedestrian activities occurring in this area would primarily be associated with Kalāheo High School where there is a sidewalk on that side of the road connecting the residential subdivision to the school. No sidewalk exists along the opposite (southern) side of this roadway until the intersection with Oneawa Street. There are no existing uses near the Kalāheo park site that would typically encourage or support pedestrian traffic along the roadway shoulder.

Kawainui Levee. Kawainui's levee was built as a flood control structure, but over time has also become a popular walking and jogging trail for the community (Exhibit 5.11). Although not authorized, occasional bikers would also ride along the levee. The levee is usually accessed from Kawainui Park, which is a gated City park with parking available from 7:00 a.m. to 7:00 p.m. Kawainui Park's hours of operation serve as an informal means of controlling access to the levee. An informal weekday survey of visitors to the levee conducted by HHF Planners in 2016 along with other information estimates visitors using the levee to be about 1,800 persons a month (60 per day), with most activities occurring during the early morning or late afternoon hours.

The levee is located in an area of Kawainui designated as a state wildlife sanctuary under Title 13, Chapter 126, HAR. This designation regulates entry and allowable uses in the sanctuary with access restricted to marked trails and roads. Motorized public vehicles are not allowed in wildlife sanctuary areas. Additionally, pets are also not allowed on the levee. Regulations governing the wildlife sanctuary limit commercial activities to up to 100 visitors per day.



Exhibit 5.11 View of Levee Being Used as Pedestrian Trail

Subarea D: Waiʻauia-Ulupō-Mokulana. Recreational sites within this subarea include Ulupō Heiau SHP use for cultural activities and viewing, and educational programs conducted at DOFAW's restoration ponds.

Ulupō Heiau State Historical Park. This State park under jurisdiction of DSP totals 28 acres, and includes the Ulupō Heiau, which is an ancient Hawaiian religious site that was important to Oʻahu's aliʻi (high chiefs) from the 15th through the 17th centuries. The massive stone platform of the Heiau measures 140 by 180 feet, and its outer walls reach up to 30 feet high. It is believed that many of the stones used to construct this monumental structure were transported from as far as Kualoa, more than 10 miles away. Ulupō Heiau is listed on the National and Hawaiʻi Registers of Historic Places.

The State park is accessed from Kailua Road via Uluoʻa and Manu Aloha Streets through the Kūkanono neighborhood, and through a gated entry shared with the Windward YMCA and Daybreak Church. This gated entry is generally open from 6:00 a.m. to 9:00 p.m. and the park is officially open during daylight hours. Five parking stalls are available for visitors in a rear parking area shared with the Windward YMCA (Exhibit 5.12). A path from the sidewalk of westbound Kalanianaʻole Highway also provides pedestrian access to Ulupō Heiau, however, this path is currently gated and closed. An informal weekday survey of park visitors conducted by HHF Planners in 2016 estimates visitors to be about 450 persons a month (15 per day).



Exhibit 5.12 Parking Area at Ulupō Heiau State Historical Park

Two non-profit organizations, ʻAhahui Mālama I Ka Lōkahi (AML) and the Kailua Hawaiian Civic Club, have a joint curatorship agreement with the Board of Land and Natural Resources (BLNR) to serve as caretakers for approximately seven acres of this site. The park's curators have restored the cultural landscape by removing invasive species, planting native and cultural plants, and constructing trails through the area. The curators and other groups have provided educational opportunities and regularly scheduled work days for visitors. Because the property (TMK 4-2-103:018) was purchased by the State with federal LWCF funds, the land is required to be protected in perpetuity for public outdoor recreational use.

A bike lane is provided along the Honolulu-bound side of Kailua Road fronting this State historical park, and there is some shoulder space for bike use along the Kailua-bound side of this road. Visitors to Ulupō Heiau using bicycles are infrequent as the vast majority travel by car to this site. A bus stop exists fronting the Kailua United Methodist Church, and a sidewalk is present along the church property up to the bus stop. No sidewalk exists along Kailua Road fronting the Windward YMCA and Daybreak Church properties.

DOFAW Restoration Ponds. The DOFAW occasionally conducts educational programs at their restoration ponds, and holds monthly community service projects to support its maintenance. AML, under their MOA with the BLNR, also conducts periodic educational programs at these restoration ponds in coordination with DOFAW. It is estimated that about 80 persons a month participate in these activities at these ponds. Access to the restoration ponds are not open to the general public, but educational and community service projects by community organizations can be coordinated with DOFAW.

No bike lane or shoulder is available along the relatively narrow Ulukahiki Street providing access to DOFAW's maintenance station. Visitors to educational programs typically arrive by car. Pedestrian traffic along this street past the residential subdivision is rare because only DOFAW's maintenance station is located at the end of this road. Pedestrian traffic along this road fronting the medical center is primarily associated with visitors or employees of the hospital.

Subarea E: Hāmākua-Puʻuoehu. Only educational programs are conducted at Hāmākua by DOFAW. It is estimated that about 160 persons a month (5 to 6 per day) participate in these occasional activities. This wildlife sanctuary is closed to the public, but educational and community service projects by community organizations can be coordinated with DOFAW.

A bike lane was recently added by the City along Hāmākua Drive fronting this sanctuary area past the commercial shopping center. A sidewalk is also available along both sides of this road. There is no bus stop provided along Hāmākua Marsh, and pedestrian traffic in this section is generally low.

Recreational Facilities in the Surrounding Vicinity

A summary of existing recreational facilities in the immediate vicinity of the Kawainui-Hāmākua project area is provided, and were previously identified on Figure 5.8.

Kawainui R/C Model Airplane Park. This five-acre City park is located on Kapa'a Quarry Road, and is used by enthusiasts to fly radio controlled model aircraft. Despite its proximity, this municipal park is not part of the state-owned Kawainui-Hāmākua project area. The park is gated and open daily from 7:00 a.m. to 7:00 p.m. There is a parking lot and a comfort station facility. An informal weekday survey of park users conducted by HHF Planners in November 2016 found that the park had highest usage in the late afternoon, and was estimated to have about 20 to 25 visitors throughout the day, the majority of which are associated with model airplanes.

Maunawili Valley Neighborhood Park. This municipal park is located in the Maunawili residential community, located about one mile south of the project area. The park has children's play equipment, two tennis courts, and an open grassed area.

Pohakupu Mini Park. This municipal park is about 3.5 acres in size and located at the intersection of Kalaniana'ole Highway with Kailua Road, just outside the project area. This park has a large water fountain, benches, an open lawn, and children's play equipment.

Kawainui Neighborhood Park. This municipal park is about 4.8 acres and is located at the end of Kaha Street, and adjacent to the levee and just outside the project area. The park has a large grassed area usually used for soccer and other activities. Many people who use the levee for walking start at Kawainui Neighborhood Park.

5.7.2 Potential Project Impact and Mitigation

5.7.2.1 No Action Alternative

Wetland restoration and upland reforestation improvements should not have a negative long-term impact on recreational facilities within the project area and in the immediate surrounding areas. These activities would not directly occur within recreational sites or disrupt activities conducted at those sites. The nearest recreational sites are at Pōhakea and Nā Pōhaku. Existing recreational sites outside the project area are located considerable distances away. The City's model airplane park is situated along Kawainui's wetland, but wetland restoration or upland reforestation activities are not being conducted near this park under this No Action Alternative.

Restoration and reforestation related activities may generate some short-term construction noise from equipment that should not be audible at the various park sites. Similarly, any fugitive dust emissions generated from these activities should not impact recreational sites or activities because of the wet soil type associated with wetlands, type of improvements planned, and distance away. The contractor would also need to comply with State DOH regulations and any

permit conditions to mitigate such emissions. Some odors from decomposing vegetation left on upland areas near the work may occur, but such nuisance effects should not impact recreational facilities that are located considerable distances away.

The vegetation processing site would be used to support wetland restoration and upland reforestation efforts. The model airplane park is located adjacent to this processing site, but should not be adversely impacted by processing activities. The composting process should not cause any objectionable odor from activities if operated properly. Piles created in the process would be monitored daily for moisture and temperature, to determine when the pile needs to be turned to allow exposure to oxygen to keep the pile aerobic. As long as the piles are kept aerobic, there is no objectionable odor from the composting process. The City's transfer station is also located across the street from this park site, and those processing activities have not negatively impacted park activities.

Improvements planned at the Kalāheo Park site under the previously approved Gateway Park proposal would include a canoe launch, outdoor canoe storage, restrooms and interpretive center to support passive outdoor recreational activities. Approximately 1,2~~1~~00 persons per month (37 persons a day) are projected to use the Kalāheo park site, but this activity would be considerably less (600 persons a month) with DSP's plan to only allow canoe launch activities for schools by permit. The majority of visitors (~~7~~200 persons) are expected to be persons participating in school-related canoe ~~related~~ activities (practices) by launching from this site into Kawainui Canal under permits from DSP. Most visitors would thus be associated with high schools ~~or private canoe clubs~~, and peak use times are expected to be late afternoons (after school ~~and after work~~).

These improvements would have a beneficial impact on recreational facilities by providing the public with another park site to use for passive outdoor recreational activities. The site could accommodate bicyclists, would provide scenic views of Kawainui, create potential educational opportunities for learning about Kawainui's resources, and support school paddling programs ~~and canoe organizations~~. The pedestrian bridge constructed over the Kawainui Canal would have a beneficial impact by providing another access point to the levee for the public, and increase outdoor recreational activities (walking).

5.7.2.2 Proposed Action

Wetland Restoration and Upland Reforestation

Expanded wetland restoration and upland reforestation improvements to additional areas within Kawainui should not have a negative long-term impact on recreational facilities within the project area and in the immediate surrounding areas. There are no recreational activities permitted within the wetlands of Kawainui and Hāmākua that would be impacted by restoration activities or the expansion of wetland area at Hāmākua. These activities would thus not directly

occur within recreational sites or disrupt activities conducted at existing sites within the project area and in the immediate vicinity.

Upland reforestation activities would include those areas under DOFAW's jurisdiction and wildlife sanctuaries along with areas under DSP jurisdiction. Some reforestation activities could occur within the Pōhakea area either by DOFAW or the non-profit organization managing that site as part of the educational center and kauhale complex. Reforestation activities should not negatively impact recreational or cultural activities occurring at Pōhakea because areas intended for reforestation are presently not being used for cultural activities or pedestrian trails. Cultural activities generally occur in the large open grassed area at this site. Upland reforestation would occur on mauka areas generally along Kapa'a Quarry Road that is heavily forested.

Reforestation activities can be managed by the contractor or non-profit organization in coordination with DSP and DOFAW to ensure overall public access to this area is maintained. Activities would likely occur in phases of several acres at a time, and would only occur on a short-term basis of several months. Once completed, reforestation improvements would provide opportunities for establishing pedestrian trails or foot trails through the Pōhakea area eventually connecting to Kahanaiki. This would be a beneficial impact for passive outdoor recreational activities and support LWCF requirements.

Upland reforestation at other areas around Kawainui would similarly have a beneficial effect by supporting establishing pedestrian trails and foot trails planned around the perimeter of the wetland. This includes Mokulana Peninsula that would provide a connection between DOFAW's management station and the Kahanaiki area. Areas around Ulupō Heiau and the lower hillside below the Kūkanono subdivision are others that would support connection from the levee and Wai'auia to DOFAW's management station. Reforestation activities would clear overgrown areas allowing for pedestrian trails to be established and increasing public access, which support LWCF requirements.

At Hāmākua, reforestation efforts along the lower hillside of Pu'uoehu would support educational programs by increasing areas that can be accessible for schools and community organizations to participate in activities (Exhibit 5.13). This supports both restoration of Hāmākua and Pu'uoehu and DOFAW's educational programs. It also increases DOFAW's ability to allow occasional community events at Hāmākua for the public to visit this area, learn about resources, and participate in passive outdoor activity (walking).



Exhibit 5.13 Hāmākua Workday with Students (Midweek, Windward Voice, May 24, 2017)

Restoration and reforestation related activities may generate some short-term construction noise from equipment that should not be audible at the various park sites, similar to the No Action Alternative. Any fugitive dust emissions generated from these expanded activities under the Proposed Action should not impact recreational sites or activities because of the wet soil type associated with wetlands, type of improvements planned, distance away, and BMPs that would be implemented. The contractor would also need to comply with State DOH regulations and any permit conditions to mitigate such emissions. Some odors from decomposing vegetation left on upland areas near the work may occur, but such short-term nuisance effects should not impact recreational facilities or activities within the project area or surrounding vicinity. Upland areas used would be within the Kahanaiki to Pōhakea area and by DOFAW's management station.

Structures and Trails

Some of the purposes for the project is to increase public access, educational opportunities, and passive outdoor recreational use within Kawainui, in compliance with Section 6(f) of the LWCF. LWCF grants were used by the State to purchase 173 acres of land within the Kawainui area, primarily within Kahanaiki to Nā Pōhaku (Subarea B) and from Ulupō Heiau to Mokulana Peninsula (Subarea D). Section 6(f) requires that these lands be maintained for public recreational use in perpetuity. At present, only a small portion of the 173 acres is available for public access and outdoor recreation. The creation of pedestrian trails and viewing platforms to enhance public access supports the State's compliance with LWCF recreational access requirements.

Pedestrian and foot trails with accessory structures (e.g. observation decks) are planned within upland areas generally around the perimeter of Kawainui's wetland. Pedestrian trails for public use are not planned within Hāmākua. Under this Proposed Action, trails would extend from ~~Wai'auia mauka to~~ Kahanaiki to Nā Pōhaku under the reduced improvements discussed in Section 2.2~~, and then northbound toward the model airplane park~~. Another trail section would extend from Ulupō Heiau to DOFAW's management station. With the levee, trails would provide access to about 50% ~~over 75%~~ of Kawainui's perimeter.

The majority of persons using trails for passive outdoor recreation and viewing is expected to occur within the Kahanaiki to Nā Pōhaku corridor, with the education center serving as a management and focal point for visitors, including residents. Although the primary mode of transportation for visitors would be vehicles, the parking area at this center can also be designed to accommodate bicyclists. The next greatest area for walking activities would continue to occur along the levee. A smaller number of persons would likely utilize trails from Ulupō Heiau to DOFAW's management station ~~Wai'auia to Mokulana~~ (~~5~~200 persons per month).

The educational center at Pōhakea would support passive outdoor recreation and increased public access. Cultural centers planned would not be open to the general public or provide outdoor recreation, but do support educational programs that are discussed under a later section. Other improvements proposed under this project support both public access and outdoor recreation.

These facilities and trails with accessory structures would therefore have a beneficial effect on recreational facilities and activities by providing new areas that can be used for passive outdoor recreational activities, increasing public access, and creating viewing opportunities for Kawainui's resources and wildlife.

The Proposed Action does not include new residential or visitor units that would increase Kailua's residential population and subsequent demand on existing public parks. The caretaker's cottage at the Kapa'a Cultural Center is intended for managing that site and thus would have negligible, if any, impact on existing parks. Project improvements would increase the number of residents and visitors to the project area utilizing recreational opportunities created. Chapter 2 discussed the projected number of visitors as a result of the various improvements. The majority of visitors stopping at Kawainui would already be traveling to Kailua as their main destination for other more popular attractions, such as beaches and shopping. However, the project would provide another recreational-related attraction for visitors and residents that improve recreational experiences and opportunities. A discussion of facility improvements and effects by subareas is provided.

Subarea B: Kahanaiki-Nā Pōhaku-Kapa'a. Facilities supporting recreational activities in this subarea include: 1) parking, observation areas, and a restroom at Kahanaiki; and 2) education center at Pōhakea. At Kahanaiki, a parking area near the intersection of Kalaniana'ole Highway with Kapa'a Quarry Road would support visitors wanting to access and utilize pedestrian trails for walking and viewing wildlife. The primary mode of transportation for visitors would be vehicles, however, bicycle parking can also be accommodated in parking lot design. Observation decks and a restroom structure would support and have a beneficial effect on recreational activities occurring in this area along with participants in educational programs.

The education center at Pōhakea would serve as a focal point for public access, educational programs, and access to pedestrian trails within the Kahanaiki to Nā Pōhaku area. This center would have a viewing deck, other accessory improvements, and parking for visitors all of which provide a beneficial effect supporting recreational activities and educational programs. The facility would also function as a management center for public access and activities conducted in this area. Even with interim facilities, in place of the education center, consisting of parking, a restroom, and pavilion, these improvements would support recreational activities and programs. With a more program focused emphasis under this interim phase, these facilities would not function as a management center for public access.

Subarea C: Kapa'a-Kalāheo-Levee. With elimination of the hale wa'a at the Kalāheo site, there are no project improvements proposed within this subarea that would affect recreational facilities and activities. ~~The only project-related change in this subarea is adding a hale wa'a and not constructing a pedestrian bridge over Kawainui Canal at the Kalāheo park site compared to the No-Action Alternative. The amount of visitors using this park site should remain about the same as that projected under the No-Action Alternative (1,100 persons per month) with the majority (75%) participating in canoe related activities. Adding a hale wa'a to this site under the project~~

~~would have a beneficial effect by making it easier for schools and canoe clubs to utilize this site. DSP envisions that a school or non-profit organization would manage and maintain this hale waʻa, increasing stewardship and management of this park site which are beneficial effects for this recreational site. Elimination of the pedestrian bridge under this project would reduce another access point for visitors wanting to access the levee for walking. However, this would reduce possible increased congestion and demand for parking stalls at this park site since visitors walking on the levee would continue to access it from Kawainui Community Park.~~

The levee is a flood control structure, but also used by visitors on a monthly basis for walking, jogging and some bicyclists ~~bicycling by about several visitors on a monthly basis~~. No project improvements are proposed for the levee, and DOFAW intends to continue allowing people to walk, ride bicycles, and jog on the levee. ~~However, bicycling is planned to be restricted due to potential conflicts and injuries with persons walking on the levee, and increased deterioration of the levee structure.~~ Dogs would not be allowed on the levee because of the potential threat it poses to waterbirds and birds in the sanctuary along with sanitary issues associated with removal of feces. Signage would be added near the levee access points to inform the public of allowed and prohibited uses. These changes would improve management and use of the levee, and increase safety for the public.

Subarea D: Waiʻauia-Ulupō-Mokulana. There are no major facilities planned within this subarea that supports recreational activities. However, there are minor accessory structures and other improvements planned within this subarea to support pedestrian trails and public access.

Waiʻauia Cultural Center. The cultural center developed at Waiʻauia would have a parking area that includes some stalls being made available for public use during certain times. This parking area provides visitors with another access point to pedestrian trails and the levee for passive outdoor recreation. An observation deck along the pedestrian trail to the levee provides a viewing opportunity for visitors. These minor improvements would have a beneficial impact by supporting passive outdoor recreational activities and public access planned under the project.

Ulupō Heiau SHP. At Ulupō Heiau, project improvements only include the green house and hale. The green house is intended to support cultural landscape improvements being implemented by non-profit organizations, and would not be available to the public. However, the hale could be incorporated as an interpretive feature within the Ulupō Heiau site for visitors creating a small, but beneficial effect on recreational activities occurring here.

DOFAW Management Station. Below (mauka of) DOFAW's management station, a parking area and minor accessory structures (pavilion, and observation deck) are planned to support public access and use of pedestrian trails through this area. The pavilions would have a small beneficial effect on recreational activities occurring here by providing shade and shelter for visitors, and the parking area creates another convenient access point for visitors.

Mokulana Peninsula. ~~The Mokulana Peninsula would only have a few pavilions supporting observation areas of Kawainui from this area.~~ This area is intended only for DOFAW authorized educational and cultural programs and activities along with supporting wetland maintenance and management activities. Parking areas planned would not be open to the public because they are intended for DOFAW use as part of management and maintenance activities, and for staging areas during educational and community service projects. ~~The pavilions would have a small beneficial effect on recreational activities occurring here by providing shade and shelter for visitors using pedestrian trails in the area.~~

5.8 MEDICAL FACILITIES

5.8.1 Existing Conditions

Adventist Health Castle (AHC), formerly Castle Medical Center, is the primary medical facility serving Windward Oʻahu, and is the only medical facility in the project vicinity as previously shown on Figure 5.8. AHC is located on the southwestern corner of the project area at the intersection of Kalaniana'ole Highway and Kailua Road. The facility began operating in 1963, and is a full-service medical center offering a wide range of inpatient, outpatient, and home-based services. AHC is a 160-bed facility with more than 1,000 employees including over 300 physicians.

It occupies a portion of a 10 acre site and is comprised of two buildings, the AHC and the Harry and Jeanette Weinberg Medical Plaza. The AHC comprises the majority of campus buildings and has a footprint of just over two acres. Most hospital departments are in this building. The smaller Harry and Jeanette Weinberg Medical Plaza and Wellness Center has a footprint of about 0.3 acres and contains the Wellness and Lifestyle Medicine Center, a pharmacy, outpatient clinic, and various physician offices.

Parking for visitors and staff of both buildings is provided in a roughly two-acre parking area fronting the medical center building and a lot located east of the medical center. This parking area totals just over an acre.

5.8.2 Potential Project Impact and Mitigation

5.8.2.1 No Action Alternative

Wetland restoration and upland reforestation improvements should not have a short or long-term impact on AHC because it is located on a hillside overlooking Kawainui, and a considerable distance away from where restoration activities would occur. DOFAW's management station and restoration ponds also separate AHC from where wetland restoration and reforestation activities would occur.

Restoration and reforestation related activities may generate some short-term construction noise from equipment that should not be audible at AHC due to the distance. In addition, AHC offices and facilities are enclosed and air conditioned further reducing the potential for any noise effects. Therefore, proposed activities should not impact AHC operations or patients residing there. Similarly, any fugitive dust emissions or odors generated from these activities should not impact AHC or operations because of the wet soil type associated with wetlands, type of improvements planned, air conditioning of facility, and distance away. The contractor would also need to comply with State DOH regulations and any permit conditions to mitigate such emissions.

Operation of the vegetation processing site would not impact AHC due to its considerable distance away. Similarly, improvements planned at the Kalāheo Park site under the previously approved Gateway Park proposal would not impact AHC or operations occurring there.

5.8.2.2. Proposed Action

Wetland Restoration and Upland Reforestation

Expanded wetland restoration to additional areas within Kawainui should not have a short or long-term impact on AHC facilities or operations. AHC is located on a hillside overlooking Kawainui, and is at a considerable distance away from where expanded wetland restoration activities would occur. Wetland restoration and upland reforestation activities planned at Hāmākua would have no effect on AHC because it is located over a mile away.

Upland reforestation activities would include those areas under DOFAW's jurisdiction and wildlife sanctuaries along with areas under DSP jurisdiction. Reforestation activities would occur along the lower hillside below the Kūkanono subdivision to clear overgrown areas and support creating a pedestrian trail. This also includes the area around DOFAW's management station situated below AHC. Once completed, only vegetation maintenance would occur for these upland areas. Therefore, reforestation activities should have no long-term impact on AHC.

Short-term reforestation activities occurring in these areas should have minimal, if any, effect on AHC's operations or patients because facilities and offices are enclosed and air conditioned further reducing the potential for any effects. Any fugitive dust emissions or odors generated from these activities should have minimal, if any, impact on AHC or operations, and the contractor would need to comply with State DOH regulations, any permit conditions, and would implement BMPs to mitigate short-term effects.

Structures and Trails

Pedestrian trails and accessory structures (e.g. parking and observation decks) established in the general vicinity of AHC should not impact their operations because trails would generally be situated around the perimeter of Kawainui's wetland in this area which is a considerable distance away from AHC. AHC is also situated on a hillside above Kawainui's wetland at about 100 feet

MSL. This creates considerable separation from pedestrian trails and activities at DOFAW's maintenance station, and vegetation along Ulukahiki Street creates additional buffer.

Permanent facilities constructed at DOFAW's management station would support their operations and accommodate an increase of about 12 more staff. These improvements and additional staff should have minimal, if any, effect on AHC. Additional staff and activities would increase vehicle traffic along Ulukahiki Street, but this is not expected to negatively impact access into and out of AHC's current parking lots.

The Proposed Action does not include new residential or visitor units that would increase Kailua's residential population and subsequent demand on AHC for emergency or medical services. Project improvements would increase the number of residents and visitors to the project area utilizing recreational opportunities created along with expanded educational programs. Increased activities within Kawainui would create opportunities for potential injuries or other situations requiring medical services from AHC. However, the likelihood for such incidents is very low, and DOFAW has not experienced many situations occurring. Most injuries that could occur would likely be minor (e.g. cuts) and not require AHC emergency or medical services.

5.9 EDUCATIONAL FACILITIES

5.9.1 Existing Conditions

5.9.1.1 Educational Facilities

There are several public and private schools in the vicinity of the project area. The closest is the main campus of Le Jardin Academy, located off Kapa‘a Quarry Road near its intersection with Kalaniana‘ole Highway as previously shown on Figure 5.8. This independent school was founded as a preschool in 1961, and originally occupied a single room at St. John Lutheran Church in Kailua. The school currently has a total enrollment of 837 students from preschool to Grade 12. Its main campus, located 200 feet upslope from Kapa‘a Quarry Road, is on a site that was once the Kailua Drive-In Theatre. Over the years, the campus footprint has expanded, and now includes separate classroom areas for the lower school, middle school and high school students, an administrative building, auditorium, library, gym and soccer field.

The Kawainui-Hāmākua project area is within the State Department of Education's (DOE) Kailua-Kalāheo Complex Area. This complex area is subdivided into the Kailua and Kalāheo sub complexes. Kalāheo High School, Kailua High School, and Maunawili Elementary School are the closest public schools to the project area. Kalāheo High School is located along Mōkapu Boulevard across of the intersection with Kapa‘a Quarry Road. The high school occupies approximately 15 acres.

Maunawili Elementary School is located within the Olomana subdivision along Kalaniana‘ole Highway travelling toward Waimanalo. The school site is over 2,000 feet away (southeast) from Castle Medical Center and occupies portions of an 11-acre property. Kailua High School is located on Ulumanu Drive within the Pohakupu neighborhood, about 600 feet away (east) of Kailua Road.

5.9.1.2 Educational Programs in the Project Area

The Kawainui and Hāmākua wetlands serve as important educational resources to the windward and larger O‘ahu educational communities, supporting educational programs for students of all ages, and providing hands-on learning opportunities in the areas of wetland ecology, conservation, and historic and cultural resources. DOFAW continues to provide hands-on education at Kawainui through its partnerships with nearby schools and local organizations. A summary of some of the many educational programs and community service projects occurring at Kawainui and Hāmākua is provided.

DOFAW has worked with Le Jardin Academy conducting educational work days at the Kawainui restoration ponds. The division also partners with community organizations such as AML, the Pacific American Foundation (PAF), and Hika‘alani to conduct education programs related to Kawainui and Hāmākua. PAF leads the Watershed Investigations, Research, Education, and Design (WIRED) project, which brings together students of all ages, University of Hawai‘i researchers, and private or public sector entities like DLNR to increase the interest of Hawai‘i youth in science, technology, engineering and math (STEM) related disciplines. Students focus on the environment of their surrounding area to identify manmade and natural environmental challenges through scientific investigation. Program participants have conducted research at sites throughout the project area.

AML’s DOFAW-affiliated service learning projects are conducted at Ulupō Heiau, Nā Pōhaku O Hauwahine, and at Kawainui. These ongoing events occur on a regular basis and are available to adults and students of all ages. Hika‘alani has partnered with DOFAW and other Kailua organizations to bring Kailua Intermediate School students to Kawainui and Hāmākua wetlands for service learning field trips. These trips educate students in STEM subjects through experiential learning in both marshes. Healthy Climate Communities is another non-profit organization that has collaborated with DOFAW to conduct education-based work days at Hāmākua to reforest lowland areas with native plants.

Non-traditional students, including at-risk youth, have also participated in experiential learning at Kawainui. Inmates from the Women’s Community Correctional Center in Olomana have worked with the Kailua Hawaiian Civic Club to maintain Ulupō Heiau and Kawainui. The goal of these activities is to help inmates reconnect with their cultural roots and encourage their emotional healing and rehabilitation.

The Hawai‘i Nature Center in Makiki is also planning to begin a pilot program for Windward O‘ahu middle school students at Kawainui. This program is offered in partnership with DOFAW and the University of Hawai‘i Center for Conservation of Research and Training, and offers hands on STEM-related field activities.

5.9.2 Potential Project Impact and Mitigation

5.9.2.1 No Action Alternative

Wetland restoration and upland reforestation improvements should not have short or long-term impacts on existing educational facilities because these facilities are situated outside of the project area and are considerable distances away. This includes cultural landscape restoration activities occurring at Ulupō Heiau. Le Jardin Academy is the closest school facility located across of Kapa‘a Quarry Road, but facilities are situated up hill (elevations greater than 80 feet MSL) and over 300 feet away.

Restoration and reforestation related activities may generate some short-term construction noise from equipment, but that should not be audible at Le Jardin Academy due to the distance and type of activities occurring. Noisier equipment, such as pile drivers or jackhammers, would not be used for activities. Therefore, proposed activities should not impact Le Jardin Academy school operations or student activities. Similarly, any fugitive dust emissions or odors generated from these activities should not impact school operations because of the wet soil type associated with wetlands, type of improvements planned, and distance away. The contractor would also need to comply with State DOH regulations and any permit conditions to mitigate such emissions.

Activities related to wetland restoration and upland reforestation should not negatively impact existing educational programs and community service projects occurring within the areas being worked on. No programs are occurring within the wetlands. As estimated in Chapter 2, there are currently about 460 persons a month participating in educational programs at Kawainui and Hāmākua. These programs employ service learning, where students learn through active participation in community service, specifically in stewardship activities.

Educational programs or community serving learning projects can be scheduled for different upland areas that are being used for restoration activities (e.g. contractor staging areas) or reforestation. Wetland restoration and upland reforestation improvements would have a long-term beneficial effect of providing additional areas to use for educational and community service learning projects. These improved areas could be used as a resource for activities and to learn about restoration, etc. benefitting students from all schools and community organizations.

Development and operation of the vegetation processing center would not impact school facilities because none are located in the immediate vicinity. Educational programs conducted within Kawainui or Hāmākua would not occur at this site. However, there could be opportunities

to incorporate vegetation processing activities, methods, etc. into educational programs that would have a long-term beneficial effect on education.

Development of park improvements at the Kalāheo park site under the Gateway Park plan would occur across of Kalāheo High School. Some short-term construction noise from equipment and construction activities could be audible at this high school, but is not expected to significantly impact instruction or other student activities. Noisier equipment, such as pile drivers or jackhammers, should not be used for activities, and the contractor would need to comply with State DOH noise regulations and permit requirements, if needed. Fugitive dust emissions generated from these short-term activities would be mitigated by compliance with permit requirements and implementation of BMPs, such as watering.

Once the park is completed, Kalāheo High School could benefit from being allowed to launch canoes from this site into Kawainui Canal, if permitted by DSP. That would support the school's athletic program and students participating in that sport. Other schools permitted to access the canal would similarly benefit from construction of this site, supporting their athletic programs related to this sport.

5.9.2.2 Proposed Action

Wetland Restoration and Upland Reforestation

Expanded wetland restoration and upland reforestation improvements under the Proposed Action should not have short- or long-term impacts on existing educational facilities because these facilities are situated outside of the project area and are considerable distances away. Similar to the No Action Alternative, restoration and reforestation related activities may generate some short-term construction noise from equipment, but that should not negatively impact Le Jardin Academy school operations or student activities. Any fugitive dust emissions generated from these activities should not impact school operations because of the wet soil type associated with wetlands, type of improvements planned, and distance away. The contractor would also need to comply with State DOH regulations and any permit conditions to mitigate such emissions.

Expanded wetland restoration and upland reforestation areas should not negatively impact existing educational programs and community service projects occurring within the areas being worked on at both Kawainui and Hāmākua. No programs are occurring within the wetlands. Educational programs or community serving learning projects can be scheduled for different upland areas that are being used for restoration activities (e.g. contractor staging areas) or reforestation.

Wetland restoration and upland reforestation improvements would have a long-term beneficial effect of providing additional areas to use for educational and community service learning projects beyond that implemented under the No Action Alternative. These additional areas restored would expand the range and opportunities being used as a resource for activities further

benefitting students from all schools and community organizations. This supports DOFAW opportunities to partner with schools and non-profit organizations to expand educational activities and service learning projects having a beneficial effect on education. There are currently more requests from local schools and community groups for service learning opportunities than can be accommodated. As discussed in Chapter 2, there is projected to be an increased number of students and visitors participating in educational programs and community service learning projects within the Kawainui-Hāmākua project area.

Structures and Trails

Pedestrian trails, viewing platforms, pavilions for shelter, etc. would have a beneficial effect on educational programs and community service learning projects by improving access within upland areas and allowing students to see and experience the natural environment in a minimally intrusive manner. Pedestrian trails would make it easier to participate in hands-on activities such as wetland restoration, reforestation, and data collection, and to visit cultural areas at Ulupō Heiau SHP, Pōhakea, and Na Pōhaku. Improvements at Mokulana Peninsula, Hāmākua, and near DOFAW's management station would improve access to areas for students and program participants, environmental resources that can be used as part of educational programs, and provide necessary amenities (e.g. shelter, restroom) for service learning projects associated with the restoration ponds, Hāmākua's wetland and upland area, etc.

Parking and staging areas planned would support access for school and community groups while providing safe and more convenient areas to park vehicles and load/unload program participants. School buses participating in these programs would be allowed access to parking and staging areas in coordination with DOFAW and DSP. Commercial tour buses would not be allowed access to these parking areas, such as the educational center, unless authorized by DSP under a permit. The restrooms planned at Kahanaiki and Hāmākua would provide a beneficial and necessary amenity to support program participants. Shelters and pavilions also provide a necessary amenity for program participants to rest under shade, inclement weather, and to receive program instructions.

The Proposed Action does not include new residential or visitor units that would increase Kailua's residential population and subsequent demand on existing schools. The caretakers cottage at the Kapa'a Cultural Center is intended for managing that site and thus would have negligible, if any, impact on schools. The education center, cultural centers, and other improvements planned would support educational programs and community service learning projects conducted within the Kawainui-Hāmākua project area by providing additional facilities where these programs can occur or by supplementing the content of program materials with other resources such as cultural practices. In the long-term, facilities supporting environmental and cultural education would increase the public's understanding and appreciation of the resources of Kawainui and Hāmākua. A discussion of these effects by subareas is provided.

Subarea B: Kahanaiki-Nā Pōhaku-Kapa‘a. The proposed education center at Pōhakea would provide a starting point for students and visitors to the area, and support management of this area and activities. The center would provide a venue for exhibits and material to be used for educational programs. The area adjacent to the education center has been set aside for a kauhale, a traditional Hawaiian homestead, which will illustrate native settlement and subsistence in the pre-contact period. The kauhale complex would thus provide a valuable educational resource in the area of cultural history, practices, and resources.

The Kapa‘a Cultural Center would be constructed and operated by a non-profit organization for cultural practices and education. The non-profit organization would be required to support and participate in educational programs conducted by DOFAW and DSP. Therefore, the facilities could also serve as a venue for conducting classes, programs, or activities related to DOFAW and DSP educational programs. Cultural practices managed by the non-profit organization’s operations at this center would provide opportunities to increase and broaden educational programming in the areas of native Hawaiian cultural practices, environmental restoration, history, and stewardship resulting in a beneficial effect on education.

Subarea C: Kapa‘a-Kalāheo-Levee. With elimination of the hale wa‘a at the Kalāheo site, there are no project improvements proposed within this subarea that would affect educational facilities and activities. ~~The addition of a hale wa‘a constructed at the Kalāheo park site to that already approved under the No Action Alternative would have a beneficial effect by making it easier for schools and canoe clubs to utilize this site, store canoes, and support their school athletic programs. DSP also envisions that a school or non-profit organization would manage and maintain this hale wa‘a, increasing stewardship and management of this park site. The meeting room included as part of the hale wa‘a is also intended to support educational and cultural programs (e.g. canoe voyaging studies, canoe repair, celestial navigation) in partnership with non-profit organizations, schools, and DSP.~~

Subarea D: Wai‘auia-Ulupō-Mokulana. Similar to the Kapa‘a Cultural Center, this center constructed at Wai‘auia would be operated by a non-profit organization for cultural practices and education. The non-profit organization would be required to support and participate in educational programs conducted by DOFAW and DSP. Therefore, the facilities could also serve as a venue for conducting classes, programs, or activities related to DOFAW and DSP educational programs. Cultural practices managed by the non-profit organization’s operations at this center would similarly provide opportunities to increase and broaden educational programming in the areas of native Hawaiian cultural practices, language, history, and stewardship resulting in a beneficial effect on education.

Project improvements at Ulupō Heiau only include the green house and hale that would support cultural landscape restoration (community projects) and education programs occurring there. The green house would directly support replanting native plants that can be incorporated into educational programs, and the hale would provide shelter for instruction, shade and rest, and activities.

5.10 POLICE AND FIRE PROTECTION

5.10.1 Existing Conditions

5.10.1.1 Honolulu Police Department

The Honolulu Police Department (HPD) provides protective services to the Kailua district through their District 4 operations bureau. District 4 is the largest HPD patrol area, encompassing the Windward Oʻahu region from Makapuʻu Point to Kahuku and Kawela Bay. The district is divided into four sectors, with Kailua designated as Sector 2. The main District 4 station is located in Kāneʻohe, with the Kailua substation located along Kuʻulei Road.

HPD officers have been proactive and innovative in areas of crime prevention and criminal apprehension through the usage of all-terrain vehicles to reduce crime on parks and beaches. The department patrols the perimeter of the project area along public roads and upholds parking regulations within project area parking lots. However, the HPD does not patrol within State-owned property, much of which is undeveloped wetland areas or undeveloped upland areas with no improved vehicular access within the Kawainui-Hāmākua project area.

5.10.1.2 DLNR Division of Conservation and Resource Enforcement (DOCARE)

The Division of Conservation and Resource Enforcement (DOCARE) is the enforcement arm of the State's DLNR, and has jurisdiction over State-owned property like the Kawainui-Hāmākua project area. DOCARE's mission is to *"effectively uphold the laws that serve to protect, conserve, and manage Hawaii's unique and limited natural, cultural, and historic resources held in public trust for current and future generations of visitors and the people of Hawaiʻi."* DOCARE officers investigate complaints, gather evidence, lead investigations, and conduct field observations and inspections as required within the project's State-owned lands. Officers may exercise all the powers and authorities of a police officer, including the power of arrest and may enforce all other State and County laws provided that such powers are in effect only in performance of their duties as outlined in Title 12, Chapter 199, HRS.

DOCARE officers responsible for Kawainui and Hāmākua work with DOFAW and DSP to address violations of State laws and regulations, including unauthorized entry onto state lands. DOCARE would be the entity responsible for the safety and security of all improved lands within the project area, including pedestrian trails.

DOFAW and DOCARE has coordinated together in addressing some issues associated with the Kawainui area, such as homelessness. There has been incidents of homeless occurring with several areas such as at the Kalāheo park site, along the trail from Waiʻauia to the levee, within the lower hillside area from the levee to Ulupō Heiau, at Mokulana Peninsula, and the northern end of Kawainui in the hillside area above Kapaʻa Quarry Road leading up to Mokapu Saddle

Road. There are no known issues within Hāmākua, although homeless do stay under the Hāmākua Drive Bridge over Kawainui Stream. Most homelessness occurs in areas that have little public access, active management, and activities occurring. DOCARE has assisted DOFAW in removing homeless camps so that areas can be cleaned up, and vegetation cleared creating more open space that is visible.

The Kawainui area particularly along Kapa‘a Quarry Road has a history of persons dumping trash, large household appliance and goods, construction debris, etc. along roadway areas. Community organizations have conducted periodic clean-up events, and DOFAW has worked to remove trash. Theft is another issue as DOFAW has had equipment stolen from their management station.

5.10.1.3 Fire and Emergency Medical Services

The City HFD has three fire stations in the Kailua area. The fire station located closest to the project area is Station 39, situated on Kalaniana‘ole Highway next to Maunawili Elementary School. Station 18 is located in Kailua town along Ku‘ulei Road. Station 19 is located on Kāne‘ohe Bay Drive in the ‘Aikahi Park community.

Fire response within the project area is shared between the City (HFD) and State (DOFAW). Within wetland areas (i.e., the majority of Kawainui and Hāmākua), DOFAW is the designated primary responder in the event of fire. Fire response in the surrounding upland areas (e.g., Subarea C: Kapa‘a–Kalāheo-Levee, Subarea B: Kahanaiki-Nā Pōhaku-Kapa‘a, Subarea D: Wai‘auia-Ulupō-Mokulana) are under jurisdiction of DSP, DOFAW and the HFD. In these areas, DSP and DOFAW provide mutual assistance, if requested by the HFD. HFD has fire response responsibility in small portions of Subarea C and the upland portions of the Subarea D.

The City’s Emergency Medical Services (EMS) responds to requests for ambulance assistance. The City’s EMS service is comprised of 20 ambulances that provide medical coverage for all of O‘ahu. Ambulances are staffed by Mobile Intensive Care Technicians (MICTs) that are trained and authorized to perform advanced life support functions in a pre-hospital emergency setting. An Emergency Medical Technician (EMT) trained in basic life support or an additional MICT constitutes the remainder of ambulance staff. On some calls, members of the HFD may assist MICTs or EMTs inside the ambulance.

O‘ahu is divided into two response districts, each with an EMT Field Operations supervisor. The project area falls within District 2 which encompasses East O‘ahu (Honolulu Emergency Services Department). District 2 possesses nine EMS ambulance units and one rapid response unit. These EMS units are responsible for emergency medical service within the project area.

5.10.2 Potential Project Impact and Mitigation

5.10.2.1 No Action Alternative

Under the No Action alternative, DOFAW's ongoing management of the project area, wetland restoration and upland reforestation activities would continue in a manner similar to what occurs now. These activities are expected to have minimal, if any, long-term effect on HPD, DOCARE, HFD, and EMS services. There are no residential or visitor units planned under this alternative that could increase demand for police, fire and emergency services. Short-term effects could occur associated with DOFAW staff or contractors operating within areas that may require EMS services for injuries, or DOCARE and HPD assistance due to issues arising, such as encountering homeless camps. However, the likelihood of this occurring is expected to be quite low based upon DOFAW's prior experience and knowledge of the area.

Construction and operation of the vegetation processing facility should have minimal effect on these service providers. There is the potential for theft and vandalism of the facility, however, DOFAW or the operator of that facility would be responsible for security of the site. Being situated across the City's transfer station and in an area having greater accessibility and daily activities should decrease this potential as compared to more isolated areas around Kawainui.

The development of the Kalāheo Park site, including a comfort station, canoe launch and pavilion would make this site a community activity area. There would be more people using the site, particularly during after-school and after-work hours for canoe practices. As with any public area, there is the potential for more calls for police or fire response, or complaints from nearby residents about traffic, parking issues, crime, and noise. The presence of more people, vehicles, and human activity in a concentrated area creates the potential for an increase in police, fire and emergency medical calls.

There are a number of measures that have been included in this project to minimize impacts to police and fire service. The park would have set hours, and rules would be posted regarding park use, hours, allowable activities, and parking similar to other state parks. Use of the canoe launch would only be permit only for schools and canoe clubs reducing the likelihood of overcrowding, commercial use violations, and resulting resident complaints. The comfort station would include exterior security lights and the park's vehicular entrance would be secured at night. Activities with the potential to generate noise, such as the parking lot, comfort station and pavilion would be sited in the western half of the site, away from the nearest residences. Screening vegetation could be left in place to serve as a visual barrier.

5.10.2.2 Proposed Action

Wetland Restoration and Upland Reforestation

Expansion of wetland restoration and upland reforestation activities to additional areas within Kawainui and at Hāmākua would be implemented in a manner similar to that occurring under the No Action Alternative. Work would be done in phases based upon available funding. These expanded activities and management of areas are expected to have minimal, if any, long-term effect on police, fire and emergency services. There are no residential or visitor units planned that could increase demand for police, fire and emergency services.

Short-term effects could occur with DOFAW staff or contractors operating within areas that may require EMS services for injuries, or DOCARE and HPD assistance due to issues arising, such as encountering homeless camps. The likelihood of this occurring within Hāmākua and the lower Pu'uoehu hillside is expected to be quite low based upon DOFAW's prior experience and knowledge of the area. DOFAW has already been working on addressing issues with other areas of Kawainui, and no major issues are expected that would significantly impact police, fire and emergency services.

Structures and Trails

Pedestrian trails created within Kawainui would increase public access within areas that are currently inaccessible or have minimal use. It is possible that there could be future calls to police and DOCARE due to thefts, vandalism, and enforcement or intervention, as is the case with any recreational area open to the public. DOCARE would be responsible for overall security and management of state lands. As occurs now, HPD and HFD personnel would be available to provide assistance and service as needed. Additional DOCARE personnel would be required to cover the project area. Hāmākua would not have this issue because it would not open to the public.

Parking areas and staging areas would be gated and closed during the evening to prevent unauthorized access. Restrooms, observation decks, and pavilions would also be patrolled and monitored to prevent unauthorized use or activities. Rules governing the use of pedestrian trails and parks, including hours of operation and allowed activities, would be posted at the education center, at trail heads, and near public facilities for the public. Other management options for DOFAW and DSP are to not improve and open up areas unless sufficient DOCARE and DOFAW staff are added to support operations.

Therefore, it is recommended that additional DOCARE staff be dedicated to Kawainui as trail segments are constructed and opened to the public. Adequate DOCARE security personnel should be available to patrol and provide service to newly opened trails and public areas. Rules governing use of the trails, including the prohibition of unauthorized commercial activity, should be posted and enforced.

Construction of the education center and cultural centers would increase activities in these areas along with opening up areas that are presently inaccessible. Cultural centers would not be open to the general public, so the non-profit organizations operating them would be responsible for that facility's security and activities conducted there. The education center would be open to the public during normal business hours, and the non-profit organization operating this center would be responsible for coordinating security and operations with DSP. Activities at these centers could generate increased calls due to injuries, thefts, or fires. However, the frequency of assistance and services is likely to be low, and should not significantly impact police, fire, or emergency service providers.

Non-profit and community partners conducting stewardship activities within the project area and neighbors could support these efforts by "serving as the ears and eyes" for DOFAW and DSP staff, and report unauthorized or illegal activities observed. In many areas, the increased presence of people and activity and greater visibility of the area can be a deterrent to undesirable activity. Partnerships and cooperative working relationships between DLNR DOFAW, DSP, HPD, HFD, and community partners would be improve maintaining the safety and security of the project area, improvements, and activities occurring.

CHAPTER 6. RELATIONSHIP OF THE PROPOSED ACTION TO LAND USE PLANS, POLICIES AND CONTROLS



6.1 NON-GOVERNMENTAL PLANS AND POLICIES

6.1.1 Ramsar Convention

The Convention on Wetlands of International Importance, also called the Ramsar Convention, is an intergovernmental environmental treaty adopted in the Iranian city of Ramsar in 1971. It provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. It is the only global environmental treaty that deals with a particular ecosystem.

The Ramsar Convention's mission is for the conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world. At the center of the Ramsar philosophy is the "wise use" concept, defined as "the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development." "Wise use" therefore has at its heart the conservation and sustainable use of wetlands and their resources, for the benefit of humankind. (Ramsar, 2014).

In 2005, the Kawainui-Hāmākua Marsh was designated a Ramsar Wetland of International Importance. The designation came as a result of an application prepared and submitted by the State of Hawai'i Department of Land and Natural Resources (DLNR) Division of Forestry and Wildlife (DOFAW); the Pacific Representative of the National Audubon Society; and the Culture Chair of Hawai'i's Thousand Friends. The justification for the selection of the Kawainui-Hāmākua project area was based on four Ramsar criterion. The project area's eligibility for this designation under these criterion is discussed below.

- ***Criterion 1:*** A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.
    - **Discussion:** Kawainui and Hāmākua Marshes meet this criterion due to their hydrological functions and provision of valued services. The wetland complex provides flood control for the surrounding community by functioning as a reservoir, storing runoff from major rainfall events before gradually discharging waters into Kailua Bay. The project would enhance this important function by facilitating the improved management of Kawainui and Hāmākua wetlands. Wetland restoration improvements will remove invasive vegetation that impedes surface water flow. This action will enhance wetland flood retention capabilities

from storm runoff through increased open water areas and reduced invasive vegetation. The project also proposes improvements that enhance DOFAW's ongoing maintenance of the wetland, such as improved facilities and constructing maintenance roads to facilitate easier access within upland areas. The wetland also aids maintenance of natural functions and water quality in Kailua Bay by trapping sediment and up taking nutrients and pollutants. This reduces adverse water quality impacts on Kailua Bay's nearshore ecosystems.

- ***Criterion 2:*** A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.
    - **Discussion:** Both Kawainui and Hāmākua wetland meet this criterion because they support four endangered waterbird species endemic to the Hawaiian Islands: hybrids of the Hawaiian Duck or koloa maoli (*Anas wyvilliana*), Hawaiian Coot or ʻalae keʻokeʻo (*Fulica alai*), Hawaiian Moorhen or ʻalae ʻula (*Gallinula chloropus sandvicensis*), and Hawaiian Stilt or kukuluaeʻo (*Himantopus mexicanus knudseni*). A key objective of the project is restoring wetland conditions to improve habitat for these endangered waterbirds. Wetland restoration initiatives would remove and replace invasive vegetation with native vegetation, allow the creation of more open water, mud flats, and vegetated areas around wetland fringes that are preferred natural waterbird habitat. DOFAW's ongoing predator control activities will continue with the project, positively supporting waterbird survival. These management activities include predator traps and construction of predator fencing.
- ***Criterion 3:*** A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.
    - **Discussion:** Both wetlands meet this criterion because they include a significant portion of habitat requirements for the aforementioned endangered waterbirds, which are endemic to Hawaiʻi, as well as for the non-endangered endemic Laysan Duck (*Anas Laysanensis*) and Hawaiian Goose or Nene (*Branta sanvicensis*). Kawainui and Hāmākua support four of the six waterbirds mentioned in this discussion, making the wetland complex important in maintaining the biological diversity of the biogeographic region. Project habitat enhancement and predator management initiatives would improve the suitability of the wetland area as habitat for endangered waterbirds. This will support biodiversity objectives in the long-term by providing improved conditions that can support population recovery of these waterbirds.
- ***Criterion 8:*** A wetland should be considered internationally important if it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.

- **Discussion:** Kawainui meets this criterion because the wetland provides a migration path from the ocean to mountain streams for indigenous and endemic amphidromous fish and crustaceans, including *Awaous guamensis* (indigenous goby), *Stenogobius hawaiiensis* (endemic goby), *Eleotris sandwicensis* (endemic eleotrid), and *Atyoida bisulcata* (endemic shrimp). The project enhances the suitability of Kawainui as a migration path for these biota through wetland restoration improvements proposed. Removal of invasive vegetation and the floating peat mat from wetland areas would restore natural stream and water flow through the area. Removal of the peat layer will also allow sunlight to penetrate marsh waters, allowing aquatic algae to generate oxygen thereby improving stream habitat suitability for these migratory indigenous and endemic species.

6.1.1.1 Compatibility with Ramsar Mission and Philosophy

Ongoing and proposed wetland stewardship activities are the primary focus of the project and directly support the Ramsar Convention mission to utilize an ecosystem approach, within the context of sustainable development.

In keeping with the Ramsar wise use philosophy, the project will support ongoing and proposed stewardship activities, and provide opportunities for the public to experience and learn about the wetland areas through trails, viewing platforms, and an education center. Other improvements seek to enhance a sustainable native Hawaiian cultural presence, and to integrate cultural aspects with long-term resource stewardship. These improvements are compatible with Ramsar Convention guidance as discussed below.

6.1.1.2 Ramsar Strategic Plan 2016-2024

The Ramsar Strategic Plan 2016-2024 is the fourth strategic plan of the Ramsar convention. This strategic plan provides guidance on how the convention can be implemented over the nine year period covered. Plan guidance facilitates implementation of the convention by orienting the actions of Contracting Parties and stakeholders involved with wetland conservation and management. The strategic plan is guided by the following vision, “Wetlands are conserved, wisely used, restored and their benefits are recognized and valued by all” (Ramsar, 2016).

- **Discussion:** The project supports the vision of the fourth strategic plan. This vision is focused on the conservation, wise use, restoration, and recognition of wetlands and their benefits. The objective of the project is similar as discussed in Section 2.1, and focuses on the restoration and improved management of project area wetlands and their natural resources. Project areas would be restored through wetland restoration, upland reforestation activities, and associated facility improvements that support these activities. Proposed management initiatives would aid the conservation of wetland natural resources and endangered waterbirds. Physical improvements including trails

and structures enhance access to upland areas within the project site, and support programs that educate attendees on the value of wetlands and allow them to participate in restoration efforts. In this manner, wise use components of this vision are supported as the project facilitates ongoing stewardship and sustainable usage of Kawainui and Hāmākua wetlands.

Strategic plan guidance is oriented around four goals that facilitate implementation of the Ramsar Convention from 2016-2024. These goals constitute four priority areas for the Ramsar Convention during this period. Strategic plan goals are operationalized through actionable targets. The project's adherence to pertinent goals and their associated targets is discussed below.

Strategic Goal 1 – Addressing the Drivers of Wetland Loss and Degradation

Target 2: Water use respects wetland ecosystem needs for them to fulfil their functions and provide services at the appropriate scale inter alia at the basin level or along a coastal zone.

- **Discussion:** Kawainui and Hāmākua wetlands possess valuable natural functions that benefit downstream coastal water resources. These natural functions include detention of stormwater and subsequent filtration of pollutants before being released into Kawainui Canal and eventual discharge at the shoreline. However, these functions have been impeded due to the ongoing terrestrialization of wetlands. The project supports this strategic plan target by restoring, enhancing, and ultimately improving these natural functions. Proposed wetland restoration improvements would remove invasive vegetation, increasing the presence of open water areas and improving water flow. As a result, waterborne pollutants would have time to settle and be filtered by vegetation rather than being conveyed directly to coastal areas. Stormwater entering the project's wetlands would also be better detained. Invasive vegetation removal may require usage of approved herbicides. DOFAW has also obtained State NPDES coverage for herbicide use and wetland restoration for certain areas planned for implementation. Facility improvements and associated infrastructure, such as parking lots and staging areas, would support restoration and management efforts, while having minimal impact on these wetlands and their natural functions. LID elements such as permeable pavers would be incorporated into these improvements, allowing continued groundwater recharge. Although the area occupied by impervious surfaces in the project area would increase, usage of detention basins as part of on-site drainage improvements would detain any additional stormwater produced over existing conditions. Facility improvements would also enhance DOFAW's capacity to conduct ongoing restoration and operational activities conducted by agency staff and the public. By extension, development of these facilities would aid enhancement of wetland natural functions.

Target 3: The public and private sectors have increased their efforts to apply guidelines and good practices for the wise use of water and wetlands.

- **Discussion:** This state DLNR initiated project was guided by a draft master plan that identified improvements for DOFAW and DSP to consider for the project area. This environmental document refined project plans based upon community input and evaluation of environmental effects, and identified best management practices, minimization and mitigative measures to guide good practices and use of areas. This plan and associated guidance is in alignment with the Ramsar wise use philosophy that calls for the conservation and sustainable use of wetlands. Project plans provide a guide for how proposed restoration, reforestation, and facility improvements can be implemented so that wetlands are enhanced in a manner that is sustainable and does not degrade wetland resources. For example, implementation of LID site design elements with proposed facilities allow for minimizing effects and allowing sustainable use of project areas. The project also provides broad guidance on how wetland restoration improvements should be phased and implemented, supporting the conservation of project area wetlands. In this manner, this project supports this strategic plan target by identifying guidelines and various measures that further Ramsar wise use principles.

Target 4: Invasive alien species and pathways of introduction and expansion are identified and prioritized, priority invasive alien species are controlled or eradicated, and management responses are prepared and implemented to prevent their introduction and establishment.

- **Discussion:** The project's focus on managing the presence of invasive plants and vegetation found in the wetlands support this strategic plan target. Invasive mammalian, avian, and vegetative species have been identified by DOFAW with specific management efforts proposed. For example, a predator control program is already operational and would be continued. This program involves usage of traps as the primary method of regulating the presence of mongoose and feral cats that are invasive mammalian species in the project area. Perimeter fencing around the wetland boundaries is proposed to minimize the access by larger invasive mammals in wetland areas, such a feral pigs.

Strategic Goal 2 – Effectively Conserving and Managing the Ramsar Site Network

Target 5: The ecological character of Ramsar sites is maintained or restored, through effective planning and integrated management.

- **Discussion:** The project plans support this strategic plan target. The project plans provide guidance to DOFAW and DSP that effectively integrates their agency responsibilities in a manner that enhances the restoration of Kawainui and Hāmākua wetlands. For example, development of a trail system within Kawainui's upland areas that surround the wetland allows fulfilment of objectives to support public access and create passive recreational opportunities within the project area. The environmental

review process allowed for public input to be evaluated along with assessments of environmental impacts from proposed improvements. This supported effective planning of the project to ensure the ecological character of Kawainui-Hāmākua is not adversely impacted. Proposed coordination with agencies and community organizations increasing stewardship opportunities, cultural practices, educational programs, etc. support an integrated management approach to this project site.

Target 7: Sites that are at risk of change of ecological character have threats addressed.

- **Discussion:** The ecological character of Kawainui's wetlands has been degraded due to anthropogenic impacts and the long-term overgrowth of invasive vegetation. Anthropogenic impacts including the large scale urbanization of the surrounding area over decades and the overgrowth of invasive vegetation have adversely impacted the wetland's ecological character. The project supports this strategic plan target by proposing improvements and activities that alleviate these threats. Upland drainage infrastructure improvements along Kapa'a Quarry Road will repair existing drainage facilities and improve upslope detention (e.g. causeways). Connections between these facilities and downslope stormwater detention improvements are proposed. Drainage improvements would facilitate retention of sediments and other pollutants conveyed to the wetland by runoff. As a result, a threat source to the ecological character of these wetlands in the form of waterborne pollutants would be addressed. Wetland restoration improvements involve removal of invasive vegetation and replanting of native vegetation. Restoration improvements address the overgrowth of invasive vegetation, which has threatened and diminished the vegetative aspects of the area's ecological character.

Strategic Goal 3 – Wisely Using All Wetlands

Target 9: The wise use of wetlands is strengthened through integrated resource management at the appropriate scale, inter alia, within a river basin or along a coastal zone.

- **Discussion:** The variety of natural resources found within the project area are integrated in proposed natural resource management initiatives. These initiatives are mutually supporting, restoring and enhancing various project area natural resources in support of the Ramsar wise use concept. For example, wetland restoration improvements involve removal of invasive vegetation and the replanting of native vegetation. Increased open water areas result from invasive vegetation removal that support aquatic resources, improve flood protection, and enhance waterbird habitat. Multiple natural resources benefit from wetland restoration improvements. In this manner, wetland restoration improvements are a form of integrated resource management, enhancing multiple natural resources of the project area in support of the Ramsar wise use concept.

Target 12: Restoration is in progress in degraded wetlands, with priority to wetlands that are relevant for biodiversity conservation, disaster risk reduction, livelihoods and/or climate change mitigation and adaptation.

- **Discussion:** The project supports this strategic plan target by proposing improvements that further ongoing wetland restoration improvements occurring in the project area. A diverse population of vegetation and fauna are found within Kawainui and Hāmākua's wetland areas. These wetlands also provide important stormwater retention functions and support flood risk reduction for downstream areas. However, the ongoing degradation of these wetlands has adversely impacted the ecological characteristics previously discussed. DOFAW operational staff and associated volunteers continue to conduct wetland restoration activities that aim to reverse degradation of these wetlands, benefiting wetland biodiversity and stormwater retention functions. Project improvements will provide facilities and infrastructure that would better facilitate the restoration work of DOFAW and their volunteers. The proposed trail system would improve access to the wetland for agency operational staff and volunteers. Improvements to DOFAW's management and research station would also support these restoration efforts. The project supports this strategic plan target by providing improvements that facilitate improved execution of DOFAW restoration efforts.

Operational Goal 4 – Enhancing Implementation

Target 16: Wetlands conservation and wise use are mainstreamed through communication, capacity development, education, participation and awareness.

- **Discussion:** The project supports this strategic plan target by proposing improvements that enhance the efficacy of DOFAW programs focusing on wetland conservation and education. Infrastructure improvements such as proposed staging areas and trails improve access to wetland areas for DOFAW operational staff and volunteers. This enhances the capacity of DOFAW operational staff to conduct these programs. These programs not only allow volunteers to participate in wetland restoration but educate volunteers about the value of the wetlands and their resources. In this manner, the project supports this strategic plan target.

6.1.1.3 Culture and Wetlands

In the years following the signing of the Ramsar Convention, it became clear that natural resources conservation could not be successful without considering the welfare of local populations and ensuring their active participation. Since 2006, the Ramsar Culture Working Group has been responsible for the Convention's work on the cultural aspects of wetlands. In 2008, the Culture Working Group released a guidance document on cultural aspects of wetland management. In its introduction, the document states that *"it has become more than evident that*

the fate of wetlands depends on human attitudes and activities, and that incorporating cultural values in our work can be beneficial for conservation and wise use efforts."

The following excerpts are from Chapters 1 and 2 of "Culture and Wetlands, a Ramsar Guidance Document" prepared by the Ramsar Convention's Culture Working Group (Papayannis et al 2008). The excerpts provide an overview of the concept of incorporating cultural aspects in the management of wetlands. The project's alignment with these concepts is discussed.

Chapter 1. General Considerations

1.1 The global context

"A growing body of evidence supports the recognition of links between biological and cultural diversity and continued exploration of the interface between these and other forms of diversity. The role of indigenous peoples, both as custodians of biodiversity and proponents of cultural diversity, is crucial in understanding the interconnectedness of these issues…

…In many of the current discussions about environmental issues at national and international level, people are not often treated or regarded as part of the biosphere or as part of 'biodiversity'…conservation biologists and wildlife managers tend to focus on biological issues when addressing conservation of 'natural areas', but the achievement of conservation outcomes requires an understanding of people and their aspirations and an awareness of the political and social climate..." (Papayannis et al, pp. 10-11)

Discussion: The project recognizes the relationship between the biological diversity of the project area and the diverse cultural groups involved in its restoration. These culturally oriented organizations, many of which are guided by native Hawaiian cultural values, play a critical role in project efforts to restore and enhance the project area's biological diversity. The project aims to provide opportunities for organizations to participate in stewardship, educational programs, and cultural practices within upland areas of Kawainui. In comparison, earlier planning efforts (e.g. 1994 master plan) included a very limited native Hawaiian presence in the project area. Native Hawaiian cultural groups continue to play a pivotal role in area conservation efforts. Greater inclusion of these groups in the project indicates an awareness of the current social climate and how this awareness can facilitate achievement of conservation goals.

1.3 Cultural landscapes and wetlands

"…Humanity's relationship to the natural environment has so far been seen predominantly in biophysical terms; but there is now a growing recognition that societies themselves have created elaborate processes for protecting and managing their resources. Most landscapes are, or have been, subject to cultural influences, and as such, maintenance of ecosystem services and conservation of biological diversity are achievable only when cultural diversity is maintained. Humankind's management of biodiversity thus becomes a cultural expression, and, in turn, biodiversity shapes human culture"

…the intimate link between science, culture, socio-economic concerns and sustainable development must be strengthened. A strong scientific basis is essential for all of today's major development and resource-related concerns, because science not only provides an explanation of how environmental processes work, but also its application may offer solutions to some of the critical problems. For wetland issues, identification of their cultural elements, or the cultural elements of the landscape in which they are found, is an important step in ensuring that agreed policies under the Ramsar Convention can be implemented effectively and efficiently." (ibid., p. 17)

Discussion: The project recognizes the role past and present cultural groups have played in the maintenance of the biodiversity of the project area's landscape. Project improvements incorporate recognition of this concept and will facilitate improved cultural landscape restoration efforts. Incorporation of needed facilities in areas such as the Ulupō Heiau State Historical Park, where native Hawaiian cultural groups continue to restore the cultural landscape of the area and thereby increase the area' biodiversity, directly align with the concept discussed. Continuing educational efforts by DOFAW, DSP, and community organizations embody the partnership and relationship between science, culture, and the continued sustainability of the wetland. Educational activities have grounded their curriculum in traditional native Hawaiian practices that effectively served as stewards of the project area since pre-contact times. These activities may highlight the scientific aspects of these practices, concretizing the links between culture, science, and effective solutions to the project area's ecological issues.

Section 1.5 Rationale for concern for cultural aspects

"It should not be forgotten, however, that cultural values are not only associated with the past (either remote or recent), but also with the present, as culture evolves and is being created, in one form or another, on a continuous basis…Use of the word 'heritage'…should be understood as including 'living heritage' and the legacy or inheritance for future generations, as well as historic heritage." (ibid., p. 22)

"Thus, the importance of the cultural values of wetlands may broaden their appeal to significant sectors of society. These include not only specialists in the various forms of culture, from archaeology to music, but also the wider public at large. (ibid., p. 23)

"The significance and sometimes uniqueness of the cultural values of certain wetlands contributes to [local and indigenous] communities' self-esteem, solidarity, strength, spiritual traditions and moral codes. This can be expected to enhance their readiness to safeguard such sites, often including Ramsar sites.

That said, it must be clearly understood that not all cultural aspects of wetland-related activities are necessarily to be viewed as positive in a Ramsar context simply because they exist. Objectives and actions based on cultural values must always be considered in a context of compatibility with the wise use principle of the Convention." (ibid., p. 24)

Discussion: The project directly acknowledges concepts in this statement advocating recognition of the interrelationship between cultural values and wetlands. Proposed facilities will provide area where native Hawaiian culture can be perpetuated and shared for future generations with permanent support facilities. Indeed, these areas can encourage perpetuation of multiple aspects of native Hawaiian culture, thereby enhancing the self-esteem and solidarity of multicultural groups which safeguard Kawainui and Hāmākua. These facilities align with broader Ramsar Convention wise use sustainability goals and are proposed in a manner appropriate with the wetland environment.

Chapter 2. Policy guidance and proposed strategic actions

Section 2.3 Guidance on the conservation and management objectives
"The cultural aspects of wetlands should be fully incorporated in the management planning of sites, involving relevant indigenous peoples and local communities, as well as other relevant stakeholders. (ibid., p. 30)

"Mechanisms for monitoring wetland ecological character should include indicators related to cultural aspects. In general, indicators are a measurable means for identifying and documenting changes and trends, both positive and negative. They are also invaluable for communicating these trends in a convincing way to decision-makers and the public…" (ibid., p. 30)

Discussion: Cultural aspects of wetlands will continue to be incorporated in the management of project area sites by diverse stakeholders. These stakeholders include a multicultural array of community members as well as State agencies. The project proposes these stakeholders adaptively manage the project sites in recognition that wetlands are not static ecosystems. As the project area changes due to restoration improvements, improvement of cultural aspects of the landscape, such as the increased presence of culturally significant biota can be incorporated into management metrics.

6.1.1.4 Wetland Tourism

In recent years, the Ramsar Convention formally addressed the issue of wetland tourism. Its July 2012 Resolution on Tourism signed at the 11th Meeting of the Conference of the Parties in Bucharest, Romania (Ramsar COP11 Resolution XI.7) recognized the increased demands for tourism expansion and the potential negative impacts on the health of wetlands, but also acknowledging that if managed sustainably, tourism can bring environmental, social, and economic benefits. Annex 1 of the 2012 Resolution on Tourism defines sustainable tourism conceptually. The resolution states that sustainable tourism should:

- Make optimal use of environmental resources that constitute a key element in tourism development, maintaining essential ecological processes and helping to conserve natural heritage and biodiversity;

- Respect the socio-cultural authenticity of host communities, conserve their built and living cultural heritage and traditional values, and contribute to intercultural understanding and tolerance;

Discussion: Although ecological restoration initiatives are the primary focus of the project, improvements to public access, outdoor recreation, and educational programs are also important project initiatives. In particular, improvements such as the education center and trails may be used by visitors along with local residents. Visitor activity at Kawainui and Hāmākua resulting from the project align with the Ramsar values. Ramsar supports sustainable tourism, recreational use, and cultural practices within designated wetlands of international importance. Ramsar views sustainable tourism as maintaining a high level of visitor satisfaction, ensuring a meaningful experience, and raising awareness about sustainability issues. The project includes improvements (e.g. pedestrian trails, education center) for the public that support these aspects recognized under Ramsar.

Public access regulations exist to maintain essential ecological processes and conserve natural heritage and biodiversity. Commercial activities like commercial tours are not allowed in the project area unless permitted by DOFAW or DSP, and these agencies are not planning to issue commercial permits under this project. Similarly, usage of proposed pedestrian trails by commercial tours is prohibited. As a result, essential ecological processes, natural heritage, and natural biodiversity would not be adversely impacted by visitor activity and would be maintained.

Project improvements respect the cultural authenticity of the native Hawaiian community, promoting the continuation of their cultural heritage and traditional values. Proposed facilities such as the cultural centers at Kapa‘a and Wai‘auia provide areas where native Hawaiian cultural practices and values can be perpetuated. Although these facilities would not be open to the general public, educational and cultural programs coordinated with DOFAW and DSP could occur and would be open to the general public.

Annex 2 of the 2012 resolution identified issues for stakeholders to address to achieve “sustainable tourism and recreation in and around wetlands.” According to the 2012 Resolution on Tourism, wetland site managers (including NGO’s private and government agencies) should seek to ensure that:

- Indigenous peoples and local community participation in wetland management is created and strengthened and local communities are assisted in taking advantage of the opportunities presented by sustainable tourism by developing appropriate and responsible tourist products;
- Tourism’s revenue and investment where appropriate help provide management capacity to maintain or improve the ecological character of the wetland;
- Assessment, monitoring and management of tourism and recreation impacts are integrated into wetland management planning, including limits of acceptable change of the wetland ecological character; and importantly that this information is

communicated to those responsible for tourism policy and planning and used to support adaptive management responses;

- Assessments of wetland values related to recreation criteria are prepared and made available to national/regional policy-makers and planners in the tourism and land use planning sectors and other relevant government agencies, and are applied by being incorporated into tourism and land-use planning and decision making;
- Appropriate recreation activities are identified and promoted especially to those dealing with thematic interpretation and are compatible with the wetland's characteristics and its management plan; and visitors are encouraged to follow visiting rules, if necessary through appropriate enforcement of regulations; and
- In any Wetland of International Importance (Ramsar Site) visited by tourists, the Ramsar logo is prominently displayed and the Ramsar mission promoted.

Discussion: These concepts provide important guidance on how DOFAW, DSP, and stewarding organizations can ensure visitors enhance rather than denigrate the project area. The project aligns with Ramsar principles advocating appropriate tourism products in the project areas. Project improvements support efforts to maintain a high level of visitor satisfaction with trails, and through the education center that provides informational materials and guidance as part of visitor orientation. Such educational programs and material would raise awareness about sustainability issues and help provide visitors with a meaningful experience. Fees could be charged for visitors that would support the center's operations and management. Portions of these fees could also be used to support programs and continual restoration efforts and wetland maintenance.

A feasible and practicable management approach planned is to develop monitoring, planning, and management protocols based on levels of impact or changes that consider both the receiving environment and the visitor experience. Therefore, the level of acceptable change from these factors can be more appropriately evaluated, and support adaptive management responses to address situations. The management approach would be focusing on achieving objectives defined in terms of staying within maximum acceptable deviations, such as variation in ecological conditions, visitor experiences, etc. Management options and monitoring would be more practicable and feasibly implemented to evaluate whether the amount of change occurring can be tolerated, changes to visitor experiences and satisfaction, and when steps should be taken to prevent further undesirable changes. Wetland values related to outdoor recreation objectives have also been incorporated in the project to support visitor experience, educational programs, and cultural practices. This planning process and environmental review process support wise land-use planning and decision making by DOFAW and DSP. The level of public access, passive outdoor recreation activities, and supporting infrastructure are modest and appropriate for the project site. Management practices, stewardship opportunities, partnerships with non-profit organizations all support monitoring of activities so that enforcement of regulations can be appropriately implemented.

6.2 FEDERAL

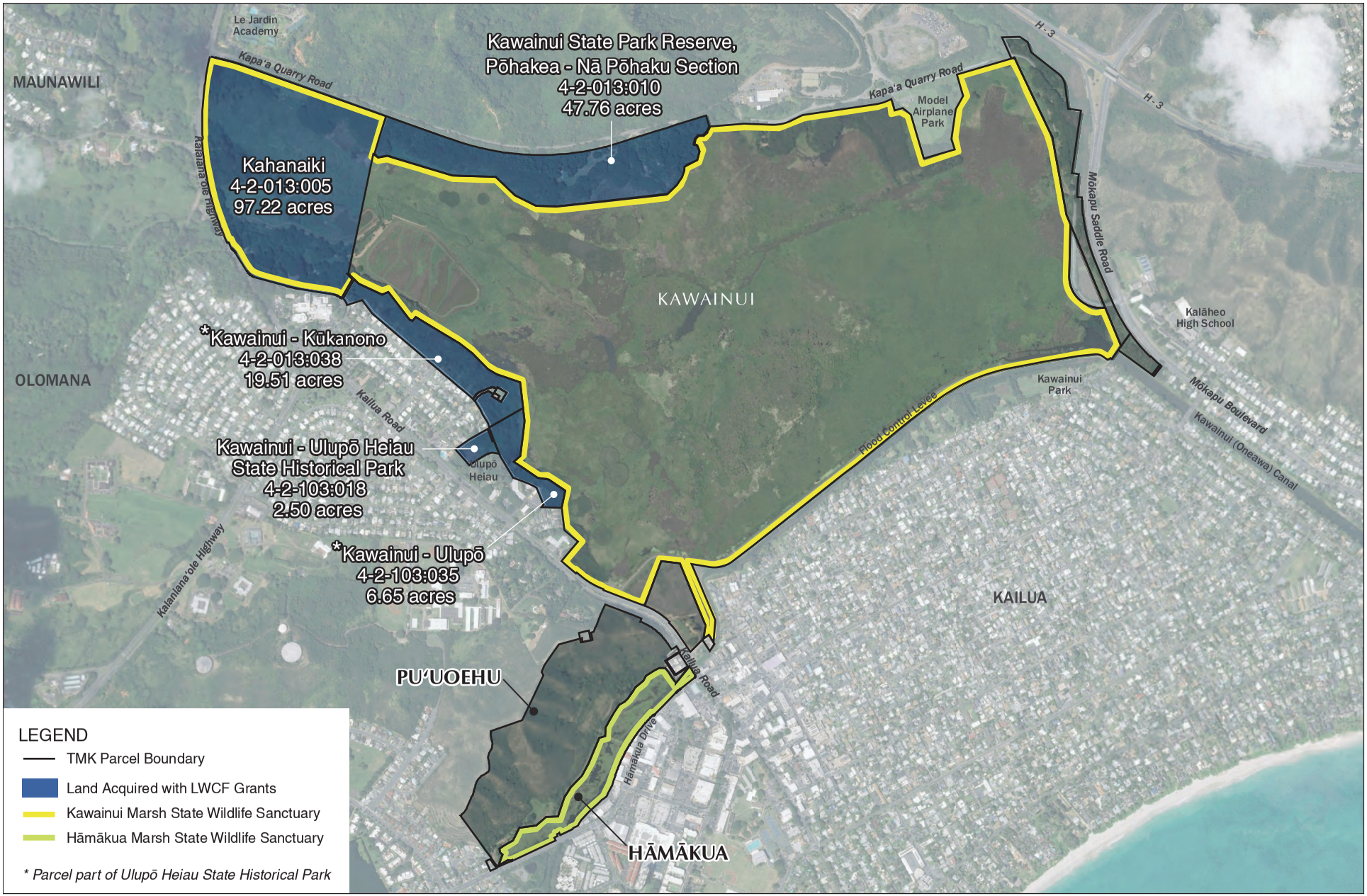
6.2.1 Land and Water Conservation Fund (LWCF)

The federal Land and Water Conservation Fund (LWCF) was established by an Act of Congress in 1965 to assist in preserving, developing, and assuring accessibility to outdoor recreation resources for America's citizens and visitors. The federal grants program, administered by the U.S. Department of the Interior, National Parks Service, provides funding assistance to state and local governments for the acquisition of land for public recreation and the development and/or renovation of outdoor recreational facilities. The LWCF program is administered on the State level by DLNR, Division of State Parks (DSP). Once LWCF funds are used, the property is protected for public outdoor recreation in perpetuity under Section 6(f) of the LWCF Act.

In the 1980s, five parcels totaling 173.64 acres at Kawainui were acquired by the State using matching LWCF funds. Figure 6.1 indicates the location of these parcels. Initially, all these parcels were placed under the jurisdiction of DSP for outdoor recreation purposes. However, 97.22 acres at the mauka end of Kawainui (TMK: 4-2-013:005) were transferred to DOFAW in 2007 to be incorporated within the Kawainui Marsh State Wildlife Sanctuary.

Currently, public access and passive outdoor recreation under LWCF areas are available at the Nā Pōhaku o Hauwahine site and at Ulupō Heiau, where trails, viewing areas, and interpretive signs are provided. The project proposes to expand trails and recreational opportunities to other areas protected under Section 6(f) in compliance with the LWCF program requirements. The following are the LWCF requirements for the approximately 174 acres of "Section 6(f)" land.

1. The property must be maintained for public outdoor recreational use in perpetuity.
2. The property must be kept reasonably open, accessible, and safe for public use. Hours and times of public use must be reasonable according to area and type of facility.
3. The property shall be maintained so as to appear attractive and inviting to the public.
4. Limitations may be imposed on the numbers of people using an area as necessary for maintenance and preservation, or the type of users, such as "hikers only."
5. No exclusive use, discrimination on the basis of residence, or required memberships are allowed.
6. Sanitary facilities, buildings, roads, trails, and other structures must be maintained in good repair and to health standards. Property should be attractive and inviting.



Source: State of Hawai'i GIS

Kawainui - Hāmākua Master Plan Project

Figure 6.1 - Land & Water and State Wildlife Sanctuaries Conservation Fund (LWCF) Parcels

Kailua, O'ahu

0 800 1,600 FEET

HHF PLANNERS places for people

Project improvements for these lands will enhance public access and promote outdoor recreation use in accordance with LWCF requirements. For example, in the Kahanaiki section of Subarea B shown in Figure 6.1, the project includes pedestrian trails with observation decks, a controlled access 25-stall parking area and program staging area to support place-based educational programming. In addition to accommodating school groups, the staging area could serve as operational space for ongoing restoration and maintenance activities. A proposed education center is planned in the Nā Pōhaku section. This facility will serve as a starting point for students and other visitors.

6.2.2 U.S. Fish and Wildlife Service Recovery Land Acquisition (RLA) Program

Acquisition of habitat to secure long-term protection is often an essential part of a comprehensive recovery effort for threatened or endangered species. Federal Recovery Land Acquisition (RLA) Program grants provide funds to aid in the acquisition of habitat from willing sellers, for the management of listed species in support of approved species recovery plans. Proposals are submitted by state agencies to the U.S. Fish and Wildlife Service (USFWS), and require a 25 percent non-federal match. Projects selected for funding must comply with strict federal land appraisal and acquisition regulations.

A grant from the RLA program was used by the State to acquire the Puʻuoehu Hillside property. The acquisition was intended to support ongoing endangered species recovery actions in Hāmākua Marsh and mitigate water quality issues in this marsh (DLNR, 2012). Properties purchased with RLA funds must be managed for purposes stated for its acquisition.

The project supports and enhances Puʻuoehu's function as a watershed for Hāmākua, consistent with the RLA objectives. The goal of the ongoing reforestation at Puʻuoehu is to gradually replace existing non-native vegetation with native vegetation, enhancing the hillside's function as a watershed. Another proposed improvement for Puʻuoehu is the construction of two maintenance trails which DOFAW staff would use in their ongoing reforestation efforts. The proposed trails could also be used for controlled educational or stewardship activities.

6.2.3 Clean Water Act (CWA)

In 1972, the U.S. Congress passed the Water Pollution Control Act, now known as the Clean Water Act (CWA). That legislation was passed in response to the realization that the discharge of dredged and fill material into water bodies and wetlands during construction projects was creating serious damage to the environment. The Army Corps of Engineers (USACE) was given authority to regulate dredge and fill activities in "waters of the United States." The CWA prohibits the discharge of "any pollutant" into waters of the United States from a point source, unless it is authorized by permit. The CWA also regulates nonpoint source discharge, referred to as runoff or stormwater.

6.2.3.1 Section 401, CWA

Section 401 of the CWA requires an applicant for a federal license or permit to provide a water quality certification (WQC) from the State that any discharges from the facility will comply with the CWA, as well as with state-established water quality standards. In Hawai‘i, the Section 401 WQC is regulated under Hawai‘i Administrative Rules (HAR), Chapter 11-54, Water Quality Standards. The WQC is issued by the State of Hawai‘i Department of Health (DOH), Clean Water Branch (CWB). The Section 401 WQC is intended to ensure that federally permitted activities will not adversely impact State inland or marine waters.

A 401 WQC may be required for project activities that need a Department of the Army (DA) Section 404 permit (see Section 6.2.3.3 below). Activities authorized under certain DA nationwide permits may be covered under a blanket WQC. Consultation with the DOH CWB should be conducted during the DA permit process to confirm WQC requirements.

6.2.3.2 Section 402, CWA

Discharge of point source pollutants into surface waters of the U.S. are regulated under the National Pollutant Discharge Elimination System (NPDES) program, pursuant to CWA, Section 402. The State DOH CWB administers the NPDES program under HAR Chapter 11-55. Potential construction activities, in particular discharges of storm water associated with construction activity, ~~will~~ may require a Best Management Practices plan and approval from the DOH if they meet the requirements triggering the need for a NPDES permit under the State regulations. Permitting requirements will be determined and satisfied ~~by the design and/or construction contractor~~ during the design phase for the specific improvements implemented.

6.2.3.3 Section 404, CWA

Section 404 of the CWA establishes a program to regulate the discharge of dredged or fill material into waters of the U.S., including wetlands. Section 404 defines requirements for discharges of dredged or fill materials in waters of the United States and sets limits on such discharges. Discharge of dredge or fill material within jurisdictional wetlands of the project area are regulated through a Department of the Army (DA) permit process issued by the U.S. Army Corps of Engineers (USACE).

Almost all proposed wetland restoration activities (e.g., removal of invasive vegetation) will take place within wetland areas, ~~but~~ and these activities are ~~not~~ regulated under the Clean Water Act. However, maintenance and related wetland restoration activities may not require a DA permit depending upon the methods used. Proposed methods involve cutting vegetation using certain equipment, and does not involve grading activities that would trigger a DA permit requirement. This was established during a 2012 consultation with the USACE for the Kawainui Marsh Wetland Restoration and Habitat Enhancement Project, and further consultation with the USACE

would be conducted as future wetland restoration activities are designed and implemented. The project proposed wetland restoration and habitat enhancement for about 60 acres of wetland and 20 acres of adjacent upland area~~,~~ would thus be similar to the restoration activities proposed under the current project. The USACE determined the proposed wetland restoration activities ~~were not regulated under the CWA, and~~ did not trigger a Section 404 permit ~~was not required~~. Restoration activities and the type of methodology proposed are considered a form of maintenance activity to manage wildlife habitat. No permit ~~will~~ would thus be required for this type of wetland restoration activities.

In contrast, several segments of the proposed pedestrian trails involve stream crossings and/or construction of boardwalk in areas that may be subject to permitting. These improvements are likely to be located in jurisdictional wetlands (i.e., wetland areas which have undergone an identification and delineation process) or involve regulatory waters of the U.S., and are subject to regulation and potential permit requirements under Section 404. Proposed reductions to sections of the pedestrian trails since the published Draft EIS have eliminated sections and boardwalks routed across wetland areas. Therefore, remaining pedestrian trails are located within upland areas outside of the wetland, and should not trigger permit requirements from the USACE. Drainageways crossed would be evaluated to see if trails need to be improved for crossing them or if existing conditions can remain for crossing (e.g. foot trail across ephemeral drainageway). If necessary, consultation with the USACE would be conducted during the design phase for trail segments implemented to verify and confirm DA permit requirements.

Bridges or other structures would be used to cross over streams or jurisdictional drainageways to avoid impacting these waters. The project has eliminated a bridge proposed across Kahanaiki Stream, therefore, only one bridge across Maunawili Stream still remains to serve DOFAW management and operations. This bridge would be designed to span over the stream and not involve filling the bed or banks of this stream. Therefore, a Section 404 permit for this bridge would not be required. ~~Thus, a Section 404 permit would likely now apply for these crossings. However, some sections of boardwalk would need to be routed through sections of wetland triggering a Nationwide Permit under the USACE regulations. These proposed boardwalk segments likely include:~~

- ~~600-foot section north of Nā Pōhaku;~~
- ~~40-foot section south of the City's Model Airplane Park; and~~
- ~~365-foot section in the vicinity of Ulupō Heiau.~~

~~A wetland delineation of Kawainui was conducted by the USACE and the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) in 2008. According to data from that study, these boardwalk segments are likely located in jurisdictional wetland areas.~~

Further consultation and coordination with the USACE will be conducted during the design phase for these sections when a definitive alignment and design for the trail segments are developed. At that time, a jurisdictional determination (JD) will be conducted by the USACE to verify whether the project activities will occur within jurisdictional waters of the United States.

If so, ~~any~~ "fill" activity~~, such as the construction of posts or piles,~~ may be subject to regulation under Section 404. All required permits will be obtained prior to construction.

6.2.4 Section 10, Rivers and Harbors Act of 1899

The Rivers and Harbors Act of 1899 gives the USACE regulatory authority over virtually any construction, excavation or fill activities that has potential to impact navigable waters of the United States. Section 10 requires that a Department of the Army (DA) permit be obtained from the Corps prior to undertaking any construction, dredging, or other activity occurring in, over, or under or affecting navigable waters of the U.S. No project improvements are planned over navigable waters.

6.2.5 Section 106, National Historic Preservation Act (NHPA)

The National Historic Preservation Act (NHPA) of 1966 was enacted to provide for the protection and use of historic properties for the benefit of the public. Section 106 of the NHPA requires that federal agencies undergo a review process for all federally funded and permitted projects that impact sites listed on or eligible for the National Register of Historic Places. It specifically requires federal agencies to "take into account" the effects of their undertakings on historic properties.

Project initiatives do not involve use of federal lands or funds. However, as discussed in Section 6.2.3 ~~and Section 6.2.4~~, a Department of the Army (DA) permit from the USACE may be required for certain trail improvements depending upon whether drainageways fall under the USACE's regulatory jurisdiction and project improvements require filling such drainageways ~~stream certain boardwalk segments in wetland areas~~. As a federal agency, the USACE must consider the effect of authorizing the undertaking (i.e., issuing a permit) in accordance with Section 106 of the NHPA. In Hawai'i, the Department of Land and Natural Resources (DLNR), State Historic Preservation Division (SHPD) oversees the Section 106 historic preservation compliance process.

~~When boardwalk segments are implemented,~~ If necessary, consultations with SHPD, native Hawaiian organizations, and the public would occur to address ~~boardwalk~~ project effects on historic sites. ~~It is expected that boardwalk sections could be realigned if needed to avoid or minimize impacts on historic sites.~~

6.2.6 Section 7, Endangered Species Act (ESA)

The Endangered Species Act of 1973 (ESA) was enacted to protect endangered species and also the ecosystems upon which they depend. Section 7 of the ESA requires all federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) and/or the National Marine Fisheries Service (NMFS) if they are proposing an action that may affect listed species or their designated

habitat. Although no federal funding is proposed for project improvements, a federal action is defined broadly to include funding, permitting and other regulatory actions. As such, the issuance of a DA permit by the USACE will require consultation with the USFWS and/or NMFS in accordance with Section 7.

The Section 7 process begins with informal consultation with the USFWS and NMFS. If a determination is made that the proposed action is not likely to affect any listed species in the project area and the USFWS/NMFS concurs, the informal consultation is complete, and Section 7 is satisfied. If the agency's action may adversely affect a listed species, a biological assessment is prepared to assist in further determination. Depending on the findings, formal Section 7 consultation may be required.

Project initiatives do not involve use of federal lands or funds. However, if ~~and when~~ a DA permit application is required ~~filed for boardwalk segments~~, compliance with Section 7 ESA will be ~~required~~ conducted.

6.2.7 Coastal Zone Management Act

The Coastal Zone Management Act (CZMA) of 1972 established a national policy to preserve, protect, develop, and where possible, to restore or enhance the resources of the nation's coastal zone for this and succeeding generations. It also encourages and assists states to exercise their responsibilities in the coastal zone through the development and implementation of management programs to achieve wise use of the land and water resources of the coastal zone.

Section 307 of the CZMA requires federal agency activities affecting any coastal use or resource to be undertaken in a manner consistent to the maximum extent practicable with the state's CZM program. Section 6.3.6 below discusses the federal CZM consistency requirements, and the proposed action's consistency with those applicable policies.

6.3 STATE OF HAWAI'I

6.3.1 Hawai'i State Plan (Chapter 226, HRS)

The Hawai'i State Plan (Chapter 226, HRS) sets forth the goals, objectives, polices, and priority guidelines for growth, development, and allocation of limited resources throughout the State. It contains diverse policies and objectives on topics of state interest including but not limited to, the economy, agriculture, the visitor industry, federal expenditure, the physical environment, facility systems, socio-cultural advancement, and sustainability. The State Plan is divided into three parts: Part I (Overall Theme, Goals, Objectives and Policies); Part II (Planning, Coordination and Implementation); and Part III (Priority Guidelines). The following section analyzes project impacts with respect to relevant State Plan objectives and policies.

6.3.1.1 State Plan Objectives and Policies

Section 226-11, Objectives and policies for the physical environment—land based, shoreline, and marine resources.

(b)(1) *Exercise an overall conservation ethic in the use of Hawai‘i’s natural resources.*
(b)(2) *Ensure compatibility between land-based and water-based activities and natural resources and ecological systems.*
(b)(3) *Take into account the physical attributes of areas when planning and designing activities and facilities.*
(b)(4) *Manage natural resources and environs to encourage their beneficial and multiple use without generating costly or irreparable environmental damage.*
(b)(5) *Consider multiple uses in watershed areas, provided such uses do not detrimentally affect water quality and recharge functions.*
(b)(6) *Encourage the protection of rare or endangered plant and animal species and habitats native to Hawai‘i.*
(b)(8) *Pursue compatible relationships among activities, facilities, and natural resources.*
(b)(9) *Promote increased accessibility and prudent use of inland and shoreline areas for public recreational, educational, and scientific purposes.*

Discussion: Project initiatives include natural resource management activities including wetland restoration, upland reforestation, and storm water runoff improvements. These will have a positive impact on the health of the wetlands, improve water quality and habitat for endangered waterbirds. The provision of perimeter trails and viewing areas will provide passive recreation and support educational and scientific programs in a manner that is compatible with the natural environment.

Section 226-12, Objectives and policies for the physical environment—scenic, natural beauty, and historic resources.

(b)(1) *Promote the preservation and restoration of significant natural and historic resources.*
(b)(2) *Provide incentives to maintain and enhance historic, cultural, and scenic amenities.*
(b)(4) *Protect those special areas, structures, and elements that are an integral and functional part of Hawai‘i’s ethnic and cultural heritage.*
(b)(5) *Encourage the design of developments and activities that complement the natural beauty of the islands.*

Discussion: The proposed perimeter trails and viewing platforms will provide an opportunity for the public to appreciate the scenic and natural beauty of the project area, as well as its cultural resources. The opportunity for cultural activities will support native Hawaiian cultural practices and education. Interpretive elements for park visitors will allow them to learn about pre-contact settlement and subsistence in the project area, as well as opportunities to participate in landscape restoration.

Section 226-13, Objectives and policies for the physical environment—land, air, and water quality.

> ***(b)(1)*** *Foster educational activities that promote a better understanding of Hawai‘i’s limited environmental resources.*
> ***(b)(2)*** *Promote the proper management of Hawa‘i’s land and water resources.*
> ***(b)(3)*** *Promote effective measures to achieve desired quality in Hawai‘i’s surface, ground, and coastal waters.*
> ***(b)(4)*** *Encourage actions to maintain or improve aural and air quality levels to enhance the health and well-being of Hawai‘i’s people.*
> ***(b)(5)*** *Reduce the threat to life and property from erosion, flooding, tsunamis, hurricanes, earthquakes, volcanic eruptions, and other natural or man-induced hazards and disasters.*
> ***(b)(6)*** *Encourage design and construction practices that enhance the physical qualities of Hawai‘i’s communities.*
> ***(b)(8)*** *Foster recognition of the importance and value of the land, air, and water resources to Hawai‘i’s people, their cultures and visitors.*

Discussion: The construction of the education center and the provision of public trails will support educational activities that promote management of land and water resources. Expanded wetland restoration activities will improve the wetland’s flood control function, reducing the threat to life and property from flooding. Proposed trails have been sited to work with the existing topography, and proposed structures will be of small scale and designed to minimize earthwork and environmental impact. Educational and cultural activities strengthen the link between native Hawaiian culture and natural resource stewardship.

Section 226-21, Objectives and policies for socio-cultural advancement--education.

> ***(b)(1)*** *Support educational programs and activities that enhance personal development, physical fitness, recreation, and cultural pursuits of all groups.*
> ***(b)(4)*** *Promote educational programs which enhance understanding of Hawai‘i’s cultural heritage.*

Discussion: There are a number of environmental and cultural education programs currently being conducted within the project area by the State and various non-profit organizations. The proposed trails, viewing stations, pavilions, and parking will support these efforts in the future and allow expanded partnerships between the state and local schools and community groups.

Section 226-21, Objectives and policies for socio-cultural advancement--leisure.

> ***(b)(1)*** *Foster and preserve Hawai‘i’s multi-cultural heritage through supportive cultural, artistic, recreational, and humanities-oriented programs and activities.*
> ***(b)(4)*** *Promote the recreational and educational potential of natural resources having scenic, open space, cultural, historical, geological, or biological values while ensuring that their inherent values are preserved.*

(b)(5) *Ensure opportunities for everyone to use and enjoy Hawai‘i’s recreational resources.*
(b)(6) *Assure the availability of sufficient resources to provide for future cultural, artistic, and recreational needs.*
(b)(8) *Increase opportunities for appreciation and participation in the creative arts, including the literary, theatrical, visual, musical, folk, and traditional art forms.*
(b)(10) *Assure adequate access to significant natural and cultural resources in public ownership.*

Discussion: The proposed perimeter trails and viewing platforms are intended to provide public access to State park lands, in compliance with Section 6(f) of the Land and Water Conservation Fund. Most of the land that the State acquired with these federal funds are currently not open to the public, despite the federal requirement that they be available for public recreation. The education center and cultural and environmental activities at Ulupō Heiau and Nā Pōhaku support cultural, artistic and recreational programs and activities that will be open to the public. Several sites are identified for use by non-profit organizations as cultural and education centers, for the practice and teaching of native Hawaiian music, dance and crafts.

Section 226-21, Objectives and policies for socio-cultural advancement--culture.
(b)(1) *Foster increased knowledge and understanding of Hawai‘i’s ethnic and cultural heritages and the history of Hawai‘i.*
(b)(2) *Support activities and conditions that promote cultural values, customs, and arts that enrich the lifestyles of Hawai‘i’s people and which are sensitive and responsive to family and community needs.*

Discussion: The education center and kauhale complex at Pōhakea, and ongoing cultural and environmental activities at Ulupō Heiau and Nā Pōhaku will allow the public to learn about traditional Hawaiian values, customs, and arts, and participate in hands on learning. The proposed cultural center sites (at Kapa‘a and Wai‘auia) will provide an opportunity for cultural practitioners to conduct activities in their original historic setting at Kawainui.

6.3.1.2 State Functional Plans

The Statewide planning system requires the development of State Functional Plans which are approved by the Governor of Hawai‘i. The State Functional Plans guide the implementation of State and County actions in the areas of agriculture, conservation lands, education, energy, health, higher education, historic preservation, housing, recreation, tourism, water resources development, transportation, employment, and human services. The proposed project is consistent with the following objectives, policies and implementing actions of the respective State Functional Plans.

Conservation Lands Functional Plan

Preparation of the Conservation Lands Functional Plan was coordinated by the State of Hawai'i Department of Land and Natural Resources in 1991.

Issue Area II: Management
Objective IIA: Establishment of plans for natural resources and land management

***Policy IIA(3)**: Identify and enhance appropriate areas for wildlife sanctuaries.*
***Implementing Action III(3)a:** Finish the end-result master planning for the new Kawainui Marsh Wildlife Sanctuary on Oahu.*

Objective IIB: Protection of fragile or rare national resources

***Policy IIB(1):** Develop protection and preservation of habitats of rare and endangered wildlife and native ecosystems in Hawai'i.*
***Implementing Action IIB(1)a:** Establish sanctuaries for populations of endangered plant and animal species when necessary to protect critical habitats.*

Discussion: The Kawainui Marsh wetland was designated a state wildlife sanctuary subsequent to the publication of the 1991 Conservation Functional Plan. The Kawainui wetland (i.e., project Subarea A) ~~is the only portion of the project area that~~ is within the State Conservation District. The project calls for expanded wetland restoration within this conservation area, consistent with the Conservation Lands Functional Plan. This project also finishes the planning for the Kawainui wildlife sanctuary resulting in proposed improvements that meet agency mission and project objectives supporting DOFAW's future long-term management of this area.

Historic Preservation Functional Plan

Issue Area III: Public Information and Education on the Ethnic and Cultural Heritages and History of Hawai'i.
***Objective F**: Provision of Better Access to Historic Information*

***Policy F.2:** Coordinate and support programs to disseminate information to the public.*
***Implementing Action F.2.b**: Develop reflective, informed, culturally sensitive, site specific interpretation programs at a statewide level for publicly-owned historic properties.*

Discussion: In pre-contact times, the Kawainui-Hāmākua project area and surrounding ahupua'a were culturally important areas. The project area was a locus of subsistence agriculture and habitation, and was the subject of many native Hawaiian songs, stories and legends. Ulupō Heiau, on the western boundary of the project area, was a center of religious activity. The project recognizes the area's historical significance and seeks to ~~combine~~ balance cultural activity with environmental stewardship. Initiatives to restore the natural and cultural landscape, create walking trails and viewing areas, and establish areas for educational and cultural programs are aimed at sharing the area's history with the public, and expanding existing partnerships between the state, local schools, and community organizations. Cultural landscape restoration will

continue at two existing sites, Na Pōhaku and Ulupō Heiau State Historical Park. In response to demand from local schools, educational programs and partnerships can expand and be supported with appropriate facilities. In addition, two new areas are identified for native Hawaiian cultural practice and education. These areas would be developed by non-profit partners under agreements with the ~~s~~State of Hawai'i.

Recreation Functional Plan

Preparation of the Recreation Functional Plan was coordinated by the State of Hawai'i Department of Land and Natural Resources in 1991.

Issue Area VI: Wetlands Protection and Management

Objective VI-A: *Increase recreational access and opportunities in Hawai'i's wetlands.*

> ***Policy VI-A(1):*** *Identify existing wetlands with the potential for recreational development without significantly affecting wetland resources, with an emphasis on passive recreation and education.*
>
> ***Implementing Action VI-A(1)(b):*** *Develop recreation program plans for selected wetland sites identified in the site evaluation.*

Objective VI-C: *Assure the protection of the most valuable wetlands in the state.*

> ***Policy VI-C(1):*** *Develop a coordinated approach to wetland protection, acquisition, and management, as well as to the provisions of public education programs.*
>
> ***Implementing Action VI-C(1):*** *Protect the following top-priority wetlands…Oahu (1) Kawainui Marsh.*

Discussion: The 1991 Recreation Functional Plan specifically identifies Kawainui Marsh as a high priority wetland which requires a coordinated approach to protection and management. It was also identified as an area where passive recreation and educational programs should be developed. DOFAW was tasked as the lead organization for these implementing actions. The project recommends expansion of ongoing restoration and upland reforestation, predator control, and physical improvements to DOFAW's management and maintenance operations. The project also includes proposals to enhance passive recreation around the wetland, including the construction of pedestrian trails, viewing areas, shelters, and parking. All these improvements directly support the wetlands protection and management issue of the Recreation Functional Plan.

6.3.2 Chapter 344, HRS, State Environmental Policy

Chapter 344, HRS outlines the State's Environmental Policy that establishes State guidelines for encouraging a balanced and productive relationship between people and the environment. The following discusses the project's conformance and consistency with the pertinent goals, policies, and guidelines described under Chapter 344, HRS, Hawai'i State Environmental Policy.

Section 344-3(1). *Conserve the natural resources, so that land, water, mineral, visual, air and other natural resources are protected by controlling pollution, by preserving or augmenting natural resources, and by safeguarding the State's unique natural environmental characteristics in a manner which will foster and promote the general welfare, create and maintain conditions under which humanity and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of the people of Hawai'i.*

Discussion: The project will be consistent with this policy. Many project improvements are associated with environmental preservation and stewardship in the form of wetland restoration, habitat enhancement, erosion control and upland reforestation. In upland areas, invasive plant species will be replaced with native species, and drainage improvements will reduce erosion. These improvements will improve habitat for endangered waterbirds and support their re-establishment.

Other project recommendations are intended to enhance public access, create recreational and educational opportunities, and promote Native Hawaiian culture and stewardship. The provision of walkways, trails, and viewing platforms creates conditions where humanity and nature can exist in productive harmony. They provide safe and low impact ways for people to experience, appreciate, and learn about the area's natural and cultural resources. The education center and areas for native Hawaiian cultural practice provide social benefits to all the people of Hawai'i.

Section 344-3(2). *Enhance the quality of life by:*

A. Setting population limits so that the interaction between the natural and manmade environments and the population is mutually beneficial.

B. Creating opportunities for the residents of Hawai'i to improve their quality of life through diverse economic activities which are stable and in balance with the physical and social environments.

C. Establishing communities which provide a sense of identity, wise use of land, efficient transportation, and aesthetic and social satisfaction in harmony with the natural environment which is uniquely Hawaiian.

D. Establishing a commitment on the part of each person to protect and enhance Hawai'i's environment and reduce the drain on nonrenewable resources

Discussion: The proposed project is consistent with the environmental policies regarding quality of life. Project improvements will have a negligible impact on the future resident and visitor population of the Kailua district or the state. The project will not generate noticeable long-term

economic activities for residents, but construction activities will create short-term job opportunities. The improvements intended to promote a Hawaiian cultural presence (e.g., education center, Kapa‘a Cultural Center, Wai‘auia Cultural Center) are specifically intended to recognize the area’s cultural and historic significance and promote cultural identify and education through wise use of land, with a uniquely Hawaiian aesthetic. Increasing opportunities for public access can facilitate environmental and cultural education and foster an appreciation of the resource. Public awareness and understanding is critical to establishing a long-term commitment to protect and enhance Kawainui and Hāmākua Marsh.

Section 344-4. Guidelines:

1. Population.

A. Recognize population impact as a major factor in environmental degradation and adopt guidelines to alleviate this impact and minimize future degradation;

B. Recognize optimum population levels for counties and districts within the State, keeping in mind that these will change with technology and circumstance, and adopt guidelines to limit population to the levels determined.

Discussion: The proposed project will not affect the existing or future resident population in the Kailua district or elsewhere in the State. Proposed improvements do not involve construction of any new homes or visitor units, and short-term construction jobs are expected to be filled by Hawai‘i residents. Non-resident visitors may visit the project area, utilize the trails ~~and boardwalks~~, and participate in educational and/or cultural activities. However, the improvements are not designed to be commercial tourist attractions.

2. Land, water, mineral, visual, air, and other natural resources

A. Encourage management practices which conserve and fully utilize all natural resources;

B. Promote irrigation and waste water management practices which conserve and fully utilize vital water resources;

D. Encourage management practices which conserve and protect watersheds and water sources, forest, and open space areas;

E. Establish and maintain natural area preserves, wildlife preserves, forest reserves, marine preserves, and unique ecological preserves;

G. Promote the optimal use of solid wastes through programs of waste prevention, energy resource recovery, and recycling so that all our wastes become utilized.

Discussion: The project is consistent with these guidelines and restoration improvements will have a positive impact on natural resources. Upland improvements will be designed to incorporate sustainability concepts to reduce the use of non-renewable resources, and best management practices will incorporate measures to protect the environment. Drainage improvements will reduce existing erosion and improve water quality or runoff into the wetland. Removal of invasive plants and reforestation of upland areas maintain natural areas. Improvements at the vegetation processing area promotes the optimal use of green waste

generated by ongoing maintenance activity. The project will help to restore, enhance, and maintain Kawainui Marsh as a wildlife preserve.

3. Flora and fauna

A. Protect endangered species of indigenous plants and animals and introduce new plants or animals only upon assurance of negligible ecological hazard.

B. Foster the planting of native as well as other trees, shrubs, and flowering plants compatible to the enhancement of our environment.

Discussion: Project improvements directly support the protection of endangered waterbirds by restoring wetland habitat. Wetland restoration and upland reforestation includes the re-establishment of native plants in the area that would enhance the environment of this marsh.

4. Parks, recreation, and open space

A. Establish, preserve and maintain scenic, historic, cultural, park and recreation areas, including the shorelines, for public recreational, educational, and scientific uses.

C. Promote open space in view of its natural beauty not only as a natural resource but as an ennobling, living environment for its people.

Discussion: Project recommendations for trails~~, boardwalks~~ and viewing areas are specifically intended to promote passive recreation and allow public enjoyment of open space. The intent is to create an "outdoor classroom" for hands-on learning, and to foster a sense of ownership and stewardship through participation in restoration, maintenance and research.

5. Economic development.

C. Encourage federal activities in Hawai'i to protect the environment;

Discussion: The State has been the recipient of federal Land and Water Conservation Act funds, which it used to acquire 173 acres of the project area, and Recovery Land Acquisition program funds which were used to acquire Pu'uoehu Hillside. Project initiatives are intended to comply fully with the requirements associated with these funds. This includes requirements to provide and maintain public access and recreation. The improvements also support the recommendations of the approved species recovery plan.

6. Transportation.

C. Encourage public and private vehicles and transportation systems to conserve energy, reduce pollution emission, including noise, and provide safe and convenient accommodations for their users.

Discussion: The project includes small scattered parking areas throughout the project area, and encourages larger educational and student groups to arrive by bus, rather than individual vehicle. Use of on-site bus loading and unloading areas will be limited to schools and other authorized

groups, and will not be open to commercial tour operators. ~~The provision of connected trails around the marsh perimeter encourages visitors to walk rather than drive.~~

7. Energy.

A. Encourage the efficient use of energy resources.

Discussion: New facilities at the education center and the Kapa‘a Cultural Center will be designed using energy efficient and green technology. The improvements to the vegetation processing area will promote the reuse of greenwaste generated from marsh maintenance and upland reforestation activities, reducing solid waste disposal requirements.

8. Community life and housing.

E. Recognize community appearances as major economic and aesthetic assets of the counties and the State; encourage green belts, plantings, and landscape plans and designs in urban areas; and preserve and promote mountain-to-ocean vistas.

Discussion: The proposed wetland restoration and upland reforestation will support Kawainui and Hāmākua Marsh’s role as a wildlife sanctuary and wetland of international importance. Proposed structures are of small scale and will have no impact on mountain-to-ocean vistas. The structures will have no adverse impact on community life and housing in Kailua or other neighboring areas. The provision of walking trails and viewing platforms will allow public enjoyment of open space resources within the project area.

9. Education and culture.

A. Foster culture and the arts and promote their linkage to the enhancement of the environment.

Discussion: A major objective of the project is to recognize Kawainui’s cultural and historical significance, and to promote the linkage between Hawaiian culture and stewardship of the natural environment. The Kapa‘a Cultural Center along Kapa‘a Quarry road is specifically intended to be a place where Hawaiian cultural practitioners can gather and share knowledge in support of the stewardship of Kawainui and the surrounding ahupua‘a. Educational components will include the history, legends, music, arts and crafts, science and traditional Hawaiian conservation practices of the Kawainui-Hāmākua project area. The Wai‘auia Cultural Center off Kailua Road is envisioned as a center for Hawaiian studies in performing and literary arts, and will be operated by a non-profit organization.

DOFAW will continue working with educational institutions and community organizations to develop cultural and educational opportunities at these sites. Partnerships between the State and native Hawaiian organizations will foster culture and the arts and promote their linkage to resource stewardship activities.

10. Citizen participation

A. Encourage all individuals in the State to adopt a moral ethic to respect the natural environment; to reduce waste and excessive consumption; and to fulfill the responsibility as trustees of the environment for the present and succeeding generations;

B. Provide for expanding citizen participation in the decision making process so it continually embraces more citizens and more issues.

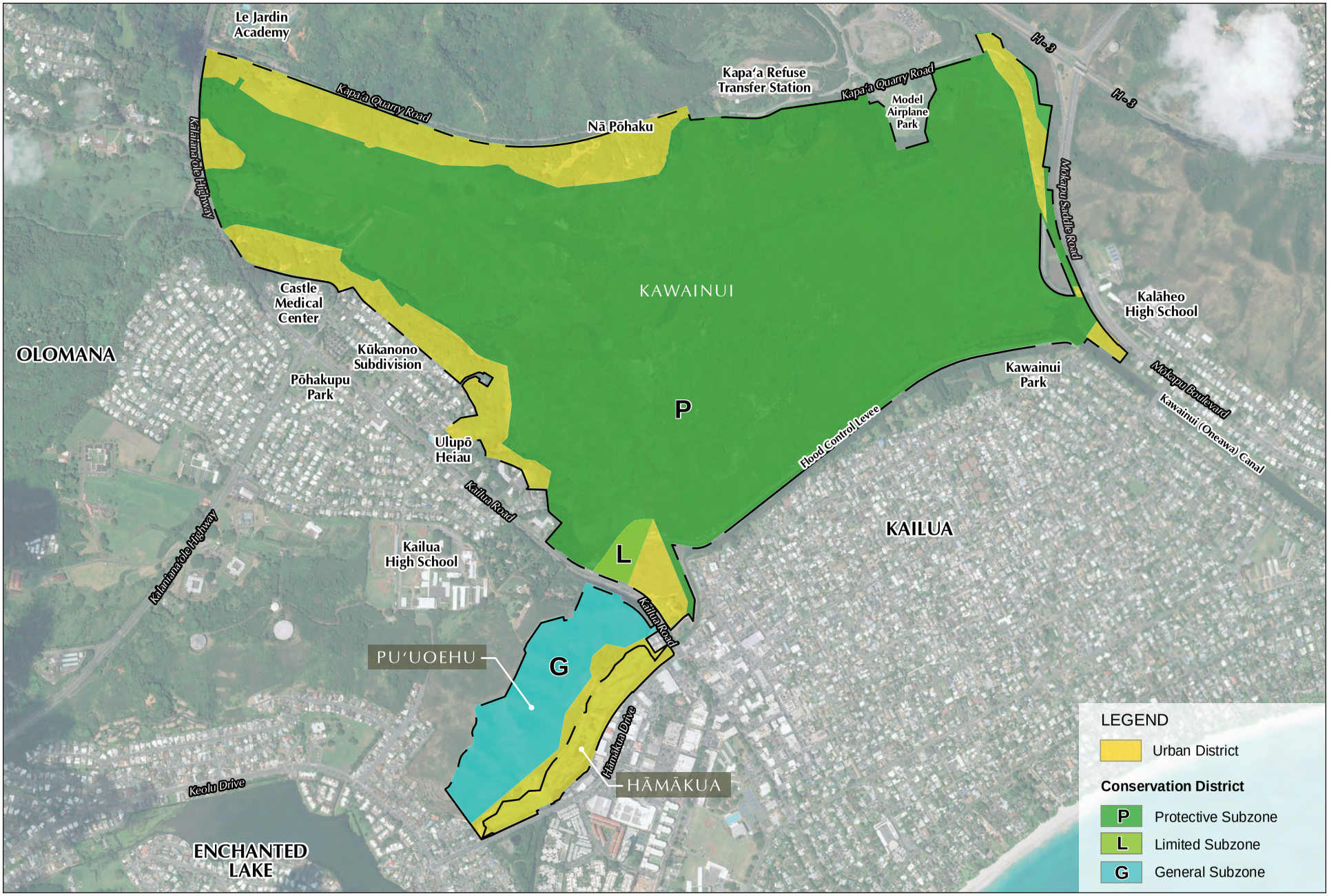
Discussion: Project recommendations are the result of a master planning process that involved the participation of a wide range of government and citizen stakeholders. The extensive planning process involved site visits; consultation with stakeholders, community organizations and agencies; public information meetings; analysis of site conditions; evaluation of alternatives; and plan development. The draft master plan providing guidance for the project went through a lengthy public review period. Several modifications to the draft master plan were made as a result of the comments. The ~~ongoing~~ environmental review process ~~will~~ included a public meeting and public and government agency review of the Draft EIS, providing additional opportunities for citizen participation.

Project initiatives supporting public access, environmental education, and cultural activities are specifically intended to develop a community of citizens who are informed and knowledgeable about the area's natural and cultural significance. Young people who have an opportunity to experience, understand and respect the Kawainui- Hāmākua project area are more likely to become advocates and trustees of this precious resource for future generations.

6.3.3 State Land Use Districts

Pursuant to Title 13, Chapter 205 (Land Use Commission), HRS, all lands in the State of Hawai‘i are classified by the State Land Use Commission (LUC) into four major districts. These four land use districts are Urban, Rural, Agricultural, and Conservation. Permitted uses within the State Land Use Districts are prescribed under Title 13, Chapter 205, HRS, and the State LUC's Administrative Rules (HAR) prescribed under Title 15, Subtitle 3, Chapter 15, Land Use Commission Rules. As shown in Figure 6.2, the majority of the land within the project area is in the State Conservation District. Upland areas around the perimeter of the wetland, are within the Urban District.

Proposed land uses within the Urban and Conservation districts must be consistent with the applicable LUC rule for these districts.



Source: State of Hawai'i GIS

Kawainui - Hāmākua Master Plan Project

Figure 6.2 - State Land Use Districts and Conservation District Subzones

Kailua, O'ahu

0 800 1,600 FEET

HHF PLANNERS places for people

6.3.3.1 Conservation District

The majority of the project area, including all of the Kawainui and Hāmākua wetland areas are designated as State Conservation District. Conservation District lands fall under the jurisdiction of the State Board of Land and Natural Resources (BLNR), which has the authority to establish Conservation District subzones. There are five Conservation District subzones: Protective, Limited, Resource, General, and Special. The first four subzones are arranged in a hierarchy of environmental sensitivity, ranging from the most environmentally sensitive (Protective) to least sensitive (General). The Special subzones defines a unique land use on a specific site.

Almost all of Kawainui is within the Protective Subzone, the most environmentally sensitive lands that may include restricted watersheds, wildlife sanctuaries, and other unique areas. Relevant permitted uses within the protective subzone include:

- *Public Purpose Uses*: Land uses undertaken by the State of Hawai‘i or its counties to fulfill a mandated government function, activity, or service for public benefit and in accordance with public policy and the purpose of the conservation district. Such uses may include transportation systems, water systems, communications systems, and recreational facilities.
- *Sanctuaries*: Plant and wildlife sanctuaries, natural area reserves, and wilderness and scenic areas, including habitat improvements under an approved management plan.

There is a small area near Wai‘auia that is in the Limited Subzone. Pu‘uoehu upland areas are in the Conservation District’s General Subzone. Figure 6.2 also identifies these various subzones.

6.3.3.2 Conservation District Use Permits

Use of land uses within the State Conservation District requires a Conservation District Use Permit (CDUP) from the BLNR.

Previous and Existing CDUP

According to an EISPN comment letter from the Department of Land and Natural Resources (DLNR) Office of Conservation and Coastal Lands (OCCL) dated October 6, 2016, several CDUPs have been issued over the years within the project area. They include:

- CDUP OA-318, Regional Park Use at Kawainui Swamp
- CDUP OA-1374, Kawainui Marsh Resource Assessment Use
- CDUP OA-3016, Kawainui Community Park Improvements
- CDUP OA-3068, Kawainui Marsh Improvements Project

- CDUP OA-3126 and OA-3278, Kawainui Gateway Park
- CDUP OA-3278, Kawainui Gateway Park (2006).

CDUP OA-318, Regional Park Use at Kawainui Swamp (1972). This CDUP application was filed by the City and County of Honolulu Department of Parks and Recreation and was approved on September 8, 1972. The CDUP application proposed use of 750 acres of Kawainui for regional park use as described in a conceptual master plan. The plan included a 300-acre lake for use as a boating and water recreation area, a bird sanctuary, and storage area for flood waters. Islands and small ponds were proposed in the lake for wildlife nesting. Perimeter areas would have intensified recreational uses such as a golf driving range, archery range, picnic areas, ball fields, hiking trails and community recreation center. Use of a 3.5-acre area abutting Kapa‘a Quarry Road was requested for a model airplane field. The CDUP approval included a condition that the proposed small boat harbor use be excluded. ~~The applicant was given one year from the date of CDUP approval to start the project. This CDUP has expired.~~

CDUP OA-1374, Kawainui Marsh Resource Assessment Use (1981). The applicant, the State of Hawai‘i Department of Planning and Economic Development, sought to engage consultants to observe, monitor, and measure certain resource elements of the 750-acre wetland for the purpose of developing a Kawainui Marsh Resource Management Plan. The CDUP to conduct these activities was granted by the BLNR on August 17, 1981. ~~This CDUP has expired.~~

CDUP OA-3016, Kawainui Community Park Improvements (2001). The CDUP application was submitted by the City Department of Design and Construction to improve a 4.4-acre area of Kawai Nui Community Park (aka Kaha Park), located on fast land at the northern fringe of Kawainui Marsh. The park was originally developed in 1978 (under CDUP OA-2/28/78-1036) and later subdivided from the larger Kawainui Marsh in 1994. This park site owned by the City and is not part of the Kawainui-Hāmākua project site being situated makai of the levee. The applicant proposed construction of a 40-stall parking lot to support the existing playfields and landscape improvements to create a passive park at an adjoining unimproved triangular area. The CDUP was approved on June 8, 2001, and this park has been constructed by the City. ~~with a condition that the work be completed within three years of the approval. This CDUP has expired.~~

CDUP OA-3068, Kawainui Marsh Improvements Project (2002). In January 2002, the BLNR issued a CDUP to the Land Division of DLNR for management activities within Kawainui Marsh. CDUP OA-3068 allowed resource management activities as outlined in a 1983 Resource Management Plan for Kawainui Marsh (DPED 1983). Two years earlier, the DLNR completed an Environmental Assessment for this same 1983 management plan (DLNR Land Division, March 2000). The 1983 resource management plan identified goals, objectives, policies, and recommended actions to implement and maintain measures to manage the economic, ecological and cultural resources of the marsh.

The primary objectives of the 1983 management plan include:

1. To provide a comprehensive and coordinated management plan for existing and future land and water uses;
2. To protect, maintain and enhance wildlife species, their habitats and related ecological systems; and
3. To protect, preserve and enhance cultural, educational and recreational values.

CDUP OA-3068 allowed future plans and activities for the marsh to be developed, changed, and implemented pursuant to these goals and objectives. It also included the development, operation and maintenance of ranching, agricultural activities, wildlife habitat and vegetation buffer, flood control, and fire control areas.

The CDUP covered all future improvements that met the 1983 management plan objectives. The 80-acre Kawainui Marsh Wetland Restoration and Habitat Enhancement project, the subject of a 2012 Environmental Assessment, was determined to be fully covered under CDUP OA-3068. That project proposed wetland restoration and erosion control, habitat restoration, and improvement to support DOFAW's maintenance operations.

On May 11, 2012, CDUP OA-3068 was granted a 10-year time extension by the BLNR. Condition 5 of the original permit required that all construction work be completed within ten years of approval. In April 2012, the DOFAW requested 10-year extension. The request noted that efforts to restore and improve Kawainui Marsh as authorized have been progressing. However, an extension of 10 years, rather than the usual two years, is needed due to the unique circumstances associated with Kawainui Marsh, the level of restoration and other improvements planned for implementation, compliance with environmental and land use regulations, and availability of funds to implement improvements. The approved extension has a new completion date of January 25, 2022.

CDUP OA-3126, Construct Kawai Nui Gateway Park (2003). This application was filed by the City and County Department of Design and Construction for development of the Kawai Nui Gateway Park on two non-contiguous sites, the Mōkapu Site (same as the currently proposed Kalāheo Park site) and the Coconut Grove Site, comprising approximately 13.3 acres. The 5.1-acre Mōkapu site was designed for a "nature" experience and proposed improvements included a comfort station, parking lot, education pavilion, canoe storage area, viewing platform, and a pedestrian bridge over the canal to provide pedestrian access to the Coconut Grove site. The 8.2-acre Coconut Grove Site, bordering Kaelepulu Channel, was designed for a "nature walk" experience and proposed improvements included a nature trail, observation deck, landscaping, and wetland improvements. Work was to be completed within three years of the CDUP approval date of September 12, 2003.

CDUP OA-3278, Kawainui Gateway Park (2006). This was an extension of the CDUP OA-3126 which authorized construction of Kawai Nui Gateway Park. The new CDUP application was filed by the Department of Design and Construction because CDUP OA-3126 had expired, as the deadline to initiate construction was not met. The plans for the Mōkapu Site and the Coconut Grove Site were the same as previously proposed. DLNR staff reiterated their support for the project, stating in the CDUP staff report that "…the project will result in an improvement of the protected lands and will benefit the natural resources of the marsh and the public." It was noted that completion of the proposed park will depend on future funding, and due to limited funding, this could take years. For this reason, the CDUP condition stated construction should be initiated within five years and construction should be completed within ten years of the approval date. The BLNR approved CDUP OA-3278 on April 13, 2006. ~~This CDUP has expired.~~

Current Project Proposals

The majority of the project initiatives affecting Conservation District lands are related to natural resource management and wetland restoration and are expected to be covered under existing CDUP OA-3068, which was recently extended to January 25, 2022. The project's natural resource management initiatives are intended to maintain and enhance wildlife habitat and related ecological systems, and are consistent with the 1983 Resource Management Plan for Kawainui Marsh. Proposed structures such as the new office and equipment shed in the marsh vegetation processing area (Subarea B), and facilities at the DOFAW management and research station area (Subarea D) directly support ongoing wetland maintenance. These resource management activities and facilities are also expected to be covered under the existing CDUP, as was DOFAW's 80-acre restoration project.

A cultural center is a supported activity on 9 acres in the Kapa'a area of Subarea B. Most of this land appears to be located within the Conservation District. Proposed improvements include several single story hale structures with administrative, classroom and storage space, as well as a caretaker's cottage. A water storage structure, plant nursery, hula mound and imu are also proposed. The purpose of the center is to support Hawaiian cultural practice, stewardship of resources, and education. As such, it appears to be consistent with the 1983 Management Plan objective to "protect, preserve and enhance cultural, educational and recreational values." Although the Kapa'a Cultural Complex it is expected to be covered under CDUP OA-3068, formal confirmation will be obtained from the DLNR Office of Conservation and Coastal Lands (OCCL).

Although most of the proposed pedestrian trails are located in the State Urban District, some sections of the trail ~~(including boardwalks through wetland areas)~~ are in the Conservation District. These improvements conform to the 1983 Management Plan objective to enhance cultural, educational and recreational values. Trail ~~and boardwalk~~ construction is expected to be allowed under CDUP OA-3068. However, formal confirmation will be obtained from DLNR OCCL. If any of the proposed improvements in the Conservation District are not covered under CDUP OA-3068, a new CDUP must be obtained.

Project Improvements Within the Conservation District

Table 6.1 below summarizes project improvements by subarea, and indicates which are located in the Conservation District and the Urban District. For those improvements proposed on Conservation District lands, the table indicates whether they are covered under an existing CDUP. Those improvements in the Conservation District that are not covered under a current CDUP will need to obtain a new CDUP.

Table 6.1:
Project Improvements in the Conservation vs. Urban Districts

CONSERVATION DISTRICT	Covered Under Existing CDUP?	URBAN DISTRICT
Subarea A: Kawainui		
-Wetland restoration and maintenance -Invasive species removal -Wildlife sanctuary management -Flood control management	YES CDUP OA 1374 CDUP OA-3068	N/A
Subarea B: Kahanaiki -Nā Pōhaku-Kapa'a		
Kahanaiki None	N/A	***Kahanaiki*** -Upland reforestation -Parking and Program Staging area -Perimeter trail, observation deck
Nā Pōhaku None	N/A	***Nā Pōhaku (Kawainui State Park Reserve)*** -Upland reforestation -Education center -Associated kauhale complex and parking -Perimeter trail
Kapa'a -Cultural Center (hale, hula mound, imu) -Perimeter trail and walkways	Possibly covered. Meets objective to "protect, preserve and enhance cultural, educational and recreational values." To be confirmed by DLNR OCCL.	**Kapa'a** -Upland reforestation
Vegetation Processing area -Office, equipment shed	YES CDUP OA-3068	***Vegetation Processing area*** None
Subarea C: Kapa'a-Kalāheo-Levee		
Kawainui State Park Reserve, Kalāheo Section -Kalāheo Park (majority of site in Conservation District)	~~Was~~ Is covered under CDUP OA-3278, Construct Kawai Nui Gateway Park (approved April 13, 2006). ~~This CDUP expired in 2016, and new application needs to be resubmitted.~~	***Kawainui State Park Reserve, Kalāheo section*** -Kalāheo Park (approximately 1.9 acres of the site is in Urban District)[1]
Levee	N/A	-Levee maintenance

[1] Per Kawai Nui Gateway Park Environmental Assessment, October 2002

Table 6.1:
Project Improvements in the Conservation vs. Urban Districts

CONSERVATION DISTRICT	Covered Under Existing CDUP?	URBAN DISTRICT
Subarea D: Wai'auia-Mokulana		
Wai'auia -Wetland vegetation buffer	YES CDUP OA 1374 CDUP OA-3068	***Wai'auia*** -Cultural center for Hawaiian Studies, hula mound and parking ~~-Reinterment site~~ -Perimeter trail with observation deck
Ulupō Heiau State Historical Park -Wetland vegetation buffer	YES CDUP OA 1374 CDUP OA-3068	***Ulupō Heiau State Historical Park*** -Hawaiian cultural landscape improvements -Halau and gathering area -Perimeter trail
DOFAW Management and Research Station -Wetland vegetation buffer	YES CDUP OA 1374 CDUP OA-3068	***DOFAW Management and Research Station*** -Upland vegetation restoration -Management and research offices -Nursery office, greenhouse -Storage building -Program staging area -Parking and access roads -Perimeter trail
Mokulana -Wetland vegetation buffer ~~-Boardwalk (850 ft) from Mokulana across Kahanaiki Stream~~ ~~-Boardwalk (240 ft) near DOFAW Research Station across Mokulana Stream~~	Probably covered under CDUP OA-3068. ~~Boardwalk through wetland meets 1983 management plan objective to "protect, preserve and enhance cultural, educational and recreational values."~~ ~~To be confirmed by DLNR OCCL~~	***Mokulana*** -Upland vegetation restoration ~~-Perimeter trail and viewing pavilions~~ -Equipment parking and storage -Maintenance access and staging areas
Subarea E: Hāmākua-Pu'uoehu		
Pu'uoehu -Upland vegetation restoration -Maintenance foot trails -Protective fencing	~~YES~~ ~~CDUP OA-3068~~ To be confirmed by DLNR OCCL.	***Pu'uoehu*** ~~None~~ Management and programs access road Hāmākua wetland expansion
Hāmākua Marsh None	N/A	**Hāmākua Marsh** -Wetland expansion and enhancement -Upland vegetation restoration -Program staging areas, restrooms -Maintenance access road -Fencing

CDUP Evaluation Criteria

Improvements that apply for a new Conservation District Use Permit will be evaluated on the following eight criteria:

1. The purpose of the Conservation district is to conserve, protect and preserve the important natural and cultural resources of the State through appropriate management and use to promote their long-term sustainability and the public health, safety, and welfare. How is the proposed land use consistent with the purpose of the conservation district?
2. How is the proposed use consistent with the objectives of the subzone of the land on which the land use will occur?
3. Describe how the proposed land use complies with the provisions and guidelines contained in Chapter 205A, HRS, entitled "Coastal Zone Management"
4. Describe how the proposed land use will not cause substantial adverse impact to existing natural resources within the surrounding area, community or region.
5. Describe how the proposed land use, including buildings, structures and facilities, is compatible with the locality and surrounding areas, appropriate to the physical conditions and capabilities of the specific parcel or parcels.
6. Describe how the existing physical and environmental aspects of the land, such as natural beauty and open space characteristics, will be preserved or improved upon.
7. If applicable, describe how subdivision of land will not be utilized to increase the intensity of land uses in the Conservation District.
8. Describe how the proposed land use will not be materially detrimental to the public health, safety and welfare.

6.3.3.3 Urban District

A smaller portion of the project area is within the Urban District. The Urban District areas are primarily the uplands within Subarea B (along Kapa‘a Quarry Road), Subarea C (Kapa‘a-Kalāheo-Levee) and Subarea E (behind Castle Medical Center and the Kūkanono subdivision). Permitted uses or activities in the Urban District are regulated by the City and County of Honolulu. The Urban District designation provides for improvements such as structures, trails ~~and boardwalks~~, and drainage improvements.

Most of the proposed structures and trails are on land within the Urban District. These improvements are not subject to Conservation District regulations and do not need a CDUP. These improvements include the education center at Pōhakea, permanent facilities at the DOFAW Management and Research Station, Hawaiian cultural facilities ~~and a reinterment site~~ at Wai‘auia, and a portion of the Kalāheo Park (former Gateway Park site). Associated parking at these areas, as well as a new parking area at Kahanaiki (Subarea B) are also located in the Urban District. Most of the proposed walking trails and viewing platforms are within the Urban District, ~~with the exception of a few sections of boardwalk within wetland (Conservation District) areas, as discussed above~~.

6.3.4 HRS Chapter 195D and State of Hawai‘i Wildlife Sanctuaries

6.3.4.1 HRS Chapter 195D

Hawaii Revised Statutes (HRS) Chapter 195D, Conservation of Aquatic Life, Wildlife and Land Plants, states that all indigenous species of aquatic life, wildlife, and land plants are integral parts of Hawai‘i’s native ecosystems and represent a natural resource of scientific, cultural, educational, environmental, and economic value to future generations. To insure their continuation, it is necessary that the State take positive actions to enhance their prospects for survival.

6.3.4.2 State of Hawai‘i Wildlife Sanctuaries

Hawai‘i state wildlife sanctuaries are established by the Hawai‘i Board of Land and Natural Resources (BLNR) for “the conservation, management, and protection of indigenous wildlife and their habitats.” (Hawai‘i Administrative Rules (HAR) §13-126-3). The project area includes two State-designated wildlife sanctuaries, Kawainui Marsh and Hāmākua Marsh State Wildlife Sanctuaries. The boundaries of the wildlife sanctuaries in relation to the overall project area are previously shown in Figure 6.1. As shown in the figure, the Pu‘uoehu Hillside is not a designated wildlife sanctuary, but ~~as part of the Hāmākua Marsh reserve,~~ serves as the watershed for the Hāmākua Marsh State Wildlife Sanctuary.

State wildlife sanctuaries are regulated under Hawai‘i Administrative Rules (HAR) Title 13, Chapter 126, Rules Regulating Wildlife Sanctuaries. Designation as a state wildlife sanctuary imposes controls on entry and the types of uses allowed. Public access within state wildlife sanctuaries is restricted to marked trails and roads and no motorized public vehicles are allowed. Within Kawainui Marsh, access is “restricted to the perimeter marked trails and roads, or other marked trails or roads.” Within Hāmākua Marsh, access is “prohibited in wetland areas bounded by the perimeter fence and Makai canal.” According to state regulations, commercial activities may be permitted within the Kawainui and Hāmākua Marshes, though as a guideline it designates ~~at~~ a limit of 100 visitors per day (Chapter 126 HAR).

Currently, there are no marked trails or roads designated for public use within the Kawainui and Hāmākua sanctuary areas. Access is restricted to DOFAW employees for management and maintenance operations, and contractors hired by DOFAW or others authorized by DOFAW to support management activities. DOFAW has authorized limited access to the non-profit organization ‘Ahahui Mālama I Ka Lōkahi (AML) to conduct restoration and educational activities within portions of the wildlife sanctuary at Kawainui. ~~The community group, Ke Kahua O Kūali‘i (Ke Kahua), works with the DSP to clean up and revitalize a portion of Kawainui for public use.~~

6.3.4.3 Conformance with HRS Chapter 195D and Wildlife Sanctuary Regulations

The BLNR may issue permits to conduct activities within the wildlife sanctuaries for the following purposes, as outlined in HAR §13-126-9:

1. Scientific, research or education purposes
2. Conservation and management
3. Subsistence, traditional, and customary practices by Native Hawaiians consistent with the long-term preservation of the wildlife sanctuary resources
4. Any other purpose consistent with Chapter 195D, HRS

All facilities proposed within the boundaries of the wildlife sanctuaries meet one or more of these purposes. Wetland restoration and habitat enhancement are the primary initiatives within the project area. Removal of invasive vegetation, replacement with native wetland vegetation, and creation of additional wetland areas are ongoing conservation and management initiatives, all meeting Purpose 2, conservation and management.

The project proposes parking and staging areas along with an observation deck and maintenance trails in the Kahanaiki area at the corner of Kalaniana‘ole Highway and Kapa‘a Quarry Road (Subarea B). These are intended to support ongoing conservation and educational activities in the area. The proposed education center and kauhale complex (Subarea B) are located outside the wildlife sanctuary boundary. The site of the Kapa‘a Cultural Center in the Kapa‘a area of Subarea B is within the boundary of the wildlife sanctuary. Structures proposed here include ~~two~~ a parking lot~~s~~, several hale structures and a plant nursery. The intent of this center is to promote customary Native Hawaiian practices, conservation, and education in support of the area’s natural resources. These improvements meet the first three purpose statements above, as they support research, education, conservation and management, and traditional and customary practices.

The proposed marsh vegetation processing area will recycle greenwaste generated during invasive vegetation removal. In this area, an office, equipment shed and 6-stall parking lot will support these activities. Improvements at the Management Research Station and Mokulana Peninsula (Subarea D) provide permanent facilities to support DOFAW’s research, conservation and management mission. Throughout the project area, walking trails~~, boardwalk,~~ and viewing platforms will be located around the perimeter of the sanctuary. ~~Some segments will encroach into wetland areas, but they will be constructed as raised boardwalks and will remain on the wetland perimeter.~~ Providing limited and controlled public access to the wildlife sanctuary will provide opportunities to appreciate and learn about the area’s indigenous flora and fauna and their habitats. Public access supports the purposes of education, research, conservation, and resource management and stewardship.

In summary, all project improvements are consistent with the rules and regulations for a wildlife sanctuary as well as with the intent of the Chapter 195D HRS.

6.3.5 State Comprehensive Outdoor Recreation Plan (SCORP)

The State Comprehensive Outdoor Recreation Plan (SCORP) 2015 Update was prepared by the DLNR as part of Hawai‘i’s requirement to qualify for continuous receipt of federal grants for outdoor recreation projects under the Land and Water Conservation Fund (LWCF) Act (see Section 6.2.1 above). This document updates the previous 2009 version of the SCORP. The SCORP provides technical guidance to various government agencies and private entities in the planning, development, and management of Hawai‘i’s outdoor recreation resources.

6.3.5.1 SCORP Wetlands Resource Plan

Chapter 5 of the SCORP provides a Wetlands Resource Plan. In its discussion of wetland values, the plan discusses both ecological and recreational functions of wetlands. It notes that wetlands *“serve as outdoor classrooms where ecological principles are taught. Through wetland education programs and community work days, people of all ages are better able to understand environmental concepts through hands-on activities, learn how to conscientiously interact with a wetland environment while contributing to the conservation of the resource.”* The SCORP notes that wetlands offer a cultural and/or subsistence environment where kalo (taro) has been historically grown, and cites Ulupō Heiau State Historical Park as a location where *“lo‘i kalo have successfully been integrated with recreational facilities.”* (SCORP 2015)

Regarding the management and regulation of wetlands, the SCORP indicates that in general, the priority is management for resource protection with recreation a secondary emphasis, where appropriate. Passive recreation and/or educational use, such as interpretive programs, environmental education, bird watching, and guided hikes may be appropriate depending on the sensitivity of the resource and the program mission of the managing agency.

6.3.5.2 SCORP Outdoor Recreation Strategic Plan

Chapter 8 of the SCORP is the document’s Outdoor Recreation Strategic Plan, which sets forth overarching goals and recommended strategies for the next five years to achieve SCORP goals. The following goals and strategies are directly applicable to the project.

Goal 4: Promote recreational opportunities that preserve and sustain Hawai‘i’s natural and cultural resources

> **Objective 4-2:** Enable and enhance opportunities to preserve and sustain Hawaii’s cultural environment through protection of resources and provision of authentic experiences.

Strategies:

- Support development of outdoor recreation facilities that support cultural activities such as community gardening of kalo and other traditional foods, halau for outrigger canoes, and mauka trails to forests for hunting and gathering activities.
- Coordinate with Native Hawaiian cultural practitioners to develop interpretive programs and to establish protocol for recreation activities in and around cultural resources.
- Support public recreational programs that encourage culturally relevant activities such as hula, lua (a form of Hawaiian martial arts), paddling, swimming, fishing, and surfing.

Discussion: The project was developed in consultation with multiple stakeholders, including native Hawaiian organizations and cultural practitioners. Project initiatives will create opportunities for cultural experiences and education including cultivation and use of native plants, traditional building techniques, music and dance, martial arts, and sustainable land practices. Project initiatives clearly support Goal 4 and Objective 4-2.

Objective 4-3: Encourage outdoor recreation planning and development that considers the effects of climate change and sea level rise.

Strategies:

- Support planning efforts that incorporate Hawaiian traditional knowledge and practices in the planning for the impacts of climate change.
- Support the preservation and restoration of natural landscape features, such as coral reefs, beaches and dunes, forests, streams, floodplains, and wetlands that have the inherent capacity to avoid, minimize, or mitigate the impacts of climate change.

Discussion: Project initiatives for wetland restoration and maintenance, upland reforestation, and sedimentation reduction will improve wetland ecological functions. By removing invasive wetland vegetation and opening up water areas, the wetland will provide greater flood protection capacity. The wetland will also be better able to trap sediments and retain excess nutrients, both of which will help mitigate the impacts of climate change. Proposed project improvements are consistent with Objective 4-3.

6.3.6 Coastal Zone Management Federal Consistency

Hawai‘i’s Coastal Zone Management (CZM) program was enacted in 1977 (Chapter 205A, Hawai‘i Revised Statutes), following the passage of the federal CZMA of 1972. Section 307 of the CZMA requires that federal agency activities and development projects affecting any coastal use or resource be undertaken in a manner consistent to the maximum extent practicable with the State’s CZM objectives and policies. Although the project area is not located on the coast, in

Hawai‘i, the entire state has been designated as the CZM area. Activities requiring a federal permit or license (e.g., Department of the Army permit) must also be conducted in a manner consistent with the State's CZM program.

If a (federal) Department of the Army permit is required for certain project improvements ~~(e.g., construction of boardwalk in wetland areas)~~, the project must be reviewed for consistency with the Hawai‘i CZM program. The following discusses the project's consistency with the following CZM components and objectives. The numbering of the policies below (e.g., Policy 2a) reflects the reference numbers in the federal consistency assessment form, which will be submitted to the Hawai‘i CZM program at the time of the Department of the Army permit application.

6.3.6.1 Consistency with CZM Objectives

Recreational Resources

Objective: Provide coastal recreational opportunities accessible to the public.

Discussion: The project area is not located directly on the coastline and does not abut the shore. However, the wetlands within the project area have a direct hydrological relationship with the surrounding watershed through the streams that feed into it, and with eventually discharging into the Kawainui canal which drains into the nearshore waters of Kailua Beach. The project area includes state park lands which will be enhanced for public use. The project will not affect shoreline access, but includes improvements to provide public access around the perimeter of the wetland for education and passive recreational use. The proposed perimeter trails and viewing locations directly support the following CZM policies for Recreational Resources:

- Policy 2a. Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas
- Policy 2c. Providing and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value
- Policy 2d. Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation

Historic Resources

Objective: Protect, preserve, and where desirable, restore those natural and man-made historic and pre-historic resources in the coastal zone management area that are significant in Hawaiian and American history and culture.

Discussion: The project area is not within a designated historic or cultural district, but it does include several sites which are on or eligible for the Hawaii and National Registers of Historic Places. The Kawainui wetland itself is a former Hawaiian fishpond and the project area is a historic settlement area. The area has been the subject of numerous archaeological investigations.

Project initiatives protect identified historic sites and include cultural resource management initiatives to promote cultural preservation and stewardship. Several areas within Kawainui are identified for the establishment of cultural centers or programs for native Hawaiian cultural practice, including two existing sites, Nā Pōhaku o Hauwahine and Ulupō Heiau State Historical Park. These improvements directly support the following CZM policies for Historic Resources:

- Policy 1. Identify and analyze significant archaeological resources
- Policy 2. Maximize information retention through preservation of remains and artifacts or salvage operations
- Policy 3. Support State goals for protection, restoration, interpretation, and display of historic resources

Scenic and Open Space Resources

Objective: Protect, preserve, and where desirable, restore or improve the quality of coastal scenic and open space resources.

Discussion: The project does not include any alteration of natural landforms or structures that will impact existing shoreline views. Structures proposed as part of the project will be of low scale and designed to blend into the surrounding environment. They will not impact any scenic views within or of the project area. The proposed trails and viewing platforms around the wetland perimeter will provide the public with additional opportunities to enjoy the existing scenic and open space resources with minimal impact on the environment. These improvements directly support the following CZM policy for Scenic and Open Space Resources:

- Policy 2. Insure that new developments are compatible within their visual environment by designing and locating such development to minimize the alteration of natural landforms and existing public views to and along the shoreline

Coastal Ecosystems

Objective: Protect valuable coastal ecosystems from disruption and minimize adverse impacts on all coastal ecosystems.

Discussion: The project area is located within the Special Management Area (SMA) and several perennial streams flow into the wetland. The Kawainui and Hāmākua wetlands provide habitat for endangered Hawaiian waterbirds. The primary focus of the project is natural resource management, and initiatives include the removal of invasive vegetation, replacement with native vegetation, encouraging stream areas to naturalize, opening up water areas, reducing erosion and sedimentation, improving water quality and ~~establishing~~ enhancing wildlife habitat. These initiatives will improve wetland function and biological productivity, improving the health of the ecosystem from mountains to the sea. The project directly supports the following CZM policies for Coastal Ecosystems:

- Policy 1. Improve the technical basis for natural resources management
- Policy 2. Preserve valuable coastal ecosystems of significant biological or economic importance
- Policy 4. Promote water quantity and quality planning and management practices

Economic Uses

Objective: Provide public or private facilities and improvements important to the State's economy in suitable locations.

Discussion: This CZM objective is concerned with coastal dependent development, and ensuring that it is located appropriately with minimal adverse social, visual and environmental impacts. The Economic Uses objective and policies are mainly concerned with coastal dependent economic use, and the proposed improvements are not commercial activities. However, the improvements are consistent with the policies to direct developments to areas presently designated for such development. For example, the perimeter trails and viewing areas have been identified for years in approved public planning documents. Passive recreation is consistent with federal and state regulations and policies to provide public recreational access. New development outside of presently designated areas (e.g., education center, cultural centers) will minimize environmental impact.

- Policy 1. Concentrate coastal development in appropriate areas
- Policy 2. Ensure that coastal development…are located, designed and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area.
- Direct the location and expansion of coastal dependent development to areas presently designated and used for such development…

Coastal Hazards

Objective: Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion and subsidence.

Discussion: This CZM objective is concerned with coastal dependent development, and ensuring that they are located appropriately with minimal adverse social, visual and environmental impacts. Although the project area does not abut the shoreline and is not especially prone to coastal hazards such as tsunami or storm waves. However, surrounding areas have been subject to severe flooding in the past, and Kawainui and Hāmākua serve an important role as water retention areas. The proposed wetland restoration will improve Kawainui's flood retention capabilities, reducing coastal hazard.

Managing Development

Objective: Improve the development review process, communication, and public participation in the management of coastal resources and hazards.

Discussion: This CZM objective is concerned with the development review and approval process and ensuring timely processing and public participation in the planning and review process. The process of developing the master plan ~~that guides the project~~ involved public participation. An Environmental Impact Statement is now being prepared in accordance with HRS Chapter 343 and will evaluate short and long-term environmental impacts. The EIS process includes public review and comment. Implementation of specific project initiatives will require an SMA Use Permit which will be subject to public input, and construction for certain improvements may ~~in wetland areas (e.g., boardwalks) will~~ require a Department of the Army Section 404 permit. The overall permitting, review and approval process is consistent with the following CZM policies for Managing Development:

- Policy 2. Facilitate timely processing of application for development permits and resolve overlapping or conflicting permit requirements
- Policy 3. Communicate the potential short- and long-term impacts…early in their life cycle and in terms understandable to the general public to facilitate public participation in the planning and review process

Public Participation

Objective: Stimulate public awareness, education, and participation in coastal management.

Discussion: As noted above, proposed improvements under the Kawainui-Hāmākua ~~Complex Master Plan~~ project was developed with extensive public participation including several community workshops and many stakeholder meetings. The public had an opportunity to review and comment on the draft master plan. The ~~ongoing~~ environmental review process ~~will~~ provides further opportunity for public review and comment.

- Policy 1. Promote public involvement in coastal zone management processes.

Beach Protection

Objective: Protect beaches for public use and recreation.

Discussion: The project area does not include beach areas. These objectives are not applicable.

Marine Resources

Objective: Implement the State's ocean resources management plan.

Discussion: Although the project area is not located on the coast, the health and functioning of Kawainui and Hāmākua Marshes have an impact on marine water quality and coastal resources. Project initiatives focus on restoration and management of the wetland, and restoration of its ecological function as a sedimentation and flood control basin. Restoration of upland areas reduce erosion and improve water quality. Given that Kawainui and Hāmākua ultimately ~~connect~~ discharge waters to the ocean, these project area improvements will benefit the State's ocean resources. Project initiatives support the following CZM policies for Marine Resources:

- Policy 1. Exercise and overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources
- Policy 2. Assure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial

6.3.7 Other Statewide Plans

6.3.7.1 Watershed Management Plan

The state water code (HRS Chapter 174C) mandates that each County prepare and adopt water use and development plans. The City and County of Honolulu's water use and development plan is called the O'ahu Water Management Plan (OWMP), and it calls for the preparation and adoption of regional watershed management plans for each of the City's eight Development Plan (DP) areas. Collectively, these district-specific watershed management plans will form the updated O'ahu Water Management Plan. The Kawainui-Hāmākua project area is within the area covered by the Ko'olau Poko Watershed Management Plan (KPWMP) (Townscape, Inc., 2012).

As discussed in Chapter 3 (Section 3.4 Water Resources), all O'ahu watershed management plans have five objectives:

1. Promote sustainable watersheds
2. Protect and enhance water quality and quantity
3. Protect Native Hawaiian rights and traditional and customary practices
4. Facilitate public participation, education, and project implementation
5. Meet future water demands at reasonable cost

The KPWMP identified specific watershed management "projects and programs with project champions," and "watershed management strategies." It specifically mentioned:

1. #24, Management and Stewardship of Kawainui Marsh
2. #25, Hāmākua Marsh Ecosystem Restoration Program

The project proposes to continue and expand these ongoing watershed management efforts. Project initiatives support objectives 1 and 2 for sustainable watersheds and protect and enhance water quality. Opportunities for public access, passive recreation, hands-on education and cultural practice meet objectives 3 and 4. Project initiatives also support the following KPWMP district wide strategies and recommendations:

1. #04, Native Plant Propagation Program
2. #05, Establish Alien Plant Control Programs
3. #06, Establish Fencing Enclosures in High Priority Areas for Feral Pig Control
4. #08, Minimize the Impacts of Small Mammals on Watershed Resources
5. #16, Promote Kalo Restoration Projects
6. #23, Encourage Water Efficient Fixtures in Current and Future Development
7. #24, Encourage Low Impact Development Design Concepts in Future Development
8. #35 Maintain "Green Spaces" in Kailua

6.3.7.2 Statewide Greenways System

On July 12, 2011, Hawai‘i Governor Neil Abercrombie signed into law Act 233, Session Laws of Hawaii 2011, recognizing the benefits that greenways and trails can have on Hawai‘i's communities. Act 233 directed the State Office of Planning (OP) to develop a plan to establish a statewide system of greenways and trails, and to report its findings and recommendations to the 2012 State Legislature. The resulting report to the legislature was entitled "Establishment of Statewide Greenways System for Hawai‘i".

The report defined the term "greenway" as corridors of land and/or water that connect and protect the natural, cultural, and recreational resources that define communities, linking these features within the surrounding landscape. They help create sustainable landscape where ecological and community processes are maintained and enhanced, rather than fragmented by development. Greenways serve multiple uses, among them health and fitness; recreation; mobility with less dependence on motorized vehicles; protection of historic and cultural resources; wildlife and habitat protection; scenic amenity; environmental education; and economic activity and investment (Office of Planning 2011).

The report found that much work is already being done in this area by State and County agencies, as well as by community members and non-profit organizations. Efforts by DOFAW and DSP were specifically noted. Although there is a high level of interest and activity statewide, the report stated that current efforts to implement and develop greenways elements and systems

are fragmented and project driven. Among the report's recommendations were to 1) maintain the current course; 2) establish a statewide greenways and trails facilitator position, 3) expand authority and funding for a greenways program and 4) establish dedicated funding for a new and separate statewide greenways program.

A model framework for a Statewide greenways system was laid out, based on a system offered by the 1000 Friends of Florida (Office of Planning 2011). The major components of the model are summarized below:

1. Create an institutional framework for greenways
   Assigns responsibility for coordinating and integrating government and private sector greenways efforts and supports state and community greenways initiatives and coordinates.
2. Create and manage community greenways through community initiatives
   Stimulate public and private sector awareness, involvement, and action in creating and managing community greenways and greenways systems
3. Conserve native ecosystems and landscapes
   Design and manage a statewide system of greenways that provides essential ecological linkages and conserves green infrastructure of native ecosystems and landscapes
4. Incorporate urban open spaces, working landscapes, historical sites, and cultural resources into the greenways system
5. Provide access to system of greenways
   Design, develop, and maintain linkages/trails that provide public access to and promote appreciation, support, and conservation of the natural, cultural, and historical features of the state's system of greenways.
6. Educate and involve the public
   Educate and inform diverse audiences about the concept of greenways and the statewide system of greenways.
7. Fund a statewide greenways system
   Fund the creation and maintenance of a statewide greenways system using a combination of funding sources.

Discussion: The proposed trail system throughout the Kawainui-Hāmākua project area has long been a part of long-term plans for the area. The provision of public access and a trail system was a part of the 1994 Kawai Nui Marsh Master Plan, the Koʻolau Poko Sustainable Communities Plan, and other planning documents. The proposed trails will provide recreational and educational opportunities, and link cultural resources. It is consistent with component #2 above, in that it encourages private sector support and strong community involvement. The trails will enhance opportunities for environmental education and hands-on learning, and link cultural points of interest. These directly support components #3 through #6.

6.3.7.3 Aloha+ Challenge

The State's Aloha+ Challenge is a statewide commitment to building a more secure, sustainable, and resilient future for Hawai'i. The Challenge is comprised of six sustainability targets to be achieved by 2030 in the areas of clean energy transformation, local food production, natural resource management, solid waste reduction, smart sustainable communities, and green workforce and education development. Hawai'i's elected officials formally endorsed the Challenge by signing the Aloha+ Challenge Declaration at a July 7, 2014 press conference. The State Legislature also provided unanimous endorsement of the Aloha+ Challenge through a Senate Concurrent resolution (SCR69).

Project improvements support the majority of sustainability targets. However, some targets are unrelated to the project purpose and need. Therefore, it is not appropriate for the project to advance these objectives. The project's alignment with goals of the *Aloha+ Challenge* is discussed below.

Clean Energy

Objective: 70 percent clean energy – 40 percent from renewables and 30 percent from efficiency.

Discussion: Incorporation of renewable energy elements, such as photovoltaic systems, in the design of project facilities will support target objectives. Energy efficient elements may be incorporated into project improvements. However, the implementation of renewable energy and energy efficient elements in improvements will be determined during the design and implementation phases of improvements. Whether these elements are included in facility design will be determined by programmatic need, costs, and available financing. Therefore, the actual contribution of these improvements toward advancement of these objectives will be determined in later project phases.

Local Food

Objective: At least double local food production – 20 to 30 percent of food consumed is grown locally.

Discussion: At present, kalo lo'i and other traditional crops may be grown around Nā Pōhaku, Pōhakea, and Ulupō Heiau. These activities contribute to the attainment of target objectives and are conducted as part of educational and cultural practices. Project conceptual plans support continuation of these activities. However, large scale agriculture or aquaculture supporting food sustainability of the broader community is prohibited in the project site. Large scale agriculture and aquaculture would be considered commercial agricultural production, which is not allowed.

Natural Resource Management

Objective: Reverse the trend of natural resource loss mauka to makai by increasing freshwater security, watershed protection, community based marine management, invasive species control and native species restoration.

Discussion: The purpose and need for this project does not include reversal of natural resource loss trends for areas outside the project site or DOFAW and DSP jurisdiction. Therefore, advancement of target objectives for areas outside physical site boundaries or the jurisdiction of these agencies is not appropriate. However, the project will advance pertinent objectives within the project site. Project improvements will not adversely impact water resources and portions of the watershed applicable to the project site. Improvements will not impact or influence the volume of water flowing into Kawainui or Hāmākua Marshes from streams associated with the project area. Wetland restoration and upland reforestation activities will enhance the natural character and functions of the wetland, improving wetland natural functions that filter pollutants suspended in waters entering the marsh. These pollutants are removed before waters travel to the underlying aquifer. These initiatives support attainment of target freshwater security and watershed protection objectives. The project does not advance target marine management objectives because marine areas are outside project site boundaries. However, benefits to marine areas downstream from the project area would likely result from improved pollutant filtration functions from project implementation. Project activities such as predator control fencing support objectives to control invasive species while restoring the presence of native species.

Waste Reduction

Objective: Reduce the solid waste stream prior to disposal by 70 percent through source reduction, recycling, bioconversion, and landfill diversion methods.

Discussion: The project supports attainment of Waste Reduction objectives. Proposed green waste processing activities at the vegetation processing center advances this objective. Proposed activities divert green waste produced by project restoration and reforestation activities from municipal green waste processing facilities.

Smart Sustainable Communities

Objective: Increase livability and resilience in the built environment through planning and implementation at state and county levels.

Discussion: The project supports Smart Sustainable Communities objectives to increase the resilience of the built environment. Project upland and wetland restoration improvements enhance the natural functions of project site wetlands. These natural functions include flood retentive capabilities. Flooding may occur from natural disasters such as storms, which may

become more severe due to climate change. Enhancement of wetland flood retentive capabilities reduces the potential for flood damage of downstream developed areas during storms.

Green Workforce & Education

Objective: Increase local green jobs and education to implement these targets.

Discussion: The Green Workforce & Education target is unrelated to the project purpose and need. Although this target is unrelated to the project purpose and need, design and construction of project improvements may result in a small increase in green jobs on O‘ahu. However, increases to the number of jobs in O‘ahu’s green workforce are anticipated to be negligible.

6.4 CITY AND COUNTY OF HONOLULU

6.4.1 General Plan

The General Plan of the City and County of Honolulu (DGP, 1992, amended October 3, 2002) is a comprehensive statement of objectives and policies which sets forth the long-range social, economic, environmental, and design objectives for O‘ahu. The General Plan serves as a guide for government, private enterprise, communities, and individual citizens around 11 areas of concern.

The 1992 O‘ahu General Plan is currently undergoing an update. The O‘ahu 2035:General Plan Focused Update will look at the critical issues of growth, development, and quality of life, including regional population, economic health, affordable housing, and sustainability. A final plan is expected to be completed by the end of 2017. The updated plan will be reviewed and adopted by the City Council. Until the new plan is adopted, the 1992 General Plan remains the guiding document, and this General Plan discussed in the remainder of this Section.

6.4.1.1 Consistency with General Plan Objectives and Policies.

The following discusses the project’s conformance and consistency with pertinent objectives and policies from the City’s General Plan.

Natural Environment

Objective A	*To protect and preserve the natural environment.*
Policy 2	*Seek the restoration of environmentally damaged areas and natural resources.*
Policy 3	*Retain the Island's streams as scenic, aquatic, and recreation resources.*
Policy 6	*Design surface drainage and flood-control systems in a manner which will help preserve their natural settings.*

Discussion: A major goal of the project is to promote environmental preservation and stewardship through the restoration and maintenance of wetlands, improvement of habitat for native Hawaiian waterbirds, restoration of the wetland's function as a flood control and sedimentation basin, and improvement of upland areas through reforestation and drainage improvements. For years, the project area was a neglected and degraded environment. The proposed stewardship activities directly respond to the General Plan objective to protect and preserve the natural environment.

Policy 8	*Protect plants, birds, and other animals that are unique to the State of Hawaii and the Island of Oahu.*
Policy 9	*Protect mature trees on public and private lands and encourage their integration into new developments.*
Policy 10	*Increase public awareness and appreciation of Oahu's land, air, and water resources.*

Discussion: Enhanced habitat will support endangered waterbirds, and the installation of predator fencing will provide further protection. Invasive vegetation will be gradually reduced and replaced with native vegetation. A hybrid ecosystem model implemented in upland areas will allow non-native tree canopies to support establishment of native understory plantings to create a robust native forest. Improvements that promote native Hawaiian stewardship and opportunities for public access and education promote public awareness and appreciation of Kawainui and Hāmākua Marsh as important natural resources.

Objective B	*To preserve and enhance the natural monuments and scenic views of Oahu for the benefit of both residents and visitors.*
Policy 1	*Protect the Island's well-known resources: its mountains and craters; forests and watershed areas; marshes, rivers, and streams; shoreline, fishponds, and bays; and reefs and offshore islands.*
Policy 4	*Provide opportunities for recreational and educational use and physical contact with Oahu's natural environmental.*

Discussion: The project's wetland restoration and reforestation improvements will support wetland functional value and wildlife habitat at Kawainui and Hāmākua Marsh. Project initiatives will provide public access through trails and encourage participation in stewardship activities. These will create opportunities for educational, cultural, and recreational enjoyment of these natural and cultural resources.

Culture and Recreation

Objective B	*To protect Oahu's cultural, historic, architectural, and archaeological resources.*
Policy 1	*Encourage the restoration and preservation of early Hawaiian structures, artifacts, and landmarks.*

Policy 2	*Identify, and to the extent possible, preserve and restore buildings, sites, and areas of social, cultural, historic, architectural, and archaeological significance.*
Policy 5	*Seek public and private funds, and public participation and support, to protect social, cultural, historic, architectural, and archaeological resources.*
Policy 6	*Provide incentives for the restoration, preservation, and maintenance of social, cultural, historic, architectural, and archaeological resources.*

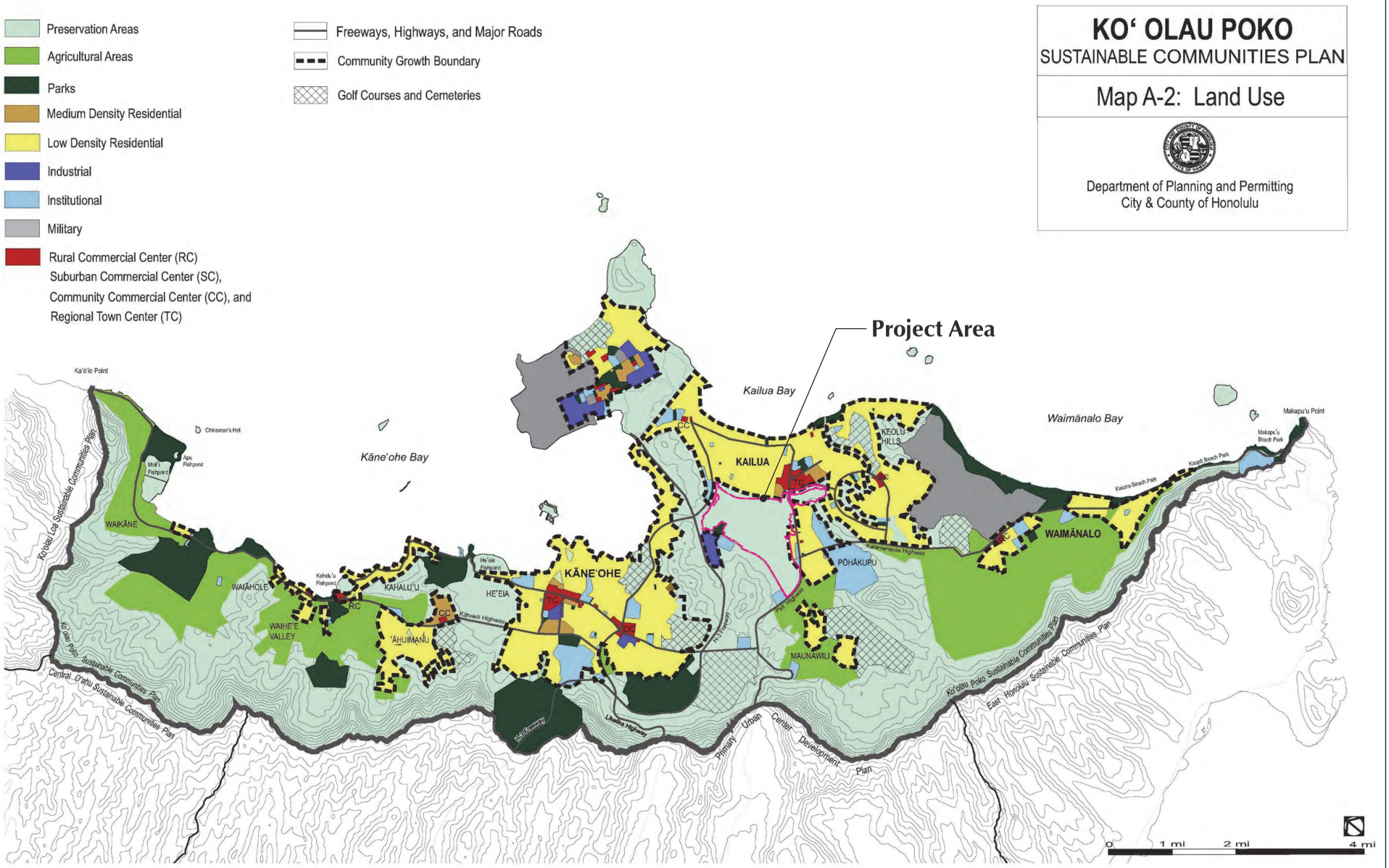
Discussion: The project seeks to support Hawaiian cultural practices, stewardship and education through the identification of four specific areas where these activities can be pursued, including two existing cultural sites (Nā Pōhaku o Hauwahine and Ulupō Heiau State Historical Park). The combination of cultural practice and resource stewardship is also consistent with DOFAW and DSP agency missions to manage and protect cultural resources. Proposed restoration of the cultural landscape surrounding Ulupō Heiau, the establishment of Hawaiian cultural and education centers~~, and establishment of a burial preserve/reinterment site~~ are some of the cultural activities planned. ~~A canoe storage and launch area is a recreational initiative with a strong cultural component.~~

Archaeological monitoring prior to restoration and construction activities will minimize potential effects on potential subsurface sites that may be present.

6.4.2 Koʻolau Poko Sustainable Communities Plan (SCP)

The City and County of Honolulu's Development & Sustainable Communities Plan program provides a regional level framework to implement the City's General Plan objectives. The project area is located within the Koʻolaupoko Sustainable Communities Plan (SCP) area, one of eight geographic regions of Oʻahu that are part of the SCP program. The Koʻolaupoko district encompasses the windward coastal and valley areas generally extending from Makapuʻu Point to Kailua, Kāneʻohe, and northbound up to Kaʻōʻio Point in Kualoa.

The updated Koʻolau Poko SCP was adopted in August 2017 as Ordinance No. 17-42, Revised Ordinances of Honolulu (ROH). The updated 2017 SCP supplants the prior 2000 SCP as the governing document. Figure 6.3 shows the 2017 Koʻolau Poko SCP's Land Use Map applicable to the project area (Map A-2, Land Use). The project area is designated as Preservation Areas.



Source: City and Country of Honolulu Department of Planning and Permitting, 2017.

Kawainui - Hāmākua Master Plan Project

Figure 6.3 - Ko‘olau Poko Sustainable Communities Plan-Kailua

Kailua, O‘ahu

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The project area is designated a major wetland of the Koʻolau Poko region by the SCP. The SCP makes reference to the project area's designation as a Ramsar Wetland because of its purpose as a flood control basin, wetland filter, wildlife habitat, and cultural and scenic resource. Project wetland restoration, upland reforestation, and cultural resource management initiatives further project area purposes which qualified the area for the Ramsar Designation. The SCP also references the 1994 Kawai Nui Marsh Master Plan that encourages the preservation and restoration of Kawainui Marsh. The 1994 plan proposed hiking trails and pedestrian paths and an environmental education center. These components have been carried into the project. Additionally, the SCP discusses the COE and DLNR's habitat restoration efforts initiated in 2013. The project also continues these efforts.

6.4.2.1 Conformance with SCP

This section discusses the project's conformance and consistency with the pertinent policies and guidelines of the 2017 Koʻolau Poko SCP. Specific objectives to improve the project area's endangered waterbird habitat; and archaeological and cultural sites are provided in the SCP. Project conformance with applicable objectives is discussed.

Section 3.1.3.3 Wetlands, Wildlife Preserves and Nature Parks/Preserves, Kawainui Marsh

- Improving water quality in contributing Kapaa and Maunawili streams;
- Improving water quality in the marsh;
- Removing invasive plant species to open up water flow;
- Implementing predator control measures;
- Preserving and enhancing identified wildlife species, their habitats, and related ecological systems.

Discussion: Project improvements support achievement of these objectives. Project wetland and upland improvements will enhance the water quality of project area streams and the marsh. This will be achieved through upland drainage improvements that will better regulate stormwater runoff into the marsh and wetland restoration improvements that restore streamflow to natural conditions through removal of invasive vegetation. This facilitates improved pollutant control functions which are a natural function of the marsh. This can result in improved water quality throughout the project area. The project also continues ongoing predator control measures in the project area which include trapping and construction of fencing. Wetland restoration and predator control measures can enhance project area wetlands as habitat for identified endangered waterbird species. These efforts will help preserve endangered waterbirds.

The 2017 Koʻolau Poko SCP provides a number of land use policies and guidelines that are applicable to the project area. The project's conformance with applicable policies and guidelines is discussed below.

Section 3.1 Open Space Preservation
Section 3.1.3.3 Wetlands, Wildlife Preserves and Nature Parks/Preserves
Guidelines:

- *Prohibit encroachment or intensification of residential or other urban uses near wildlife sanctuaries and nature parks.*
- *Prepare wildlife preserve management plans emphasizing conservation and restoration of native plants, birds, fish, and invertebrates.*

Discussion: The project is consistent with and supports prohibiting encroachment or intensification of urban uses near Kawainui Marsh. No residential development is proposed. Proposed structures are intended to support DOFAW operations, ongoing stewardship, and cultural and educational initiatives. Proposed wetland restoration and upland reforestation will enhance the value of the wetland as a wildlife sanctuary, waterbird habitat, and habitat for native plants and aquatic species. ~~The project is guided by the Kawainui-Hāmākua Complex Master Plan, which is a master planning document focused on restoring the project area as a suitable habitat for endemic and endangered waterbirds.~~

Section 3.1.3.4 Natural Gulches, Streams and Drainageways
Guidelines:

- *Incorporate erosion control measures and best management practices, as cited in the Hawai‘i’s Coastal Nonpoint Pollution Control Program Management Plan to prevent pollution of wetlands, streams, estuaries and nearshore waters.*

Discussion: The project includes initiatives to repair drainage culverts along Kapa‘a Quarry Road to reduce storm water runoff, erosion and sedimentation into the wetland. A healthy, well-functioning wetland will also reduce runoff and pollution into nearshore waters. Public access around the perimeter of the wetland will be enhanced through trails ~~and boardwalks~~.

Section 3.4~~4~~3 Historic and Cultural Resources
Guidelines:

- *Determine the appropriate preservation methods on a site-by-site basis in consultation with the State Historic Preservation Officer.*
- *Determine the appropriateness of public access on a site-by-site basis in consultation with the State Historic Preservation Officer and the owner of the land on which the site is located.*
- *Promote the identification, survey and listing of sites that are eligible for the Hawaii or National Registers of Historic Places.*

Discussion: Project improvements, anticipated impacts, and proposed mitigation will be evaluated by the DLNR State Historic Preservation Division (SHPD) as part of the environmental review process. The appropriateness of public access to specific project area sites was determined through consultation with DOFAW and DSP who are organizations with responsibility over portions of the project area. An archaeological investigation has

recommended archaeological inventory surveys for areas where site improvements are proposed. This recommendation will be reviewed by the SHPD during the environmental review process. Kawainui Marsh has already been nominated for the National Register of Historic Places, and the results of archaeological work conducted for this project will provide additional information for this resource.

6.4.3 Honolulu Land Use Ordinance (LUO)

The City and County of Honolulu Land Use Ordinance (LUO) regulates land use in accordance with adopted land use policies, including the General Plan and Development (Sustainable Communities) plans. Permitted land uses and activities are prescribed under Chapter 21 Land Use Ordinance (LUO) of the City's Revised Ordinances of Honolulu, as amended (City and County of Honolulu 1990). The provisions are also referred to as the zoning ordinance.

Zoning designations for the project area are shown in Figure 6.4. Almost all of the project area is in the P-1 or P-2 preservation districts. According to the LUO, the purpose of the City's preservation districts is to preserve and manage open space and recreation lands and lands of scenic and other natural resource value.

The vast majority of the project area, encompassing the Kawainui wetland and Puʻuoehu Ridge is within the City's P-1 Restricted Preservation district. These P-1 lands correspond to the areas within the State Conservation District and are under the jurisdiction of the State Board of Land and Natural Resources. Permitted land uses are regulated under Section 13-5-23, HAR, and they are not subject to City zoning regulations. There is a portion of the project area near the intersection of Kapaʻa Quarry Road and Mōkapu Boulevard which appears to be in the Urban District but is zoned P-1. Typically, land in the State Urban District would not be zoned P-1 Restricted Preservation, and the reason for this discrepancy is unknown. However, this segment of property consists of Kapaʻa Quarry Road and would not be affected by the project.

Only the lands in the Urban District are subject to City zoning regulations. As shown on Figure 6.4, these areas are mostly zoned P-2, with small areas zoned R-5 Residential. These areas include the perimeter and uplands around Kawainui, and all of Hāmākua. An area at Waiʻauia is zoned R-5. The LUO regulates permitted uses and sets development standards for these zoning districts.



Source: State of Hawai'i GIS Data

Kawainui - Hāmākua Master Plan Project

Figure 6.4 - County of Honolulu Zoning Districts

Kailua, O'ahu

0 800 1,600 FEET

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6.4.3.1 Permitted Uses

Permitted uses and structures within the P-2 and R-5 zones are identified in the LUO's Table 21-3, Master Use Table. According to this table, "public uses and structures" are permitted within the P-2 zoning district. Public uses and structures are defined in the LUO as *"uses conducted by or structures owned or managed by the federal government, the State of Hawaii or the City to fulfill a governmental function, activity or service for public benefit and in accordance with public policy."*

All uses and structures proposed in the P-2 zone meet the LUO definition of public uses and structures. Kawainui Marsh and Hāmākua Marsh are state-designated wildlife sanctuaries under the jurisdiction of DOFAW. The proposed wetland restoration, reforestation, storm water runoff improvements, and improvements supporting DOFAW operations are activities that provide a public benefit in accordance with public policy. Use of the area for scientific, research, education, and traditional and customary practices by native Hawaiians is also consistent with the State's wildlife sanctuary designation, as discussed in Section 6.3.4 above.

The land for the Ulupō Heiau State Historical Park and Kawainui State Park Reserve were purchased with federal LWCF Act grants. These lands must be maintained for public outdoor recreation, and remain open and accessible for public use. This requirement will be met through proposed trails, viewing areas, and parking areas. ~~The passive park with canoe launch and storage supports DLNR's public policy to provide outdoor recreation.~~ The project's cultural and educational initiatives also fulfill the Ramsar Convention's policy to consider the cultural aspects of wetlands and to integrate cultural heritage with wetland management.

6.4.3.2 Consistency with Development Standards

LUO development standards apply to project area lands that are zoned P-2 and R-5. Standards are specified in the LUO Table 21-3.1 and 21-3.2 and shown in Table 6.2 below. Structures within the P-2 district which must comply with the P-2 standards include the education center at Nā Pōhaku and adjoining kauhale complex; Kapa'a Cultural Center; ~~park and canoe launch facilities at the former Gateway Park site;~~ structures at Ulupō Heiau; and the DOFAW Management and Research Station.

The portion of the Wai'auia site where structures are proposed is zoned R-5 Residential. The proposed improvement for this 1.3 acre site is a cultural center for Hawaiian studies comprised of three single-story structures totaling about ~~5~~7,000 SF. The Wai'auia Cultural Center will focus on Hawaiian performing and literary arts. Applicable development standards for structures are summarized below.

Table 6.2
LUO Development Standards

Development Standard	P-2 General Preservation	R-5 Residential
Minimum Lot Area	5 acres	5,000 feet
Minimum Lot Width And Depth	200 feet	50 feet
Yards - Front	30 feet	30 feet
Yards – Side / Rear	15 feet	15 feet
Maximum Density	5 percent of the zoning lot	50 percent of the zoning lot
Maximum Height	15-25 feet	25-30 feet
Height Setback	1 foot for each 2 feet in height above 15 feet	Per Sec. 21-3.70-1(c)

Source: Land Use Ordinance, Table 21-3.1 and 21-3.2

6.4.4 Special Management Area (SMA)

The Hawai‘i Coastal Zone Management Program embodied in Chapter 205A, HRS contains the general objectives and policies upon which all counties within the State have structured specific legislation creating Special Management Areas (SMA). The SMA permit is part of a regulatory system that is the cornerstone of the Hawaii CZM program. The City and County of Honolulu's SMA permitting system is a management tool to assure that uses, activities, or operations on land within the SMA comply with the CZM objectives, policies, and guidelines. The project area is located within Honolulu's SMA and is subject to the requirements of Chapter 25, ROH. Figure 6.5 illustrates the location of the project area in relation to the City and County of Honolulu's SMA.

6.4.4.1 Previous SMA Use Permits

Several initiatives within the Kawainui- Hāmākua project area have previously been authorized under SMA use permits, including various pond and habitat restoration activities (Resolution 01-58), improvements at the Gateway Park Mōkapu site (Resolution 02-339), and restoration within an 80-acre area (Resolution 12-337). Figure 6.6 shows the areas covered by these three previous permits. A new SMA use permit will be required for all proposed project activities and areas that were not previously covered.

Kawainui Marsh

Resolution 01-58, Kawainui Management Plan Improvements. Resolution 01-58, approved by the Honolulu City Council on December 12, 2001, granted an SMA use permit for various wildlife habitat restoration improvements which were identified in the 2000 Kawainui Marsh Management Plan. Permitted improvements included the Army Corps of Engineers restoration ponds, which have since been completed. The applicant was the DLNR Land Division.



Source: State of Hawai'i GIS Data

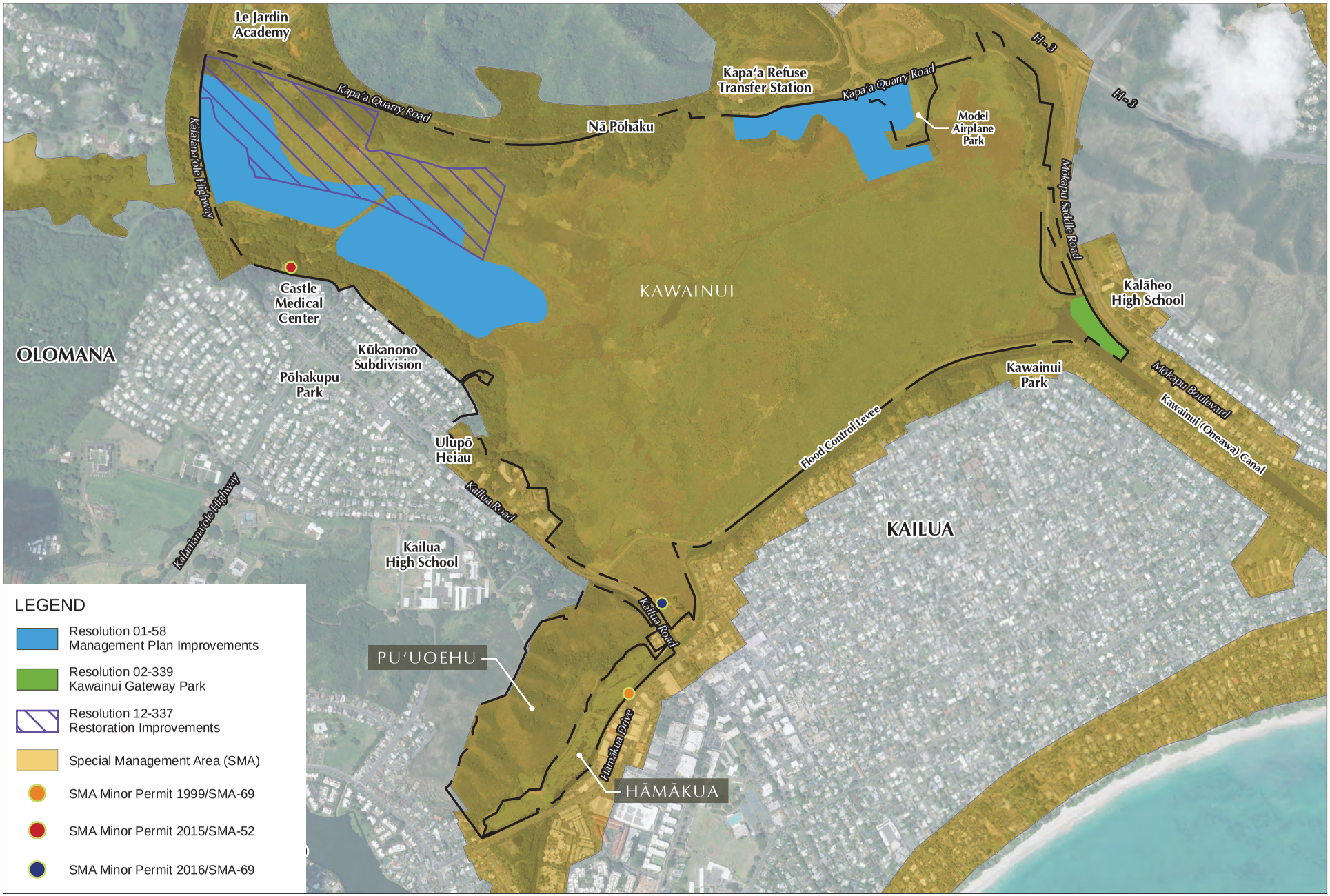
Kawainui - Hāmākua Master Plan Project

Figure 6.5 - County of Honolulu Special Management Area

Kailua, O'ahu

0 800 1,600 FEET

HHF PLANNERS places for people



Source: State of Hawai'i GIS Data

Kawainui - Hāmākua Master Plan Project

Figure 6.6 - Previous SMA Use Permits

Kailua, O'ahu

0 800 1,600 FEET

HHF PLANNERS places for people

The SMA use permit also approved other elements that were never constructed due to funding constraints. The following activities were approved by Resolution 01-58.

- Creation of approximately 71 acres of shallow mudflat ponds with water control structures
- Restoration of riparian habitat along approximately 2,800 linear feet of Maunawili and Kahanaiki Streams
- Approximately 17 acres of vegetation clearing
- Installation of about 16,200 linear feet of fencing
- Initiation of a predator control program
- Vegetative processing area improvements ~~(office building, metal storage building, and 7 metal storage containers, fencing, utilities)~~

Resolution 02-339, Kawai Nui Gateway Park. This resolution, approved by the Honolulu City Council in January 2003, granted an SMA use permit for a master plan for the 13.3-acre Kawai Nui Gateway Park. The permit applicant was the City and County of Honolulu Department of Design and Construction, and the proposed project included a comfort station, parking lot, pavilion, outrigger canoe access to Oneawa Canal, a pedestrian bridge, nature walk, and waterbird habitat enhancement. The City never funded or implemented the Gateway Park project, and the property was subsequently transferred to the State of Hawai‘i. This Gateway Park site is where the Kawainui SPR, Kalāheo Section site (Kalāheo Park) is situated within the Kawainui project site. The project does not propose any new improvements for this park site. Thus, the State DSP can presently construct improvements approved under Resolution 02-339. ~~The site is currently proposed for Kalāheo Park, which will include many of the same components as the former Gateway Park. The pedestrian bridge is not included in the current plans.~~

Resolution 12-337, Kawainui Marsh restoration improvements. This resolution, adopted by the City Council on January 30, 2013, granted an SMA use permit to allow restoration improvements to approximately 80 acres of the Kawainui Marsh. The permit applicant was DLNR DOFAW. Proposed improvements include restoration of native wetland habitat, reforestation and revegetation of upland areas and erosion control, habitat restoration for native Hawaiian waterbirds and other fauna, and improvements to support DOFAW’s maintenance operations.

SMA Minor Permit 2015/SMA-52 (2015). This SMA minor permit allows construction of a roughly 3,500 SF storage building at DOFAW’s Kawainui Management and Research Station. The permit applicant was DLNR DOFAW. The storage building will replace existing shipping containers being used for temporary storage. The proposed structure provides secured storage for small vehicles, an open garage for vehicles and equipment, space for administrative activities, and additional storage areas for other equipment and supplies.

SMA Minor Permit 2016/SMA-69 (2016). This SMA minor permit allows construction of a permanent reinternment site for remains disinterred from the Kailua ahupua‘a since the 1990’s. The permit applicant was the City Board of Water Supply. The approximately 800 SF site will consist of a grouted rock retaining wall standing two feet above grade with a single entry point, a walking path through the open air enclosure, and rocks used to identify iwi locations.

Hāmākua Marsh and Pu‘uoehu Hillside

SMA Minor Permit 1999/SMA-69 (1999). This permit was issued in 1999 for Kawainui Stream bank beautification (issued for 4-2-003:030). The applicant was the City and County of Honolulu Department of Design and Construction for landowner DLNR.

6.4.4.2 Conformance with SMA Policies and Objectives

The City’s SMA objectives are the same as the Coastal Zone Management objectives discussed previously in Section 6.3.6, Hawai‘i Coastal Zone Management Federal Consistency Determination. That section discussed the project’s consistency with each of the following CZM objectives.

(1) Recreational resources
    (A) Provide coastal recreational opportunities accessible to the public

(2) Historic resources
    (A) Protect, preserve, and, where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.

(3) Scenic and open space resources
    (A) Protect, preserve, and, where desirable, restore or improve the quality of coastal scenic and open space resources.

(4) Coastal ecosystems
    (A) Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.

(6) Coastal hazards
    (A) Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution.

(7) Managing development
    (A) Improve the development review process, communication, and public participation in the management of coastal resources and hazards.

(8) Public participation

(A) Stimulate public awareness, education and participation in coastal management.

(9) Beach protection

(A) Protect beaches for public use and recreation.

(10) Marine resources

(A) Promote the protection, use and development of marine and coastal resources to assure their sustainability.

Discussion:

Project improvements directly support a number of CZM objectives and policies, as discussed previously in Section 6.3.6, Coastal Zone Management Consistency. Although the project area is located on the shoreline, the project area wetlands play an important hydrologic role in the entire watershed, and ~~there is a direct connection~~ eventually discharges to nearshore waters via the Kawainui (Oneawa) canal. Project initiatives for wetland restoration and upland reforestation will enhance the wetland's hydrologic function and its role as a sediment sink and flood control basin. Proposed trail ~~and boardwalk~~ improvements provide opportunities for passive recreation and enjoyment of the resource, supporting CZM recreational objectives. State park lands will be available for public use, consistent with federal Section 6(f) requirements and DOFAW agency objectives. The project area includes numerous historic resources, including Kawainui, an ancient Hawaiian fish pond, and Ulupō Heiau. Project initiatives support the protection, preservation and restoration of these historic resources. Scenic and open space resources will be enjoyed by more people from the perimeter trails and viewing platforms. Low scale structures will provide facilities for environmental and cultural education and native Hawaiian cultural practice. All structures will blend into the natural environment and have no impact on view planes or on wildlife resources. Coastal ecosystems and marine resources are the ultimate beneficiary of project initiatives to improve wetland function, as this will maintain flood control capabilities and reduce water pollutants entering the ocean. The process of developing the master plan ~~that guides the project~~ included extensive public participation. ~~There will be f~~Further opportunities for public input was provided throughout the environmental evaluation process.

6.4.5 Climate Change

6.4.5.1 State of Hawai‘i Climate Change Adaptation Guidelines

In 2012, the Hawai‘i legislature passed Act 286, Hawai‘i Revised Statutes §226-109 amending the Hawai‘i State Planning Act to incorporate climate adaptation into county and state actions. Act 286 included ten climate change adaption priority guidelines as follows:

(1) Ensure that Hawai‘i's people are educated, informed, and aware of the impacts climate change may have on their communities;

(2) Encourage community stewardship groups and local stakeholders to participate in planning and implementation of climate change policies;
(3) Invest in continued monitoring and research of Hawai‘i’s climate and the impacts of climate change on the State;
(4) Consider Hawaiian traditional knowledge and practices in planning for the impacts of climate change;
(5) Encourage the preservation and restoration of natural landscape features, such as coral reefs, beaches and dunes, forests, streams, floodplains, and wetlands, that have the inherent capacity to avoid, minimize, or mitigate the impacts of climate change;
(6) Explore adaptation strategies that moderate harm or exploit beneficial opportunities in response to actual or expected climate change impacts to the natural and built environments;
(7) Promote sector resilience in areas such as water, roads, airports, and public health by encouraging the identification of climate change threats, assessment of potential consequences, and evaluation of adaptation options;
(8) Foster cross-jurisdictional collaboration between county, state, and federal agencies and partnerships between government and private entities and other non-governmental entities, including nonprofit entities;
(9) Use management and implementation approaches that encourage the continual collection, evaluation, and integration of new information and strategies into new and existing practices, policies, and plans.
(10) Encourage planning and management of the natural and built environments that effectively integrate climate change policy.

6.4.5.2 Consistency with Climate Change Guidelines

The project supports many of the State’s climate change adaption guidelines listed above. Project initiatives focus on ~~a watershed (ahupua‘a) approach to~~ conservation and resource management which would help mitigate the impacts of climate change. The primary focus of the project is natural resource management initiatives to restore, manage and maintain the health of the Kawainui and Hāmākua wetlands. Removing invasive vegetation, upland reforestation, and reducing storm water runoff would enhance the natural wetland functions of flood control, storm water retention, and pollutant control. It would also ~~maintain~~ increase open water habitat for wildlife. These initiatives are consistent with Act 286 Guidelines 5, 6 and 7 above.

Improvements expanding educational and recreational opportunities through construction of an education center, perimeter trails, viewing areas and interpretive signage would support hands-on learning and allow the expansion of ongoing environmental education. Visiting school children would learn about the role of Kawainui in the overall ahupua‘a and watershed, as well as the process of climate change and its ongoing and future effects on wildlife, plants and ecosystems. Similar education on climate change is ongoing at other national wildlife refuges throughout the United States. Federal agencies such as the U.S. Fish and Wildlife Service, the National Park

Service, and NASA have developed training tools and materials to guide refuge staff on informal conversations on climate change with refuge visitors. (Czech et al., 2014)

Act 286's Guidelines 2 and 3 call for continued monitoring and research, and encourages community stewardship and the participation of local stakeholders. At Kawainui, community-based cultural and wetland restoration has been going on for many years. Efforts at Ulupō, Pōhakea, and Nā Pōhaku have been closely tied to cultural sites and traditional practices which historically occurred in the area. The use of sites in the Kapa'a subarea and Wai'auia for cultural practices acknowledge the historic significance of the area and an attempt to combine traditional Hawaiian knowledge and cultural practice (Guideline 4) in the ongoing stewardship of the resource. In a time of limited public resources, these initiatives foster collaboration and ~~public-private (including nonprofit)~~ partnerships with non-profit organizations, as specifically called for in Guideline 8. It is also important that community partners and caretakers with lease and curatorship agreements develop specific management objectives, methods for ongoing data collection and regular evaluation and reporting of their stewardship efforts (Guideline 9).

Permanent facilities at the DOFAW Research Station would allow State resource managers to continue their restoration work including the continual collection, evaluation and integration of new information (Guideline 9). DLNR would continue its monitoring and research role. With an expanded educational component and partnerships with school and community groups, there would be additional support with tasks such as water quality monitoring and data collection.

6.4.6 City Complete Streets

The City has established a complete streets policy and principles for the City and County of Honolulu to guide and direct more comprehensive and balanced planning, design, and construction of city transportation systems under Ordinance 12-15. This Ordinance was adopted to implement the provisions of Section 264-20.5, HRS.

Under this policy, the City is committed to encourage the development of transportation facilities that are planned, designed, operated, and maintained to provide safe mobility for all users. Thus, every transportation facility or transportation project, whether new construction, reconstruction, or maintenance, provides the opportunity to implement complete streets policy and principles. Complete streets principles includes several objectives intended to improve safety, protect and promote accessibility and mobility for all, balance the needs and comfort of all modes and users, encourage opportunities for physical activity, and recognize the health benefits of an active lifestyle.

Discussion:

The project is not a City initiated transportation project involving the new construction, reconstruction, or maintenance of the City's transportation facilities. No project improvements proposed involve City transportation facilities. Therefore, complete street principles would not

directly apply to this Kawainui-Hāmākua project. However, the project does include improvements that would support certain complete street objectives.

The project would improve safety along Kapaʻa Quarry Road, particularly at Nā Pōhaku, by providing an off-street parking lot for vehicles. Currently, visitors to Nā Pōhaku typically park along the shoulder of Kapaʻa Quarry Road and walk along the shoulder or cross the street access this site. The other parking lot proposed near the intersection of Kapaʻa Quarry Road with Kalanianaʻole Highway (across Le Jardin Academy) would similarly allow visitors to park within the Kawainui site instead of along the roadway improving visitor access and safety.

The design of the education center would consider accommodating mobility for all that includes ADA requirements and bicyclists (e.g. bike racks). The cultural centers would be constructed by the non-profit organizations selected, but their design could similarly consider incorporating ADA requirements and bicyclists. The pedestrian trails proposed would support passive outdoor recreational activities that support encouraging opportunities for physical activity while recognizing health benefits. Finally, upland restoration activities proposed would replace non-native invasive vegetation with native vegetation incorporating more environmentally and culturally appropriate trees and landscaping.

CHAPTER 7: CONTEXTUAL ISSUES



7.1 RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY

This section addresses the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity. Short-term uses usually occur during the project's construction phases, and long-term productivity refers to the benefits of the project after construction. The discussion identifies the trade-offs between short and long-term gains and losses. It also examines the extent to which the proposed action forecloses future options or narrows the range of beneficial uses of the environment. The nature of these short-term and long-term trade-offs differ by the type of project improvement, as discussed below.

7.1.1 Wetland Restoration and Upland Reforestation

In the short-term, the continuation and proposed expansion of wetland restoration and upland reforestation activities within the project area will require a dedication of public funds, Division of Forestry and Wildlife (DOFAW) personnel, and physical resources (vehicles, machinery, equipment, etc.). These resources will not be available to support other park maintenance needs during this time. During these activities, there will be minor, short-term environmental impacts on traffic, noise, and air quality due to the operation of equipment and machinery. There will be disturbance to soils and removal of vegetation which could potentially increase short-term erosion and runoff during periods of large rainfall. Spraying of authorized herbicides and mowing could also ~~adversely impact~~ disturb some non-invasive plants in the immediate vicinity. However, ~~T~~these impacts will be short-lived and would not have a significant impact based upon the assessment results of this FEIS, and BMPs, adaptive management, and other design measures which would be implemented to further minimize such construction-related effects.

Impacts to other land uses will be minimal, since the majority of the wetland restoration and reforestation take place away from existing residential and commercial areas. During construction of drainage improvements (e.g., along Kapa'a Quarry Road), the use of best management practices to avoid erosion, runoff, and the release of contaminants will avoid long-term losses. In the long-term, these restoration efforts will result in a healthier wetland and more productive wildlife habitat. Short-term trade-offs are inevitable, but there are sufficient BMPs and other design measures that avoid, minimize, and mitigate effects. These effects can be viewed as minimal in comparison to long-term benefits from restoration of wetlands and upland areas along with enhancing waterbird habitat.

The proposed wetland restoration and reforestation activities will not narrow or foreclose the range of beneficial uses of the environment. The majority of these initiatives will take place in wetland areas which are identified for preservation, yet are in need of human intervention to ~~maintain~~ restore their condition and integrity due to environmental and habitat degradation occurring prior to the State's acquisition of the property as discussed in Chapter 2. Restoration and enhancement of the project area's wetland, environmental resources, habitat, and culturally important areas is the most "beneficial" land use in the long-term. This is consistent with ~~public~~ designation of the area as a State wildlife refuge and as a Ramsar wetland of international importance.

7.1.2 Structures and Trails

Project proposals include the construction of limited pedestrian trails~~, boardwalks,~~ and accessory support facilities for public access (e.g. viewing platforms, restroom) throughout much of the ~~project~~ upland area around and away from the wetland perimeter. ~~At the Kalāheo Park site in Subarea C, proposals include a canoe launch, hale wa'a canoe storage, restrooms, and parking.~~ At the DOFAW management and research station (Subarea D), new permanent facilities (offices, storage, parking, pavilion and staging) are proposed to better support staff with management and operations at Kawainui. Along Kapa'a Quarry Road (Subarea B), the project proposes the establishment of an education center and associated parking. An adjacent area is set aside for a kauhale complex with traditional Hawaiian structures. Improvements at the vegetation processing site would include an office and equipment shed. The project also identifies two new areas for use by ~~third party entities~~ non-profit organizations for various cultural and educational activities.

Permanent facilities for DLNR ~~Division of Forestry and Wildlife (~~DOFAW~~)~~ will improve the long-term productivity of this State agency tasked with managing these important public lands by providing permanent, appropriately designed facilities instead of working out of temporary trailers. In the short term, redevelopment of the existing management station will be temporarily disruptive, ~~and phased~~ but would be implemented in phases over time, include BMPs, and be coordinated ~~construction will be needed~~ to ensure that DOFAW's ~~current~~ maintenance operations can continue effectively.

The construction of the trails and structures will result in temporary disruption and permanent alteration of land due to grading, site work, and construction of permanent improvements and buildings. Short-term construction impacts on air, noise and water quality can be avoided or mitigated by the implementation of construction BMPs and other design measures (e.g. post-and-pier construction). Most of the trails and improvements along Kapa'a Quarry Road (Subarea B) are located away from existing populations, and there will be minimal traffic impact during construction. With proposed reductions, there would be no project improvements at the Kalāheo Park site. This eliminates project effects on Mōkapu Boulevard and existing land uses in that area. ~~However, there will be short-term traffic impacts during construction at Kalāheo Park,~~

~~which is located on Mōkapu Blvd. across Kalāheo High School and in proximity to existing homes. In the long-term, regular vehicle traffic into and out of this park site could impact traffic on Mōkapu Boulevard. The park improvements, however, represent a long-term productive use for a site which is currently overgrown, vacant and underutilized.~~

Proposed pedestrian trails, program staging areas, parking and the education center at Pōhākea will be designed to require minimal grading and earthwork. In the long-term, ~~these~~ improvements at Pōhakea will foreclose some alternate uses for the education center site, but there are still areas available to accommodate other compatible uses, if necessary (e.g. pavilion, increased open space, observation areas) ~~the sites~~. However, there are few, if any, alternative land uses which ~~are~~ would be as productive, sensitive to the natural environment, and consistent with public policy and planning directives as the education center with kauhale complex proposed at Pōhakea. All proposed improvements are intended to support long-term environmental, educational, and cultural objectives as discussed in Section 2.1. With these facilities, there will be more opportunities for passive recreation, service learning, and hands on-education and cultural practice for Hawai‘i’s students and families. In the long-term, increased community education and awareness about Kawainui and Hāmākua will support the continued stewardship of this resource. All improvements support the primary function of Kawainui-Hāmākua as wetland and wildlife habitat.

An important long-term objective of the proposed improvements is to increase public access ~~to~~ and enjoyment of the resource, consistent with the requirements of Section 6(f) of the federal Land and Water Conservation Act (LWCA). The land in the southern half of Subarea B along Kapa‘a Quarry Road (Kahanaiki to Nā Pōhaku) and much of Subarea D (Ulupō to Kahanaiki) are ~~State Park reserve lands located~~ in the State Urban district. Because they were purchased with federal LWCF grants, there is a federal requirement to provide outdoor public recreation and public access in perpetuity. The proposed trails, viewing platforms, and education center support this mandate. State Park reserve lands are not appropriate for other “beneficial uses” such as light industrial, commercial or residential. They are in the City’s P-2 General Preservation zone, a designation intended to preserve and manage land with scenic and natural value for open space and recreation.

Two new sites within the project area are identified to be used for cultural practices and education and resource stewardship. The Kapa‘a Cultural Center (Subarea B, Kapa‘a) and Wai‘auia Cultural Center (Subarea D) sites will be utilized by eligible non-profit organizations through curatorship agreement, lease, or special use permit. Both areas are under DOFAW ~~control~~ jurisdiction, and the type of legal agreement governing use of these areas will be determined by DOFAW and the Land Board at a later date.

Construction of buildings and structures by the users will have short-term construction impacts and physically alter the sites. At the same time, the integration of cultural practices and resource stewardship is supported by the Ramsar Convention. There is a growing recognition of the importance of culture and indigenous populations in the conservation and wise use of wetlands,

and their role in sustaining long-term productivity. The use of State lands for private activities and events, while legally and environmentally permissible, will ~~exclude~~ restrict other public uses for varying periods of time. As such, ~~they~~ these cultural centers will foreclose other potentially beneficial uses for the duration of the lease or permit. However, the cultural practices, educational programs, stewardship opportunities, and other related activities benefitting residents and the public strongly support the project objectives and agency missions. This reflects a positive and beneficial long-term use of these areas.

7.2 SECONDARY IMPACTS

Secondary impacts, also referred to as indirect effects, include those impacts that are caused by the project and occur later in time or farther removed in distance, but are still reasonably foreseeable. They may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rates~~, regardless of who initiates the action~~. For example, a new highway project could induce changes to land use patterns along the improvements. Secondary impact assessments are concerned with impacts that are sufficiently "likely" to occur, and not with the speculation of any impact that can be conceived of or imagined.

The project would not result in secondary impacts that would have significant or adverse long-term impacts on the environment, social-economic conditions, infrastructure, or public facilities. In addition, revisions to the project reducing the extent of improvements and limiting public access (e.g. reduction in trails) further diminish the potential for contributing to secondary effects. The project would not contribute to growth inducing effects or increase resident populations and densities. Such growth inducing impacts are typically associated with more intensive development such as new residential subdivisions, which would increase resident populations and subsequently have a secondary impact by placing more resident demand on existing public facilities like schools (e.g. new students).

Proposals for wetland restoration and upland reforestation will have minimal likelihood of causing secondary impacts. Wetland restoration would improve and restore the existing degraded wetland of Kawainui by removing invasive vegetation and increasing open water. Such restoration efforts would also improve habitat for endangered waterbirds and aquatic resources. Similarly, upland reforestation would involve the gradual replacement of invasive vegetation with native vegetation using the methods discussed in Section 2.2. These improvements do not involve or contribute to urban growth inducing effects or changes to resident populations and densities.

~~On the other hand, t~~The proposed structures and trails were raised as concerns by some members of the community during the planning and early environmental review process for having the ~~have greater~~ potential for causing secondary impacts~~ or indirect effects~~. The most likely area of improvements that may contribute secondary impacts include: 1) expansion of educational or

cultural activities and facilities within the project area; 2) expansion of commercial activities within the project area; and 3) pressure to develop other sites within the project area or surrounding areas. ~~All were raised as concerns by some stakeholders during the master planning process.~~

Expansion of Educational or Cultural Activities. The successful implementation of educational and cultural programs and partnerships with schools and community organizations may lead to greater demand for these types of opportunities and programs. Table 2.5 shows the existing and projected persons participating in monthly educational and cultural programs over the entire Kawainui-Hāmākua project area. This reflects an increase from 520 persons a month now to 3,690 persons a month (123 persons a day). Projected program activities reflect a reasonable level and are not anticipated to be significantly greater (e.g. double projected levels). Furthermore, it is reasonable to expect that participation levels in programs would likely occur gradually over time. Participation would also be subject to DOFAW and DSP increasing staff to accommodate program requests from schools, universities, organizations, etc. Therefore, available State DLNR staffing would function as a constraint on the number of programs and participants that could be accommodated on a weekly basis.

Higher demand for participation in educational and cultural programs attributable to project success would be a beneficial secondary effect because it would mean that more students and residents would be able to learn, experience and benefit from these programs. Such secondary effects would not significantly or adversely impact the environment, infrastructure, or public facilities. The upland area available for such programs (e.g. 70-acres from Kahanaiki to Nā Pōhaku) is large, and more program participants could be accommodated without significant secondary impacts on the environment. For example, accommodating one or two more school groups a week would not adversely affect waterbirds, vegetation, historic sites, hydrology, etc. Public facilities would not be negatively impacted nor supporting infrastructure (water, sewer, drainage, transportation).

Larger numbers of participants will require adequate supporting facilities. Facilities now proposed would be sufficient to accommodate higher participation levels, which includes the education center. Overall, proposed support facilities are minimal and consist of restrooms, a pavilion, and an area for parking and staging. Therefore, accommodating more program participants than projected should not adversely impact accessory facilities or the planned education center. Overcrowding due to more participants would not be an issue because of the available large upland area. A 2008 Waikiki study surveying the area between Sans Souci/Kaimana Beach and Diamond Head/Kuilei Cliffs beaches determined that the “minimum point” where one’s toleration toward crowding changes from acceptable to unacceptable is between 200 to 330 persons at one time per an area of only about 20 acres. Areas for proposed programs would not experience such high levels.

~~This~~ Nevertheless, increased program demand beyond that projected may lead to a desire to expand existing structures (e.g., education center) or to provide additional amenities (e.g., parking and program areas, pavilions, restrooms, expanded recreation, etc.). It is possible that there will be requests to diversify and increase the programmatic offerings, such as cultural or environmental programs with Hawai‘i-based schools, or to offer opportunities to non-residents, for example volunteer/service ~~tourism~~ for students from other parts of the U.S. or the world. However, the expansion of the educational center, accessory facilities, or cultural facilities beyond that proposed under this project would require separate environmental review at that time to determine project merits and effects. In addition, necessary land use entitlements would be required.

The success of cultural centers could also generate higher participation in programs and cultural practices than that projected to occur. This would be a beneficial secondary effect because it means more children and residents would be able to learn and benefit from such educational and cultural programs run by non-profit organizations. Increased participation would not cause significant or adverse secondary impacts to the environment, infrastructure, or public facilities.

The cultural centers at Kapa‘a, Wai‘auia, and kauhale at Pōhakea would be limited to the facilities proposed under this project, and should be able to accommodate higher participation levels. Projected activities at these cultural centers are reasonable, and are not anticipated to be significantly greater (e.g. double projected levels). In addition, it is reasonable to expect that participation in programs would likely occur gradually over time as facilities are developed in phases, dependent upon the non-profit organization’s financial ability to build. Therefore, it is unlikely that expanded facilities beyond that proposed under this project would be required, and there should be minimal secondary impacts on the environment.

Expansion of Commercial Activities. The opening of new scenic and recreational areas ~~will inevitably~~ could attract attention from individuals and organizations seeking to use the area for private commercial activities-for example, as part of bicycle or Segway tours, for fitness or yoga classes, or as a stop on an eco or cultural tour. Although there is a prohibition on such commercial activity on State lands unless allowed by permit, entrepreneurial individuals ~~will likely~~ could seek “creative ways” to get around these restrictions.

Addressing such unauthorized commercial activities would be part of DOFAW and DSP efforts to manage public access within the Kawainui area. Hāmākua would not be open to the general public. Section 2.2.5.3 addressed proposed management practices that would apply to restricting unauthorized commercial activities. The potential for unauthorized commercial activities could only occur in areas open to the general public, such as at the education center and the Kahanaiki to Nā Pōhaku upland area. Such commercial activities would not occur at the cultural centers because these centers would be managed and operated by non-profit organizations. These organizations would be accountable to DOFAW and DSP, and restricted by the terms of their agreements (e.g. lease).

Proposed management practices include a phased approach to open areas to the public so that activities can be adequately assessed and evaluated. Enforcement would require additional permanent DOCARE officers to address unauthorized commercial activities. Therefore, it would be difficult to open areas to the public without adequate staffing. DOFAW and DSP can also restrict areas available to the public. Revisions to the project reduce the extent of improvements and limit public access areas (e.g. pedestrian trails) to reduce opportunities for unauthorized commercial activities.

Therefore, the project should not result in a significant or adverse effect on the environment due to secondary effects associated with unauthorized commercial activities. There are sufficient management practices proposed to address unauthorized activities. This would address fears that commercial tour buses would visit Kawainui on a daily basis.

~~The initiation or expansion of commercial activities could also come from DOFAW and/or its authorized lessees. DOFAW will require an ongoing revenue source for adequate long-term maintenance of the project area. Sustainment of educational and cultural programs also require financial resources, and cannot rely on volunteers alone. In the face of declining public revenues for parks nationwide, states are exploring new methods of finance, including the imposition of user fees, privatization of park operations, or concessionaire agreements to operate gift shops, restaurants or park programs and events. The need to generate adequate public revenue for ongoing maintenance activities clearly exists. A variety of financing options, including increased commercial activities, may be explored. To the extent that the parks of the project area generate revenues, those revenues should remain in the park system rather than being returned to a parent agency or to the state's general fund. Funds raised by schools or non-profit partners should be used to support its Kawainui-Hāmākua programs.~~

Other Development Pressures. Another potential secondary impact is development pressures on lands adjacent to the project area. The periphery of Kawainui Marsh is already occupied by a number of existing institutional (Castle Medical Center, Windward YMCA, churches) and residential (Kukānono, Kawainui Vista) uses. There are also numerous commercial establishments lining Hāmākua Drive adjacent to Hāmākua Marsh. Over the past 30 years, there have been various proposals to expand urban uses around the marsh. Some proposals encountered public opposition and were halted. Others, such as the relatively recent Kawainui Vista subdivision adjacent to St. John Lutheran Church, were completed.

With the project's enhancement of wetland and neglected upland areas, the provision of new trails and areas supporting passive outdoor recreation ~~parks~~, and increased human presence in the project area, adjacent lands may be coveted for urban development. Any proposed development adjacent to the project area would require an extensive land use approval process at both the State and County levels, and is likely to encounter strong opposition from local residents and government agencies.

Project-related improvements would not affect the core factors contributing to the popularity and desirability for living in Kailua. Kailua's popularity would continue to be based primarily upon its beach town character, convenient access to renowned beaches and ocean recreational activities, being a more upscale and affluent residential community, availability and diversity of shops and businesses, and its convenient location to downtown Honolulu. Therefore, the project would not trigger secondary effects expanding residential or commercial developments in the area. Such decisions by landowners and developers would be based upon other economic factors. ~~Project initiatives are clearly defined and are limited in scope. They are intended to further environmental, recreational and cultural objectives. That said, there are existing social, economic, and market conditions at work—e.g., Kailua's popularity as a visitor destination and residential community; the public's desire for unique outdoor experiences; growing interest in hands-on, project-based education; and the cultural and historic significance of the area. These conditions can contribute to pressures to expand programs, facilities, and/or activities beyond what is currently being proposed.~~

7.3 CUMULATIVE IMPACTS

Cumulative impacts are those that result from the incremental impact of an action when added to other past, present and reasonably foreseeable future actions. The focus is on "reasonably foreseeable" actions that are those likely or probable to occur rather than those that are merely possible or subject to speculation. The prediction of reasonably foreseeable impacts thus requires judgment based on information obtained from reliable sources such as approved development plans and land use entitlements received. While they may be insignificant by themselves, cumulative impacts accumulate over time, from one or more sources, and can result in the degradation of important resources. Project initiatives have the potential to contribute to cumulative impacts—both positive and negative--on the natural and human made environment. The discussion below addresses potential cumulative impacts throughout the ~~life of the~~ project's study year.

The only other known development in the immediate area that is reasonably anticipated to have ongoing development within the 2037 study year, and possibly contribute to cumulative impacts for this project is the expansion of the Kapa'a Light Industrial site. This privately-owned property is situated next to the City's Kapa'a Transfer Station, and mauka (west) of the City Model Airplane Park and Kawainui's Kapa'a subarea. This development completed a Final EIS (SD&C, 2011) and obtained land use entitlements in 2014. The development would expand the existing industrial site by adding new warehouse buildings for industrial floor space, use remaining areas of the property as a buffer zone being mainly unaltered with the exception of some landscaping, and utilize low impact development and other design measures.

Cumulative effects from the project would mainly be associated with direct short- and long-term effects resulting from construction activities for restoration and facility improvements supporting cultural practices, public access, and outdoor recreation. The various sections of the Final EIS include reasonable assessments of various environmental factors that provide sufficient information for addressing cumulative impacts when evaluated in conjunction with the Kapa‘a industrial site expansion.

Relevant past actions associated with the Kawainui-Hāmākua project area were discussed in Sections 1.3 to 1.5 that included a summary of: 1) property information; 2) site conditions and surrounding uses; and 3) existing land use entitlements and approvals. Section 4.1 discussed the history and prior usage of the area, and an archaeological report (Appendix F) and cultural impact assessment (Appendix G) included extensive background information. All of this provides a background from past activities. Present conditions are addressed in the various sections covering environmental factors and such existing conditions reflect the effects from past actions. For example, discussion of the existing condition of the Kawainui wetland reflects past actions, or lack of actions under former property owners, to manage the resource. Therefore, information on the past coupled with information on present conditions provide a basis to address cumulative effects. The entire build-out of the project was included in the assessments of impacts for the study year. Discussion of cumulative impacts associated with the project is provided.

7.3.1 Wetland Restoration and Upland Reforestation

Project initiatives include the removal of invasive wetland vegetation, creation of open water mud flats, replanting native wetland species, repair of drainage culverts and other stormwater improvements, and upland reforestation. The project also includes constructing maintenance roads to support DOFAW management activities, expansion of predator control, installation of protective fencing, and monitoring wildlife activities.

The majority of these activities would not have significant cumulative effects on the environment because they involve minor accessory improvements (e.g. maintenance roads, fencing) or management activities (e.g. predator control) normally conducted as part of DOFAW’s regular operations. Most of these activities would also occur in other areas of Kawainui (e.g. DOFAW management station) that are too far away from the light industrial park expansion to result in cumulative effects on the environment. Furthermore, these minor accessory improvements and management activities generally have a beneficial effect on Kawainui’s wetland and resources.

The Kapa‘a light industrial site expansion proposed several improvements that support and complement the project’s wetland restoration and upland reforestation activities. The industrial expansion proposed site and design improvements to achieve Leadership in Energy and Environmental Design (LEED) Silver certification. Measures proposed include maximizing open space within their property with landscaping and a “green” landscape barrier around warehouses,

improving management of stormwater runoff discharged from the site, and using harvested rainwater from buildings to support irrigation of landscaping, which decreases discharges (SD&C, 2011).

These improvements, from both the light industrial expansion and the proposed project ~~will~~ would not have ~~positive~~ significant nor adverse cumulative impacts on two major resource areas - 1) water resources, including wetlands, streams, watershed, and water quality; and 2) biological resources, including threatened and endangered waterbirds, native plants, and native aquatic species. The proposed project would not contribute to significant cumulative impacts on human environmental factors, such as historic sites or cultural resources and practices, because such effects are more site specific. For example, the industrial expansion site did not identify historic sites or cultural practices present that would be impacted, and would thus have no cumulative impact with Kawainui. Other pertinent human environmental factors, infrastructure, and public facilities are addressed.

Water Resources. Proposed expansion of wetland restoration and upland reforestation will build upon past, present and future restoration efforts at Kawainui and Hāmākua. In recent years, various initiatives by DOFAW and the U.S. Army Corps of Engineers have succeeded in improving a neglected and degraded wetland, enhancing its ability to provide flood control, wildlife habitat, and to reduce water pollution.

The Kapa‘a light industrial site is located above (mauka of) the northern end of Kawainui where the existing wetland consists of the peat mat and remediation zones. These zones would remain unchanged, with the exception of selective removal of trees and managing peat mat growth, due to these areas flood control capability. Therefore, there should not be significant cumulative impacts to the Kawainui wetland from the project and industrial expansion. The industrial expansion stormwater design includes detention basins, underground rainwater harvesting cisterns (for irrigation), and other management systems that would minimize and mitigate effects on Kapa‘a Stream and discharges into Kawainui. City approval of land use entitlements for the industrial expansion also included review and agreement that these measures were sufficient to address effects.

Kapa‘a Stream is the only stream in the vicinity of the Kapa‘a industrial site that could be affected. Stormwater management measures for the industrial expansion would minimize effects on Kapa‘a Stream by reducing sediment, debris, and pollutants (e.g. oil). Filter units would remove over 80% of pollutants, thereby meeting LEED Silver certification. The Kawainui project does not include wetland restoration or upland reforestation improvements impacting Kapa‘a Stream. Therefore, there would be no significant cumulative impacts to this stream with the project.

There should be no significant cumulative impacts to the watershed area affected by the industrial expansion and the proposed project at Kawainui. The Kawainui wetland has effectively served this watershed area that includes the industrial site along with the City transfer

station, landfill, and airplane park. Project improvements would continue this function even with the industrial expansion. As discussed in Section 3.4.1, the project would improve the functionality of the watershed by enhancing the wetland's important hydrologic function of regulating the movement of water within this area of the watershed before discharging into Kailua Bay. Design measures for the industrial expansion would also minimize effects on the watershed.

Water quality samples show that the Kawainui wetland is naturally functioning as a trap for particulates, assimilation and recycling of nutrients, and sequestering of pollutants. Even with the existing industrial uses mauka of this area of Kawainui, there were no significant water quality issues arising from the sampling. Drainage improvements from the light industrial expansion would minimize development effects and reduce pollutants by 80% to meet LEED Silver certification. Thus, there should be no significant cumulative effects from the proposed wetland restoration and upland reforestation activities coupled with the light industrial expansion.

These efforts within the project area contribute cumulatively to other watershed management efforts within windward Oʻahu and island-wide. The project area is located within the designated Koʻolau Poko watershed area, which was the subject of the Koʻolau Poko Watershed Management Plan (KPWMP) (Townscape, Inc., 2012). The KPWMP is part of a comprehensive Oʻahu-wide watershed management effort. The recommendations of the KPWMP include promoting a sustainable watershed, protect water quality, and native Hawaiian rights and customary practices. The KPWMP specifically mentions and endorses the ongoing watershed management efforts at Kawainui and Hāmākua. Other KPWMP recommendations include controlling illegal dumping, native plant propagation, control of alien species, feral pig control, and restoration of forested area, all of which are included in project initiatives. Within the larger context of the island of Oʻahu, the project supports the Oʻahu-wide watershed management objectives to promote sustainable watersheds, protect and enhance water quality and quantity, and to protect native Hawaiian rights and traditional and customary practice.

The majority of the industrial expansion site is located within Zone D (undetermined flood hazards). A drainage channel along a section of Kapaʻa Quarry Road near the mouth of Kapaʻa Stream is identified as a flood area being inundated at times by heavy rainfall. No development is planned within this flood area (drainage channel) (SD&C, 2011). Therefore, development would not have a significant impact on flood hazards, and storm water design measures would minimize impacts to Kapaʻa Stream and the Kawainui wetland. Wetland restoration planned within this northern section of Kawainui would be minimal, and there would be no significant cumulative impact on flood hazards or flooding in the general area.

Biological Resources. The cumulative impact of the wetland and upland improvements, upgraded DOFAW management station, and the current and future efforts of community partners, volunteers and cultural practitioners would enhance the restoration and long-term survival of the area's biological resources. The proposed removal of invasive vegetation, creation of mud flat habitat, improved water quality, and more robust predator control would have long-

term benefits to native flora, fauna, and aquatic resources within the project site. Improvements in water quality will support stream biota and biota in nearshore areas over the long-term. Strengthening partnerships with established community groups and cultural practitioners will ensure that these efforts continue into the future.

The industrial expansion site has historically been heavily disturbed from landfill and quarry operations from the 1940s to 1960s. These activities have changed the site's original soils (SD&C, 2011). Therefore, there would be no significant cumulative impact to soils, topography, geology, or botanical resources in conjunction with the proposed project.

Wetland restoration and upland reforestation coupled with the industrial expansion would not have significant cumulative impacts on avian and mammalian resources, which includes endangered waterbirds. The industrial expansion site has no endangered species present, and in conjunction with the Kawainui project, would not impact any endangered species. This northern area of Kawainui (peat mat and remediation zones) is not know for suitable waterbird habitat. Even so, Section 3.3.2 discussed various measures to be implemented during restoration activities to minimize effects on waterbirds.

There would be no significant cumulative impact on aquatic resources with the restoration work and industrial expansion. As discussed in Section 3.4.6, the body of water covered by a layer of peat is biologically dead (except for bacteria). Without light penetration, oxygen cannot be generated by aquatic algae, and the subsurface of the wetland supports no invertebrates (such as aquatic insects and prawns) or vertebrates (such as fishes) over most of its area. Given the extensive peat mat covering the northern section of Kawainui, aquatic resources should not be negatively impacted. The industrial expansion drainage and storm water design improvements would further minimize effects on potential aquatic resources that may be present in this area.

Wetland restoration and upland reforestation activities would only occur during the day, and thus not affect endangered seabirds from night lighting. The industrial expansion entitlements include standard conditions to mitigate exterior lighting (e.g. shielding) effects. Therefore, the proposed project restoration and reforestation improvements would not contribute to significant cumulative effects on seabirds. The industrial site does not include tall vegetation (taller than 15 feet) that would be of potential concern to Hawaiian hoary bats, and the project reforestation work would not affect such tall vegetation during the bat birthing and rearing season. Therefore, no significant cumulative impact on mammals would occur.

Short-Term Effects. Short-term construction-related activities from the industrial expansion and wetland restoration and reforestation activities would not have a significant cumulative impact on the environment, natural resources, or human environmental factors. This includes factors such as fugitive dust emissions, construction noise, and erosion control during site disturbance. Construction activities for the industrial expansion would be site specific, and various design and best management practices required as part of entitlement conditions would minimize and mitigate potential impacts. Furthermore, ministerial permits required, such as grading permits,

NPDES permit, etc., would include review of design plans by jurisdictional agencies to ensure appropriate mitigation measures and best management practices are implemented. Minimal wetland restoration would occur within this northern area of Kawainui, and no upland reforestation is proposed. Therefore, the project would not contribute to short-term cumulative impacts on the environment.

7.3.2 Structures and Trails

With the proposed project reductions at Kawainui (Section 2.2), the only facility improvements proposed in the vicinity of the industrial expansion would be the cultural center at Kapa‘a and facilities supporting the vegetation processing site or other research and agency support activities. Other project facilities and trails are located considerable distances away from the industrial expansion site, and those activities would not significantly affect or influence the environment near the industrial expansion. Therefore, pertinent cumulative impacts evaluated would primarily be associated with the industrial expansion combined with the cultural center at Kapa‘a and vegetation processing facilities. The following sections discuss the cumulative impacts of pertinent environmental factors associated with the project.

Natural Resources. The cultural center at Kapa‘a and facilities at the vegetation processing site would not significantly impact the project site’s topography, soils, geology, and botanical resources. This area is relatively flat, comprised of fill material, does not contain unique geologic features, and is generally overgrown with non-native invasive vegetation. As already discussed, the industrial expansion site has historically been heavily disturbed from landfill and quarry operations. Therefore, there would be no significant cumulative impact on topography, geology, soils, and botanical resources associated with proposed project improvements and industrial expansion.

Project improvements coupled with the industrial expansion would not have significant cumulative impacts on avian and mammalian resources, which includes endangered waterbirds. This northern area of Kawainui (peat mat and remediation zones) is not known for waterbird nesting because the wetland does not provide suitable habitat. The proposed vegetation processing site and cultural center are located mauka of the wetland area, and the industrial site is even further inland. Low fencing and vegetation buffers are proposed along the wetland perimeter to physically restrict and separate cultural practices and activities providing further protection and minimization measures. The industrial expansion site does not have endangered species present, and the combined impact with the proposed project would not negatively impact pertinent avian and mammalian species.

There would be no adverse cumulative impacts on seabirds due to exterior lighting from these facilities, and there are no other project facilities contributing to outdoor lighting in this general area. Exterior lighting from existing uses in the project area that include the City’s transfer station, State highways (Kalaniana‘ole Highway, Mōkapu Saddle Road), schools, residences, and

medical and commercial uses have not resulted in significant fallout issues with seabirds. DOFAW has not experienced any major issues with impacts on migratory seabirds from night lighting at Kawainui or Hāmākua. Endangered waterbirds within Kawainui and Hāmākua are not adversely impacted by night lighting within the project site or from outside surrounding uses. Furthermore, the FWS recovery plan for Hawaiian waterbirds also does not identify night lighting as a threat to these species. Activities at the vegetation processing site would typically occur during daylight hours. Outdoor lighting for buildings at the cultural center would be required to be shielded to the extent possible, and use the lowest wattage bulbs feasible similar to design requirements for the industrial expansion. These measures are standard agency accepted protocols applied for developments and would address and minimize potential seabird fallout risk. DOFAW also has protocols in place and staff are trained to address seabird recovery from such fallout if it occurs.

The industrial site does not include tall vegetation (taller than 15 feet) that would be of potential concern to Hawaiian hoary bats, and the cultural center and processing site would not affect such tall vegetation during the bat birthing and rearing season. Therefore, there would be no significant negative cumulative impact on mammals, especially since the majority of mammals present are alien species and deleterious to native ecosystems.

The cultural center and vegetation processing sites are not located within the 100-year flood area, but are within the 500-year flood area (Zone X) designated for moderate to low risk areas. The majority of the industrial expansion site is located within Zone D (undetermined flood hazards). The drainage channel along a section of Kapa‘a Quarry Road near the mouth of Kapa‘a Stream is identified as a flood area being inundated at times by heavy rainfall. No industrial expansion is planned within this flood area (drainage channel) (SD&C, 2011). Development of the cultural center and vegetation processing facilities would thus have no adverse cumulative impact on flood hazards even with the industrial expansion. Project improvements along with the industrial expansion would also not experience cumulative adverse effects from climate change based upon the assessments results discussed.

The Kapa‘a light industrial site is located above (mauka of) the north end of Kawainui where the existing wetland consists of a peat mat and remediation zones. These zones would remain unchanged, with the exception of selective removal of trees and managing peat mat growth, due to these areas flood control capability. Therefore, there should be no significant cumulative impacts to the Kawainui wetland from the proposed project and industrial expansion. The industrial expansion stormwater design includes detention basins, underground rainwater harvesting cisterns (for irrigation), and other management systems that would minimize and mitigate effects on Kapa‘a Stream and discharges into Kawainui. City approval of land use entitlements for the industrial expansion also included review and agreement that these measures were sufficient to address potential effects. Design plans for improvements would also be reviewed by jurisdictional agencies to ensure site improvements adequately address drainage conditions.

Kapa‘a Stream is the only stream in the vicinity of the Kapa‘a industrial site that could be affected. The Final EIS for the industrial expansion discussed several measures to minimize and mitigate effects from stormwater (sediments, nutrients, and suspended solids). The industrial expansion stormwater management measures would minimize effects on Kapa‘a Stream by reducing sediment, debris, and pollutants (e.g. oil). Filter units would remove over 80% of pollutants meeting the LEED Silver certification. Kawainui improvements do not include wetland restoration or upland reforestation improvements impacting Kapa‘a Stream. Thus, there would be no significant cumulative impacts to this stream.

There should be no significant cumulative impacts to the watershed area that includes the industrial expansion site and Kawainui. The Kawainui wetland effectively serves this watershed area that includes the industrial site along with the City transfer station, landfill, and airplane park. As discussed in Section 3.4.1, the proposed project would improve the function of the watershed by enhancing the wetland’s important hydrologic function of regulating the movement of water before discharging into Kailua Bay. The industrial expansion design measures would also minimize effects on the watershed.

Water quality samples show that Kawainui naturally functions as a trap for particulates, assimilation and recycling of nutrients, and sequestering of pollutants. Even with the existing industrial uses above this area of Kawainui, there were no significant water quality issues identified from the sampling. Drainage improvements from the light industrial expansion would reduce pollutants by 80% to meet LEED Silver certification. The cultural center and vegetation processing sites would not significantly impact water quality based upon the assessment addressing stormwater runoff and wastewater restroom facilities. Thus, no significant cumulative effects are expected from the proposed project and the light industrial expansion.

Aquatic resources should not be adversely impacted by the proposed project and industrial expansion due to the proposed stormwater management design measures. Further, the body of water in the wetland covered by a layer of peat is biologically dead (except for bacteria). Without light penetration, oxygen cannot be generated by aquatic algae, and the subsurface of the wetland supports no invertebrates (such as aquatic insects and prawns) or vertebrates (such as fishes) over most of this area along with the broader Kawainui wetland area.

Historic and Cultural Resources. The proposed project structures ~~and trails~~ below the industrial expansion area are expected to have positive cumulative impacts on historic resources, and contribute to sustaining the cultural significance of Kawainui and Hāmākua. No historic sites would be adversely affected by the physical structures planned by the industrial expansion, cultural center, and vegetation processing sites. The provision of limited pedestrian trails will make historic and cultural resources within Kawainui accessible for public appreciation and facilitate access for maintenance and restoration activities that have been ongoing for years. The creation of new areas for cultural practice and education will build upon the efforts at Ulupō and Nā Pōhaku, existing partnerships with schools and non-profit organizations, as well as larger cultural endeavors such as the Hōkūle‘a Mālama Honua, whose crew visited the project area in

2013 on their worldwide journey. Project initiatives create new places for kanaka maoli to gather and share knowledge, care for historic and natural resources, and exchange with other indigenous cultures. The combination of cultural practices and resource stewardship is consistent with DOFAW and DSP objectives and with Ramsar guidance on wetlands and culture. The proposals are expected to have positive cumulative impacts on historic resources, and contribute to the enhancement and sustainment of the Hawaiian culture.

Social and Economic Factors. The proposed project coupled with the industrial expansion should have minimal, if any, cumulative effect on the demographic characteristics of Kailua as discussed in Section 4.2.2, since there are no residential or visitor units proposed except for a caretakers unit at the cultural center at Kapa‘a. These projects would not change Kailua’s resident population, the number of housing units, or resident demographic characteristics.

There would be no significant cumulative effect on military uses and jobs because improvements are not located within MCBH Kāne‘ohe Bay, and would not affect business operations occurring within the base. The industrial expansion would have a positive beneficial effect on light industrial businesses by providing increased jobs and business opportunities that would support the region’s economic condition. Kawainui improvements would have minimal effect on light industrial uses and commercial and retail businesses, except for short-term construction-related activities. Therefore, these activities would have a small beneficial cumulative economic effect.

The project and industrial expansion would not have a cumulative adverse effect significantly exacerbating the major community issues of: 1) over-commercialization by tourism; 2) attracting more tourists; 3) traffic impacts with residential areas; 4) security and crime; and 5) long-term management of Kawainui improvements. Issues related to the over-commercialization of tourism would be mainly related to community perceptions of Kawainui’s improvements. The light industrial expansion would not have an issue with over-commercialization by tourism or attract large number of tourists. Typical light industrial businesses would be associated with manufacturing, repairs, suppliers that would be pertinent to businesses and residents (e.g. home renovation). Tourists would be more attracted to commercial retail businesses such as boutique shops, restaurants, etc. that have been popular in Kailua town. Kawainui would not have significant issues with “over-commercialization” from tourism because improvements, including cultural centers, do not include commercial uses (e.g. Starbucks, restaurants) as discussed in Section 2.2. DOFAW and DSP have currently not permitted any commercial tourism activities, and do not plan on permitting privately-owned for-profit tourism operations at Kawainui.

Kawainui would attract some visitors as discussed in Section 2.2, however, the visitation levels projected would be moderate and manageable. Section 4.2.2 also includes measures to address this issue, such as increased DOCARE enforcement and restricting public access. Thus, concerns with attracting more tourists are primarily associated with Kawainui improvements and do not involve a significant cumulative effect involving the light industrial expansion that would serve residents and businesses. The cumulative effect of tourist attraction is therefore similar to that

discussed in Section 4.2.2, and measures such as effective management along with support by non-profit organizations were identified.

Traffic issues associated with the project would mainly be related to the education and cultural centers that are not expected to have much effect on traffic because they would not generate a significant amount of daily traffic, as discussed in Sections 4.2.2 and 5.6. In addition, traffic would not impact the morning commuter peak hour because activities would occur later in the morning, and many cultural activities would occur in the early evening (after work for participants) or on weekends, reducing effects on the afternoon commuter peak hour. The light industrial expansion project mitigated traffic effects as a result of street improvements included with conditions of their entitlement approvals. The majority of industrial related traffic occurs along Kapa‘a Quarry Road, and not within residential areas. Therefore, the industrial project would contribute some traffic to roadways, but this increase would not have a significant or adverse cumulative traffic impact on roadways, particularly in residential areas.

Issues with security and crime would only be associated with proposed Kawainui improvements because the light industrial expansion is a private development and can properly address concerns with the homeless and crime. For example, tenants would have their own security systems, and the industrial development management would address general security of the property. Thus, there would be no significant cumulative impacts on this issue.

In terms of economic and fiscal cumulative effects, short-term construction of both projects would have a temporary positive effect by creating direct and indirect construction-related jobs along with additional income for workers that would be spent within the local economy. There would also be a small, but positive (relative to Windward region and islandwide jobs), cumulative effect in creating additional long-term jobs and incomes associated with continued wetland restoration and upland reforestation efforts combined with employees working for new business tenants at the light industrial expansion.

Air, Noise, and View Factors. There would be no adverse cumulative impact on air quality and noise from the proposed project and the light industrial expansion. Impacts on air quality and noise would be primarily associated with short-term construction activities. There are no noise sensitive properties (e.g. residences) located adjacent to the light industrial site and the proposed project area. Only the City Model Airplane Park, vegetation processing site, and cultural center at Kapa‘a are situated in the vicinity of the industrial site. Sufficient measures were identified to address short-term effects on air quality and noise, such as required State DOH noise permits, BMP measures, and existing government regulations.

The light industrial expansion does not affect important scenic coastal views or significant open space resources that were identified in Section 4.6. Industrial expansion would include a buffer zone consisting of earth berms and vegetation to screen views of the development and mitigate noise generated by industrial activities. Visual impacts associated with proposed Kawainui improvements were addressed in Section 4.6, and determined there would be no significant

impacts on the scenic character of Kawainui, important viewsheds or scenic resources. Most of the improvements at Kawainui would not be visible from Kapa'a Quarry Road and other areas due to the extensive existing vegetation along the perimeter of the project area. Therefore, there would be no significant cumulative impacts on important views or scenic resources.

Infrastructure Facilities. There would be no adverse cumulative impact on existing infrastructure facilities based upon the results discussed in Chapter 5 and the Final EIS for the light industrial expansion (SD&C, 2011). A summary of these results is provided below since more detailed discussion of Kawainui project effects are discussed in this FEIS.

1. *Water Facilities*. Kawainui improvements would generate modest average daily demands for potable water that would not significantly impact the existing water system. The City BWS has indicated that the existing water system is adequate to accommodate proposed improvements. Similarly, the industrial expansion would require additional water, which has been addressed in their Final EIS. Increased water demands would be met by the BWS when they review project design plans and determine Water System Facility Charges. Therefore, there would not be a significant cumulative impact on water facilities.
2. *Wastewater Facilities*. The light industrial expansion would implement an advanced on-site wastewater system that includes a recirculation pump chamber with sand filter before discharging to a leach field to improve treatment. Treated wastewater would be used for irrigation use. As discussed in Section 5.2.2, the Kawainui improvements would not generate a large volume of wastewater, and proposed on-site treatment methods are adequate to process such volumes, and would not adversely impact the wetland or environment. Therefore, there would be no significant cumulative impact to the City's existing wastewater systems or the surrounding environment from proposed treatment methods.
3. *Drainage Facilities*. Project improvements and the industrial expansion would increase impervious surface areas and stormwater runoff volumes that eventually discharge into the Kawainui wetland. Kawainui effectively serves the greater watershed area that includes the Kapa'a light industrial site, City transfer station and landfill, the Model Airplane Park, and other surrounding uses. Water quality results show that Kawainui is naturally functioning as a trap for particulates, assimilation and recycling of nutrients, and sequestering of pollutants from such runoff.

   Project trails account for about 40 percent of attributable estimated runoff, as they are primarily comprised of compacted soils, having a high runoff coefficient. Proposed reductions in trail segments would reduce estimated runoff volumes as discussed in Section 5.3.2. Other facility improvements would include LID elements and BMPs incorporated into the design to detain runoff, further reducing effects of stormwater runoff. LID elements could include greywater gardens, bioswales, rain gardens, bioretention areas, rain catchment systems, and infiltration trenches. The industrial expansion project similarly includes measures to detain and improve the quality of stormwater runoff eventually discharged into Kapa'a Stream and the Kawainui

wetland. Such measures include underground rainwater harvesting cisterns for irrigation use and underground detention basins allowing for settlement and treatment of stormwater runoff before being released. These measures were evaluated and acceptable as part of the project entitlements process. Further design details would be reviewed during the project design and ministerial permit phase. Consequently, stormwater runoff from the project and industrial expansion should not have an adverse cumulative effect on existing drainage facilities or Kapa‘a Stream and the Kawainui wetland.

During short-term construction activities, applicable BMPs and conditions included in approved ministerial permits would minimize and mitigate discharges of stormwater runoff. Because the project would be phased, all construction activities would not occur within one concentrated area. Therefore, drainage impacts would be minimized. Only the cultural center at Kapa‘a is proposed within the area that would be cumulatively effected by the light industrial expansion. Runoff from short-term construction activities should thus not have a significant cumulative impact on existing drainage facilities or the receiving waters of Kapa‘a Stream and the Kawainui wetland.

4. *Transportation Facilities*. The project is not expected to have a significant effect on transportation facilities because activities would not generate a significant volume of daily traffic as discussed in Section 5.6. Project generated traffic would not impact the morning commuter peak hour because activities (e.g. education center) occur later in the morning, and many cultural activities would occur in the early evening (after work for participants) or on weekends, reducing effects on the afternoon commuter peak hour. The light industrial expansion project had a traffic study conducted for the project Final EIS. Traffic effects from that development were mitigated. The project is required to implement street improvements as part of entitlement conditions. Consequently, the project would contribute some traffic to roadways, but this increase would not have a significant or adverse cumulative traffic impact on roadways.

Education. The construction of the education center, parking areas, and pedestrian trails and viewing areas are intended to support ongoing environmental education. The proposals would support educational programs and make possible further partnerships between DOFAW and DSP, local schools and community groups. The industrial expansion would not impact schools or school operations. The project would not have ~~an~~ a cumulative adverse impact on public educational facilities. Due to the demand for hands-on outdoor classroom learning opportunities and interest in Kawainui and Hāmākua, educational programs associated with the project area are likely to expand in years to come.

Recreation. The industrial expansion would not impact existing recreational facilities or activities. The only existing recreational facility in the immediate vicinity is the City Model Airplane Park. Operation of the expanded industrial site would not prevent or significantly disrupt activities occurring at this park. An objective of the project is to increase public access

and passive outdoor recreational use. The proposed trails and parking areas support this objective. Enhanced public access to State park lands is mandated by Section 6(f) of the federal LWCF Act. In addition, the provision of trails and viewing and interpretive areas is consistent with a State-wide initiative toward development of greenways and protected lands within urban areas. Act 233, Establishment of a Statewide Greenways System for Hawai‘i, was signed by Governor Neil Abercrombie in 2011. This act recognized the benefits that greenways and trails can have on Hawai‘i communities, and directed the State Office of Planning (OP) to develop a plan to establish a statewide system of greenways and trails. Although no funds were appropriated, OP’s study identified State and County activities related to greenways and trails, and existing resources and entities engaged in greenways planning and development in Hawai‘i.

DLNR’s Na Ala Hele Trails and Access program housed with DOFAW is charged with planning, developing, and acquiring land or rights for public use of land, construction and coordination of activities to implement a trail and access system in Hawai‘i. The proposed trails within the project area would have a positive cumulative impact on the State’s greenway effort. The cultural center at Kapa‘a, vegetation processing site, and the activities conducted there would not negatively impact activities occurring at the Model Airplane Park. Thus, the project and expansion of the light industrial site would not have an adverse cumulative impact on existing recreational facilities.

7.4 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible and irretrievable commitments of resources refers to impacts on or losses of resources that cannot be recovered or reversed. Some of the irreversible and irretrievable commitments include the use and commitment of fiscal resources, labor, construction materials and energy.

Use of these resources would be needed to conduct wetland restoration and upland reforestation. The State DOFAW and DSP would utilize resources to construct proposed trails, the education center, and DOFAW maintenance facilities~~, and improvements at the Kawainui SPR, Kalāheo site~~. Other cultural facilities will be constructed by private entities and will not involve a commitment of public resources. Land used for proposed structures and improvements will be physically altered and modified. All land within the project area will still be owned by the State of Hawai‘i. No significant cultural or natural resources will be irretrievably harmed or lost.

7.5 PROBABLE ADVERSE ENVIRONMENTAL EFFECTS THAT CANNOT BE AVOIDED

This section identifies probable adverse environmental effects from the project that cannot be avoided. The rationale for proceeding with a proposed action, notwithstanding unavoidable effects, is also discussed in this section, if applicable. In summary, the project would not cause short- or long-term adverse effects that cannot be avoided or minimized.

Short-Term Effects

As with any construction of facilities, including wetland restoration and upland reforestation activities, the existing environment will be altered to a certain extent due to these activities. Such restoration, reforestation and construction activities would generate short-term disruptions and impacts to the environment. However, these short-term effects would not be adverse as discussed in other sections of this document. There are several best management practices and other mitigative measures that can be implemented to avoid or minimize effects on the environment.

Wetland restoration activities provide a significant benefit to the environment by removing invasive vegetation and peat mat that have degraded Kawainui's wetland ecology. The methods proposed for wetland restoration activities primarily involve vegetation cutting and removal over smaller phased increments that should not adversely impact this resource and endangered waterbirds. The principal impact would be disturbance of nesting birds during the nesting season. DOFAW has been managing both the Kawainui wetlands and Hāmākua for some time now, and have done an excellent job of conducting heavy clearing activities during periods when waterbirds were not nesting to minimize impacts to listed avian species to the maximum extent practical. As their biologists are part of the team that would be managing and/or participating in much of the work in the wetlands, it is not expected that those expanded restoration and reforestation activities would result in deleterious impacts to listed waterbird species. DOFAW has also been implementing upland reforestation improvements using the methods proposed, and in small increments without having any adverse effects on the environment or waterbirds. Continued implementation of these methods, BMPs, and other pertinent mitigative measures would similarly not result in an adverse effect on the environment that cannot be avoided.

Construction of facilities such as the education center, cultural centers, and public access improvements (e.g. trails and restrooms) would have short-term effects on the environment, particularly in the area of site disturbance and where improvements occur. As discussed in other sections, the locations for these improvements are in previously disturbed areas or upland areas that would not adversely impact historic sites or environmental resources. BMPs or other applicable mitigative measures would be implemented to further minimize or avoid potential adverse effects on the environment.

During the design phase, additional field reconnaissance would be conducted to assess and evaluate current site conditions at that time since improvements would be phased over time. Such design work would typically include topographic surveys and civil engineering design to determine necessary site improvements to support buildings, vehicle access, and other necessary infrastructure. These efforts would support the proper siting of final building footprints for structures and pedestrian trail routes. BMPs would typically be included in design plans to address storm water runoff and other short-term construction effects.

Pedestrian path routes can be modified and aligned to avoid impacting any archaeological sites along path routes, and interpretive features (e.g. signage) could be added along path routes to support public education and knowledge of the area and sites, as appropriate. Archaeological monitoring would be conducted for pertinent areas as part of the improvement's construction, and the need for such mitigative measures would be determined in consultation with the SHPD.

Improvements would also be constructed in accordance with City grading, grubbing, and stockpiling permits along with State NPDES permit requirements. Therefore, the project would not have short-term adverse environmental effects that cannot be avoided or mitigated through BMPs and agency permit requirements.

Long-Term Effects

There are no long-term adverse effects resulting from the project that cannot be avoided. Facilities and public access improvements are located within upland areas and would not adversely impact historic sites or environmental resources. BMPs, proposed management practices, and other mitigative measures discussed would minimize and avoid long-term adverse effects on the environment.

However, certain community concerns could be perceived by others as being adverse regardless of the analysis and assessment results discussed in this document. This document addresses these concerns and its background in more detail. The main issue with certain members of the public involves improving public access because this would increase the number of visitors to Kawainui.

Concerns with Public Access. Members of the community and some organizations have expressed concerns and opposition to public access that can be attributed to the level of visitors to Kailua experienced over the years, and general opposition to visitors to Kailua as a whole. Therefore, proposing improved public access, even in a managed approach, has generated concerns and opposition to anything that may attract more visitors to Kailua. Sections of this document discuss the background associated with this issue, which is attributable to several items. Kailua's changing commercial town is attracting visitors due to available boutique shops, restaurants, etc. and popular hiking trails provide additional activities for visitors. However, Kailua's renowned beaches and available ocean recreational activities continue to be the main attractions for both visitors and island residents to this community.

Several members of the community and other organizations do support improving public access along with necessary support facilities, such as restrooms, shelters, and a pedestrian trail. Input received from community meetings and comment letters reflect another strong perspective from the community that supports managed public access and the associated benefits from project improvements. Public access improvements would support educational programs, cultural practices, passive outdoor recreation, and stewardship opportunities. Impacts from these improvements are discussed and would not have an adverse effect on the environment. The locations for these improvements are in previously disturbed areas or upland areas that would not adversely impact environmental resources or historic sites. BMPs or other applicable mitigative measures discussed would be implemented to further minimize or avoid potential adverse effects on the environment.

The Kawainui-Hāmākua project site is a Ramsar wetland of international importance. It should be noted that Ramsar supports sustainable tourism, recreational use, and cultural practices within designated wetlands. Ramsar views sustainable tourism as maintaining a high level of visitor satisfaction, ensuring a meaningful experience, and raising awareness about sustainability issues. The project includes improvements (e.g. pedestrian trails, education center) supporting these aspects of sustainable tourism recognized under Ramsar, and facilities proposed are much smaller in scale than those occurring at many other Ramsar sites in the United States and other countries.

One of the purposes for the project is to improve public access and outdoor recreation to meet regulatory requirements along with agency missions. The interests of the entire State of Hawai‘i need to be considered because Kawainui is a state resource of international importance for the entire public to enjoy. Therefore, project improvements support educational programs by providing shelter and restrooms for students, and allows passive recreational use (trails) within designated upland areas furthering the observation and appreciation of nature and wildlife.

The project supports the Public Trust Doctrine of the Hawai‘i State Constitution, by conserving and protecting this natural resource for the benefit of present and future generations. Public benefits would further be achieved by providing managed and reasonable public access to allow for the enjoyment of this resource by all. The master plan that guides this project sets a framework for programming and implementing improvements thereby reducing uncertainty in the management and future use of this resource. Project initiatives are also intended to promote the utilization of this resource in a sustainable and managed manner by providing public access and opportunities for educational programs and stewardship consistent with the conservation and development of resources under the Constitution. It also supports traditional and customary rights of native Hawaiian’s for cultural purposes under Article XII of the State Constitution.

To address public access concerns, project improvements have evolved throughout the planning and environmental review process by reducing improvements supporting public access such as reducing available public parking areas. Suggestions from the public have proposed further reductions, restricting, or eliminating public access. Unfortunately, such suggestions to do not

support the purpose and need for this project, and instead provide only restricted, very limited, and superficial access for the public. As a result, the assessment of improvements supporting public access do not support them having an adverse effect on the environment that cannot be avoided, nevertheless, the already established perspectives of others within the community against public access and visitors to Kailua are viewed differently.

Concerns with Commercial Activities. Another community issue related to public access concerns is opposition to commercial activities and tours that may result in more visitors to Kawainui and subsequently Kailua. DOFAW is allowed to permit up to 100 commercial visitors per day within both Kawainui and Hāmākua under State wildlife sanctuaries regulations. DSP can also issue commercial permits for access (e.g. tours) to state parks under their jurisdiction. No commercial permits have been issued by either agency for this project area, and DOFAW and DSP are not planning to issue such commercial permits for visitor tours under this project. Therefore, the project would not have an adverse effect on the environment or community that can be avoided due to commercial activities.

Unfortunately, misinformation on the project has been spread throughout the community by some organizations and individuals that have contributed to a misunderstanding of the project and this situation regarding commercial activities. People within the community have thus developed their own opinions based upon this misinformation or from what they have heard from others, while not understanding the project well. Therefore, some members of the community may incorrectly perceive this project as having an adverse effect due to commercial activities, which is not the case.

Concerns with Cultural Centers. Another community concern is with areas proposed to allow development of cultural centers by non-profit organizations. Such centers are intended to provide opportunities to establish a permanent presence at Kawainui with support facilities so that cultural practices and activities, educational programming, and stewardship opportunities can occur. The concern with these cultural centers again stems from opposition to public access and commercial activities by some organizations and members of the public because of the potential to attract more visitors to Kailua. As discussed in this document, establishment of these centers would not have an adverse effect on the environment or community that can be avoided. Cultural centers would not be open to the general public and no commercial tours or activities would be allowed. Thus, cultural centers would not generate impacts from tourist and visitor activities as compared with other areas of Kawainui open to the general public (e.g. education center).

The cultural centers support traditional and customary rights of native Hawaiian’s for cultural purposes under Article XII of the State Constitution. The opportunity to establish such centers has been requested by several organizations and individuals since the beginning of the planning process. Centers are viewed as a place where culture can be practiced, customs and traditions studied, taught, and shared with others, etc. DOFAW and DSP view such opportunities as supporting the project need by increasing stewardship opportunities within established areas, increasing and diversifying educational programs associated with cultural practices and

traditions, and supporting management and supervision of Kawainui. Supporting cultural practices also aligns with agency missions.

These centers would be constructed and operated by non-profit organizations. Non-profit organizations involved in stewardship, curatorship, and other activities at Kawainui and Hāmākua for many years have been strong and committed partners with DOFAW and DSP. Restoration efforts, educational programs, and cultural programs already being conducted by non-profit organizations at Ulupō Heiau, Nā Pōhaku, Pōhakea, the restoration ponds, and other project areas under curatorship agreements reflect their commitment, and are examples of successful stewardship partnerships with DOFAW and DSP. Therefore, these centers are viewed as additional partnership opportunities to support stewardship and management of Kawainui.

Unfortunately, misinformation on these cultural centers have also been spread throughout the community by some organizations and individuals that have contributed to their misunderstanding of this situation. People within the community have thus developed their own opinions based upon this misinformation or from what they have heard from others, while not understanding the real purpose and activities associated with these centers. Therefore, some members of the community may incorrectly perceive these cultural centers as having an adverse effect due to possible commercial activities or increased tourists, which is not the case. The large majority of guests visiting and persons operating at these cultural centers would be residents.

7.6 UNRESOLVED ISSUES

The only potential unresolved issue identified at this time concerns general opposition to visitors to Kailua as a whole by some organizations and members of the community, and any project improvements that would support accommodating visitors to Kawainui.

As previously discussed, members of the community and some organizations have expressed concerns and opposition to public access that can be attributed to the level of visitors to Kailua experienced over the years, and general opposition to visitors to Kailua as a whole. Therefore, improving public access under this project by making designated upland areas available and providing support facilities such as an education center, pedestrian trails, restrooms, and observation decks generates concerns and opposition. Even a managed approach that is proposed to improve public access may not satisfy some organizations and community members. Therefore, this concern could be perceived by some as being adverse and irresolvable regardless of the management measures proposed, mitigative measures identified, analysis and impact assessment results discussed in this document.

Several members of the community and other organizations do support improving public access along with necessary support facilities, such as restrooms, shelters, and a pedestrian trail. Members of the community see the value in improving public access because it would support educational programs, cultural practices, passive outdoor recreation, and stewardship

opportunities. Input received from community meetings and comment letters also reflect this strong perspective supporting managed public access and the associated benefits.

The Kawainui-Hāmākua project site is a Ramsar wetland of international importance. Ramsar supports sustainable tourism, recreational use, and cultural practices, and views sustainable tourism as maintaining a high level of visitor satisfaction, ensuring a meaningful experience, and raising awareness about sustainability issues. The project includes improvements supporting these aspects of sustainable tourism recognized under Ramsar. Project improvements support educational programs by providing shelter and restrooms for students, and allow passive recreational use (trails) within designated upland areas furthering the observation and appreciation of nature and wildlife.

One of the purposes for the project is to improve public access and outdoor recreation to meet regulatory requirements along with agency missions. Consequently, the interests of the entire State of Hawai‘i need to be considered because Kawainui is a state resource of international importance for the entire public to enjoy.

CHAPTER 8: CONSULTED AGENCIES AND ORGANIZATIONS



8.1 PROJECT SCOPING

An extensive project scoping and community outreach process was implemented for this project since its initiation in 2011 to solicit public input that helped refine the project's purpose and need and development of project improvements that are being studied in this Draft EIS. Input from the community helped to identify the type of activities desired, improvements needed to support activities, and issues and areas of concerns from the community. This planning process led to the preparation of a *Draft Kawainui-Hāmākua Complex Master Plan* (May 2014) report that was published in May 2014. Public comments on this draft master plan report were solicited that resulted in modifications to proposed improvements as discussed in the published EISPN.

The planning framework associated with community consultations under this planning process included several public informational meetings, meetings with various community organizations, and participation in other public events to distribute project information. This section summarizes the results of the project scoping and community consultations. An electronic copy (pdf file format) of this draft master plan report can be found on the project's website located at the following, and this report also discusses the community consultation efforts leading to its preparation.

http://www.hhf.com/kawainui

8.1.1 Public Informational Meetings

DOFAW and DSP has held three public informational meetings on this project as part of the project's scoping process, and participated in a fourth public informational meeting sponsored by others.

8.1.1.1 Public Informational Meeting No. 1

The first public informational meeting was held on Saturday, December 10, 2011 at Le Jardin Academy's Wang Auditorium in Kailua, Hawai'i. Public notification of this meeting was published in the November 23, 2011 issue of The Honolulu Star-Advertiser newspaper. Notice of this meeting was also distributed via email to several community organizations, elected officials, and individuals. Approximately 70 persons attended this first meeting, and information associated with this meeting and other public meetings are included in the appendices of the draft master plan report (HHF, 2014).

The purpose of the meeting was threefold:

1. Notify the public of the project and commence the project's community outreach efforts;
2. Provide background on the project, and the project area; and
3. Solicit input from the community.

A Powerpoint presentation was given by HHF explaining the meeting's framework, the planning process, and background information on the project and area. After the presentation, attendees were divided into three working groups to discuss various topics on the project as they pertain to: 1) activities and access; 2) education/visitor center; 3) Hawaiian culture; 4) resource management; and 5) other topics. Comment forms were also made available for participants to submit additional feedback after the meeting.

A "Calabash" exercise was implemented for attendees to respond to two questions that were then placed in a "calabash bowl". The questions focused on: 1) desired wish for the project area; and 2) concern with project area's future. The exercise results identified the following four desires and concerns for the area that were graphically added to a mural (Exhibit 8.1).



Exhibit 8.1 Mural Created During Public Informational Meeting No. 1 from "Calabash" Responses

The top three wishes for the project area were as follows:

1. Management. This was the most often expressed theme, and generally referred to as restoration, preservation, or protection of the wetland. Types of actions referenced were stewardship, removal of garbage and invasive plants, ethnobotanical and cultural restoration, and lo'i (taro terraces), and loko i'a (fishpond).

2. Cultural Resources. Hawaiian culture was the second most often expressed theme. Cultural activities expressed were loʻi, loko iʻa, the practice of Hawaiian culture, and stewardship of resources. This demonstrated that participants perceive a strong connection between the project area and Hawaiian culture.
3. Public Access. Public access to the project area was another priority theme expressed, and had a large overlap with cultural resources and management. Access was tied to cultural activities, stewardship, education, and recreation (viewing).

Five main concerns were expressed for the project area as follows:

1. Management. This theme was most often expressed. Concerns were with the consequences from the lack of management or mismanagement of the area. Commercialization of the area, inappropriate usage and access, degradation of natural resources, and loss of water rights were expressed.
2. Commercialization. The second most often expressed theme was related to concerns with commercialization and tourism affecting the natural beauty and wildlife, and its resources could be utilized without evaluating impacts.
3. Cultural Resources. Concern related to the potential loss of cultural resources and not having a cultural presence within the project area to perpetuate traditional practices.
4. Public Access. Concern with public access to the project area was expressed. Polarized ends of the comments included concern with having too much public access versus being restricted from public access due to insufficient improvements.
5. Construction/Development. A theme related to development was concern with structures supporting commercialization or tourism of the area and allowing too much public access.

A breakout session conducted to discuss various topics in small groups identified the following four major themes.

1. Resources Management. The primary focus should be on resources management (uplands, open water, streams) and all other issues come after that. Resource management funding is a concern. Improvements should start with restoration in the center of the wetland rather than at the periphery. Restoration projects should not negatively impact water quality downstream.
2. Hawaiian Culture. Hawaiian culture and activities would welcome all people and provide a cultural presence at the site. Preserve and acknowledge native Hawaiian heritage, history, protect archaeological resources, living ecosystems, and respect the spirit of the place. It is important to have a place for cultural resources practitioners trying to teach the living process.
3. Activities and Access. Access to the area needs to be controlled. The main priorities are for the restoration of the wetlands and to support Native Hawaiian activities. There is a concern about using the wetland for commercial activities. Do not create a visitor center, but instead create an education center. Community activities should come after restoration. There is a concern that large structures would be constructed at the site, and that the area would be overused. Conduct fundraising via community

activities to support restoration activities. Activities should be conducted in association with resource management and be pertinent to the wetland.

4. Education: Education as an activity is welcomed. There are several locations suggested for an education/visitor center. However, the center should tread lightly on the land. Education activities should focus on the wetlands, geology, etc.

8.1.1.2 Public Informational Meeting No. 2

The second public informational meeting was held on Thursday, November 15, 2012 at Le Jardin Academy's Wang Auditorium. Public notice of this meeting was published in the November 1, 2012 issue of The Honolulu Star-Advertiser newspaper. Notice of this meeting was also distributed via email to community organizations, elected officials, and individuals. Approximately 70 persons attended this meeting, and the purpose of the meeting was to:

1. Update the public on the status of the project;
2. Obtain input on alternative concepts at study area locations; and
3. Assess the level of sensitivity to preliminary alternative concepts.

A Powerpoint presentation was given by HHF explaining the meeting's framework, summary of comments from the first public informational meeting and meetings with community organizations, assessment of existing site conditions and developing alternatives, and identifying differences between the 1994 master plan and this update. Community members were invited to participate in an open house-style workshop to evaluate alternative master plan concepts under consideration at several display booths set up. The objective of this exercise was to obtain public input on the degree of their level- of-sensitivity toward various uses and concepts.

The workshop utilized display boards with maps, images, and a list of important existing conditions. Other display boards had images of various types of alternative uses (such as paths, pavilion, cultural center) and design concepts (such gravel, unpaved, paved pedestrian paths) for consideration. The intent of this workshop was to:

1. Provide site-specific information about the Kawainui-Hāmākua Complex, since each part of the project area has unique qualities/attributes, sensitivities, visibility.
2. Provide images of building-landscape types and materials that would be appropriate for low-impact development to facilitate the mission and goals of DOFAW and DSP.
3. Provide community members with a vehicle for communicating what they think is acceptable in areas.

Questionnaires were completed by person's participating, and the number of responses supportive or against items were tallied and calculated as percentages of total responses (Exhibit 8.2). Most favorable responses were for paths and gathering areas, and potential master plan elements at Kalāheo Section of Kawainui State Park Reserve and Ulupō Heiau State Historical Park.

Area/Amenity	1A Kawainui State Park Reserve (Kapa'a)	1B Hawaiian Cultural Area	1C Kawainui State Park Reserve (Nā Pōhaku)	1D Kahanaiki	2A Kawainui State Park Reserve (Kalāheo)	2B Levee	2C Wai'auia	2D Ulupō Heiau State Historical Park	3A Hāmākua	3B Pu'uoehu
Canoe Hālau					94					
Pavilion	52	50	54	58	77		64	83	55	62
Observation Deck/ Tower	53	59	59	53			63	51	57	52
Paths	80	76	93	77	89		85	94	82	89
Gathering Area	71	70	88	65	78		78	81		83
Cultural Center	53	62	57	57	57		50	74		
Education Center	54	50	55	53	57		57	73		
Camping		57	60							
Comfort Station	50	56	68	54	82		53	78	54	
Parking	58	59	66	59	88		55	73	50	
Bridge					55					
Paving for Bicycles						51				

Exhibit 8.2 Summary Results of Workshop Responses

8.1.1.3 Public Informational Meeting No. 3

The third public informational meeting was held on Wednesday, August 6, 2013 at Le Jardin Academy's Wang Auditorium. Public notice of this meeting was published in the November 1, 2012 issue of The Honolulu Star-Advertiser newspaper. Notice of this meeting was also distributed via email to community organizations, elected officials, and individuals. Approximately 135 persons attended this meeting, and the purpose of the meeting was to:

1. Update the public on the status of the project;
2. Present preliminary master plan concepts developed; and
3. Obtain comments on preliminary master plan concepts.

A Powerpoint presentation was given by HHF that summarized comments from the second public informational meeting and meetings with community organizations, an evaluation of site conditions for appropriate use, and presented preliminary master plan concepts. Information was provided on DOFAW and DSP missions and objectives, evaluation of site alternatives and concepts, and a description of resource management concepts.

The public then participated in an open house style breakout session designed to obtain comments on the preliminary conceptual plans. Comment forms were provided to obtain written comments, and the public could review display boards and information, and talk with project representatives. Four stations were established that covered different sections of the project area: 1) Hāmākua and Pu'uoehu; 2) Kawainui – South; 3) Kawainui – West; and 4) Kawainui - North. Station 3 was the most commented-on, followed by stations 2, 1, and 4 (Exhibit 8.3), as summarized below.

1. Station 1: Hāmākua and Pu'uoehu. Favorable comments included full support of the wetland expansion, habitat restoration, endangered wildlife protection, paths, and trails. Suggestions included alternative pathways, building small restrooms, insuring educational and cultural activities are maintained and restricting access to areas that

are culturally or environmentally sensitive. Concerns included keeping the wetland clean, homeless encampments, habitat impacts, respecting the importance of culture, and tourist overuse, and commercialization of buildings. Negative comments included having issues with more parking in the area. An increase in crime and pollution from additional vehicle and human use.

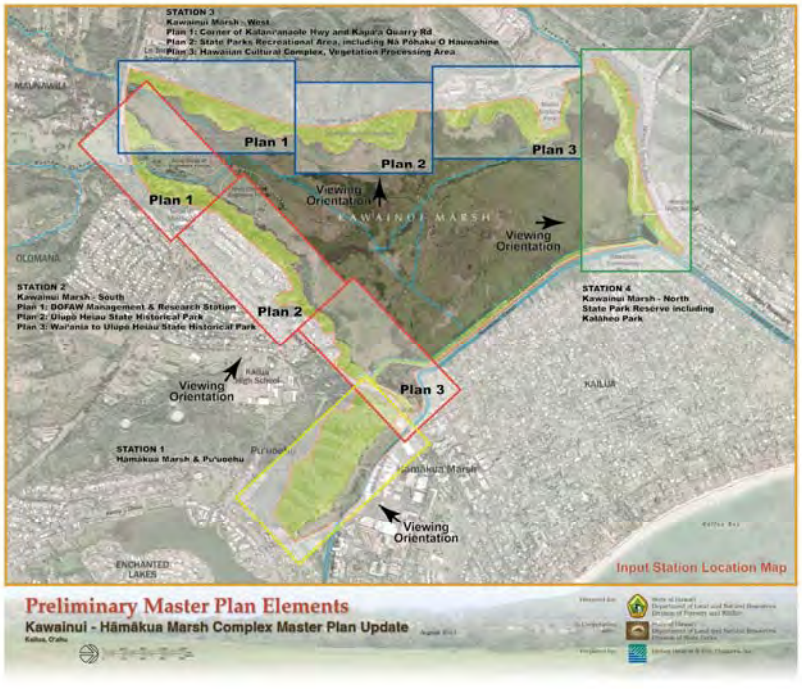


Exhibit 8.3 Preliminary Master Plan Elements Board

2. Station 2: Kawainui–South. Favorable comments included support of the halau and education pavilion, interpretive and signage, trails, and recreational access. Suggestions included removing roads, alternative placements for the boardwalk, providing a cultural practice space, preserving historical sites, and ensuring that vegetation is maintained. Concerns included attracting homeless populations, resident safety, too many trails, tourist and commercial buses taking over parking areas, and needing to make the area more dog-friendly.
3. Station 3: Kawainui–West. Favorable comments included support of the building and design, trails, parking, and community space. Suggestions included incorporating the model airplane park into the plan, alternative building architecture, including local education materials, and developing area in stages to spread out development. Concerns included site maintenance and security, not enough parking, traffic issues, and tourist overuse. Negative comments included not supporting the structures or trails at that site, having too many parking lots, and too large of a building foot print.

4. Station 4: Kawainui–North. Favorable comments included support for the canoes and facility, parking, and paths. Suggestions included incorporating showers by the canoe launching area, restoring fish pond, increasing gate height for security, developing trails right away. Concerns included homeless attraction, concerns about canoe facility access, habitat impacts from more use of the area, and security.

8.1.1.4 Envisioning Kawainui Public Meeting

A public informational meeting was conducted by and co-sponsored by the Office of Senator Jill N. Tokuda and the Harold K. L. Castle Foundation to solicit additional public input on the project, of which DOFAW, DSP and HHF attended. This meeting was held on Saturday, November 30, 2013, at Le Jardin Academy's Wang Auditorium. Approximately 200 people attended this meeting. The meeting was facilitated by two individuals, and consisted of a panel discussion by the following (Exhibit 8.4):

1. Lehuakona Isaacs, Jr., President, ʻAhahui Mālama I Ka Lōkahi;
2. Māpuana de Silva, kumu hula, Hālau Mōhala ʻIlima;
3. Damian Rentoule, Middle School Principal, Le Jardin Academy;
4. Chuck Prentiss, Chair (former), Kailua Neighborhood Board; and
5. Dave Curry, Principal, HHF Planners.



Exhibit 8.4 Envisioning Kawainui Meeting Panel

Each of the five panelists answered a series of three questions. After each presentation, community members had the opportunity to ask the panel questions and/or provide comments. Community members were directed to a website where they could send questions and comments using smart phones during each panelist's presentation. Community members could also submit questions/comments on index cards, which were posted at the front of the auditorium according to which panelist they were directed. Some concluding comments from the panelists and DOFAW at the conclusion of the meeting were:

- Lehuakona Isaacs, Jr.: "We are asking to re-establish the same kauhale that were built by our ancestors. To deny a people to re-establish themselves because of a fear of tourists, that is not rational, is not pono."
- Māpuana de Silva: "We (Hawaiians) need to be given that chance; but we're still at step 1 and we want to have that opportunity ..."

- Damian Rentoule: "I've learned a lot and was pleasantly surprised that there's more unity than was expected by me as an outsider."
- Chuck Prentiss: "I saw a lot of agreement here today; that's a step in the right direction."
- Dave Curry: "The greatest concern is not moving forward with a plan, Kawainui is being degraded, and educational and cultural opportunities are important, we need to take those steps forward."
- Dave Smith (DOFAW): "I'm struck that we agree on 90% of everything. We're talking about some details around the edges."

8.1.1.5 Public Informational Meeting No. 4

A fourth public informational meeting was held on Thursday, January 18, 2018 at Le Jardin Academy's Wang Auditorium. Public notice of this meeting was published in the January 5, 2018 issue of The Honolulu Star-Advertiser newspaper. Notice of this meeting was also distributed via email to community organizations, elected officials, and individuals. Approximately 200 persons attended this meeting. The purpose of the meeting was to:

1. Update the public on the status of the project; and
2. Clarify project information and address questions to facilitate public review of the Draft EIS.

An informal open house session was held prior to the main presentation and program. Open house attendees viewed display boards showing subarea conceptual site plans, and other information on proposed improvements and projected visitors. HHF, DOFAW, and DSP staff were present to answer questions from attendees.

A PowerPoint presentation was given by HHF that summarized the status of the project, provided information on the published Draft EIS, and notified the community of the grace period being allowed for late comments on the Draft EIS. The 45-day comment period deadline for the Draft EIS was January 22, 2018. However, DOFAW would accept "late" written comments under a grace period up to February 6, 2018. Notification of this grace period was also included in the Participant Letter included with the Draft EIS distribution.

The presentation provided information on the background of the project, purpose and objectives for the project, and discussed proposed improvements. As part of the presentation, known common issues and concerns were identified, and misconceptions about the project were clarified. The public was then allowed to submit written questions on index cards. Within the time allotted, questions from several cards collected were read and responded to by the project team. An open forum was then held to allow persons to speak. The purpose for these activities was to clarify questions on the project so that reviewers were better prepared to submit written comments on the Draft EIS.

Overall, the questions and comments received were generally consistent with prior comments received throughout the environmental review process. Similar areas of support, questions, and concerns included commercial visitors, visitor levels, support for cultural practices, management of areas, educational opportunities, project costs, trail effects on communities, and crime and security. These similar topics of support and concern have been addressed in respective sections of this document. A summary of the general types of topics expressed from this meeting is provided.

- Commercial tourism, such as tour buses, Segway tours, bicycle tours, and commercial tours occurring within Kawainui, and facilities that may support them (e.g. parking stalls, concessions).
- Managing visitation levels, types of visitors and activities, increased traffic, and the State's ability to manage activities and enforce restrictions.
- Extent of improvements, such as number of buildings, pedestrian trails, and compatibility of facilities in relation to the wetland.
- Supporting native Hawaiian cultural practices and heritage.
- Paying for improvements, funding sources, and maintenance of facilities.
- Clarifying project information, such as the number of parking stalls and lots, wetland areas, use of trails, and types of fencing (e.g. predator fence).
- Research and educational opportunities for schools, and areas of research benefitted by project.
- Presence of homeless, increased crime from activities, and security of new facilities.
- Pedestrian path activities along hillside, parking within neighborhood, and Ulupō Heiau activities and tours.
- Stormwater runoff and erosion, pig destruction of habitat, hydrology of area, light effects from buildings, and human activities in relation to the wetland.
- Selection of non-profit organizations, accountability of organizations, and how permits would be issued.
- Ramsar designation, land use plans, and environmental review process.

8.1.2 Meetings with Community Organizations

Informal meetings were held with many community organizations to share information on the project at various stages in the planning process, and to solicit their input. The community organizations consulted were generally comprised of those with stakeholder interest in the Kawainui-Hāmakuā Complex and other organizations associated with Kailua. Information shared by community organizations included suggestions and concerns that assisted in identifying opportunities and constraints, understanding community issues, and in developing project concepts plan. A summary of these community organizations consulted is provided.

8.1.2.1 Hoʻolaulima iā Kawainui (Hoʻolaulima)

Formed in 2004, this organization is comprised of a network of concerned community organizations, government agencies, and individuals cooperating to foster public awareness and understanding of the natural, cultural, and scenic resources of the Kawainui-Hāmākua complex to to ensure the long-term protection, restoration, and stewardship of this complex. This network includes representatives from the DOFAW and DSP, and several community organizations such as ʻAhahui Mālama i ka Lōkahi, Hawaiʻi Audubon Society, Hawaiʻi's Thousand Friends, Kailua Hawaiian Civic Club, Kailua Historical Society, Lani-Kailua Outdoor Circle, Pacific American Foundation, and Windward Ahupuaʻa Alliance.

Several meetings were held with Hoʻolaulima on this project to brief them on the project, solicit their comments and input, and discuss project concepts. Meetings started as early as in November 2011, and has include a meeting in August 2012 to discuss their community developed report providing suggestions for this project. Other meetings have occurred leading up to the preparation of the draft master plan report, and a meeting after its publication to clarify concepts and questions members may have to facilitate their review before submitting comments.

Since publication of the Draft EIS, another meeting was held with members of Hoʻolaulima and other consulted parties in September 10, 2018 at Le Jardin Academy. The purpose of this meeting was to discuss and obtain preliminary input on possible project revisions being considered to reduce the level of improvements. The DOFAW and DSP consideration of potential reduced improvements was intended to address Draft EIS comments regarding the extent of improvements.

8.1.2.2 Native Hawaiian Organizations

Many meetings were held with various native Hawaiian organizations from Kailua due to their strong interest in Kawainui as an important cultural place, and their desire for re-establishing a permanent Hawaiian cultural presence at Kawainui. Meetings have occurred since the initial planning work started on this project, has occurred throughout the preparation of the draft master plan report, and after this report's publication. An overview of these organizations is provided:

1. ʻAhahui Mālama I Ka Lōkahi (AML). AML is a native Hawaiian conservation organization established in 1994 to ensure the preservation of native ecosystems and Hawaiian traditions through education, stewardship and research. They have been a major stakeholder in Kawainui-Hāmākua since the late 1990s when they initiated a lowland native forest restoration project at Nā Pōhaku o Hauwahine. Their efforts have expanded to include conducting stewardship programs at Nā Pōhaku under a curatorship agreement with the DSP. They also have a Memorandum of Agreement with the State BLNR to conduct stewardship activities and educational programs within the Kawainui-Hāmākua Wildlife Sanctuary. AML and the Kailua Hawaiian Civic Club also have a co-curatorship agreement with DSP for the stewardship of

Ulupō Heiau, as well as developing and implementing educational, interpretive, and cultural programs.

2. Kailua Hawaiian Civic Club (KHCC). The KHCC was established in 1959 to perpetuate Hawaiian culture, improve the lives of Hawaiians and the Kailua community, and to malama the Kailua ahupua´a. They have been curators of Ulupō Heiau under a curatorship agreement with DSP since 1987. In 2006, KHCC and AML joined as co-curators of a 7-acre area that encompasses Ulupō Heiau. They are currently working to restore the cultural landscape of the heiau with the gradual removal of the alien vegetation, restoration of loʻi kalo, and planting of native and Polynesian-introduced plants. KHCC also sponsors the Ulupō Heiau Hoʻike to heighten public awareness and understanding of the cultural history of Kawainui and Kailua. They are also active in the future reinterment of iwi at Waiʻauia.
3. Hui Kanaka ʻOiwi. Hui Kanaka Oiwi consists of several Hawaiian cultural organizations that came together in 2009 to form this organization. This group consists of native Hawaiian cultural practitioners in Kailua such as AML, KHCC, Kailua Descendant Group, and other cultural practitioners. The group developed the idea of a cultural and educational center in Kailua within the boundaries of the Kawainui complex due to the site's historical and cultural significance to the Hawaiian community as a center of spiritual, agricultural, and civic life.
4. Hikaʻalani. Hikaʻalani's mission is to reestablish Kailua as a place appropriate to the dedicated study, practice, and promotion of Hawaiian culture. The five areas the organization is involved in are: 1) performing and language arts; 2) traditional applied arts; 3) pacific cultural exchange; 4) ceremony, ritual, protocol for iwi kūpuna; and 5) cultural performance and exhibition. They are also active in the reinterment of iwi at Waiʻauia with the KHCC.
5. Ke Kahua O Kualiʻi ~~(Ke Kahua)~~. ~~Ke Kahua's~~ This organization's mission is to create a Hawaiian place of culture, a healthy landscape for the perpetuation of cultural practices. Their vision is a native Hawaiian environment that practices traditional land management principles for perpetuating cultural practices. The organization conducts men's ~~lua~~ activities, programs for women, landscape restoration, cultural programs and celebrations, and has partnerships with other cultural organizations.
6. ʻĀlele. This recently formed organization is comprised of mostly young adults, many who have been active in paddling through the years, and its creation was sparked by the visit of Hōkūleʻa to Kailua. One of its missions is supporting canoeing in Kailua to provide people with a sense of community and a sense of pride. For this organization, canoes at Kawainui are culturally symbolic.
7. Association of Hawaiian Civic Clubs Annual Meeting. A presentation on the project's draft master plan was given to the Association of Hawaiian Civic Clubs (AHCC) at their annual meeting held on the Island of Hawaiʻi on October 31, 2014. The AHCC unanimously adopted a resolution supporting the project's master plan.

8.1.2.3 Neighborhood Boards

Several presentations have been given to the Kailua Neighborhood Board (KNB) during the development of the project's conceptual plans and after publication of the draft master plan report to brief members on the project and solicit their input. Some members of the KNB are also participating members of the Hoʻolaulima organization, such as the past Chair of the KNB and Chair of the KNB's Planning, Zoning, and Environment Committee. Other KNB members have also attended some of Hoʻolaulima organization's meetings when this project was on the agenda.

A presentation was also given to the KNB's Planning, Zoning, and Environment Committee on September 17, 2013 to present and obtain their input on preliminary conceptual plans for this project. Being the only topic on that meeting's agenda, lengthy discussions were held with committee members to obtain their comments and address questions raised. Members of the public present at this KNB committee meeting also provided their comments

A presentation on the project's preliminary conceptual plans was also provided to the Kaneohe Neighborhood Board.

8.1.2.4 Educational Stakeholders

Meetings were held with various educational organizations to discuss the project, potential educational program opportunities, and to obtain their general input. A meeting was held with several administrative and teaching staff from Le Jardin Academy to discuss existing educational programs the school has related to environment and Kawainui, and future opportunities to expand and increase educational programs. Other meetings have been held with several potential educational partners for Kawainui to discuss opportunities and program requirements, such as the Pacific American Foundation and Hawaiʻi Nature Center.

8.1.2.5 Other Organizations and Activities

Meetings have been held with several other organizations to present the project and solicit their input and concerns. A summary of these organizations is provided.

1. Meetings with various canoe clubs to discuss potential opportunities for supporting canoe-related activities at the Kawainui SPR, Kalaheo park site. Those participating in these discussions included members of the Lanikai Canoe Club, Kailua Canoe Club, and staff from Kalāheo High School (school's canoe paddling teams).
2. A presentation to the State's Environmental Council was scheduled at their March 20, 2014 monthly meeting at the request of Hawaiʻi's Thousand Friends. The then President of the KNB also served as Vice President of the Environmental Council. Board members from the KNB, and representatives from Hawaiʻi's Thousand Friends, and Lani-Kailua Outdoor Circle were also present. Environmental Council members asked questions about the project, and representatives from the

organizations attending expressed concerns with elements of the conceptual plans being proposed and provided further comments primarily associated with visitors, public access, and improvements supporting public access.

3. Meetings were held with many residents from the Kūkanono community along with representatives of the Windward YMCA in June and July 2014 to discuss the project. About 35 to 45 persons attended each of these meetings to clarify questions on the project, and obtain their input and concerns.
4. DOFAW gave a presentation to the Hawai‘i Audubon Society at their July 2014 meeting to share information on the project, present conceptual plans with members, and obtain their comments and input. Board and other members from the society asked various questions on the project and other activities associated with Kawainui and Hāmākua. Representatives from the Lani-Kailua Outdoor Circle were also present at this meeting, and provided comments and questions on the project.
5. HHF staff attended the Ramsar World Wetlands Day events in 2012 and 2014 to provide the public with information on the project, and to answer questions they had. During the 2012 event, an information booth with display boards and handouts was provided, and a powerpoint presentation given on the project. During the 2014 event, an information booth with display boards and handouts was provided (Exhibit 8.5).



Exhibit 8.5 Participation at 2014 World Wetlands Day

6. Representatives from the Kailua Neighborhood Board, Hawai‘i’s Thousand Friends, and Lani-Kailua Outdoor Circle met with the Director of the State DLNR and DSP representatives on two occasions to express their comments on the project. Representatives from the Lani-Kailua Outdoor Circle also met with DOFAW staff to conduct a site visit of the project area, and to discuss their concerns. DOFAW gave a presentation to the Kailua Rotary Club to share information on the project and preliminary conceptual plans with members at one of their club meetings.

8.1.3 Draft Master Plan Report

A *Draft Kawainui-Hāmākua Complex Master Plan* (HHF, 2014) report was prepared and made available for the public in May 2014. The draft master plan was developed during a three-year long planning process that included extensive consultations and discussions with multiple governmental and community stakeholders, along with the public.

Copies of the report (on CDs) were made available to the public via email notices sent out to the community, elected officials, and posting notification of its availability on the project website and State DOFAW website. A CD of the report was also mailed to elected officials, various agencies, the KNB, and community organizations. Two hardcopies of the report were also provided to the Kailua Public Library for access by the community. A 30-day public review period on this draft report followed that ended in June 2014. The beginning of this chapter included a website address where an electronic copy (pdf file format) of this draft master plan report can be found.

8.1.3.1 Modifications Since Draft Master Plan Publication

Since publication of the draft master plan report in May 2014, many public and agency review comments were received. The comments were reviewed and evaluated by DOFAW and DSP, and some modifications to the project were made. For example, some proposals were eliminated, others modified, and others are being recommended for postponement, with possible reconsideration by DOFAW and DSP in the future. Project improvements, with these changes, were then used in the preparation of the EISPN published. A summary of the modifications to proposed improvements from the draft master plan is provided.

1. Kahanaiki to Nā Pōhaku-Kapa‘a Subarea
    a. Eliminated maintenance access road/path across wetland and Kahanaiki Stream that was intended to support DOFAW vehicular access between the Kahanaiki area and their management and research station.
    b. Eliminated boat launch ramp at vegetation processing area. Boat ramp was initially planned to support the transportation of removed vegetation for processing as part of wetland restoration activities.
    c. Support facilities planned at vegetation processing site would be consolidated closer to the entrance.
    d. Incorporated the kauhale concept into the Educational Center at Pōhakea with the addition of six traditional pole and thatch Hawaiian structures, Hawaiian games area, and gardens of native and Polynesian-introduced plants. This provides an interpretive element for park visitors to learn about pre-contact settlement and subsistence along the edges of Kawainui. This also expands upon the existing cultural use of the site and makes it integral to educational goals serving as outdoor classrooms.

2. Kapa‘a to Kalāheo Subarea
    a. The section of the pedestrian trail planned from the City’s Model Airplane Park northeast up to the Kawainui SPR, Kalāheo Section park site (former Gateway Park site) is designated for implementation as a future phase, yet to be determined. If this pedestrian trail section is desired for implementation sometime in the future, a separate environmental review would be conducted for that by DSP.
    b. Eliminated a pedestrian bridge across Kawainui Canal from Kawainui SPR, Kalāheo Section park site to levee due to public safety concerns.
3. Wai‘auia to Mokulana Subarea
    a. Relocated the location of a proposed hālau at the Ulupō Heiau SHP site further northwest, and away from an existing residence.
    b. Eliminated a proposed rest room along with parking lot and access road improvements (from Kailua Road) currently serving the Ulupō Heiau SHP site. This area initially identified for improvements under the draft master plan report is privately-owned by the Windward YMCA. If DSP acquires some property in this area in the future, separate plans would be developed along with an environmental review conducted by DSP.
    c. Eliminated two observational decks along a section of the pedestrian path extending from the Ulupō Heiau SHP southwest to DOFAW’s management and research station.
4. Hāmākua and Pu‘uoehu Subarea
    a. Designated pedestrian trails at Pu‘uoehu strictly for DOFAW-authorized management and program activities only, and not for general public use. However, DOFAW could conduct occasional day activities as part of community service learning projects, educational events, or other community events allowing the public to access this area for that day event.
    b. Eliminated trailhead along Pu‘uoehu that was connecting to Kailua Road.

8.1.3.2 Summary of Comments on Draft Master Plan

Many comments were received from the public on the *Draft Kawainui-Hāmākua Complex Master Plan* during the 30-day public comment period. Written comments were received by either mail or email during this period. Copies of all comments received can be found on the project web site at the following address:

http://www.hhf.com/kawainui/

A summary of public comments received was subsequently prepared and made available to the public in August 2016. This document included a summary of proposed revisions to project improvements and a summary matrix of comments with responses. Copies of this summary were made available to the public via email notices sent out to the community, elected officials, and posting notification of its availability on the project website listed above.

The comments reflect different, often divergent opinions on the planning issues and project proposals. The summary matrix is not intended to be a comprehensive itemization of the 200+ written comments received, nor does it reflect how many people hold a particular position. Instead, the summary presents a sample of the feedback received, illustrating the diversity of opinion among the community. The summary is organized by broad themes and sub-topics. A consolidated response pertaining to each theme or sub-topic is included in Table 8.1.

Table 8.1
Summary of Comments on Draft Master Plan Report (May 2014)

Summary of Comments	Response
General Comments	
Comments of Support	
This plan should have been done a long time ago.	Comments of support are acknowledged.
Plan is reasonable and responsible.	
Park space created will promote healthy lifestyles and more outdoor activities.	
Plan will do much to bring honor back to Kawainui.	
Kawainui will become a great place for families.	
Plan is defined enough to give shape to what we want for Kawainui for future generations.	
Concerns with Type/Extent of Development	
Development is too large and extensive, and will change Kailua's small town character.	Of the total 986 acres in the project site, less than about 80 acres are intended for program areas (e.g. Nā Pōhaku, Ulupō Heiau, cultural centers) with the remaining 906 acres consisting of wetland (about 680 acres) and open space upland area. Except for a few sections of boardwalk supporting pedestrian trails, there will be no construction of facilities in the wetlands. All proposed structures are related to supporting stewardship, cultural practices, outdoor recreation, and educational activities, and are situated within upland areas outside the wetland. Kawainui is not a pristine environment. The wetland is overgrown with invasive vegetation reducing open water needed for waterbirds habitat and floodwater retardation. Upland areas are similarly overgrown with invasive vegetation and subject to erosion that are slowly transforming this resource into a forest. We believe the proposed uses are appropriate for this project area. The common thread among all proposed improvements is to restore the area due to overgrowth of alien plant species, enhance waterbird habitat, support native Hawaiian cultural resources and practices, provide opportunities for passive outdoor recreation and educational programs, and support this resource's sustainment for future generations. This goal is in alignment with Ramsar Convention policies. Restoration of this resource needs to be integrated with educational programs, increased stewardship opportunities with partners, and allow the public to view and enjoy the resource with managed public access. Facility and other improvements
Development within marsh will take away unspoiled lands and will lead to environmental damage.	
True restoration of Kawainui would be to clean, maintain, and protect from intrusion rather than develop ways for more people to visit.	
Plan's conservation elements and small scale development are fine, but facilities and trails development will lead to environmental damage.	

Table 8.1
Summary of Comments on Draft Master Plan Report (May 2014)

Summary of Comments	Response
	support these objectives and DOFAW and DSP's agency missions. The floor area of all structures shown on the master plan, is approximately 52,000 square feet, and occur over less than about 15 acres of land. Facilities are supportive of native Hawaiian cultural practices, passive outdoor recreation, increasing stewardship partnerships, and DOFAW management and maintenance activities. These facilities are scattered throughout an approximately 240-acre upland area surrounding Kawainui's wetland. Given their purpose and objectives, we do not believe that this constitutes extensive development. The structures would not have a negative impact on the area's natural resources or character. In addition, improvements should not negatively impact the character of the Kailua Town that is influenced more by the popular beaches along the coastline and commercialization of the town center. The Environmental Impact Statement (EIS) being prepared for this master plan project will address impacts in greater detail.
The Draft Master Plan does not reflect an update of the 1994 Kawai Nui Marsh Master Plan (e.g. sections from 1994 plan not included).	The master plan does not need to include the same sections covered in the 1994 report. Much of the information from 1994 report will be covered in the upcoming EIS being prepared, since no environmental documentation was prepared for that 1994 report. However, the current master plan does update concepts and improvements from the 1994 plan that are now being considered for Kawainui based upon current conditions, DLNR jurisdiction of areas, and input from the public. Several of the current concepts being considered are similar to the 1994 plan, such as a visitor center, waterbird enhancement areas, and public outdoor recreation areas (parks).
Master plan concepts to be implemented by DLNR are not clear. Additional historical details should also be included in master plan.	We believe the concepts and themes discussed are clear. Concepts are general notions or ideas that form the basis for developing more specific implementable elements. However, revisions to this master plan will include providing more details and descriptions of plan concepts, as appropriate, which includes additional historical details.
The plan is not consistent with the public trust doctrine of Hawai'i State Constitution. Kawainui is a public trust resource with DLNR that needs to take precautionary and preventive actions in the face of uncertainty.	Master plan concepts comply with the public trust doctrine as improvements are intended to restore Kawainui's wetland and upland areas consistent with managing this public natural resource. The master plan sets the framework for programming and implementing improvements reducing uncertainty in the management and future of this resource. Plans are also intended to promote the utilization of this resource in a sustainable and managed manner by providing public access, educational programs, and stewardship consistent with the conservation and development of resources under the Constitution. It also supports traditional and customary rights of native Hawaiian's for cultural purposes under Article XII of the State Constitution.

Table 8.1
Summary of Comments on Draft Master Plan Report (May 2014)

Summary of Comments	Response
Specific Master Plan Areas	
Ulupō Heiau State Historical Park	
Support expressed for heiau and cultural landscape restoration, cultural resource management improvements, and parking and rest room facilities to provide community access to trails, viewing areas, and support educational programs.	Proposed improvements for the Ulupō Heiau State Historical Park are intended to promote the preservation of natural and cultural resources in the area. No commercial activity is proposed.
Support expressed for cultural resource management and landscape plan.	
Do not commercialize the area.	
Trails should connect Ulupō Heiau with DOFAW management and research station and Wai'auia.	The plan shows a potential connection between the trails around Ulupō Heiau, DOFAW's management and research station and Wai'auia. A continuous trail between these areas will require boardwalk segments, and trails would be designed and sited to adequately separate pedestrians from residential neighborhoods. An earlier plan to improve the access road from Kailua Road to the YMCA parking lot (serving Ulupō Heiau) is no longer included. DSP will continue to coordinate with the YMCA to address use and activities associated with the access road separately from this project.
YMCA access road should not be re-opened and widened for access to Ulupō Heiau. Concern with buses using this access road. Concern with people loitering in area around YMCA access road.	
Kūkanono Neighborhood	
Need for security and traffic safety measures for traffic in Kūkanono neighborhood. There are existing concerns and problems, e.g., heavy traffic from the YMCA and Faith Baptist Church, cars speeding and failure to obey stop signs.	Existing concerns from activities and guests of the YMCA and Faith Baptist Church (now Daybreak Church) would need to be addressed by those organizations. Traffic impacts on the Kūkanono neighborhood from project improvements will be addressed in the EIS. If necessary, mitigative measures addressing project effects will be identified. We note that Hawaiian community organizations are committed to addressing potential impacts associated with activities at Ulupō Heiau. The plan does not include any actions to acquire private property from residences for Ulupō Heiau improvements.
Residents do not want property taken again or encroached upon.	
Proposed development will increase traffic, effect neighborhood roads, and don't meet the needs of neighborhood.	
Kailua native Hawaiian community organizations are committed to minimizing potential negative impacts from improvements on nearby neighborhoods.	
Kawainui State Park Reserve, Kalāheo Section	
Kayak and canoe storage and launch areas with restrooms are needed to support programs at Kalāheo High School and Le Jardin Academy.	Plans at this site include canoe storage, a launch area, and restrooms. Canoe storage and launch from this site is intended for schools reducing the potential traffic along the canal, but DSP could allow other organizations to launch. Concerns about canoe and vehicular traffic will be addressed in the EIS. In response to resident concerns about security, the proposal for a pedestrian bridge has been removed from the plan.
Amount of potential canoe traffic along Kawainui Canal is a concern.	
Increased vehicular traffic in area is a concern.	
Pedestrian bridge from park site allows access to back yards of residences and presents a security concern.	

Table 8.1
Summary of Comments on Draft Master Plan Report (May 2014)

Summary of Comments	Response
Wai'auia Area	
Support for burial preserve (reinternment site) at Wai'auia. Center will allow for proper care and maintenance of reinternment site.	Comment acknowledged.
Kapa'a Hawaiian Cultural Complex	
Comments on cultural center design: • Facility should be designed for low environmental impact; • Use alternative energy with the goal of LEED-certification; • Architecture should support native Hawaiian cultural character; and • Blend into surrounding landscape.	The Hawaiian Cultural and Environmental Complex is planned to be developed using sustainable building guidelines. The plan recognizes the importance of Kawainui to Hawaiian cultural practitioners. The plan identifies areas for cultural activities that will include stewardship opportunities in partnership with DOFAW of the natural resources in the study area. The Hawaiian Cultural and Environmental Center site is envisioned to have a specific cultural focus, and would be operated by a nonprofit entity under a long-term lease with DOFAW. This use may have more restricted access based on lease conditions.
It's important that cultural and educational centers are located at Kawainui (i.e., not in Kailua town as some have recommended) in recognition of Kawainui's cultural significance.	
City-owned property situated between the Hawaiian Cultural Complex and the road is not addressed in the plan.	The EIS will address City-owned property associated with Kapa'a Quarry Road, and pertinent information incorporated in the final master plan. The City has indicated that the project area will have access to the municipal sewer system. Capacity reservation is contingent on permitting and approval by the City.
Hawaiian cultural complex will not have access to the City sewer system.	
Kawainui State Park Reserve, Nā Pōhaku Section	
Safe parking for volunteers working at Nā Pōhaku is important. Lack of parking creates dangerous conditions by forcing parking in unmarked spaces on side of road.	Parking will be provided on site to accommodate future visitors to the proposed educational center along with visitors to Nā Pōhaku, volunteers, and those using the pedestrian path for outdoor recreation. This addresses concerns with current parking along the roadside. There will be gates with posted park hours, and parking areas will be chained to regulate visitation during closed hours.
Concerns with tour bus use can be addressed by chaining parking areas.	
Organizations intend to continue lowland native forest restoration work at Nā Pōhaku and Kawainui.	This area is planned to include the education center, and would be open to the public for educational and passive outdoor recreational activities (pedestrian paths). Organizations have worked to re-establish a lowland native forest at Nā Pōhaku, and the master plan supports the continuation of these activities and stewardship of the area. Facilities planned at this site are intended to support volunteer restoration activities by providing storage sheds and shelters.
Facilities (storage sheds, shelters) needed for volunteer restoration activities.	
Lo'i kalo should also be established within wetland area in accordance with native Hawaiian customary rights and practices.	Establishing lo'i kalo within designated areas as part of cultural practices will be considered and evaluated by DOFAW in relation to its effects on their wetland restoration and waterbird habitat improvements planned. Planting endemic plants, native fruit trees, etc., would be allowed in upland areas as part of reforestation efforts supporting cultural practices and educational programming. However, such activities conducted as part of agricultural farming and production would not be permitted because that may be considered commercial activity.
In addition to endemic plants, native fruit trees (e.g. breadfruit, mountain apple), dryland kalo and sweet potato should be grown. Create farmer's co-op to support educational and environmental activities.	

Table 8.1
Summary of Comments on Draft Master Plan Report (May 2014)

Summary of Comments	Response
Support Ke Kahua O Kūali'i continuation of cultural lua practices and other activities.	DSP is permitting this organization to conduct current cultural lua practices and other activities at this site as part of a 5-year agreement. However, no facility improvements are included.
Education center is not necessary on this site if the Hawaiian Cultural Center and the environmental complex are built down the road.	The educational center is still necessary at this site because it serves a different purpose than the Hawaiian Cultural Center. The education center would function as a visitor center open to the public, serve as a focus for viewing and learning about Kawainui, and provide access to pedestrian paths. It would also include additional structures supporting a kauhale concept using traditional pole and thatch Hawaiian structures. These structures would be associated with interpretive elements as part of the education center's operation, and open to the public. Operation of the education center with kauhale area would be by a nonprofit organization. In contrast, the Hawaiian Cultural Center would support cultural practices, programs and stewardship of the area predominantly among native Hawaiian organizations. The center would be used to participate in DOFAW and DSP educational programs and operated by a nonprofit organization, but not be open to the public.
Education center will significantly modify views from Kailua town.	We do not agree that proposed actions in this area will significantly modify views from Kailua Town. The plan recommends development of design guidelines to ensure physical improvements are compatible with the natural setting and cultural heritage of the area. Additionally, structures will utilize low-impact development techniques and local and sustainable building materials. The EIS will address potential visual impacts of proposed actions.
Hāmākua Marsh/ Pu'uoehu	
Sturdy predator-proof fencing needed to protect water birds.	Protective fencing will be installed by DLNR around wetland areas to provide predator protection for water birds. Property boundary fencing will be provided to improve management of area and access, and security services provided by DOCARE.
Maintenance and security needed because of transient community living adjacent to marsh.	
DOFAW Research Station	
Support research station improvements to allow DOFAW to continue restoration efforts.	Comment acknowledged.
Kapa'a: Vegetation Processing Area	
Support vegetation processing area for wetland restoration and upland reforestation. Needed to support the removal of trees maturing and spreading in the central Kawainui.	Comment acknowledged.
Various Issues	
Public Access	
Pedestrian trails, boardwalks and causeways will bring more people to Kawainui, changing the character of the area	Restoration activities have greatly improved what for years was a neglected and degraded environment at Kawainui. Hawaiian community groups have restored a lowland native forest at Nā Pōhaku; ranching structures at the former Cash Ranch have been removed; cattle ranching has been replaced by restoration ponds supporting waterbird habitat; and Hawaiian community groups have replaced overgrown,
Pedestrian trails will increase number of homeless around the marsh and give undesirable people greater access to residential areas.	

Table 8.1
Summary of Comments on Draft Master Plan Report (May 2014)

Summary of Comments	Response
Need to control access to areas and facilities for security reasons.	invasive vegetation around Ulupō Heiau with lo'i kalo and native plants. The goal of providing appropriate access within the project area is to continue and expand these types of efforts at Kawainui and Hāmākua. Public access also provides opportunities to experience, learn about, and appreciate the area's natural and cultural resources. We believe that this awareness and appreciation is critical in developing and sustaining public support for continued stewardship activities. Visitors will not be allowed in wetland areas. Access to various sites in upland areas will be controlled by gated entry points, future lease agreements, or available parking. Structures serving the education center and viewing decks are planned to be modest in scale, appropriate for the site, and support passive outdoor recreation, education, and public enjoyment of the resource. Modifications have been made to concepts included in the draft master plan in response to concerns about access. The modifications include elimination of the pedestrian bridge over Kawainui Canal between Kalaheo Park and the levee; removal of the access road improvements at Ulupō Heiau from Kailua Road; and designation of trails on Pu'uoehu for DOFAW program use only.
Number of Structures/Intensity of Development	
Restored marshes in other states and countries have successfully included trails, boardwalks, parking lots, and restrooms that are maintained and regulated. These resources are enjoyed by the surrounding communities.	Master plan concepts are intended to enhance wetland and wildlife habitat and support other agency and community objectives. These include public education, supporting native Hawaiian cultural practices, increasing stewardship opportunities and partnerships, and providing passive outdoor recreational opportunities. At each location, the proposals and concepts were influenced by the unique physical features and land forms, environmental conditions, and land use restrictions. The extent of structures illustrated at each site represents a notional scenario that provides flexibility for future design refinements, while minimizing potential impacts on the environment. The EIS process will estimate visitors to Kawainui and Hāmākua, and assess the effects on waterbirds and natural environment. Ho'omaluhia Botanical Park will also be evaluated as a reference resource. Public parking areas are already limited, and other improvements would be evaluated to support DOFAW and DSP management of this area. The plan will clarify that hotels or other visitor accommodations are not included as part of project improvements.
Activities and facilities comprise small portion of total site acreage and will not be environmentally intrusive.	
Carrying capacity analysis needed to understand number of visitors the marsh can sustain.	
Ho'omaluhia Botanical Park in Kaneohe is an example of an attractive and well-maintained complex that works and is a good public resource. It has trails, pavilions, parking, restrooms, visitor center, classrooms, conference rooms, maintenance facilities, etc. The buildings and parking are not detrimental to the experience.	
Multipurpose facilities and parking areas should be used to reduce the number of improvements (e.g., two educational centers could be consolidated into one multipurpose facility. Parking lots across multiple sites could be consolidated into a single lot)	

Table 8.1
Summary of Comments on Draft Master Plan Report (May 2014)

Summary of Comments	Response
Include physical and operational restrictions to enforce capacity limits (e.g., parking stall that could be offered for school buses but closed to unscheduled buses). Without explicit limitations, increased development can have adverse cultural and environmental impacts.	
Number of buildings and parking lots are not appropriate for wildlife sanctuary.	
Plan needs to clarify potential of hotels, motels, or bungalows being included.	
Traffic and Vehicular Access	
Proposal for 11 parking lots will increase traffic and impact Kailua roadways.	A traffic assessment will be conducted during the EIS process to identify potential traffic impacts resulting from the plan proposals. The traffic study will also include recommendations to mitigate any impacts. The majority of vehicle access points around Kawainui will be controlled; that is, entries and parking areas will only be open for use at certain times. Access at Hāmākua is already controlled in this way. Some proposed parking areas are intended to support stewardship and/or cultural activities, whereas other areas are intended for public access. The EIS will evaluate the possibility of integration of proposed project pedestrian trails with the Koʻolau Greenbelt and Heritage Trails System.
How will traffic and increase in visitors be managed, especially near residential neighborhoods such as around Ulupō Heiau?	
Consolidate parking lots between improvements and direct people to trail access, especially for sites adjacent to residential neighborhoods (e.g., Ulupō Heiau).	
Consolidate the five entry points along Kapa ʻa Quarry Road into two to increase safety.	
Address how project will be integrated within Koʻolau Greenbelt and Heritage Trails System.	
Safety and Security	
A security plan that coordinates with DLNR Division of Conservation and Resources Enforcement (DOCARE) and Honolulu Police Department (HPD) should be provided to support maintenance of the area.	The EIS will address safety and security issues in the project area and identify measures or guidelines to enforce existing State regulations.
Final plan should address how security measures will be implemented in each section.	
Long-Term Management and Maintenance	
Concern that facilities and parking areas will not be maintained and regulations will not be enforced.	The Draft Master Plan (p. 4-22) outlines general management and maintenance strategies including property boundary fencing, locked gates at all entries, posted signage with rules and regulations, dedicated security personnel to enforce rules and regulations, and enforcement of administrative rules for State Wildlife Sanctuaries and State Parks. DOFAW will continue to manage this project area using their management and research station at Kawainui. DSP would manage their areas of jurisdiction that includes Nā Pōhaku, Ulupō Heiau State Historical Park, and the park site at Kalāheo. State lessees may be required to manage and maintain their facilities in accordance with established guidelines for maintenance and upkeep.
Unmaintained facilities will attract homeless, illegal activities, and vandalism.	
Reduce the number of facilities and parking lots to reduce management and maintenance effort.	

Table 8.1
Summary of Comments on Draft Master Plan Report (May 2014)

Summary of Comments	Response
	The number of structures illustrated in the plan are part of DOFAW's management and research center, educational program areas, support cultural activities and practices, and passive outdoor recreational activities. The actual number of structures built depends on funding availability and may be less than shown on the plan.
Establish a single set of administrative rules governing the entire project area to facilitate management and enforcement, rather than having multiple sections with different rules.	Creation of an administrative entity or new administrative rules will be at the discretion of DLNR. There is a long-standing stakeholder coalition, Hoʻolaulima iā Kawainui (Hoʻolaulima), which has served as an advisory committee on Kawainui issues. Hoʻolaulima is an appropriate entity to work with in establishing a future community advisory board. State lands are not being privatized, and DLNR can issue leases or other permits providing more exclusive use of areas. However, all nonprofit organizations obtaining such rights would include provisions to support educational programs and stewardship partners with DLNR.
Don't privatize public land. Limiting public access to specific times and conditions may be justified to protect the resource, but public lands should not be reserved for exclusive use by any group.	
Create administrative entity to coordinate with DLNR and nonprofit organizations to administer educational programs, restoration activities, and manage cultural and natural resources.	
Create a community advisory board attached to DLNR to involve community in implementation and decision-making. Board should have stakeholders from different groups.	
Cultural Significance and Use	
A permanent Hawaiian presence in Kawainui-Hāmākua marsh is needed and important for resource preservation.	A goal of the plan is to re-establish a permanent native Hawaiian cultural presence in the project area, and to foster partnerships for long-term management and stewardship of the area's natural resources. Fishpond restoration is not part of the master plan concepts because wetland restoration and waterbird habitat enhancement are the priority. However, it could be something considered for some integration within wetland restoration improvement areas by DOFAW in the future.
Kawainui can be a place for kupuna to share knowledge of culture, skills, crafts, and traditions. Loss of cultural knowledge is grave concern. Cultural center will serve future generations.	
ʻAhahui Mālama I Ka Lōkahi and other native Hawaiian organizations will assist DLNR with restoration and management of project area.	
Restore Kawainui as a functioning fishpond (loko iʻa).	
Master Plan provides the cultural balance Kailua desperately needs.	
Funding	
Nonprofit organizations should work together to pursue grants for restoration efforts.	The master plan represents a long-term vision for the complex, and improvements will be implemented over time subject to funding by the Legislature. A variety of funding sources and partnerships—between government, nonprofit, business community, and community organizations are required. Cooperation between community stakeholders is critical to the successful implementation of the plan.
Harold K.L Castle Foundation has made several grants to support restoration, education, etc. and will continue to support DLNR and nonprofit organizations with future grants.	

Table 8.1
Summary of Comments on Draft Master Plan Report (May 2014)

Summary of Comments	Response
More information is need on the funding needed to manage the area.	
The State doesn't have money to build what is planned.	
Tourism and Commercialization	
Development will bring more tourists and visitors to Kawainui and Kailua town, which is unwanted.	Certain project improvements would attract some visitors to Kawainui to view the resource, visit the education center, or use paths for outdoor recreation since this is a resource of importance to the State. However, this attraction is not expected to have a significant effect on Kailua Town, and the EIS process will estimate visitors to Kawainui and assess the impacts. Plan improvements do not include commercial activity; however, limited commercial use at Kawainui is currently allowed at the discretion of DOFAW under their administrative rules. DOFAW rules limit this to 100 visitors per day. Special use permits from DSP are required for any group over 25 people. DOFAW and DSP will manage and regulate visitors in accordance with their administrative rules in cooperation with DOCARE, and additional management practices will be evaluated during the EIS process. Community concerns about the growth of tourism in Kailua are acknowledged. But this visitor growth has occurred independent of this project, and are likely more associated with the popular beaches and commercial development in Kailua Town.
Will the improvements be open for commercial activities and tours?	
Commercial tourist traffic should not exceed 100 visitors/day for the entire Kawainui and Hāmākua marsh.	
Address how DLNR will enforce regulations limiting commercial activity in sanctuaries and state parks.	
Plan should specify State and DLNR policy goals for each facility.	
Plan needs to specify authorized uses of improvements in a manner that clearly limits potential commercial and tourism activities. Plan as written is too broad.	
The plan does not promote commercial activities or tourism. Concern about commercial/tourism uses are not warranted based on the information presented in plan.	
Archaeological and Cultural Sites	
Archaeological sites and burials should be protected and cared for by native Hawaiian descendants.	A reinterment site is planned as part of master plan concepts at Wai'auia. DOFAW and DSP will continue to coordinate with and consult with native Hawaiian organizations and individuals regarding the protection and care for archaeological sites. Site-specific archaeological surveys will be conducted as appropriate and prior to construction of buildings and structures. Public access will limited to designated areas (e.g. education center, Kalāheo park site) and trails and boardwalks. Environmental conditions in these areas will be thoroughly evaluated prior to construction of trails and boardwalks. Designated trails provide opportunities to enjoy the resource in a managed way, and discourage indiscriminate access into areas that could be environmentally or culturally sensitive.
More archaeological studies/inventory of known sites are needed before area is developed.	
Increased access will lead to disturbance and damage of undiscovered artifacts and historic sites.	
Need to address site selection and design guidelines for new development and treatment of historic properties.	
Endangered Species and Habitats	
Identify sensitive areas that should be fenced and the type of fencing that should be used in the predator control system.	The May 2014 draft plan did indicate locations of protective fencing and boundary fencing. Final fence locations and design type will be determined by DOFAW.
Provide suggestions on how ecosystem of Kawainui will be managed to ensure continued diversity for endangered waterbirds. The plan should discuss how disturbance to endangered birds will be prevented.	The U.S. Fish and Wildlife Service's Recovery Plan for Hawaiian Waterbirds (2011) is a guide to recovery actions. Its recommendations include expansion of open water areas, controlling invasive vegetation, reducing or eliminating predator populations, and managing water levels. Master

Table 8.1
Summary of Comments on Draft Master Plan Report (May 2014)

Summary of Comments	Response
Pedestrian trails will not adversely impact endangered waterbirds. For example, waterbirds do not seem to be adversely impacted by public interaction at Hāmākua Marsh.	plan improvements are specifically intended to accomplish these objectives. Removal of invasive vegetation, including the floating peat mat, will also aid in the migration and survival of indigenous and endemic species.
Plan should discuss whether closure or restricted public use rights for State Wildlife Sanctuaries will be used by DLNR to protect nesting birds and cultural resources in project area.	
Plan should discuss strategies to aid migration of indigenous and endemic fish and crustaceans from ocean to mountain streams.	
Plan should prioritize whole-scale removal of invasive vegetation to increase size of waterbird habitat and food availability.	
Water Quality and Environment	
Plan alters ability of Kawainui to thrive and sustain itself • Pollution from cars and buses (oil, hydrocarbons) will impact ground water resources. • Storm water runoff and sediment transport into wetland.	We do not agree that the plan will alter the ability of Kawainui to thrive and sustain itself. No development is proposed within the wetland, and it is unlikely that the structures proposed in the adjacent uplands will substantially increase pollution from vehicle or stormwater runoff. Approximately 60 acres of urbanized lands currently exists along the Kūkanono hillside next to Kawainui. These urban uses do not appear to have a detrimental impact on the ability of the wetlands to thrive and sustain itself. Rather, threats to the wetland's health have historically been due to neglect and the overgrowth of invasive vegetation. Pollution from the watershed area is an ongoing concern. Kapa'a Stream, Kahanaiki Stream, Maunawili Stream, and Kawainui Canal are important sources of water for Kawainui. Industrial uses within the watersheds impact the quality of water entering the project area. It is beyond the scope of this project to mitigate non-point source pollution from the watershed outside the project area. That said, a healthy, well-functioning wetland can protect water quality by trapping sediments and retaining excess nutrients and pollutants. The proposed management actions, such as removing invasive vegetation, are intended to enhance these critical wetland functions. Proposals that support education and public access ensure there is widespread awareness and ongoing support to continue these efforts.
Address impact of industrial uses on Kapa'a Stream and include plan to mitigate pollution in water before it enters the marsh.	
Address mitigation of heavy metal pollution leaching from the Kapa'a landfill toward marsh.	
Public Participation in Planning Process	
Previous master plan did not provide opportunity for Hawaiian community participation. Perspective of native Hawaiian community is now reflected in the plan for Kawainui.	The planning process for the Kawainui-Hāmākua Complex master plan was designed to provide all stakeholders in the project area equal opportunity to participate in the plan's development. The master plan process included three public meetings, participation in two additional public meetings sponsored by others, and numerous consultation meetings and presentations to stakeholder groups including

Table 8.1
Summary of Comments on Draft Master Plan Report (May 2014)

Summary of Comments	Response
Planning process was open to the community. Meeting notifications were available in the newspaper.	Ho'olaulima iā Kawainui. The master plan has been discussed at several Kailua Neighborhood Board meetings. Materials from DLNR-initiated public meetings have been posted on the project web site for those who could not attend. Members of the public were able to mail or email comments resulting from these public meetings. All comments received were considered. The proposed land uses and activities in the draft master plan represent the recommendations that 1) meet the mission of goals of DOFAW and DSP, 2) represent the wise use of land with the focus on long-term sustainment of the natural resources, and 3) provide community benefits by supporting increased public access, cultural, environmental, and passive outdoor recreational uses. The EIS will discuss comments received as part of that environmental review process. The draft master plan was released for public review in May 2014. Subsequent to its release, modifications have been made to specific plan areas in response to public concerns about the degree of public access, homeowner security, number of structures, and other issues. Specifically, a pedestrian bridge across Kawainui Canal at Kalaheo was removed, parking and access road improvements serving Ulupō Heiau were eliminated, and vehicle access points on Kapa'a Quarry Road were revised to better manage access. The project will now undergo an environmental review process. The public will have opportunity to comment on the forthcoming EIS Preparation Notice (EISPN) and again during the public review period of the Draft EIS. A public informational meeting will also be held during the EIS process, and additional meetings will be held with stakeholders and community organizations.
Plan opponents do not understand cultural importance of Kawainui and the need for a Hawaiian presence and cultural practices.	
Plan opponents place undue focus on traffic, tourist presence, and homeless issues the project may generate.	
Master Plan does not mention community opposition.	
Common concerns and objections raised by community members have not been responded to nor addressed in the draft plan.	
Plan disregards negotiations and suggested changes.	
Recommend creation of community advisory board connected to DLNR to embed community in implementation and decision making process.	
Concern that Environmental Impact Statement (EIS) will not consider the entire project and effects on the Kawainui, wildlife and community.	
More community input and discussion is needed. Reconsider timeline and allow more public input.	
Not everyone could attend meetings when they were held.	
Plan Implementation	
The proposed Request for Proposal (RFP) process to select nonprofits to conduct project area programs appears to be written for pre-determined organizations. The RFP process should be fair and open as required by law.	Concur that the RFP process must be fair and open as required by law. DLNR regulations function as a larger set of rules governing this project site.

8.2 EIS PREPARATION NOTICE

Consultation with various government agencies, community organizations, and individuals was conducted as part of the environmental review process. Publication of the EISPN was included the State Office of Environmental Quality Control's September 23, 2016 issue of *The Environmental Notice*. This initiated a 30-day public comment period that ended on October 24, 2016. In addition, notification of the EISPN's availability was emailed to over 200 contacts included on a project's public contact list, and notification was also posted on the project's website.

Consultation occurred via distribution of the project's EISPN to agencies, elected officials, and community organizations. Copies of the project EISPN were distributed to the individuals and parties listed below. In addition, several comment letters were received from other organizations and individuals that accessed the publically available EISPN for review.

A listing of those parties consulted is below with those providing written responses identified with a "»" symbol. Copies of written comments received and responses to these comments are included in Appendix A.

Federal

U.S. Department of the Army, Honolulu District Corps of Engineers, Regulatory Branch
» U.S. Department of the Interior, Fish and Wildlife Service
» U.S. Department of the Interior, U.S. Geological Survey
U.S. Department of Agriculture, Natural Resources Conservation Service
U.S. National Oceanic and Atmospheric Administration, National Marine Fisheries Service
U.S. Environmental Protection Agency, Region 9

State of Hawai'i

» Department of Accounting and General Services (DAGS)
Department of Business, Economic Development and Tourism (DBEDT)
DBEDT, Director
DBEDT, Land Use Commission
» DBEDT, Office of Planning
» Department of Defense (DOD)
Department of Education (DOE)
Department of Health (DOH)
DOH, Director
DOH, Clean Air Branch
» DOH, Clean Water Branch
» DOH, Environmental Planning Office
» DOH, Wastewater Branch

State of Hawai‘i (continued)

» DOH, Office of Environmental Quality Control
The Environmental Council
Department of Land and Natural Resources (DLNR)
DLNR, Chairperson
» DLNR, Commission on Water Resource Management
DLNR, Division of Aquatic Resources
DLNR, Division of Conservation and Resources Enforcement
DLNR, Division of State Parks
» DLNR, Engineering Division
» DLNR, Land Division
DLNR, O‘ahu Island Burial Council
» DLNR, Office of Conservation and Coastal Lands
DLNR, State Historic Preservation Division
Department of Transportation (DOT)
Office of Hawaiian Affairs (OHA)

City and County of Honolulu

» Board of Water Supply (BWS)
Department of Community Services
Department of Design and Construction
Department of Emergency Management
Department of Enterprise Services
Department of Environmental Services
Department of Facility Maintenance
Department of Parks and Recreation
» Department of Planning & Permitting
» Department of Transportation Services
» Honolulu Fire Department
» Honolulu Police Department

Utilities, Elected Officials, and Organizations

» Hawaiian Electric Company, Inc.
» Hawaiian Telcom
» Time Warner Oceanic Cable

» Senator Laura Theilen 25th Senate District
» Senator Jill Tokuda, 24th Senate District
Representative Chris Lee, 51st House District
» Representative Cynthia Thielen, 50th House District
» Representative Ken Ito, 49th House District

Utilities, Elected Officials, and Organizations (continued)

Kailua Neighborhood Board (KNB) No. 31
» Planning, Zoning, and Environment Committee
Kāneʻohe Neighborhood Board No. 30
Le Jardin Windward Oʻahu Academy
Maunawili Community Association
Pōhakupu-Kūkanono Community Association
» Pacific American Foundation
Hoʻolaulima iā Kawainui (Hoʻolaulima)
» Castle Medical Center
Harold K.L. Castle Foundation
» ʻAhahui Mālama I Ka Lōkahi (AML)
Hui Kanaka ʻŌiwi
Kailua Hawaiian Civic Club (KHCC)
» Hikaʻalani
Kailua Chamber of Commerce
» Kailua Hawaiian Civic Club
Kailua Historical Society
» Ke Kahua O Kūaliʻi ~~(Ke Kahua)~~
» Hawaiʻi's Thousand Friends
» Lani-Kailua Outdoor Circle
Hui o Koʻolaupoko
Sierra Club, Hawaiʻi Chapter
The Nature Conservancy of Hawaiʻi
Windward Ahupuaʻa Alliance
YMCA of Honolulu – Windward Branch
Kailua United Methodist Church
Daybreak Church
Faith Baptist Church
Pillar Church
Windward Christian Church
Rock Church
Christ Church Uniting Disciples & Presbyterians
HC&D (Ameron Hawaiʻi)
Kapaʻa I LLC (John King)

Listing of Others Submitting Comments on the EISPN

» Aloha ʻAina Health Center, Inc.
» Ms. B.A. Alexander
» Ms. Beth Anderson
» Ms. Beth Anderson with Other Supporting Organizations
ʻAhahui Mālama I Ka Lōkahi (AML)
Conservation Council for Hawaiʻi

Listing of Others Submitting Comments on the EISPN (continued)

Hālau Mōhala ʻIlima
Hikaʻalani
Hui Kailua-Kawainui Ka Wai Ola
Kailua Hawaiian Civic Club
Kailua Historical Society
Pacific American Foundation
Beth Anderson (Board Member, Hui Kailua-Kawainui Ka Wai Ola)

» Mr. Dane Anderson
» Ms. Theodora Baumgartner
» Mr. Bob Bourke
» Ms. Kelley Burg
» Ms. Roxanna Ching
» Ms. Elizabeth Connors
» Ms. Victoria Creed, Ph.D.
» The Conservation Council of Hawaiʻi
» Mr. Kyle Dahlin
» Mr. Derek Esibill
» The Hawaiʻi Audubon Society
» Mr. Scott Ferguson with Other Supporting Organizations
ʻAhahui Mālama I Ka Lōkahi (AML)
Conservation Council for Hawaiʻi
Hālau Mōhala ʻIlima
Hikaʻalani
Hui Kailua-Kawainui Ka Wai Ola
Kailua Hawaiian Civic Club
Kailua Historical Society
Pacific American Foundation
» Ms. Bobbi Gail
» Ms. Gretchen Gould
» Mr. Les Haldane
» Ms. Melinda Hamm
» Mr. Vernon Hinsvark
» Ms. Kirstin Hochart
» Hui Kawainui-Kailua Ka Wai Ola
» Kailua Urban Design Task Force
» Mr. David Kaminskas, MD
» Mr. Mike Kelso
» Ms. Mary King
» Ms. Deborah Kissinger, D.O., Ph.D.
» Ms. Tiffany Lawyer
» Mr. Leonard Lepine
» Ms. Levani Lipton

Listing of Others Submitting Comments on the EISPN (continued)

» Mr. Kukona Lopes
» Ms. Makanani Lopes
» Ms. Pauline Mac Neil
» Mr. Herman Marciel
» Ms. J. Mahealani McClellan
» Mr. John McNelly
» Mr. Steven Lee Montgomery, Ph.D.
» Ms. Janice Nakama
» Ms. Mary Louise O'Brien
» The Outdoor Circle
» Ms. Maya Saffery
» Ms. Lori Paikuli-Stride
» Mr. Mark Paikuli-Stride
» Ms. Teresa Parsons
» Ms. Sue Pignataro
» Ms. Mabby Porter
» Ms. Susan Quick
» Mr. Ted Ralston
» Mr. James Raymond
» Ms. Paula Ress
» Ms. Ursula Retherford
» Ms. Marie Riley
» Ms. Cynthia Rubinstein
» Mr. William Sager
» Ms. Diane Santiago
» Mr. Richard "Kaimi" Scudder
» Ms. Heather Shank
» Mr. David Smith
» Ms. Marie Sode
» Ms. Paulette Tam
» United Church of Christ (UCC) Church of the Crossroads
» Ms. Claudia Webster
» Mr. Michael Weitzenhoff
» Ms. Maryalice Woody

8.3 DRAFT EIS DISTRIBUTION

~~This~~ The Draft Environmental Impact Statement (Draft EIS) ~~has been~~ was prepared for the Kawainui- Hāmākua Master Plan Project, taking into consideration the comments received during the EISPN published. Notice of availability of the Draft EIS ~~is being~~ was published in the Office of Environmental Quality Control (OEQC)'s *The Environmental Notice*.

Hard copies of the Draft EIS ~~are~~ were made available for public review at the Hawai'i State Library (Hawai'i Documents Center), Kāne'ohe Regional Library and the Kailua Public Library. The Draft EIS ~~is~~ was also available for viewing and/or download on OEQC's website and publication of *The Environmental Notice.* A link to OEQC's website for the publication notice and availability of the Draft EIS ~~is~~ was also provided on the project's website below.

Project website:
http://www.hhf.com/kawainui/

A copy of the Draft EIS (on CD) ~~is being~~ was sent to the government agencies, community organizations, and consulted party individuals below.

Federal

U.S. Department of the Army, Honolulu District Corps of Engineers, Regulatory Branch
U.S. Department of the Interior, Fish and Wildlife Service
U.S. Department of the Interior, U.S. Geological Survey, Pacific Islands Water Science Center
U.S. Department of the Interior, National Parks Service
U.S. Department of Agriculture, Natural Resources Conservation Service
U.S. National Oceanic and Atmospheric Administration, National Marine Fisheries Service
U.S. Environmental Protection Agency, Region 9

State of Hawai'i

Department of Accounting and General Services (DAGS)
Department of Agriculture
Department of Business, Economic Development and Tourism (DBEDT)
- DBEDT, Director
- DBEDT, Land Use Commission
- DBEDT, Office of Planning
- DBEDT, Research Division Library
- DBEDT, Strategic Industries Division

Department of Defense (DOD)
Department of Education (DOE)

State of Hawai‘i (continued)

- Department of Hawaiian Home Lands
- Department of Health (DOH)
  - DOH, Director
  - DOH, Clean Air Branch
  - DOH, Clean Water Branch
  - DOH, Environmental Planning Office
  - DOH, Indoor and Radiological Health Branch
  - DOH, Wastewater Branch
  - DOH, Office of Environmental Quality Control
  - The Environmental Council
  - DOH, Solid and Hazardous Waste Branch
- Department of Land and Natural Resources (DLNR)
  - DLNR, Chairperson
  - DLNR, Commission on Water Resource Management
  - DLNR, Division of Aquatic Resources
  - DLNR, Division of Conservation and Resources Enforcement
  - DLNR, Division of State Parks
  - DLNR, Engineering Division
  - DLNR, Land Division
  - DLNR, O‘ahu Island Burial Council
  - DLNR, Office of Conservation and Coastal Lands
  - DLNR, State Historic Preservation Division
- Department of Transportation (DOT)
- Office of Hawaiian Affairs (OHA)
- University of Hawai‘i Water Resources Research Center
- University of Hawai‘i Environmental Center
- University of Hawai‘i, Thomas H. Hamilton Library
- Legislative Reference Bureau

City and County of Honolulu

- Board of Water Supply (BWS)
- Department of Community Services
- Department of Design and Construction
- Department of Emergency Management
- Department of Enterprise Services
- Department of Environmental Services
- Department of Facility Maintenance
- Department of Parks and Recreation
- Department of Planning & Permitting
- Department of Transportation Services
- Honolulu Fire Department
- Honolulu Police Department

Utilities

Hawaiian Electric Company, Inc.
Hawaiian Telcom
Spectrum (formerly Time Warner Oceanic Cable)

Libraries and Media

Hawai‘i State Library, Hawai‘i Documents Center
Kāne‘ohe Regional Library
Kailua Public Library
~~City and County of Honolulu Department of Customer Services, Municipal Library~~
Edwin H. Mookini Library, Hilo Hawai‘i
Kaua‘i Community College Library, Lihue, Hawai‘i
Maui College Library, Kahului, Hawai‘i
Honolulu Star Advertiser
Hawai‘i Tribune Herald
West Hawai‘i Today
The Garden Island
Maui News
Moloka‘i Dispatch

Elected Officials and Neighborhood Boards

U.S. Senator Mazie Hirono
U.S. Senator Brian Schatz
U.S. Representative Tulsi Gabbard
Senator Laura Thielen 25th Senate District
Senator Jill Tokuda, 24th Senate District
Representative Chris Lee, 51st House District
Representative Cynthia Thielen, 50th House District
Representative Ken Ito, 49th House District
City Councilmember Ikaika Anderson, District 3
Kailua Neighborhood Board (KNB) No. 31
Planning, Zoning, and Environment Committee
Kāne‘ohe Neighborhood Board No. 30

Consulted Organizations and Individuals

‘Ahahui Mālama I Ka Lōkahi (AML)
Aloha ‘Aina Health Center, Inc.
Castle Medical Center
Church of the Crossroads, United Church of Christ
Christ Church Uniting Disciples & Presbyterians
Daybreak Church
Faith Baptist Church
HC&D (Ameron Hawai‘i)

Consulted Organizations and Individuals (continued)

Harold K.L. Castle Foundation
Hawai‘i’s Thousand Friends
Hika‘alani
Ho‘olaulima iā Kawainui (Ho‘olaulima)
Hui Kanaka ‘Ōiwi
Hui o Ko‘olaupoko
Kailua Hawaiian Civic Club (KHCC)
Kailua Chamber of Commerce
Kailua Hawaiian Civic Club
Kailua Historical Society
Kailua United Methodist Church
Kailua Urban Design Task Force
Kapa‘a I LLC (John King)
Ke Kahua O Kūali‘i ~~(Ke Kahua)~~
Lani-Kailua Outdoor Circle
Le Jardin Windward O‘ahu Academy
Maunawili Community Association
Pōhakupu-Kūkanono Community Association
Pacific American Foundation
Pillar Church
Rock Church
Sierra Club, Hawai‘i Chapter
The Hawai‘i Audubon Society
The Nature Conservancy of Hawai‘i
Windward Ahupua‘a Alliance
Windward Christian Church
YMCA of Honolulu – Windward Branch

Barbara Alexander
Tania Alston
Charles K. Burrows
Kevin Butterbaugh
Mapuana deSilva
Bobbi Gail
Melinda Hamm
Diane Harding
Vernon Hinsvark
Levani Lipton
Stephen Mechler
J. Mahelani McClellan
Pauline Mac Neil

Consulted Organizations and Individuals (continued)

Linda Paul
James Raymond
Marie Riley
David Smith
Kathy Triolo

Other Interested Individuals ~~Stakeholders~~

The individuals listed below submitted written comments during the EISPN review period. They ~~will receive~~ received email notice of the on-line availability of the Draft EIS for public review and/or download from OEQC's website. In addition, other individuals included on the project's contact list ~~will also be~~ were also emailed notice of the on-line availability of the Draft EIS.

Ms. Beth Anderson
Mr. Dane Anderson
Ms. Theodora Baumgartner
Mr. Bob Bourke
Ms. Kelley Burg
Ms. Roxanna Ching
Ms. Elizabeth Connors
Ms. Victoria Creed, Ph.D
The Conservation Council of Hawai‘i
Mr. Kyle Dahlin
Mr. Derek Esibill
Mr. Scott Ferguson
Ms. Gretchen Gould
Mr. Les Haldane
Ms. Kirstin Hochart
Mr. David Kaminskas, MD
Mr. Mike Kelso
Ms. Mary King
Ms. Deborah Kissinger, D.O., Ph.D
Ms. Tiffany Lawyer
Mr. Leonard Lepine
Mr. Kukona Lopes
Ms. Makanani Lopes
Mr. Herman Marciel
Mr. John McNelly
Mr. Steven Lee Montgomery, Ph.D
Ms. Janice Nakama
Ms. Mary Louise O'Brien
Ms. Maya Saffery

Other Interested Individuals (continued)

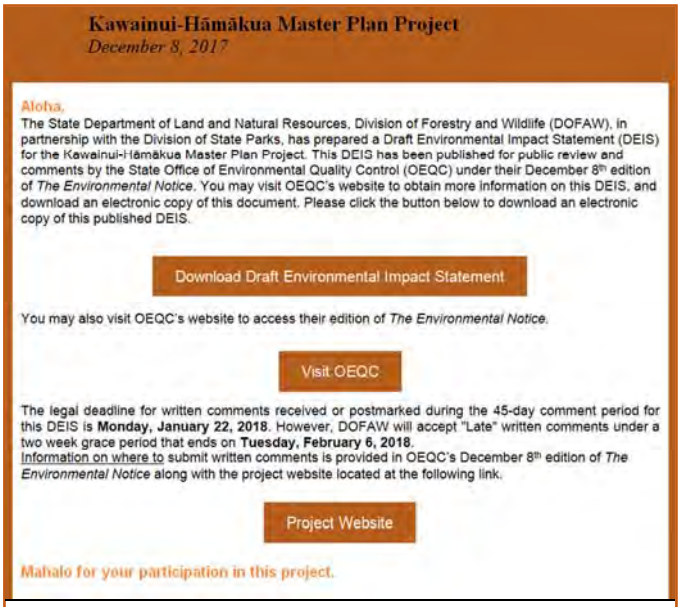
Ms. Lori Paikuli-Stride
Mr. Mark Paikuli-Stride
Ms. Teresa Parsons
Ms. Sue Pignataro
Ms. Mabby Porter
Ms. Susan Quick
Mr. Ted Ralston
Ms. Paula Ress
Ms. Ursula Retherford
Ms. Cynthia Rubinstein
Mr. William Sager
Ms. Diane Santiago
Mr. Richard “Kaimi” Scudder
Ms. Heather Shank
Ms. Marie Sode
Ms. Paulette Tam
Ms. Claudia Webster
Mr. Michael Weitzenhoff
Ms. Maryalice Woody

8.4 DRAFT EIS COMMENTS

The Draft EIS was published in OEQC's December 8, 2017 issue of *The Environmental Notice*. The legal deadline for written comments received or postmarked during the Draft EIS 45-day comment period was January 22, 2018. However, notification was issued as part of the Draft EIS distribution notice that DOFAW would accept "late" written comments under a two week grace period that ended on February 6, 2018.

A copy of the Draft EIS (on CD) was distributed for review to several government agencies, community organizations, and consulted party individuals identified in Section 8.3. CDs distributed included a Participant Letter notifying the party of the grace period deadline for late comments. Hard copies of the Draft EIS were made available for public review at the Hawai'i State Library (Hawai'i Documents Center), Kāne'ohe Regional Library, Kailua Public Library, and other state libraries. The Draft EIS was also available for viewing and/or download on OEQC's website and publication of *The Environmental Notice*.

Notification of this document's availability and grace period for receiving written comments was also emailed to over 400 persons included on a public contact list (Exhibit 8.6). Notification of the Draft EIS availability was similarly posted on the State DLNR, DOFAW website on December 18, 2017. The project's website (http://www.hhf.com/kawainui/) also included notification of the Draft EIS availability and grace period for comments, and provided a link to OEQC's website for the publication notice.



Kawainui-Hāmākua Master Plan Project
December 8, 2017

Aloha,
The State Department of Land and Natural Resources, Division of Forestry and Wildlife (DOFAW), in partnership with the Division of State Parks, has prepared a Draft Environmental Impact Statement (DEIS) for the Kawainui-Hāmākua Master Plan Project. This DEIS has been published for public review and comments by the State Office of Environmental Quality Control (OEQC) under their December 8th edition of *The Environmental Notice*. You may visit OEQC's website to obtain more information on this DEIS, and download an electronic copy of this document. Please click the button below to download an electronic copy of this published DEIS.

Download Draft Environmental Impact Statement

You may also visit OEQC's website to access their edition of *The Environmental Notice*.

Visit OEQC

The legal deadline for written comments received or postmarked during the 45-day comment period for this DEIS is **Monday, January 22, 2018**. However, DOFAW will accept "Late" written comments under a two week grace period that ends on **Tuesday, February 6, 2018**.
Information on where to submit written comments is provided in OEQC's December 8th edition of *The Environmental Notice* along with the project website located at the following link.

Project Website

Mahalo for your participation in this project.

Exhibit 8.6 iContact Notification of Draft EIS Availability

A listing of those parties consulted is provided, with those providing written responses within the two week grace period deadline identified with a "»" symbol. In addition, several written comments were received from other individuals that accessed the publically available Draft EIS for review. Copies of written comments received on the Draft EIS within the two-week grace period deadline along with response letters to comments are included in Appendix A.

Federal

- U.S. Department of the Army, Honolulu District Corps of Engineers, Regulatory Branch
- U.S. Department of the Interior, Fish and Wildlife Service
- U.S. Department of the Interior, U.S. Geological Survey, Pacific Islands Water Science Center
- U.S. Department of the Interior, National Parks Service
- U.S. Department of Agriculture, Natural Resources Conservation Service
- U.S. National Oceanic and Atmospheric Administration, National Marine Fisheries Service
- U.S. Environmental Protection Agency, Region 9

State of Hawai‘i

- » Department of Accounting and General Services (DAGS)
- Department of Agriculture
- Department of Business, Economic Development and Tourism (DBEDT)
  - DBEDT, Director
  - DBEDT, Land Use Commission
  - DBEDT, Office of Planning
  - DBEDT, Research Division Library
  - DBEDT, Strategic Industries Division
- » Department of Defense (DOD)
- » Department of Education (DOE)
- Department of Hawaiian Home Lands
- Department of Health (DOH)
  - DOH, Director
  - DOH, Clean Air Branch
  - DOH, Clean Water Branch
  - DOH, Environmental Planning Office
  - DOH, Indoor and Radiological Health Branch
  - » DOH, Wastewater Branch
  - DOH, Office of Environmental Quality Control
  - DOH, Solid and Hazardous Waste Branch
  - The Environmental Council

State of Hawai‘i (continued)

- Department of Land and Natural Resources (DLNR)
  - DLNR, Chairperson
  - DLNR, Commission on Water Resource Management
  - » DLNR, Division of Aquatic Resources
  - DLNR, Division of Conservation and Resources Enforcement
  - DLNR, Division of State Parks
  - » DLNR, Engineering Division
  - » DLNR, Land Division
  - DLNR, O‘ahu Island Burial Council
  - » DLNR, Office of Conservation and Coastal Lands
  - DLNR, State Historic Preservation Division
- Department of Transportation (DOT)
- Office of Hawaiian Affairs (OHA)
- » University of Hawai‘i Water Resources Research Center
- University of Hawai‘i Environmental Center

City and County of Honolulu

- » Board of Water Supply (BWS)
- » Department of Community Services
- » Department of Design and Construction
- Department of Emergency Management
- Department of Enterprise Services
- Department of Environmental Services
- Department of Facility Maintenance
- Department of Parks and Recreation
- » Department of Planning & Permitting
- » Department of Transportation Services
- » Honolulu Fire Department
- » Honolulu Police Department

Utilities

- Hawaiian Electric Company, Inc.
- Hawaiian Telcom
- Spectrum (formerly Time Warner Oceanic Cable)

Libraries and Media

Edwin H. Mookini Library, Hilo Hawai‘i
Hawai‘i State Library, Hawai‘i Documents Center
Kailua Public Library
Kāne‘ohe Regional Library
Kaua‘i Community College Library, Lihue, Hawai‘i
Legislative Reference Bureau
Maui College Library, Kahului, Hawai‘i
University of Hawai‘i, Thomas H. Hamilton Library

Hawai‘i Tribune Herald
Honolulu Star Advertiser
Maui News
Moloka‘i Dispatch
The Garden Island
West Hawai‘i Today

Elected Officials and Neighborhood Boards

U.S. Senator Mazie Hirono
U.S. Senator Brian Schatz
U.S. Representative Tulsi Gabbard
» Senator Laura Thielen 25th Senate District
Senator Jill Tokuda, 24th Senate District
Representative Chris Lee, 51st House District
» Representative Cynthia Thielen, 50th House District
Representative Ken Ito, 49th House District
City Councilmember Ikaika Anderson, District 3
» Kailua Neighborhood Board (KNB) No. 31 (PZ&E Committee)
Kāne‘ohe Neighborhood Board No. 30

Organizations and Individuals

‘Ahahui Mālama I Ka Lōkahi (AML)
Aloha ‘Aina Health Center, Inc.
Castle Medical Center
Church of the Crossroads, United Church of Christ
Christ Church Uniting Disciples & Presbyterians
Daybreak Church
Faith Baptist Church
HC&D (Ameron Hawai‘i)
Harold K.L. Castle Foundation
» Hawai‘i’s Thousand Friends

Organizations and Individuals (continued)

» Hikaʻalani
Hoʻolaulima iā Kawainui (Hoʻolaulima)
Hui Kanaka ʻŌiwi
» Hui Kailua Kawainui Ka Wai Ola
Hui o Koʻolaupoko
Kailua Chamber of Commerce
» Kailua Hawaiian Civic Club
Kailua Historical Society
» Kailua Kau a Hoʻoilo
Kailua United Methodist Church
Kailua Urban Design Task Force
Kapaʻa I LLC (John King)
» Ke Kahua O Kūaliʻi
» Lani-Kailua Outdoor Circle
Le Jardin Windward Oʻahu Academy
Maunawili Community Association
Pōhakupu-Kūkanono Community Association
Pacific American Foundation
Pillar Church
Rock Church
Sierra Club, Hawaiʻi Chapter
» The Hawaiʻi Audubon Society
The Nature Conservancy of Hawaiʻi
The Outdoor Circle
Windward Ahupuaʻa Alliance
Windward Christian Church
YMCA of Honolulu – Windward Branch

Ms. Barbara Alexander
Ms. Tania Alston
Mr. Charles K. Burrows
Mr. Kevin Butterbaugh
» Ms. Mapuana deSilva
Ms. Bobbi Gail
Ms. Melinda Hamm
Ms. Diane Harding
Mr. Vernon Hinsvark
Ms. Levani Lipton
Mr. Stephen Mechler
Ms. J. Mahelani McClellan
» Ms. Pauline Mac Neil

Organizations and Individuals (continued)

Ms. Linda Paul
Mr. James Raymond
Ms. Marie Riley
Mr. David Smith
Ms. Kathy Triolo

Other Interested Individuals

The individuals listed below submitted written comments during the EISPN review period. They received email notice of the online availability of the Draft EIS for public review and/or download from OEQC's website.

» Ms. Beth Anderson
Mr. Dane Anderson
Ms. Theodora Baumgartner
Mr. Bob Bourke
Ms. Kelley Burg
Ms. Roxanna Ching
Ms. Elizabeth Connors
Ms. Victoria Creed, Ph.D.
The Conservation Council of Hawai‘i
Mr. Kyle Dahlin
Mr. Derek Esibill
Mr. Scott Ferguson
Ms. Gretchen Gould
» Mr. Les Haldane
» Ms. Kirstin Hochart
Mr. David Kaminskas, MD
» Mr. Mike Kelso
Ms. Mary King
Ms. Deborah Kissinger, D.O., Ph.D.
Ms. Tiffany Lawyer
Mr. Leonard Lepine
Mr. Kukona Lopes
Ms. Makanani Lopes
Ms. Mary Louise O'Brien
» Mr. Herman Ka‘imiloa Marciel
Mr. John McNelly
Mr. Steven Lee Montgomery, Ph.D.
Ms. Janice Nakama
Ms. Lori Paikuli-Stride
Mr. Mark Paikuli-Stride

Other Interested Individuals (continued)

Ms. Teresa Parsons
Ms. Sue Pignataro
Ms. Mabby Porter
Ms. Susan Quick
Mr. Ted Ralston
Ms. Paula Ress
Ms. Ursula Retherford
» Ms. Cynthia Rubinstein
» Ms. Maya Saffery
Mr. William Sager
Ms. Diane Santiago
» Mr. Richard "Kaimi" Scudder
Ms. Heather Shank
Ms. Marie Sode
» Ms. Paulette Tam
Ms. Claudia Webster
Mr. Michael Weitzenhoff
Ms. Maryalice Woody

The additional individuals listed below submitted written comments during the Draft EIS review period.

» Ms. Trisha Axelrode
» Ms. Mary Babcock
» Ms. Leona Bangerter
» Ms. Jennifer Barra
» Mr. Timothy Keala Bowden
» Ms. Cathy Chang
» Ms. Tomoko Coles
» Ms. Lynn Cook
» Ms. Marie Coudrier
» Ms. Christine Cube
» Ms. Nola Healani Faria
» Mr. Roland Fenstemacher, Ph.D.
» Ms. Carolynn Ferreira
» Mr. Philip and Ms. Mollie Foti
» Mr. John Foti
» Mr. Timothy Ghormley
» Mr. Taylor Gray
» Ms. Nicole Harbottle
» Ms. Linda Henning
» Mr. Doug Kagawa

Other Interested Individuals (continued)

» Ms. Demetra Noble Kaulukukui
» Ms. Lucinda Keller
» Mr. Charles Koehl
» Mr. Michael and Ms. Anna Lescak
» Ms. Laurel Leslie
» Ms. Charlene Ka‘olu Luning
» Ms. Mary Ann Mack
» Ms. Melody Kapilialoha MacKenzie
» Ms. Leah Magana
» Mr. Daryl Matthews
» Ms. Cynthia Merrick
» Ms. Judy Mick
» Mr. Norikazu Miyata
» Ms. Annette Mueller-Dombois
» Ms. Merle Pak
» Ms. Juliet Pearson
» Ms. Frances Rainin
» Ms. Tadia Rice
» Ms. Kate Righter
» Ms. Phaedra Robinson
» Mr. Kalani Schrader
» Mr. Darel Shea
» Ms. Carol Shibata
» Mr. Dave Shibata
» Ms. Rachael Siciliano
» Mr. John Stimson
» Mr. Michael Lāola Tamāli‘i
» Mr. Dave and Ms. Malia Thurman
» Ms. Malia Tom
» Ms. Cindy Turner
» Mr. Albert Ueligitone
» The Wadas
» Windward Coalition, Ms. Eileen Hilton
» Ms. Lara Wilcox
» Ms. Theresa Paulette Winn
» Mr. Bert Kaleomanuiwa Wong

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CHAPTER 9: LISTING OF PREPARERS



The following is a list of those associated with the preparation of this ~~Draft~~ Final EIS document.

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Division of Forestry and Wildlife

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Mr. Ati Jeffers-Fabro
Project Manager
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O‘ahu Wildlife Manager

Preparer of Environmental Document

HHF Planners

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Mr. Ronald Sato, AICP
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Associate
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Planner

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CHAPTER 10: REFERENCES



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