Chapter 4 - Environmental Setting, Impact & Mitigation

This chapter presents the current description of the environmental setting in the region and within the project area. Mitigation measures identified in this EA have been developed to avoid, minimize, rectify or reduce the project's potential adverse environmental impacts. Mitigation measures have been considered throughout the project's planning process and incorporated into the project's design and construction plans.

The information about existing conditions, potential project impacts and potential mitigation measures presented in this Chapter has been developed through the review and use of existing information related to the project area.

4.1 Introduction

Each section in this Chapter discusses:

(a) Environmental Setting - current conditions and/or management practices in the project area related to the specific environmental subject,
(b) Potential Environmental Impacts and Mitigation Measures - the project's potential long-term operation phase impacts related to the specific environmental subject, and the potential mitigation measures that could be implemented by the project to avoid, minimize, rectify, or reduce potential substantial adverse environmental impacts, and
(c) Level of Impact after Mitigation - the project's relative potential impact that will remain after the potential mitigation measures are implemented.

4.1.1 Environmental Setting

"Environmental Setting" describes the existing environmental conditions in the project area and the region as it currently exists, before the commencement of the project. This provides a baseline for comparing "before the project" and "after the project" environmental conditions.

4.1.2 Potential Environmental Impacts & Mitigation Measures

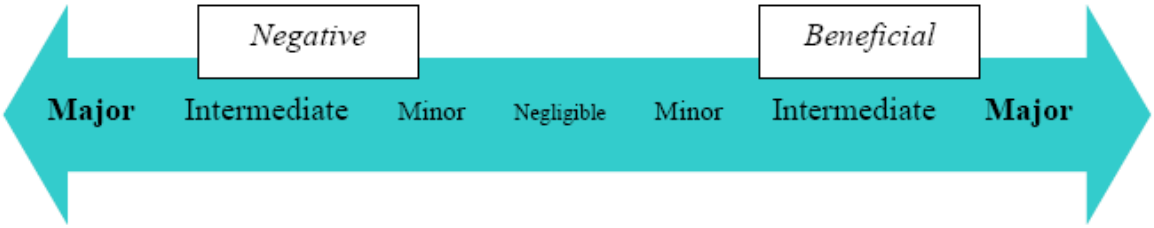
Potential environmental impacts are assessed through thresholds used to determine level of impact. "Thresholds Used to Determine Level of Impact" defines and lists specific criteria used to determine whether an impact is considered to be potentially significant.

Hawai'i Administrative Rules (HAR) Section 11-200.1-13 provides 13 "significance criteria" against which an action is to evaluate its potential impact. In determining whether an action may have a significant effect on the environment, the analysis considers every phase of a proposed action, the expected impacts, and the proposed mitigation measures. In most instances, an action shall be determined to have a significant effect on the environment if it may:

(1) Irrevocably commit a natural, cultural, or historic resource;
(2) Curtail the range of beneficial uses of the environment;
(3) Conflict with the State's environmental policies or long-term environmental goals established by law;
(4) Have a substantial adverse effect on the economic welfare, social welfare, or cultural practices of the community and State;

(5) Have a substantial adverse effect on public health;
(6) Involve adverse secondary impacts, such as population changes or effects on public facilities;
(7) Involve a substantial degradation of environmental quality;
(8) Be individually limited but cumulatively have substantial adverse effect upon the environment or involves a commitment for larger actions;
(9) Have a substantial adverse effect on a rare, threatened, or endangered species, or its habitat;
(10) Have a substantial adverse effect on air or water quality or ambient noise levels;
(11) Have a substantial adverse effect on or be likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, sea level rise exposure area, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters;
(12) Have a substantial adverse effect on scenic vistas and viewplanes, during day or night, identified in county or state plans or studies; or
(13) Require substantial energy consumption or emit substantial greenhouse gases.

Effects were assessed for scope, scale and intensity of impacts to resources. Effects may be identified further as beneficial or negative, as well as short-term and long-term. Scope, scale and intensity can be defined on a range from negligible to major - with evaluation considering whether a proposed action has a significant negative effect or less than significant impact.



(Graphic: Pacific Southwest Research Station-Institute of Pacific Islands Forestry, 2009)

- **Negligible:** Resources will not be affected, or the effects will be at or near the lowest level of detection. Resource conditions will not change or will be so slight there will not be any measurable or perceptible consequence to a population, wildlife or plant community, public use and access opportunity, visitor experience, or cultural resource;

- **Minor:** Effects will be detectable but localized, small, and of little consequence to a population, wildlife or plant community, public use and access opportunity, visitor experience, or cultural resource. Mitigation, if needed to offset negative effects, will be easily implemented and likely to be successful;

- **Intermediate:** Effects will be readily detectable and localized with consequences to a population, wildlife or plant community, public use and access opportunity, visitor experience, or cultural resource. Mitigation measures will be needed to offset negative effects and will be extensive, moderately complicated to implement, and probably successful;

- **Major:** Effects will be obvious and will result in substantial consequences to a local area or regional population, wildlife or plant community, public use and access opportunity, visitor experience, or cultural resource. Extensive mitigating measures may be needed to offset negative

effects and will be large-scale, very complicated to implement and may not have any guarantee of success. In some instances, major effects will include the irretrievable loss of the resource.

Time scales are defined as either short-term or long-term:

- **Short-term or Temporary:** An effect that generally will last less than a year or season;
- **Long-term:** A change in a resource or its condition that will last longer than a single year or season.

The thresholds established correspond to the above criteria and other environmental laws. Each section of this EA presents a significance threshold for its specific environmental subject; should the project potentially cause an impact greater than the identified threshold then the potential impact will be considered to be significant.

"Mitigation Measures" identifies project-specific measures that may be needed that go beyond compliance with applicable existing rules, regulations and requirements, to reduce a potentially significant impact, as applicable. The compliance with existing applicable rules, regulations and requirements is considered a part of the existing regulatory environment, and is described above.

The mitigation measures identified in this EA have been developed to avoid, minimize, rectify or reduce the project's potential adverse environmental impacts. Mitigation measures have been considered throughout the project's planning process and will be incorporated into the project design and construction plans. Project mitigation measures are identified and detailed in subsection 4 of sections 4.2 through 4.18.

4.1.3 Level of Impact after Mitigation

"Level of Impact after Mitigation" indicates what effect remains after application of mitigation measures, and whether the remaining effect will be considered to be significant, or not.

4.1.4 Potential Project Impacts in Context with Applicable Requirements & Mitigation Measures

The potential impacts are evaluated within the framework of the project's compliance with all applicable rules, regulations and requirements for its action type and location. The existing rules, regulations, requirements and procedures applicable to the project are considered a part of the existing regulatory environment.

Rules, regulations and requirements which may be applicable include:

- Hawai'i Administrative Rules (HAR), including (but not limited to):
    - Title 11, Chapter 45, Community Noise Control
    - Title 11, Chapter 54, Water Quality Standards
    - Title 11, Chapter 55, Water Pollution Control
    - Title 11, Chapter 60, Air Pollution Control
    - Title 11, Chapter 62, Wastewater Systems
    - Title 11, Chapter 68, Litter Control
    - Title 11, Chapter 200.1, Environmental Impact Statement Rules
    - Title 11, Chapter 260, Hazardous Waste Management General Provisions
    - Title 13, Subtitle 5, Chapter 107, Threatened and Endangered Plants

- Title 13, Subtitle 5, Chapter 124, Indigenous Wildlife, Endangered and Threatened Wildlife and Introduced Wild Birds
- Title 13, Subtitle 13, Chapter 275-284, Historic Preservation Review Process
- Title 13, Subtitle 13, Chapter 300, Burial Sites and Human Remains

- Hawai'i Revised Statutes (HRS), including (but not limited to):
  - Chapter 6E, Historic Preservation
  - Chapter 195D, Conservation of Aquatic Life, Wildlife and Land Plants
  - Chapter 205, State Land Use Law
  - Chapter 226, Hawai'i State Planning Act
  - Chapter 342D, Water Pollution Law
  - Chapter 343, Environmental Impact Statements
  - Chapter 344, Hawai'i State Environmental Policy

- County of Maui ordinances, rules and requirements, including (but not limited to):
  - County of Maui Countywide Policy Plan
  - County of Maui Lāna'i Community Plan
  - County of Maui Zoning
  - County of Maui Building and Planning Codes

4.2 Archaeological, Historic and Cultural Resources

This section discusses the archaeological, historic and cultural resources in the region and specific project area, the potential impact of the project on those resources and mitigation measures the project will employ to minimize those potential impacts.

Thomas Dye prepared an Archaeological Inventory Survey and Data Recovery Plan for sites within the Miki Basin Industrial Park on May 9, 2018.

4.2.1 Environmental Setting

Lāna'i is sixth in size of the major Hawaiian Islands, and like all islands in the group, it was formed through volcanic eruptions and is constantly being reshaped by erosional activity. The primary caldera is in the area now known as the Pālāwai Basin, which also includes portions belonging to the ahupua'a of Pāwili.

It is estimated that Lāna'i first rose above sea level approximately 1.5 million years ago, and the last eruption occurred approximately 1.25 million years ago. The island is approximately 18 miles long, and 13 miles wide, and Lāna'i Hale, its highest point, stands 3,370 ft. above sea level.

The name of the island may be literally translated as "Day of Conquest"—Lā meaning day and Na'i meaning conquest. Through the tradition of the chief Kaululā'au, Lāna'i was named on the day that the young chief vanquished the evil ghosts from the island.

The earliest traditional lore of Lāna'i describes the arrival of the gods Kāne, Kanaloa, and their younger god-siblings and companions to the southern shores of the island. Later accounts describe the visit of the goddess Pele and members of her family to the windward region of Lāna'i. Subsequent narratives describe

the settlement of Lānaʻi by evil spirits, and the difficulties that the early human settlers encountered in attempts to safely colonize the island.

Another tradition relates that in the early 1400s, a young Maui chief by the name of Kaululāʻau traveled around Lānaʻi vanquishing the evil ghosts/spirits of the island, making it safe for people to live on Lānaʻi, and is the source of the island's name, Lānaʻi a Kaululāʻau.

It was after the events in which Kaululāʻau participated that we see references to chiefly lineages associated with Lānaʻi, and the island fell under the dominion of Maui rulers. The role and fate of Maui's chiefs in warfare with the chiefs of other islands also spilled over to Lānaʻi in the centuries following Kaululāʻau, and lasted through the time of Kamehameha I.

Between the time of Kaululāʻau and his immediate peers until the middle 1700s, there are only a few notable references to chiefly associations on Lānaʻi and several passing references—generally one or two liners—to some event in which a chief visited or was associated with Lānaʻi.

In the 1770s, around the time of western Contact with Hawaiians, Kalaniʻōpuʻu, sovereign of Hawaiʻi Island, attempted to take the Maui group of islands by force. Repelled from Maui, the invading force settled on Lānaʻi for a time and reportedly killed many of the native residents and laid the land to waste. Apparently, Lānaʻi's native population never recovered from this event.

In 1804, the first major epidemic brought to the islands on foreign ships swept through the group. It is estimated that by 1805, 150,000 Hawaiians from Niʻihau to Hawaiʻi died. On Lānaʻi the decline didn't end.

One estimate of the native population on Lānaʻi in ca. 1793 is 6,000. By 1823, Mission Station Journals estimate the population on Lānaʻi to be between 2,000 and 3,000 people, and by the early 1890s the population was around 200.

By 1902, the native population dropped to 80 residents, most of whom were descendants of Lānaʻi's long-term native families. One can only guess how much traditional knowledge of place, practices, and traditions was lost as the population fell from 6,000 to 80 in a little more than a century.

With the exception of the periods from 1854 to 1864 and 1899 to 1901, there were no increases in the population on Lānaʻi. The two periods of increase were tied to western initiatives, the first being an experiment by members of the Mormon Church to establish a station on Lānaʻi between 1854 and 1864. This period led to an increase of more than 300 Hawaiians and a few foreigners, with the majority living in the ahupuaʻa of Pālāwai, and regular travel between the upland settlement and the Mānele landing.

The experiment was in decline by 1858, and though there was a revival between late 1861 and 1864, the Pālāwai experiment was terminated, and the native population continued its historic decline.

The second period of growth, between 1899 and 1901, occurred when the Maunalei Sugar Company brought in some 600 non-Hawaiian laborers to operate a sugar plantation along the windward section of Pālāwai Ahupuaʻa.

One significant contribution to the decline in Lānaʻi's ability to support the resident population was the introduction of grazing herbivores - goats, sheep, and cattle - which were raised to provide foreign vessels with a meat source. These animals, along with the Scandinavian roof rat, produced a rapid and devastating

impact on the ability of Lānaʻi's forest to draw moisture from the wind-borne clouds and develop groundwater resources.

In addition to the introduction of herbivores, the western demand for staple crops such as potatoes, along with the demand for ʻiliahi as a trade item, and the hunger for firewood By the early 1600s, all the islands of the Hawaiian group were settled sufficiently to develop an organized way to manage resources.

Each island was divided into political and subsistence subdivisions called ahupuaʻa, which generally ran from the ocean fishery fronting the land area to the mountains. Under the rule of Piʻilani, Lānaʻi was divided into 13 ahupuaʻa.

A number of historical accounts - those recorded by native residents, visitors, and in various government documents—shed light on a wide range of aspects of the history of Lānaʻi's people. The historical records below provide us with glimpses into the changes on Lānaʻi between ca. 1820 and the early 1900s.

Lānaʻi in 1823 William Ellis, an English missionary who worked with the early Protestant missionaries in the Hawaiian islands, described Lānaʻi, the nature of its resources, and the estimated population in the early 1820s:

> RANAI, a compact island, seventeen miles in length and nine in breadth, lies north-west of Tahaurawe, and west of Lahaina, in Maui, from which it is separated by a channel, not more than nine or ten miles across. Though the centre of the island is much more elevated than Tahaurawe, it is neither so high nor broken as any of the other islands: a great part of it is barren, and the island in general suffers much from the long droughts which frequently prevail; the ravines and glens, not-withstanding, are filled with thickets of small trees, and to these many of the inhabitants of Maui repair for the purpose of cutting posts and rafters for their small houses.
>
> The island is volcanic; the soil shallow, and by no means fertile; the shores, however, abound with shell-fish, and some species of medusae and cuttle-fish. The inhabitants are but few, probably not exceeding two thousand. Native teachers are endeavouring to instruct them in useful knowledge and religious truth, but no foreign missionary has yet laboured on this or the neighboring island of Morokai, which is separated from the northern side of Ranai, and the eastern end of Maui, by a channel, which, though narrow, is sufficiently wide for the purposes of navigation.

A Protestant mission station was established in Lāhaina in 1823, and was responsible for West Maui, Lānaʻi, Molokaʻi, and Kahoʻolawe. Mission station leaders were tasked with overseeing the spiritual, educational, and health needs of island residents. In addition to the Protestant missionaries, Lānaʻi experienced a period of development as a Mormon mission station from late 1853 to early 1864.

An "experiment" brought an increase in Lānaʻi's Hawaiian population, with Hawaiians from other islands moving to Lānaʻi, and also fostered some significant changes on the island, notably in the area of land tenure. The work of the various missionaries and their associates resulted in the creation of an important record of history on the island. Excerpts of reports, personal journals, and articles published in Hawaiian and missionary papers - documenting Lānaʻi population statistics, land use, health, and development of churches and schools - provide important records from Lānaʻi.

Ancient Hawaiian villages, ceremonial features, dryland agricultural fields, fishponds, and a wide range of cultural sites dot the shoreline of Lānaʻi. In the uplands, localities were also locations of significant

traditional settlements and agricultural endeavors. Over the generations, families with permanent residences in the Lāhaina District of Maui frequented Lāna‘i to take advantage of its rich fisheries.

In the period leading up to 1800, there was a decline in the native population, and in the capacity of Lāna‘i to produce agricultural resources. This was, in part, due to disputes between the rulers of Maui and Hawai‘i which overflowed onto Lāna‘i in the mid to late eighteenth century. In the late eighteenth century and early nineteenth century, foreign diseases and influences spread across the islands, leading to a further decline in the population.

Ranching Operations on Lāna‘i, 1854–1951

Goats, sheep, cattle, the European boar, and horses were introduced to the islands between 1778 and 1810. During those early years, Kamehameha I and his chiefs placed kapu over the newly introduced animals to ensure that their populations would grow.

In the fifty-year period from 1780 to the 1830s, populations of these non-native animals—like the hipa (sheep) and pua‘a bipi or pipi (wild steer or cattle), and kao (goats)—grew to become a great nuisance to the Hawaiian population, and had devastating effects on the Hawaiian environment.

Records indicate that the first of these introduced ungulates were brought to Lāna‘i around the 1830s, where a few native tenants, living under landed chiefs, managed the populations. In 1848, a new system of land management was instituted in the Hawaiian Kingdom, and individuals of means were granted large tracts of land. When fee-simple title to land was granted to native Hawaiians and foreign residents who had sworn oaths of allegiance to the king, formal efforts at controlling the hipa, pipi, kao, and other grazers were initiated.

Ranching was a part of Lāna‘i’s history for close to 100 years, in the period from ca. 1854 until closure of the ranch in 1951. Initially, Mormon elders brought livestock to Lāna‘i as a part of their effort to establish a mission in the uplands at Pālāwai. In 1862, Walter Murray Gibson took over the Mormon settlement, and focused the livestock efforts on herds of sheep and goats, of which nearly 100,000 roamed the island, almost uncontrolled by the 1890s.

As a result, Lāna‘i suffered from rapid deforestation and a drying up of the island’s water resources. This impacted every other aspect of life on Lāna‘i and was one of the contributing factors to the continual decline in the native population of the island.

From 1910 to 1951, Lāna‘i ranch operations focused on cattle and a steady decline in the population of other livestock. The steady transition to cattle grazing led to the eradication of tens of thousands of goats, sheep, and pigs—many driven over the cliffs of Ka‘āpahu in Ka‘ā—in an effort to reduce impacts on the steadily decreasing pasturage.

In 1914, the Maui News reported on a visit by rancher-investor J. T. McCrosson to Lāna‘i under the heading “Big Improvements on Lanai.” McCrosson makes specific reference to the leeward pastures on the island, extending from the 150 ft. to 1,000 ft. elevation.

> I spent a week on Lanai inspecting the ranch. The lee side of the island is greener that it has been for years. The finest Pili grass pastures in the Territory extend in a broad belt the whole length of

the island, from 150 feet above sea level to about 1000 feet elevation. The belt varies from a quarter to two miles wide.

Up in the shallow crater that occupies the center of Lanai a good many hundred acres have been plowed and planted in Rhodes grass and Paspalum. It formerly took twenty acres of the wild pasture land to support a bullock. The Paspalum pastures now fatten fifty head of stock on every hundred acres.

In 1929, L. A. Henke published A Survey of Livestock in Hawaii [32], which included the following description of the Lāna‘i Ranch operations. Henke notes that a water line system and extensive fences were made on the island. Describing the basic ranching operations on Lāna‘i, Henke reported

The Island of Lanai, while primarily given over to the growing of pineapples since 1924, still has an area of 55,000 acres of fairly well grassed but rocky and rather arid country extending in a belt around the 55 miles of coast line of Lanai, that are utilized as ranch lands and carry about 2,000 Herefords and 180 horses. This belt is from two to four miles wide and extends from the sea to about 1,000 feet in elevation.

The total area of the Island is about 140 square miles and it ranges in height from sea level to about 3,376 feet elevation, with an average annual rainfall on a great part of the uplands of about 34 inches.

In 1922 before the upper lands were given over to the more profitable pineapples an area of some 2,000 acres had been planted to Pigeon peas (Cajanus indicus) and Paspalum dilatatum. On the lower, rather rocky, present ranch lands the algaroba tree (Prosopsis juliflora) is valuable because of its bean crop, and Koa haole (Leucaena glauca) and Australian salt bush (Atriplex semibaccata) are considered desirable forage crops. It is planned to further improve the lower pastures by additional planting of the above crops and by light stocking and resting present pastures.

In the future the ranch will not do much more than raise beef and saddle horses for the pineapple plantation needs. The ranch, though a part of the Hawaiian Pineapple Company’s property, still operates as the Lanai Company, Ltd.

The Hawaiians formerly herded goats, probably for their skins on the uplands of Lanai, and some agricultural work was done by Walter Murray Gibson, who arrived in 1861, in connection with the Mormon Church. Gibson acquired considerable land and when he died in 1888 his daughter, Talula Lucy Hayselden, became the owner. Gibson and the Hayseldens developed a sheep ranch on the island, much of which was then owned by the Government and by W.G. Irwin.

Irwin later acquired the Government lands and the Hayseldens about 1902 sold out to Charles Gay and nearly the whole island of 89,600 acres was combined under the ownership of Charles Gay, which passed to Irwin in 1910 and from him to John D. McCrosson and associates in the same year, when the Lanai Company, Ltd., was formed. Their interests were sold in 1917 to H.A. and F.F. Baldwin, who in turn sold the property to the Hawaiian Pineapple Co., Ltd., in December 1922, who are the present owners.

Mr. Gay continued with the sheep ranch started by Gibson and Hayselden, probably carrying as high as 50,000 at times, but when the Lanai Company, Ltd., was started in 1910 they changed to

cattle and put in extensive provisions for water and fences, and a count in April 1911, gave 20,588 sheep and 799 head of cattle.

At the end of 1920 there were only 860 sheep and early in 1923 a count showed that the number of cattle had increased to 5,536 and besides 4,462 had been sold during the previous five years. Reduction of the herd to make room for pineapples was started on a large scale in 1924, and from the end of 1922 to October 1928, 6,764 head of cattle were sold.

Mr. Moorhead was manager for the Hayseldens, Mr. Gay managed his own property for a time, Lt. Barnard was manager for the Lanai Company in 1910, and G.C. Munro, the present manager, took charge in 1911.

The ranch ended operations in 1951 when the Hawaiian Pineapple Company decided to focus all its efforts on the pineapple plantation.

Hawaiian Pineapple Company

Historical records reveal that as early as 1910, Lānaʻi ownership investigated the cultivation of pineapple in the leeward Pālāwai Basin. The Hawaiian Gazette reported:

> Several thousand pineapple tops have been sent to Lanai by the Lanai Company to develop its pineapple enterprise.
>
> The pineapple experiment on Lanai has been successful. The first ones raised weighed about eight and a half pounds each, but later ones were not so heavy, on account of the rows being too close. The industry will be developed on the island and made one of the principal by crops. (Hawaiian Gazette, November 22, 1910, p. 8.)

James Dole, owner of the Hawaiian Pineapple Company, purchased the island of Lānaʻi on December 5, 1922. The purchase price of the island was $1.1 million. Nearly $2 million was spent on improvements to the island, for the development of macadamized roads and the town of Lānaʻi City. In 1926, Dole hosted a tour of the plantation and developing city. The 150-person tour of politicians, businessmen, and friends were impressed with the progress that had been made in the short time on Lānaʻi.

Lānaʻi had been often overlooked because the appearance of the island from offshore was dry and desolate, but Dole saw that inland are some arable lands. There were 20,000 acres of land suited to pineapple on the island of Lānaʻi—Hawaiian Pineapple Company considered it as the last of the desirable acreage left in Hawaiʻi. The soil and conditions were desirable, but many improvements had to be made.

Many miles of cactus had to be dragged out and removed from the landscape. The Hawaiian Pineapple Company built a harbor at Kaumālapaʻu with a breakwater made of a solid rock cliff that they had busted and transferred. Roads from the fields to the harbor were paved. One of Hawaiian Pineapple Company's old photos shows neat rows of pineapple, with Lānaʻi City in the background. Lānaʻi City was developed for the workers that were brought over.

Lānaʻi Airport

Aviation history for Lānaʻi began with the creation of an emergency landing strip, there, in 1919. Aviation use was on-again, off-again in different areas of the island for the next few decades.

In its 1928 Annual Report, the Territorial Aeronautical Commission reported the excellent cooperation of the Hawaiian Pineapple Company, in making a suitable field available for emergency airplane landings on the Island of Lāna‘i. The field was at Leinukalahua, Ka‘a.

In 1928, Inter-Island Airways (now Hawaiian Airlines) began operations to Lāna‘i with Sikorsky S-38 eight-passenger amphibious planes. The landing field was owned by the Hawaiian Pineapple Company. In July 1930, the Territorial Aeronautics Commission wrote to Hawaiian Pineapple Company asking if they wished to apply for a license for their field. There was no response.

During 1935, Inter-Island Airways started to replace its 8-passenger planes with 16-passenger planes, which were later (1941) replaced by 24-passenger Douglas DC-3s. The Lāna‘i field was not big enough to accommodate this type of aircraft and once the last of the S-38s were put out of service (shortly after the start of World War II,) air service to Lāna‘i came to a halt.

In 1944, the Post War Planning Division of the Territorial Department of Public Works proposed to construct a new 5,000-foot runway and airport 4-miles southwest of Lāna‘i City (Hawaiian Pineapple Company, Ltd was looking to about 220-acres for the new facility.) “The existing airport is too small for two-engine planes, and the Civil Aeronautics Administration has advised that it is willing to consider an application for a major airport,” the Public Works report stated.

“The dependence of the population upon air service justifies the proposed project. The part of the Lāna‘i pineapple plantation in the Territory’s economy is very great. The present airport, although in operation, is unpaved and is in great need of adequate paving to prevent erosion from severe winds and relatively high rainfall.”

A new airport site for Lāna‘i was chosen and on September 18, 1946, Hawaiian Airlines resumed service there using its DC-3s. The unpaved sod strip field was practically unusable in wet weather and almost untenable due to dust and dirt in dry weather. In view of these conditions, air service was not reliable and it was therefore decided to pave the runway and taxiway.

A Master Plan was prepared (1946) that called for a single 4,200-foot runway. The Territorial Legislature appropriated one-third of the funds, with the rest matched by Civil Aeronautics Administration funds. In 1947, Lāna‘i Airport management was put under the Hawaii Aeronautics Commission.

The 3,700 feet long runway and related facilities, the first field constructed by the Hawaiian Aeronautics Commission, was officially dedicated on July 12, 1948. By 1950, the airport was served regularly by Hawaiian Airlines with twice daily passenger service in two directions and twice weekly freight service. Air mail service was supplied.

Over the years, additions were made to the facility. In 1960, the Maui County Board of Supervisors requested both the State and Hawaiian Airlines to use larger more modern aircraft to provide passenger air service to Lāna‘i. (Hawaiian had changed its fleet from DC-3s to Convairs.)

A new Master Plan called for extension of the runway to a total of 5,000-feet, as wells as new terminal facilities to match the requirements of the newer planes. The new projects were completed and dedicated on October 16, 1966.

On October 1, 1979, the Civil Aeronautics Board Order 79-10-3, the Bureau of Domestic Aviation, defined essential air service for Lānaʻi as follows: "Lānaʻi: A minimum of two daily round trip flights to Honolulu and Kahului providing a total of at least 80 seats in each direction per day."

After minor upgrades, the airport went through another expansion phase. Dedicated April 19, 1994, the new single-story 15,000-square foot terminal was five times larger than the existing and included space for a gift shop and food and beverage concessions and counter space for six airlines.

The Lānaʻi Airport Master Plan Update was published in June 1999. Phase I of the proposed improvements (2000-2010) called for improvements to the airfield, terminal complex, and design, planning, project management and contingency costs.

Lānaʻi City

The story of Lānaʻi City begins when James Dole purchased nearly the entire island of Lānaʻi in November 1922, as a part of the holdings of the Hawaiian Pineapple Company, Ltd. Prior to 1922, the lands on which the city would be built had been grazed as part of the old Lānaʻi Ranch operations, and a large horse paddock at Kaumaikahōkū dominated the pre-city landscape. Plans for building Lānaʻi City were drawn up in early 1923, as Dole and his partners set out to make Lānaʻi the world's largest pineapple plantation.

Coming from Connecticut, Dole was familiar with the design of the "town square" and grid system of laying out streets in such a way that everything was connected to the "green" or park in the middle of town. Under Dole's tenure, the Lānaʻi plantation and city grew, and at one time the island supported nearly 20,000 acres of cultivated pineapple, making it the world's largest plantation. For seventy years, from 1922 to 1992 when the last harvest took place, the name "Lānaʻi" was synonymous with pineapple.

Between 1924 and 1929, Lānaʻi City blossomed upon the landscape; most of the buildings and streets which we still see today were constructed during this short period. By March 1924, the general layout of Lānaʻi City was established and some 40 buildings—many of which remain in the present-day Lānaʻi City - were built or were under construction.

In the early years of the plantation, the largest group of immigrant laborers was made up of skilled Japanese carpenters and stone masons. Their initial work was undertaken on an almost barren landscape, overgrazed by years of sheep, goat, and cattle pasturing.

Following a brief and successful experiment in planting pineapple on Lānaʻi by Charles Gay, James Dole, president of the Hawaiian Pineapple Company, purchased the island of Lānaʻi for $1.1 million dollars in 1922.

Between 1923 and 1925, the city was laid out. It included houses for individual families and group homes for single men; a hospital dispensary; a theater; stores; churches; a hotel; offices; and labor yards. Outlying plantation camps, overlooking Pālāwai, at Miki, Quarry Camp and Kaumālapaʻu, were also built. The Kaumālapaʻu Harbor was also built during this time. As this work was going on, and housing became available, tracts of land in Pālāwai were being cleared of stones and boulders both by hand and with livestock, and then planted in pineapple.

In 1926, James Dole and a large group of island politicians and business backers visited Lānaʻi. They were greeted by the new residents of the island, who were mostly of Japanese origin. By 1930, the population

of plantation employees and their families included 965 Japanese, 867 Filipinos, 102 Koreans, 82 Puerto Ricans, 78 Chinese, 46 Caucasians, and 43 Portuguese. There was also a population of 173 Hawaiians, mostly representative of the old native families, but few were working directly for the plantation.

A series of articles published in the Maui News between 1926 and 1939 provide us with eyewitness accounts of the growth and development of the Lāna‘i pineapple plantation operations and city. Several of these articles are cited below.

The first, published in the Maui News on February 3, 1926, told readers of the visit by James Dole and his associates, as he unveiled the plantation and city to all Hawai‘i. The account, describing development which had occurred on Lāna‘i between 1923 and January 1926, reads

> Sunday was show day at Lanai, the Hawaiian Pineapple Company having chartered the Inter-Island steamer Kilauea to take almost 150 prominent Honoluluans to see what it has done with the property it purchased from Baldwin interests in the way of pineapple developments. The Governor and other territorial officials as well as some of the city and county officials were in the party.
>
> The Kilauea sailed from Honolulu at 10 o’clock Saturday night and discharged her passengers at Kaumālapa‘u at 6 Sunday morning. Awaiting them were some 40 automobiles and they were taken about in cars for their sightseeing trip, most of which were brought with them from Honolulu. James D. Dole, president of the company personally conducted the party. The motorcade started at 7:50 headed by H. Bloomfield Brown in charge of affairs for the company on the island.
>
> Dinner was served at noon and there was speech making, among the speakers being the Governor. A heavy rainfall cut short the sightseeing trip and the Kilauea sailed on her return trip at 3:30. The Hawaiian Pineapple Company has spent for purchase of the property and its development more than $3,000,000 and the visitors were much impressed with what has been done on the property.
>
> Statistics Furnished
>
> The following facts and figures as to Lanai are taken from a folder which was prepared for the excursionists:
>
> Island of Lanai, 140 square miles, 90,000 acres; located 65 miles southeast of Honolulu; estimated pineapple land, 15,000 to 20,000 acres; option on Lanai taken September 5, 1922; option exercised December 5, 1922; population at that time about 150; present population, 1000; elevation of Lanai City, 1650 feet; building of Lanai City commenced August 1923; number of schools, two; attendance, 150; seven miles of asphalt macadam road to Lanai City, eight to 12 inches thick, and 200 feet wide, widened at turns; maximum grade of road to Lanai City, about 6-per cent; water supply lifted 750 feet by electric pump from tunnels in bottom of Maunalei gulch; water brought in six inch redwood pipe through three riders by three tunnels, aggregating 5300 feet in length; capacity of old Kaiholena reservoir, 500,000 gallons; capacity new Kaiholena reservoir, 3,900,000 gallons; electric power generated by 100 KW oil engine generator set, generated at 440 volts, transmitted at 2300 volts; capacity moving picture theater, 450; Kaumālapa‘u harbor development work commenced September 1923; length of break water 300

feet; tonnage of rock in breakwater, 116,000; minimum depth of Kaumālapaʻu harbor, 27 feet; depth of Kaumālapaʻu harbor entrance, 65 feet; length of wharf, 400 feet; number of cattle on ranch at present time, 4000.

By 1930, the population on Lānaʻi totaled 2,356 residents. In the mid-1930s, efforts in expanding the amount of acreage were made, and new laborers, primarily of Filipino and Japanese background, settled on Lānaʻi. All planting, picking, weeding, and most field clearing was done by hand.

There were no pineapple picking machines. The pickers picked by hand, loaded bags, walked to the end of the rows and then loaded the pineapples in boxes.

The boxes were then hand loaded onto trucks and driven down to Kaumālapaʻu, where cranes would load the truck bins onto the barges for shipping to the cannery at Iwilei in Honolulu.

Later, Maui News articles document the following descriptions of Lānaʻi City, the island community, and plantation operations, noting that 16 years after Dole's acquisition of Lānaʻi, the island had become the world's largest pineapple plantation.

The following reports on the success of the Lānaʻi venture were published in 1938 and 1939:

> Ten years ago, Lanai was just another unimportant island on the map of the Hawaiian group; today the Hawaiian Pineapple Co. operates on it the largest pineapple plantation in the world, to supply fruit for its cannery in Honolulu, also the largest in the world.
>
> Ten years ago, Lanai's population was approximately 600, and about 4,000 acres were under cultivation. Today the land under cultivation, has increased five-fold to 20,000 acres, and the island's population has grown to an estimated 3,500.
>
> The five year period from 1925 to 1930 was one of great building activity on Lanai as the pineapple company conducted an extensive building program to provide housing for the hundreds of workers who were arriving almost on every boat to make their homes on the island.
>
> Homes for married couples were erected by blocks, in numerical order. There were model two bedroom homes, with large airy living rooms and spotless kitchens, running water, electricity and spacious grassed yards.
>
> Single men's houses were divided in two by a partition with three furnished rooms in each section. All these houses were supplied with running water and electricity. They were laid out to provide ample space around each house.
>
> Attractive as these homes were eight years ago, they are now being remodeled and made better, finer homes. More spacious rooms are being added and sanitary toilets and baths installed.
>
> These new homes are painted cream white inside and out, with doors stained walnut. Each contains six rooms, four of which are 10 by 12 foot bedrooms with built in drawers and closets. The living room has a floor space of 12 by 16 feet, and the kitchen is 14 by 16 feet. All have built in cabinet cases and pantries. All are supplied with running water. Sanitary toilets, baths and wash basins are installed in all of the homes.

Archaeological Review

Emory's review of the area records the baseline data for the island. Subsequent studies focused on retracing Emory's work in order to inventory the sites that he originally recorded. Likewise, archaeological research has been in support of recent land developments; the majority of this work has taken place near Lānaʻi City.

Emory Survey (1920s)

The earliest archaeological investigation on Lānaʻi Island was conducted by Emory in the 1920s. This investigation was the first archaeological and ethnographic study of Lānaʻi Island. In this work, Emory broadly summarizes Hawaiian cultural traditions of Lānaʻi and includes discussions on the traditional oral histories, place names, material culture, and archaeology. The work is geographically organized around an inclusive gazetteer that is keyed to numbers on an accompanying map.

Since Emory's work was focused on ethnography as well as archaeology, these numbers refer to places of cultural interest in a general sense and may or may not be considered archaeological sites in their conventional sense—as locations that display evidence of past human behavior.

Nevertheless, archaeological sites were included in Emory's survey of Lānaʻi Island, but, like many of his contemporaries, his focus was on larger archaeological sites, most notably the village of Kaunolū located on the southwestern shore of Lānaʻi.

No archaeological sites were recorded by Emory in the vicinity of the project area.

Late Twentieth-Century Investigations

There was a general dearth of archaeological work conducted between the 1920s and the 1970s. The next period of archaeological investigations at Lānaʻi was due to the statewide inventory of archaeological sites that occurred in the mid-1970s. This study was focused toward the relocation of previously identified sites, and the consolidation of that information into the new State Inventory of Historic Places system. It was during this effort that Emory's sites were assigned their State Inventory of Historic Places numbers.

In general, the statewide inventory left the identification of new archaeological sites as a task to be completed for future surveys. Due to this, no new archaeological sites were recorded in the vicinity of the current project.

Following his work on the statewide inventory of historic places, Robert Hommon produced a paper that outlined his general impression of the archaeology of Lānaʻi Island. He noted that Lānaʻi Island contained the greatest degree of relatively untouched archaeology in the Hawaiian archipelago. He states,

> Through a happy set of circumstances, the archaeology of Lānaʻi is almost entirely intact. Despite the fact that nearly 20% of the area of the island is under cultivation for pineapple, less than 2% of the archaeological features recorded by Emory in the early 1920's have been destroyed in the process.

He then argued, given the completeness of the archaeological record, that an Islandwide research design should be developed in order to direct future investigations. This recommendation also appears to respond to a development plan that was proposed by Castle and Cooke that would have substantially

altered the interior and northeast shore of the island. It appears that this broad-scale development of Lānaʻi has not occurred, and no comprehensive island-wide research design is known to have been written.

Cultural Assessment

The following are excerpts transferred from Maly, K., 2016, Cultural landscape considerations that included property around the Miki Basin Indistrial Park.

The culture, beliefs, and practices of the ancient Hawaiians mirrored the natural environment around them. They learned to live within the wealth and limitations of their surroundings.

The earliest traditional lore of Lānaʻi, recorded in the early to middle 1800s, describes the arrival of the gods Kāne, Kanaloa, their younger god-siblings and companions to the southern shores of the island. In the tradition of Kāneʻāpua, we find references to the plateau lands of the Kaunolū, Kalulu and Kamoku. Later accounts describe the visit of the goddess Pele and members of her family to the windward region of Lānaʻi.

Subsequent narratives describe the settlement of Lānaʻi by evil spirits, and the difficulties that the early human settlers encountered in attempts to safely colonize the island. Another tradition relates that in the early 1400s, a young Maui chief by the name of Kaululāʻau traveled around Lānaʻi vanquishing the evil ghosts/spirits of the island, making it safe for people to live on Lānaʻi, and is the source of the island's name (Lānaʻi a Kaululāʻau). Notable events and stories place names are recorded across Lānaʻi in this tradition, the locations of which are still known by some residents.

There is significant archaeological evidence on the island indicating that in the period before western contact, more people lived on the land sustainably—growing and catching all they needed—than currently live upon the island. The earliest population estimates cite at least 6,000 residents on the island.

Several important traditions pertaining to the settlement of Lānaʻi, and the beliefs and practices of the ancient residents, are commemorated at such places as Kaululāʻau, Kalaehī, Ke-ahi-a-Kawelo, Hālulu, Puʻupehe, Pōhaku ō, Kānepuʻu, Kaʻena iki, Nānāhoa, Haʻalelepaʻakai, and Puhi-o-Kaʻala.

Ancient Hawaiian villages, ceremonial features, dryland agricultural fields, fishponds, and a wide range of cultural sites dot the shoreline of Lānaʻi at places like Keone, Kalama nui and Kalama iki, Kaumālapaʻu, Kaunolū, Māmaki, Kapalaoa, Huawai, Kapihaʻā, Hulopoʻe, Mānele, Kamaiki, Naha, Kahemanō, Lōpā, Kahalepalaoa, Kāheʻa, Keōmoku, Kaʻa, Hauola, Maunalei (including a wet land taro field system in the valley), Kahōkūnui, Kaiolohia, Kahāʻulehale, Kahue, Lapaiki, Pōkeana, Awalua, Polihua, and Kaʻena.

In the uplands, localities at Hoʻopulupuluamoa and Malulani, Kōʻele and Kihamāniania, Kalulu uka, Kaunolū uka, Keālia Kapu, Keālia Aupuni, and Pālāwai were also locations of significant traditional settlements and agricultural endeavors. We also know that over the generations, families with permanent residences in the Lāhaina District of Maui frequented Lānaʻi to take advantage of its rich fisheries.

The story of ranching on Lānaʻi spans close to 100 years of the island's history. The "paniolo" (cowboy) heritage of the island is a rich one, with formal ranching efforts spanning ca. 1850 to 1951. Ranching efforts initially focused on herds of sheep and goats, whose numbers on Lānaʻi grew to a nearly uncontrollable 100,000 animals by the 1890s.

The most significant impact of the animals between the 1830s to 1890s was the rapid deforestation and drying up of the island's water resources. Loss of vegetation had an effect on every other aspect of life on Lānaʻi and contributed to the continual decline in the native population of the island.

In 1900, there were around 800 head of cattle on Lānaʻi, while more than 20,000 sheep grazed on the island. In the early 1900s, Charles Gay and family continued ranching large herds of sheep (following the lead of the Gibson and Hayselden operations), though they slowly increased the herds of cattle and horses.

In 1910, Gay sold a large portion of his fee-simple interest in the island to W.G. Irwin and J. D. McCrosson, who formed the "Lānaʻi Company, Ltd.," and focused their ranching interests on cattle, based out of the Kōʻele Ranch Headquarters.

In 1911, Lānaʻi Company, Ltd., brought George Munro to Lānaʻi to manage the ranch operations, and he recognized the dismal state of the environment. Water was a critical issue and, in 1912, a tunneling project between the water source at Maunalei and the ranch headquarters at Kōʻele was completed.

Water could then be drawn up to Kōʻele, where a reservoir was constructed, and piped to remote pasture locations across the plateau lands. In 1917, the Baldwin brothers, of Maui, purchased the Lānaʻi Company, Ltd. ranch lands, continuing cattle ranching in conjunction with the Kahoʻolawe Ranch, and other Baldwin family ranching interests on Maui.

Then in 1922, they sold the Lānaʻi ranch lands to James Dole's Hawaiian Pineapple Company, Ltd., by which time there were more than 5,000 head of cattle, and almost no sheep on Lānaʻi. The Hawaiian Pineapple Company (HAPCo.) maintained the Lānaʻi Ranch operations from 1922 to 1951, when the last round-up took place.

The impacts of uncontrolled grazing and loss of forests and ground cover led to significant erosion from both wind and storm water flow. In many areas wind and rain nearly erased all evidence of traditional Hawaiian residency. This said, anywhere outside of the cultivated pineapple fields, lithic scatter, coral, shell, fire pits, and artifacts are still visible in deflated features, and in sheltered areas in cultural features that retain a high level of integrity.

In the early years of the Lānaʻi Plantation, harvests were picked and bagged in the field and taken to small crates along the roads. The crates were then loaded on wagons (later on trucks) and taken to Kaumālapaʻu Harbor for shipping to Honolulu.

Over the years, various machines and equipment were developed to simplify the planting, watering and harvesting process. Machines laid out mulch paper, marking the planting rows. Large boom and spray sprinklers were developed to water and fertilize the crops.

Conveyor booms 62 feet long - with lights - were developed so fruit could be harvested day and night. Gangs of pineapple pickers would walk along rows of pineapple (planted along contour lines), pick the fruit, toss it on the conveyor and send it to the large bins (of some 7 tons) on the trucks, for shipping to Honolulu from Kaumālapaʻu Harbor.

For almost 70 years, Lānaʻi was the world's largest working pineapple plantation (comprised of some 20,000 cultivated acres). All of the families of Lānaʻi, regardless of their place of origin, proudly observed that they were from the "Pineapple Island."

In 1961, Castle & Cooke bought out Dole Foods' interests, and in the 1970s began planning for new resort and residential developments on Lānaʻi. Those plans never materialized, and in 1985 David H. Murdock bought out Castle & Cooke's interests, which included the island of Lānaʻi.

Under Murdock's ownership, development plans were revitalized, and steps towards phasing out the pineapple plantation acted upon. Although pineapple was once "King" on Lānaʻi, this 70-year tradition ended in 1992 with the final pineapple harvest.

Throughout the years of cultivation, artifacts would periodically be found in the fields. Typically, ulu maika (round, disc-like game stones), koʻi (adze) and other tools would be found, and significant collections of these artifacts are now housed at the Lānaʻi Culture & Heritage Center.

While the land has radically changed where cultivation occurred, the result of 70 years of bulldozing, tilling and erosion, evidence of traditional residency may still be found.

4.2.2 Potential Environmental Impacts & Mitigation Measures

T. S. Dye & Colleagues, Archaeologists conducted an archaeological inventory survey with subsurface testing for the Miki Basin 200 Acre Industrial Development located in the lands of Kalulu and Kaunolū, Lāhaina District, Lānaʻi Island.

The survey evaluated the parcel for the presence or absence of historic properties and cultural materials in support of a zoning change to the project area.

A 100 percent pedestrian survey of the area was conducted and 31 backhoe trenches were excavated.

The pedestrian survey resulted in the identification and documentation of a secondarily deposited historic artifact scatter, a secondarily deposited historic scatter, and an historic property, designated Site 50-40-98-1980. Test excavations included a total of 31 backhoe trenches, one of which yielded a fire-pit feature, recorded as Site 50-40-98-1981.

Both historic properties are evaluated as significant for the important information on Hawaiian history and prehistory that they have yielded.

The Miki Basin 200-Acre Industrial Development will have an adverse effect on both historic properties and it is recommended that a data recovery plan be developed for Sites 50-40-98-1980 and 50-40-98-1981, and that this plan be implemented prior to proposed construction activities within the parcel.

The Inventory survey report recommended that a data recovery plan be developed and implemented prior to construction activities at the Miki Basin 200 Acre Industrial Development.

It was further recommended that the data recovery plan develop research questions that can be addressed with data yielded by the following laboratory tasks:

Site 50-40-98-1980 Analysis of the wood charcoal collected from the Context 15 firepit for taxa identification and ^{14}C dating. Analysis of artifacts collected from the Context 18 lithic scatter to further Investigate the tool-making reduction sequence utilized on the Island.

Site 50-40-98-1981 Analysis of the wood charcoal collected from the Context 12 fire-pit for taxa identification and ^{14}C dating.

T. S. Dye & Colleagues, Archaeologists conducted an Archaeological Data Recovery Plan for Sites 50-40-98-1980 and 50-40-98-1981. The research objectives of the proposed data recovery investigations include gathering data on the history of vegetation change on Lānaʻi.

In an effort to date two periods of change, one during the traditional Hawaiian period and the other In the mid nineteenth century when sheep and goats were raised on the island, and to complete paired technological and geochemical sourcing analyses of the lithic artifacts to determine the reduction sequences for the flaked stone implements, and to determine likely source locations for the fine-grained, tool-grade basalt items in the collection.

Based on the available dating evidence, the charcoal collections at Kaunolū date to late in the traditional Hawaiian sequence and to the early historic period. The lowland native forest at Kaunolū appears to have persisted into the early historic period.

Similarly, several collections of firewood charcoal from Hulopoʻe insecurely dated to the period AD 1300-1850 were composed primarily of native woods, with trace occurrences of ʻulu and kō.

Sites 50-40-98-1980 and 50-40-98-1981 were not determined significant under criterion "e," which pertains to sites that have "an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts - these associations being important to the group's history and cultural identity" (§13-275-6(b)(5)).

Thus, there is no requirement that consultation with members of the relevant ethnic group be undertaken during preparation of this plan.

Should evidence of archeological or cultural resources be encountered during site preparation work or during drilling, then activities at the site will be suspended and Pūlama Lānaʻi and the DLNR State Historic Preservation Division will be contacted immediately for review, evaluation, and recommendations on how to preserve or avoid damage to the resources.

4.2.3 Level of Impact after Mitigation

The property owner will comply with all applicable County, State and Federal laws and rules regarding the treatment of archaeological and historic sites.

In addition, mitigation measures include preparation and implementation of a data recovery plan prior to construction activities, as well as monitoring during construction. These measures will mitigate potentially adverse effects of the industrial development.

Subsequent to mitigation, the project will have a less than significant impact.

4.3 Biological Resources

This section discusses the terrestrial biological resources (flora and fauna) in the region and in project area, the potential impacts of the project on those resources and mitigation measures the project will take to mitigate those potential impacts. This section of the EA takes information from the report prepared by Robert Hobdy.

4.3.1 Environmental Setting

A walk-through botanical survey method was used to cover this 200 acre project area. All parts of this habitat were examined.

A complete inventory of all plant species was made with special attention focused on native plant species and whether any of these were federally protected Threatened or Endangered species that might require special attention or actions.

The project area is situated on gently to moderately sloping lands that were part of a large pineapple plantation. These lands have lain fallow for 25 years since the plantation closed in 1992 and are now overgrown with a dense grassland and shrubs.

Soils consist of three series characterized as Waikapū silty clay loam, 0 – 3% slopes, Moloka'i silty clay loam, 3 – 7% slopes and Uala silty clay loam, 7 – 15% slopes which are all variants of deep, well-drained soils of the upland plateau of Lāna'i, (Foote et al, 1972).

Rainfall averages about 20 inches per year with winter maximums (Armstrong, 1983). Elevations range between 1,150 feet and 1,310 feet above sea level.

Vegetation

The entire project area has lain fallow from agricultural use for 25 years, with some grazing occurring during a few of these years. The vegetation was a dense growth of grasses and shrubs. Thirty-nine plant species were recorded during the survey.

Two species were abundant throughout the project area, Guinea grass (Megathyrsus maximus) and lantana (Lantana camara). Another two species were common, sourgrass (Digitaria insularis) and Madagascar fireweed (Senecio madagascariensis). The remaining thirty-five species were either of uncommon or rare occurrence.

Just three common native plant species were found, 'ilima (Sida fallax), 'uhaloa (Waltheria indica) and 'a'ali'i (Dodonaea viscosa), all of which are widespread and common throughout Hawai'i. These have persisted here in small numbers due to their hardy nature.

The vegetation in this project area is dominated by hardy, invasive non-native species. Just three common native plant species, 'ilima, 'uhaloa and 'a'ali'i, were found here. None of these are of any conservation concern.

No special habitats for native plants were found. Because of the above information, it is determined that there is nothing of special botanical concern with regard to this project. No recommendations with reference to plants are deemed necessary.

Wildlife

A fauna survey was conducted in conjunction with the flora survey. All parts of the project area were covered. Observations were made with the assistance of binoculars.

Notes were made of species, numbers and status as well as on tracks, scat and signs of feeding. An inventory was made of all of the animal species seen in the survey.

In addition, an evening survey was conducted to observe crepuscular activities and calls, and to determine any occurrence of the Endangered Hawaiian hoary bat (Lasirius cinereus semotus) in the project area.

Mammals

Just one mammal species was observed in the project area. A herd of about 20 axis deer were seen and trails, tracks and feeding damage were everywhere. Nomenclature and taxonomy follow (Tomich, 1986).

A special effort was made to look for evidence indicating the presence of ōpe'ape'a or Hawaiian hoary bat by conducting an evening survey at two locations within the project area.

A bat detecting device (Batbox III D) was employed, set to frequency of 27,000 Hertz that these bats are known to use when echolocating for flying insects. No bats were detected with the use of this device.

Other non-native mammals likely to frequent this area include rats (Rattus spp.), mice (Mus domesticus), feral cats (Felis catus) and occasionally domestic dogs (Canis familiaris).

Birds

Birdlife was of moderate occurrence in the project area. Twelve species were observed during three site visits, but none were particularly common. Taxonomy and nomenclature follow the American Ornithologists' Union (2018).

Eight bird species were of modest occurrence, cattle egret (Bubulcus ibis), zebra dove (Geopelia striata), nutmeg mannikin (Lonchura punctulata), gray francolin (Francolinus pondicerianus), northern mockingbird (mimus polyglottos), common myna (Acridotheres tristis), Eurasian sky lark (Alauda arvensis) and Pacific golden-plover (Pluvialis fulva). The other four species were of rare occurrence.

Two native bird species were recorded, the indigenous and migratory kōlea or Pacific golden-plover and the endemic pueo or Hawaiian owl (Asio flammeus sandwichensis).

A few other non-native bird species may occasionally occur in this area, but this habitat is unsuitable for Hawai'i's native forest birds or seabirds.

Insects

Insect life was rather sparse in this habitat during three site visits. Twelve non-native species were recorded, representing five insect Orders. Just one species was common throughout the project area, the monarch butterfly (Danaus plexippus).

Two other species were uncommon, the cabbage butterfly (Pieris rapae) and the short-horned grasshopper (Oedaleus abruptus). Taxonomy and nomenclature follow Nishida et al (1992).

No native insect species were seen.

4.3.2 Potential Environmental Impacts & Mitigation Measures

The fauna recorded in this project area is largely non-native in character. Axis deer are abundant throughout the area and have significantly modified the habitat by reducing plant species to a few hardy dominants. This in turn has a somewhat limiting effect on resource availability for other mammals, birds and insects.

No Endangered Hawaiian bats were detected in the project area during the survey. They are rare on Lāna'i but could occur in this area occasionally. The U.S. Fish and Wildlife Service has guidelines that ensure that these bats are not harmed should they show up.

Just two bird species were native to Hawai'i, the kōlea and the pueo. The kōlea breed and raise their young in the arctic and then migrate to tropical places like Hawai'i to overwinter. Many thousands of kōlea come to Hawai'i every winter. Kōlea are quite common and have no endangered or threatened status.

The pueo is a race of the short-eared owl species that is endemic to Hawai'i. It occurs on all the islands but is rare on O'ahu. It is wide ranging in grasslands and shrublands on Lāna'i. It carries no federal endangered or threatened status.

Two indigenous seabirds the Endangered 'ua'u and the Threatened 'a'o, while not nesting in the project area, do fly over it during dusk to access their burrows high in the mountains and again at dawn to head out to sea.

Young birds taking their first fledging flights are inexperienced fliers. They often are disoriented by bright lights and crash into light structures where they become vulnerable to injury and predators.

It is recommended that any significant outdoor lighting associated with the proposed project be hooded to direct the light downward to mitigate this threat.

No other recommendations with reference to fauna are deemed necessary.

4.3.3 Level of Impact after Mitigation

The project activity will comply with all Federal, State and County laws and rules. Likewise, the project will comply with the recommended mitigations measures to minimize impacts. The project will not have a significant negative impact on any native botanical or fauna resources.

4.4 Visual & Aesthetic Resources

This section describes the existing visual, vista and viewplane conditions on within the project area, discusses the visual impacts the project may have, and identifies how the project mitigates its potential visual impacts.

4.4.1 Environmental Setting

The irregularly shaped project area is located approximately 3.2-miles south of Kaumālapa'u Highway in Lāna'i City, Maui County, Hawai'i.

The site is located approximately three and a half miles to the east of the Pacific Ocean, the Site topographic elevation is approximately 1,247 feet above mean sea level (MSL), and local topography slopes to the southeast.

It encompasses 200 acres within Miki Basin and is adjacent to the 5-acre Maui Electric Company (MECO) generating facility and the existing 20-acre Miki Basin Industrial Condominium.

Lāna'i Airport is located along the northern boundary of the Project site and Pālāwai Basin is located to the east of the site.

Most of the project area topography consists of flat to gently sloping open, patchy scrub lands.

4.4.2 Potential Environmental Impact & Mitigation Measures

The project site is not part of a scenic corridor and the project will not affect scenic vistas and view planes. The proposed project will not involve significant alteration of the existing topographic character of the site.

4.4.3 Level of Impact after Mitigation

The mitigation for the impacts to visual and aesthetic resources will be incorporated into the project's layout and design. Therefore, the level of the visual impact after mitigation will be less than significant.

4.5 Geology, Soils, Slope Stability & Drainage

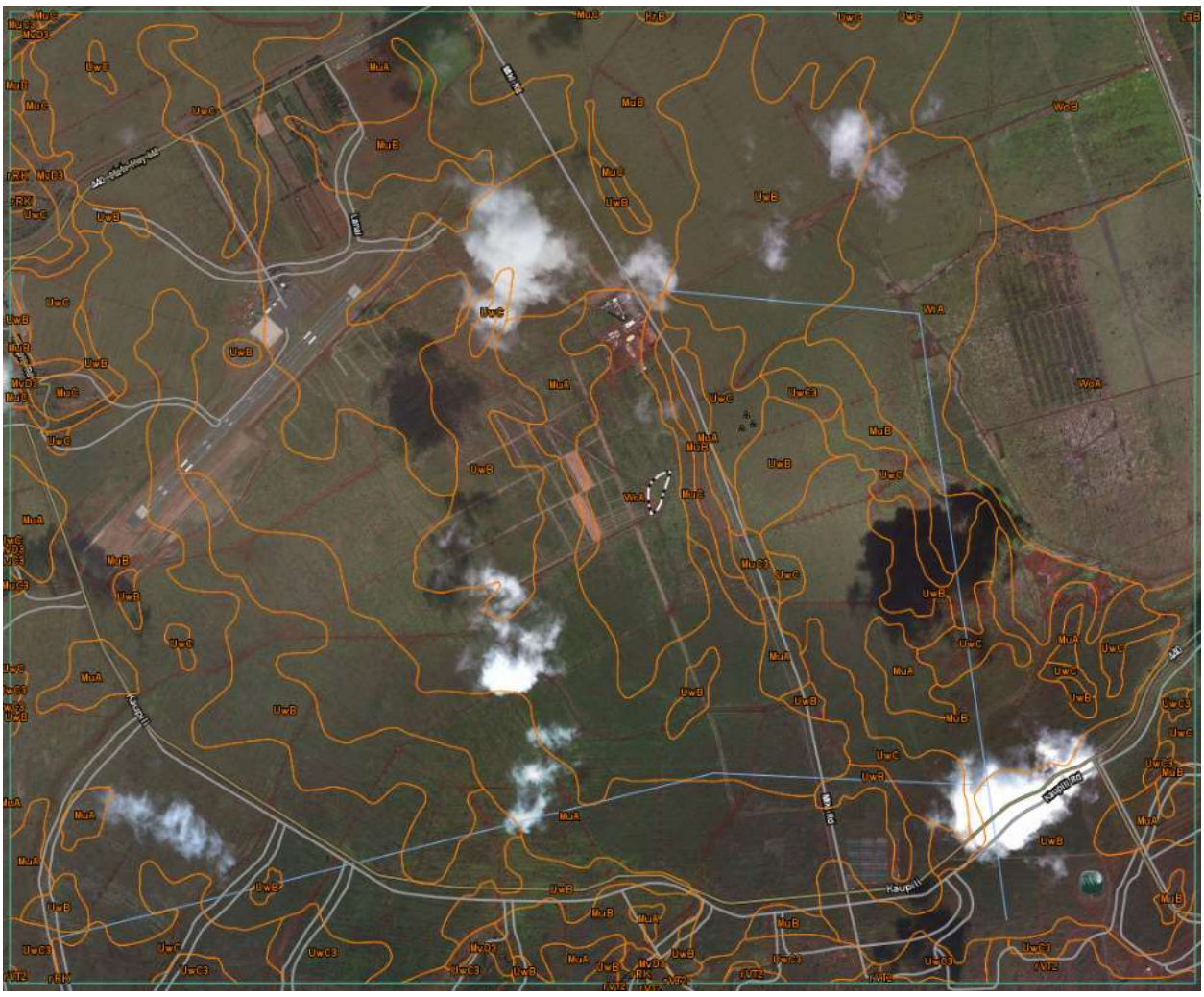
This section discusses the geology, soils and slope stability in the region and site area, the potential impact of the project on those characteristics, and mitigation measures project will employ to mitigate those potential impacts.

4.5.1 Environmental Setting

The description of the Island of Lāna'i here comes from the University of Hawai'i, School of Ocean and Earth Science and Technology (SOEST,) Coastal Geology Group.

Lāna‘i is a single shield that formed from summit eruptions and along three rift zones between 1.2 and 1.46 million years ago; a classic example of a Hawaiian shield with a gently sloping profile. The small sub-circular island has 76-km of general coastline, and a dry climate with minimal stream activity.

Similar to Moloka‘i, overgrazing of domestic and feral animals in the 19th century and widespread deforestation on Lāna‘i have drastically changed the stability of the soil. The vegetation has never fully recovered and there is considerable wind erosion on the island (Macdonald et al. 1986).



Soil Map from websoilsurvey - NRCS

Island of Lāna‘i, Hawaii (HI970)	
Map Unit Symbol	**Map Unit Name**
KrB	Koele silty clay loam, 3 to 7 percent slopes
LaB	Lahaina silty clay, 3 to 7 percent slopes, MLRA 158
MuA	Moloka‘i silty clay loam, 0 to 3 percent slopes, MLRA 158
MuB	Moloka‘i silty clay loam, 3 to 7 percent slopes, MLRA 158
MuC	Moloka‘i silty clay loam, 7 to 15 percent slopes, MLRA 158

Island of Lānaʻi, Hawaii (HI970)	
Map Unit Symbol	**Map Unit Name**
MuC3	Molokaʻi silty clay loam, 7 to 15 percent slopes, severely eroded, MLRA 158
MvD3	Lithic Eutrotorrox, 15 to 25 percent slopes, severely eroded, MLRA 158
rRK	Rock land
rVT2	Very stony land, eroded
UwB	Uwala silty clay loam, 2 to 7 percent slopes
UwC	Uwala silty clay loam, 7 to 15 percent slopes
UwC3	Uwala silty clay loam, 7 to 15 percent slopes, severely eroded
WoA	Waihuna clay, 0 to 3 percent slopes
WoB	Waihuna clay, 3 to 7 percent slopes, MLRA 158
WrA	Waikapu silty clay loam, 0 to 3 percent slopes, MLRA 158

Drainage

RM Towill Corporation was retained to determine the offsite and onsite drainage system requirements for the proposed Miki 200 acre Industrial Site that meets the County of Maui Storm Drainage Standards.

The proposed project site is mostly undeveloped except for the existing Miki Basin Industrial Condominium site and MECO facility.

Existing improvements within the project site include the Miki Basin Industrial Condominium project and MECO facility.

Offsite runoff generated from the area north of Miki Road sheet flows and is intercepted by an unlined ditch along Miki Road. Once in the unlined ditch, the runoff flows towards the southeast direction to a low point in Miki Road, near the existing MECO facility.

The existing onsite terrain is covered with vegetation and slopes at about 5% from Miki Road toward the southeast. There is no existing storm drain system within the project area.

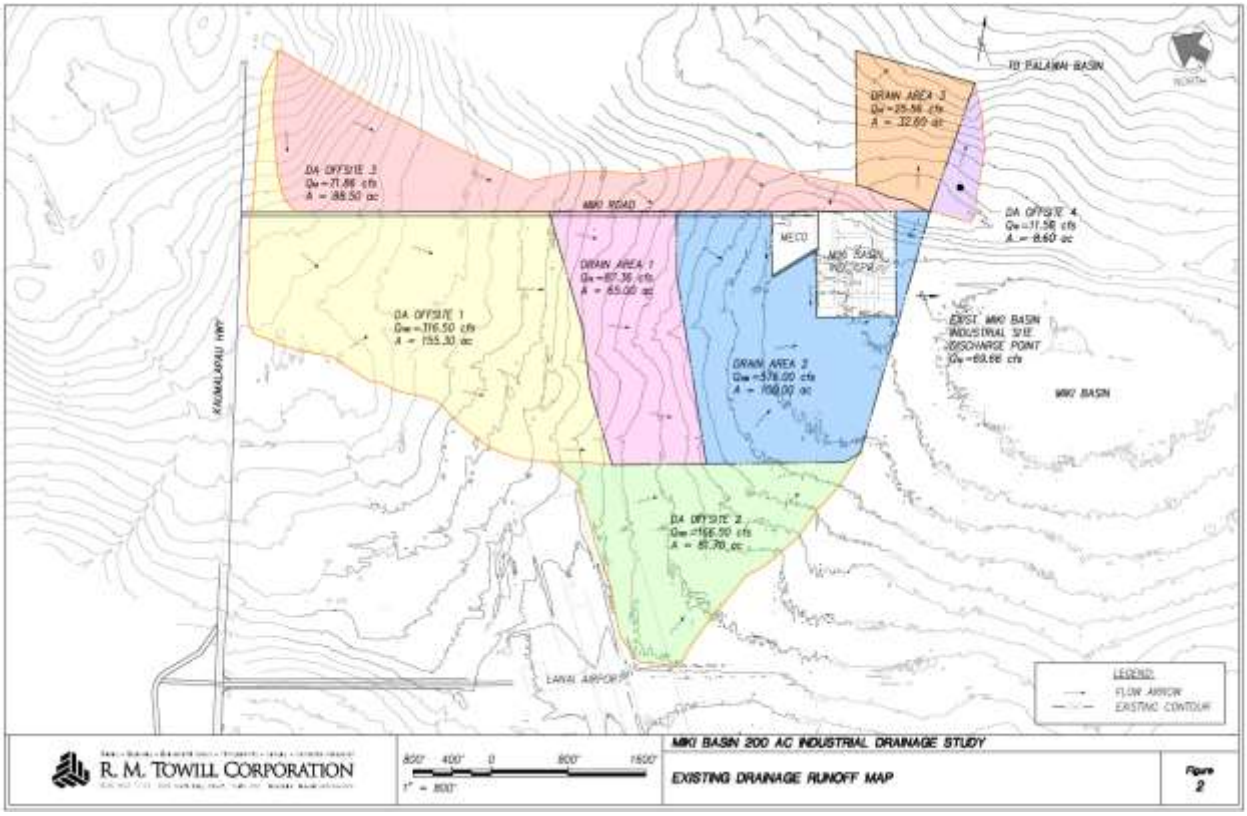
Runoff collected in Drain Area 1 and 2 of the project site flows into existing natural drainage ways and discharges into the existing Miki Basin sump, located approximately 2000 feet away (see Figure 2). Runoff collected in Drain Area 3 flows to the existing Pālāwai Basin.

Runoff generated within the existing Miki Basin Industrial CPR site is collected by an onsite drainage system and is discharged offsite.

Runoff from the Miki Basin Industrial CPR site will not impact the proposed development since it has a separate discharge point, located south of the heavy industrial parcel.

Offsite runoff, including runoff generated from the MECO facility, is diverted around the Miki Basin Industrial CPR site (within the heavy industrial parcel) and is discharged into the existing drainage way. These existing offsite flows will need to be addressed by the development of the heavy industrial parcel.

The proposed 200 acre industrial development will consist of a 65-acre light industrial parcel (Drain Area 1), 100-acre heavy industrial parcel (Drain Area 2), and a 35-acre light industrial parcel (Drain Area 3). This development will increase the amount of impervious area within the project.



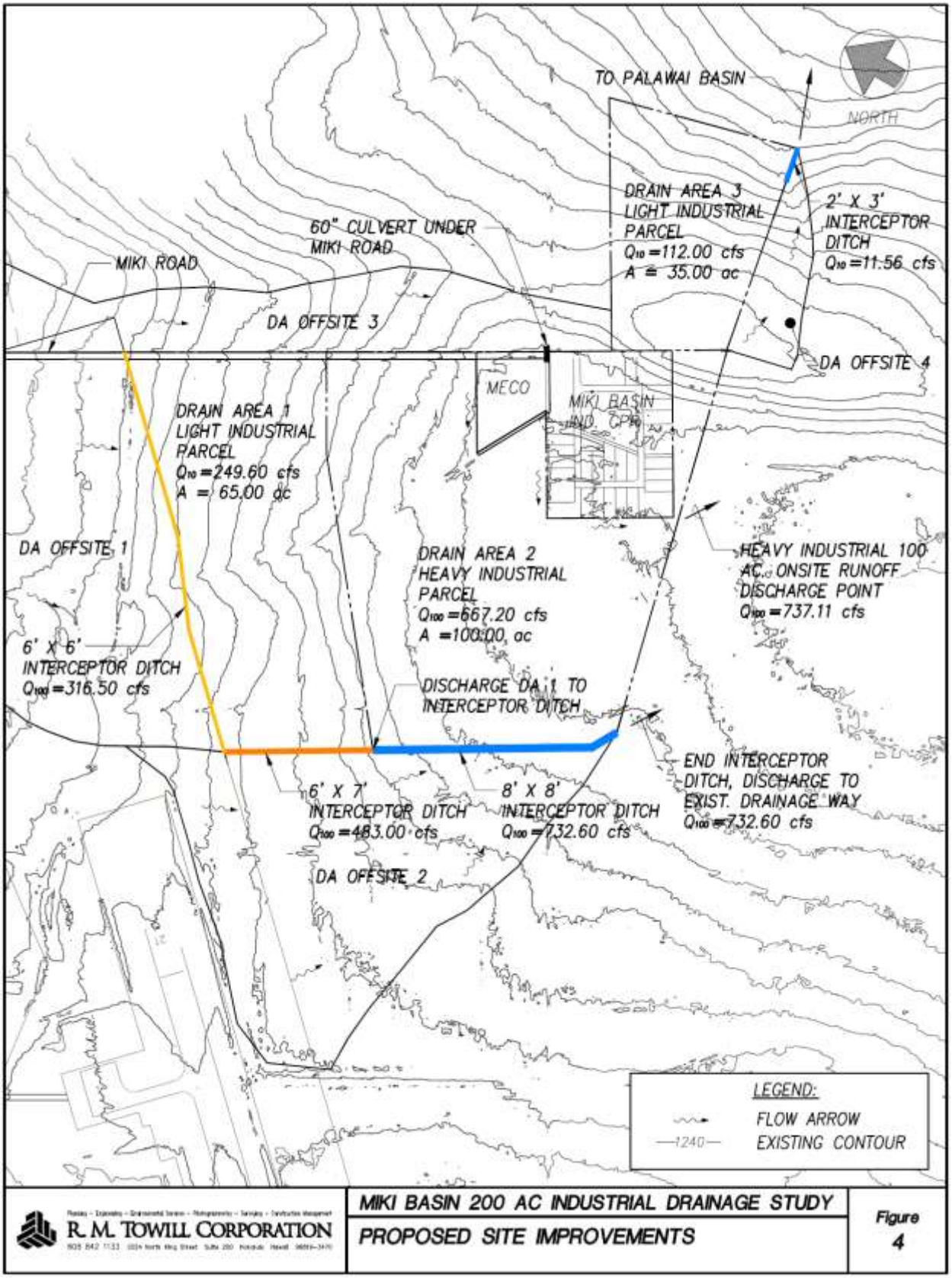
Offsite runoff will be intercepted before entering the project site by proposed drainage ditches. The drainage ditches will divert runoff around the perimeter of the project site to an offsite discharge point downstream. Onsite runoff will be collected by a proposed underground storm drain system consisting of pipes and inlets.

Runoff from 65-acre light industrial parcel, 100-acre heavy industrial parcel, and DA Offsite 1 through 3 will be discharged to the existing drainageway that drains to Miki Basin. Runoff generated from the 35-acre light industrial parcel and DA Offsite 4 drain to the existing Pālāwai Basin.

Runoff generated from areas DA Offsite 1, 2, and 4 will be collected by interceptor ditches located along the project site exterior boundary and will ultimately discharge into the existing drainageway south of the project site and to Miki Basin per existing conditions.

Offsite runoff for DA Offsite 3 will be diverted under Miki Road by a culvert and around the existing Miki Basin Warehouse area. Runoff from DA Offsite 3 will be discharged into an existing offsite drainageway adjacent to the industrial CPR site.

Therefore, the offsite runoff will not affect the design of the onsite drain systems.



At a depth of 10 feet, the existing Miki Basin has a capacity of 891 ac-ft. Since the increase in runoff from Drain Area 1 and Drain Area 2 only contributes 38.1 acre-feet, the increase in runoff depth and flow rate will be contained within the existing basin.

At a depth of 10 feet, the existing Pālāwai Basin has a capacity of 3010 ac-ft. Since the increase in runoff from Drain Area 3 contributes only 2.5 acre-feet, the increase in runoff depth and flow rate will be contained within the existing basin.

4.5.2 Potential Environmental Impacts & Mitigation Measures

The proposed industrial parcels will increase the runoff generated within the project site by 339.88 cfs. Runoff flow rates for a 100-year, 24-hour storm event were calculated for the existing site conditions of DA Offsite 1 and DA Offsite 2, since these offsite areas are greater than 100 acres. Runoff flow rates for a 10-year, 1-hour storm event were calculated using the rational method for the existing and proposed site conditions of DA Offsite 3 and DA Offsite 4, since these offsite areas are less than 100 acres.

Existing drainage patterns will be maintained by discharging intercepted offsite runoff to its original flow path. Offsite runoff will be collected by interceptor ditches located on the perimeter of the site that discharge to existing drainage way and ultimately to Miki Basin.

The proposed concrete rectangular drainage ditches vary in size from 8 feet by 8 feet to 2 feet by 3 feet. The ditches are sized to accommodate the peak runoff flow from the 100-yr, 24-hour storm and 10-yr, 1-hour storm where necessary and provide a minimum 2-foot freeboard.

Runoff from the proposed 65-acre light industrial area (Drain Area 1) will be discharged to the interceptor ditch at the southwest corner of the parcel Runoff flow for this area is 249.60 cfs and ultimately flows to Miki Basin. Offsite runoff from DA Offsite 1 flowing towards the 65-acre parcel is 316.50 cfs and will be intercepted by a 6 ft. by 6 ft. interceptor ditch on the north perimeter of the parcel.

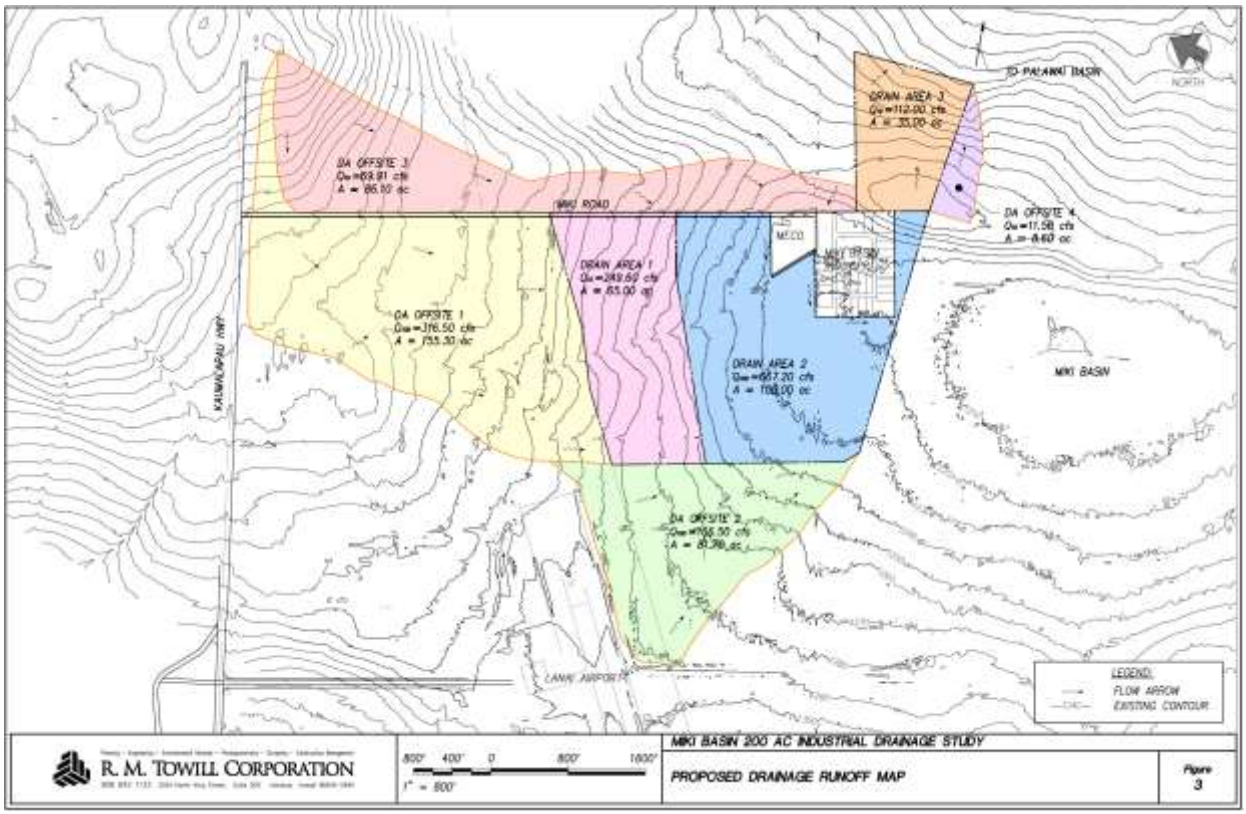
Runoff from the proposed 100-acre heavy industrial area (Drain Area 2) will be discharged at the south end of the parcel (see Figure 4). Runoff flow for this area is 667.20 cfs. The runoff from DA Offsite 3 that is diverted around the existing Miki Basin Industrial site is also discharged at the south end of the parcel. Runoff flow for DA Offsite 3 is 69.91 cfs.

Both the runoff flow from the proposed 100-acre site and the DA Offsite 3 flow to Miki Basin. Design of the drainage system for the 100-acre site should consider the impacts of incorporating the existing flows into the proposed drainage system versus keeping them separate. Offsite runoff from DA Offsite 2 flowing towards the 100-acre parcel is 166.50 cfs and will be intercepted an 8 ft. by 8 ft. interceptor ditch on the west perimeter of the parcel.

Runoff from the proposed 35-acre light industrial area (Drain Area 3) will be discharged at the eastern side of the parcel (see Figure 4). Onsite runoff flow for this area is 112.00 cfs and ultimately flows to Pālāwai Basin. Offsite runoff south of the 35-acre parcel from DA Offsite 4 will be intercepted by a 2 ft. by 3ft. interceptor ditch on the south perimeter of the parcel and will discharge to Pālāwai Basin.

Runoff flow for the offsite area is 11.56 cfs. The increase in onsite runoff volume from Drain Area 1 and Drain Area 2 will be conveyed to the existing drainage way and can be easily accommodated in the existing

Miki Basin. The additional runoff volume is negligible compared to the available basin capacity. The increase in onsite runoff volume from Drain Area 3 will be conveyed to the existing Pālāwai Basin.



The additional runoff volume is negligible compared to the available basin capacity. Storm water treatment will not be provided for this project since the runoff flows into an existing offsite sump with no outlet to the ocean. Applicable law will be followed to minimize soil movement, erosion and compaction during all project actions.

Both short-term construction and long-term maintenance BMPs will be included in any permit conditions. Implementation of Best Management Practices (BMPs) will ensure that the alterations to the terrain minimize erosion, water quality degradation and other environmental impacts.

4.5.3 Level of Impact after Mitigation

As noted above, the soils in and around the site are generally well drained and the soils can be expected to be low in organic matter. Further, the soil is not ideal for the growing of most commercially viable crops due to poor soil. No impacts on geological resources are noted.

The development of the proposed industrial parcels will increase the runoff onsite by 339.88 cfs. The additional flow generated within the proposed parcels can be accommodated by the existing Miki Basin and Pālāwai Basin.

Therefore, the proposed 200-acre industrial development will not have an adverse impact on any existing downstream properties. The project will not have a significant negative impact on geologic resources and drainage.

4.6 Water Resources

This section discusses the water in the region and in the subject property area and the potential impacts of the project on the resources, and mitigation measures the project will employ to mitigate those potential impacts.

4.6.1 Environmental Setting

Akinaka & Associates, Ltd. prepared a Water Master Plan to identify and review the condition of the existing systems and analyze the existing systems for projected water demands for the project. The following water matters are from those reports, as well as other sources, as noted.

Water Sources

The following is from the Lāna‘i Water Use and Development Plan (2011.) Lāna‘i lies in the rain-shadow of Maui and Moloka‘i. The island has no major surface water sources. The sustainable yield (SY) of Lāna‘i is estimated at 6-MGD. Virtually all of this is located in the Central aquifer sector which is divided into two aquifer systems with 3-MGD each. Withdrawals come primarily from eight wells, with the exception of about 2,000 GPD.

The Commission on Water Resource Management (CWRM) in 2019 reviewed all the Hawai‘i Counties’ sustainable yield (SY) and increased/decreased/no change as a result of further water analysis entitled Robust Analytical Modeling (RAM). On Lāna‘i they allowed for the possibility that there are seven additional aquifers that could provide water to Lāna‘i with up to a SY of 36M GPD. Further research is needed and then accepted by CWRM to change the SY from 6-MGD. The following notes the Predicted Sustainable Yield Ranges Considered by CWRM (Sustainable Yield (SY) in Million Gallons Per Day (MGD)) (Water Resources Protection Plan 2019 Update Appendix F, Inventory and Assessment of Resources, Table F-10 (page 75):

Aquifer Sector	**Aquifer System**	**RAM (1990)**	**RAM (2008) corrected** *(1)*	**RAM + Updated Information** *(2)*	**RAM 2 + Updated nformation** *(2)*	***SY Range (2019)*** *(3)*	**Previously Adopted SY (2008)**	**SY (2019)**
Lāna‘i								
Central	Windward	3(4)	3	5	~	*3-12*	3	3
Central	Leeward	3(4)	3	5	~	*3-6*	3	3
Mahana Sector	Hauola	~	~	3	~	~-3	0	~0
Mahana Sector	Maunalei	~	~	2	~	~-2	0	~0
Mahana Sector	Paoma	~	~	4	~	~-4	0	~0
Ka‘a	Honopū	~	~	4	~	~-4	0	~0
Ka‘a	Kaumālapa‘u	~	~	2	~	~-2	0	~0
Kanao	Lealia	~	~	1	~	~-1	0	~0
Kanao	Mānele	~	~	1	~	~-1	0	~0

General Comments & Historical Background on Changes to Aquifer System Boundaries and Sustainable Yield from the Water Resource Protection Plan 2019 Update provides further (page 80):

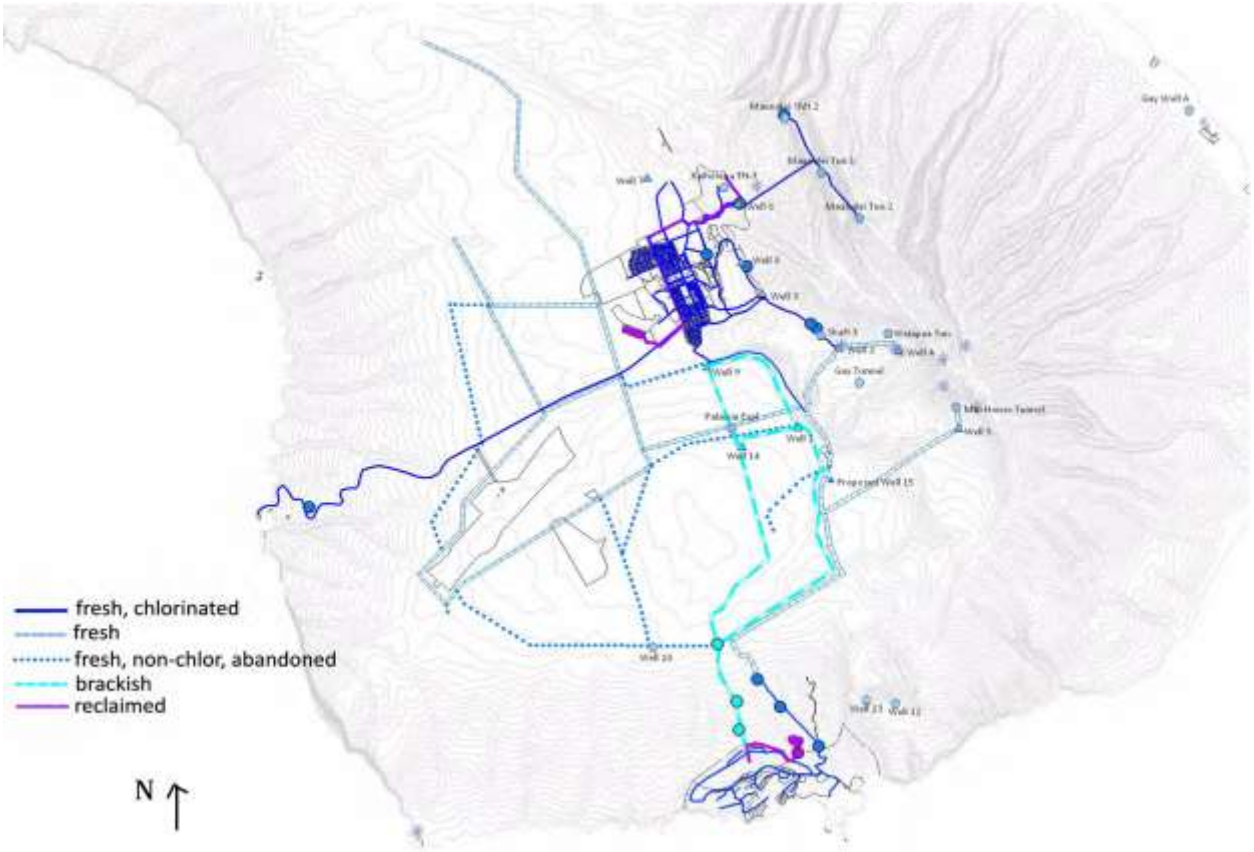
(1) Corrected minimum for 2008 WRPP SY based on 2017 review of RAM D/I, recharge that should have been used in 2008, or mathematical errors)

(2) RAM or RAM 2 methodology using updated best information available for recharge estimates. In cases where multiple valid studies were published ranges of SY are shown.

(3) 2019 SY Range - The bounds of the sustainable yield range were set based on the minimum and maximum estimates resulting from the comparison between the green columns: corrected RAM 2008, RAM + Updated best available Information, and RAM 2 + Updated best available Information.

(4) The Sustainable Yield values

The following illustrates the existing water service on the Island (from the Lānaʻi Water Use and Development Plan:)



Schematic Layout of Lānaʻi Water Systems - Blue is Potable, Aqua is Brackish, Purple is Reclaimed (Lānaʻi WUDP)

The Lānaʻi Water Company privately owns the domestic water system servicing the proposed 200-acre Miki Basin Industrial Park.

The water for this system is provided by existing groundwater sources and the water quality has met all State of Hawaiʻi regulations for drinking water. All water quality monitoring required by the State of Hawaiʻi Department of Health, Safe Drinking Water Branch, Annual Consumer Confidence Reports are available to all customers on the Lānaʻi Water Company website.

The water system for Lānaʻi is divided into nine (9) aquifer systems for the island. The Project falls within the Leeward Aquifer; however, water to support the project is intended to come from the Leeward and Windward aquifers.

Some Key Points on the Lānaʻi Water System as Noted Primarily from the Lānaʻi Water Use and Development Plan (2011)

Lānaʻi has five water supply systems, including two public drinking water systems, two reclaimed water systems, and a brackish water system. All are owned and operated by wholly owned subsidiaries of Pūlama Lānaʻi.

The following information is from the Lānaʻi Water Use and Development Plan (2011); there have been changes in certain operations and uses (i.e. Mānele was renovated and has changes in operations, Kōʻele Lodge has been renovated and the Kōʻele golf course is not in operation), but the summary gives a good contextual background of the systems, as indicated in the CWRM-approved Plan:

- Lānaʻi Water Systems
    - Two drinking water systems
        - Lānaʻi City to Kaumālapaʻu (PWS 237)

          The system has five available wells for service, three tanks and roughly thirty-five miles of potable line. Source for this system is/can be drawn from three wells:

            - Well 2/Shaft 3 is a potable source, and was once a major source of the pineapple plantation's irrigation water.
            - Well 3 is located such that it has the most flexibility of any source in the system, but it was most recently used primarily as backup for the Mānele system, serving as a secondary backup for the City, Kōʻele and related areas.
            - Well 4 services the mauka region.
            - Well 6 is a major source for this system.
            - Well 7 has never been in regular use but is considered a future source.
            - Well 8 is located above the City and the former Kōʻele Golf Course.

              - Total Installed Capacity 2.416-MGD
              - Installed Capacity of Potable Sources 2.016-MGD
              - Average Fresh Water Use 0.523 metered/0.605 pumped
              - Average Reclaimed Use 0.209-MGD Kōʻele Golf Course
              - Capacity of Brackish Sources in Use 0.000-MGD
              - Capacity of Reclaimed Water Facilities 0.400-MGD
              - Average Effluent Production 0.235-MGD
              - Potable Storage 2.786-MGD
              - Non Potable Storage 16.8 active/22.8-MGD total

- Mānele, Hulopoʻe and the Pālāwai Irrigation Grid (PWS 238)

  The Mānele Water System may be served by several wells, five tanks and roughly thirty-five miles of potable waterlines.

  - Wells 2 and 4 are the primary wells for this system
  - Well 5 has not seen much use and is considered a potential backup or future source for the Mānele area.
  - Well 6 is currently a major source serving this system.

    - Total Installed Capacity 4.518-MGD
    - Installed Capacity of Potable in Use 3.024-MGD
    - Average Potable Use 0.375 metered/0.683 pumped
    - Average Brackish Use 0.760 metered/0.944 pumped
    - Average Reclaimed Use 0.073-MGD
    - Capacity of Brackish Sources in Use 1.354-MGD
    - Capacity of Reclaimed Water Facilities 0.140-MGD
    - Average Effluent Production 0.073-MGD
    - Potable Storage 2.000-MGD
    - Non Potable Storage 17.85 active/19.35-MGD total

  - Two reclaimed water systems used for irrigation

  - One brackish water system used for irrigation

- Collectively, these systems include about 79-miles of active pipe, 35-MG of storage, of which about 4.8-MG is potable, and about 6.394-MGD installed well capacity of which 5.04 is potable.

- No surface water sources remain on Lānaʻi, although historical evidence points to the fact that the island once had springs, streams and even taro loʻi. Lānaʻi has 13-ahupuaʻa. Of one hundred and ten kuleana claims made within these ahupuaʻa, fifty-six were awarded.

- Fresh water is found only in high level dike confined compartments in the Central Sector. The hydrogeology of Lānaʻi is unusual in various respects, among them the predominance of high level water.
  - High-level water is found within 3.8-miles of the coast all around the island.
  - Numerous dike and fault boundaries divide the main aquifer into many smaller, relatively independent compartments bounded by vertical walls of lower permeability.

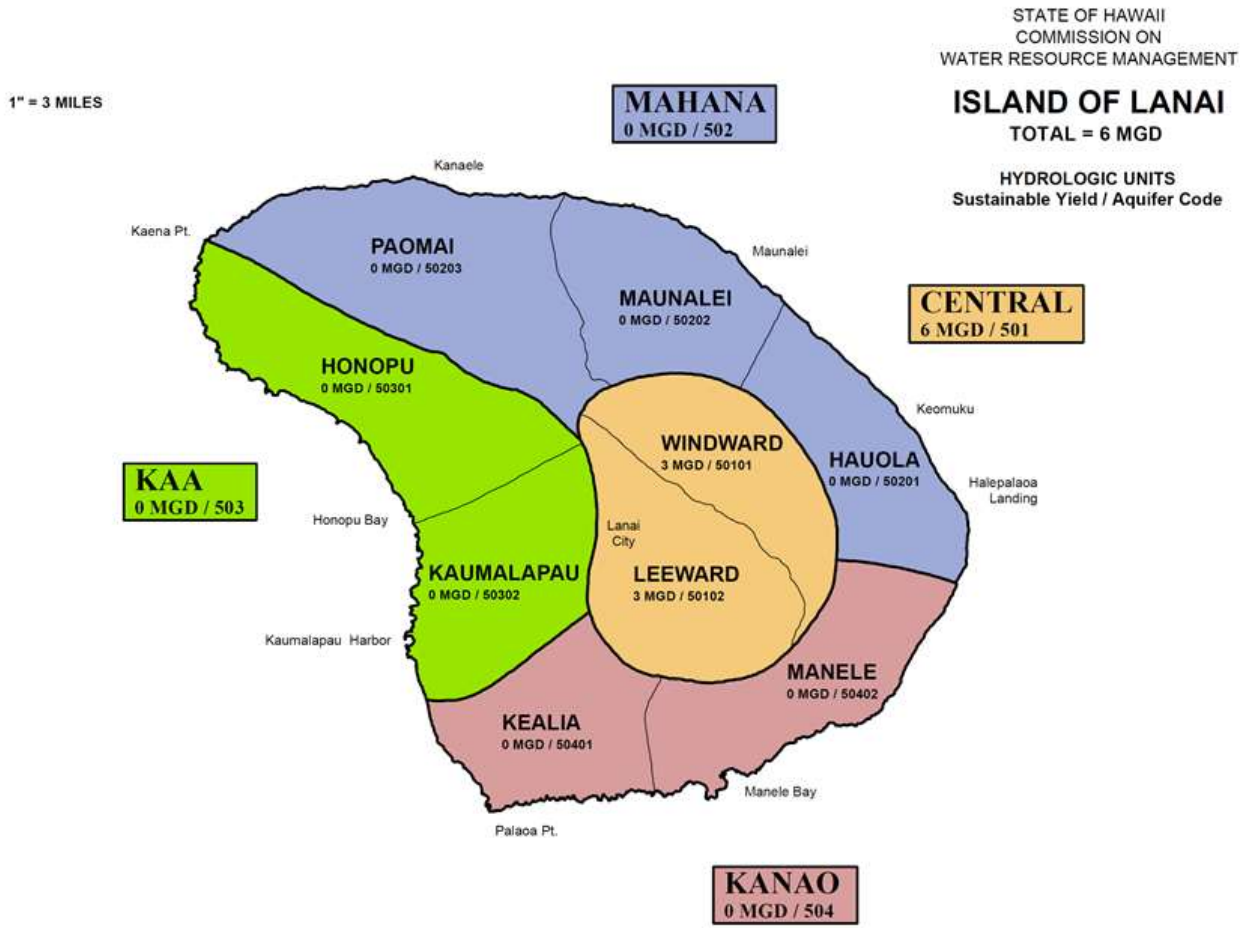
- Only the Central Aquifer sector is believed to contain fresh water.

- Estimates of sustainable yield on the island have varied from about 5- to 10-MGD, with the current regulatory sustainable yield estimate at 6-MGD.

- The island's entire sustainable yield of 6-MGD is found in the Central Sector.
  - The Central Sector is divided into two aquifer systems, the Leeward and the Windward, with 3-MGD sustainable yield in each.

- There are currently 7 pumped sources, with one pumped at only 2,000-GPD.
    - Average day capacity of potable systems in use, by System Standards, equates to about 2.24-MGD.

- Total recent pumpage is about 1.56-MGD.
    - All pumping sources, but one, are currently located in the Leeward aquifer system, with about 85% of total pumpage coming from the Leeward aquifer system.



Commission on Water Resource Management (CWRM)

The Commission on Water Resource Management provides a variety of resources to the public to ensure the proper management of Hawai‘i’s water resources. As defined in the State Water Code, the Commission protects and manages the State’s ground and surface water resources.

First and foremost, the Commission utilizes a permit system to regulate water use and ensure the integrity of our streams and aquifers. Permit forms and applications, along with request forms for other Commission actions, are available to the public for download.

Ground-water hydrologic units have been established by the Commission on Water Resource Management to provide a consistent basis for managing ground water resources. The units are primarily determined by subsurface conditions.

In general, each island is divided into regions that reflect broad hydrogeological similarities while maintaining hydrographic, topographic, and historical boundaries where possible. Smaller sub-regions are then delineated based on hydraulic continuity and related characteristics. In general, these units allow for optimized spreading of island-wide pumpage on an aquifer-system-area scale.

An aquifer coding system is used to reference and describe the ground water hydrologic units delineated by CWRM. It is established to provide a consistent method by which to reference and describe ground water resources, and to assist in various water planning efforts. The coding system was first initiated by the State Department of Health in response to directives from the U.S. Environmental Protection Agency.

Since then, boundary delineations of ground-water hydrologic units were manually drawn or retraced by the DLNR Division of Water and Land Development (DOWALD) General Flood Control Plan of Hawai'i (1983), the State Department of Health (1987), and the Commission on Water Resource Management (1990). (CWRM)

On January 22, 2014, the Commission required all wells in the State of Hawai'i to report monthly ground water use including quantity pumped, chloride (and/or conductivity) concentrations, temperature, and (pump off) water-level data (CWRM)

Lāna'i Water Use and Development Plan (WUDP) (2011)

In 1990 each county in the State of Hawai'i prepared and adopted its initial Water Use and Development Plans (WUDP). These WUDPs were incorporated by the Commission on Water Resources Management (CWRM) into the Hawai'i State Water Plan.

The State Water Code and the Maui County Charter, Chapter 11, Section 8-11.2(3) mandate that County WUDPs be consistent with County land use plans and policies. The 2030 Maui County General Plan is comprised of the Countywide Policy Plan (2011), Maui Island Plan (MIP, 2012) and the Community Plans adopted in various years.

The plans provide direction for future growth, the economy, and social and environmental decisions and establishes a Directed Growth Strategy. The WUDP does not propose alterations to proposed land use and development patterns established by the General Plan.

The original WUDP for Maui County was adopted by County ordinance and by CWRM in 1990. An update adopted by Maui County Council in 2010 was not approved by CWRM, primarily because it was limited in scope to the MDWS District rather than all water uses and needs.

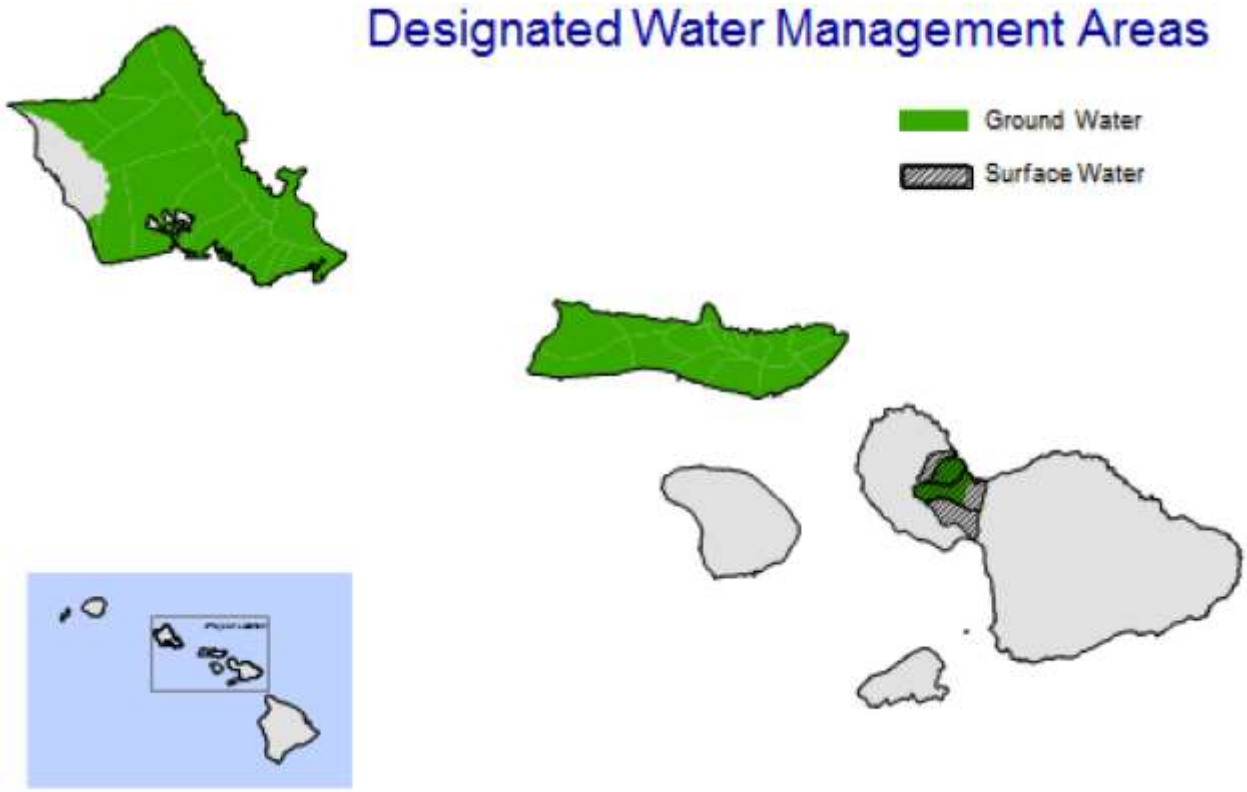
The Lāna'i WUDP was updated in 2011 and the Moloka'i WUDP will be updated following adoption of this Maui Island WUDP. (Maui County WUDP Update, 2018)

Water Management Areas

Water Management Areas are special areas where additional Commission regulation is required. This additional regulation is for owners of water sources (such as wells owners) who must obtain water use permits to withdraw water for various uses. Fundamentally, individual water management areas coincide with individual hydrologic unit areas.

Science is the foundation of the Water Commission's water management area designation decision-making. State Law (HRS §174C-41) notes that designation of water management areas shall occur "when it can be reasonably determined, after conducting scientific investigations and research, that the water resources in an area may be threatened by existing or proposed withdrawals".

State Water Management Area designation is not a simple or routine process. It is complicated, expensive and has an uncertain outcome. Compounding the problem, Water Use Permits are subject to Contested Case Hearings. Lāna'i is not a Designated Water Management Area.



Map taken from the approved Water Resource Protection Plan (2019) noting Existing CWRM Designated Water Management Areas (WRPP 2019)

If a State Water Management Area designation is granted:

- Existing permittees (well owners) must apply for a Water Use Permit from the State - even the County's Department of Water Supply. No one is grandfathered in.
- There is no guarantee that any existing water user will be issued a State Water Use Permit, including the existing water company providing water to others.
- Well owners do not know what level of water use will be permitted to them.
- Well owners may receive an allocation that is lower than their present use. (In that case, water companies are obligated to provide water to existing customers, before it can consider providing water to future users.)
- The Water Commission will resolve all "existing" water uses before it will process any "new" water uses.
- Every Water Use Permit in the designation process is subject to a Contested Case Hearing.

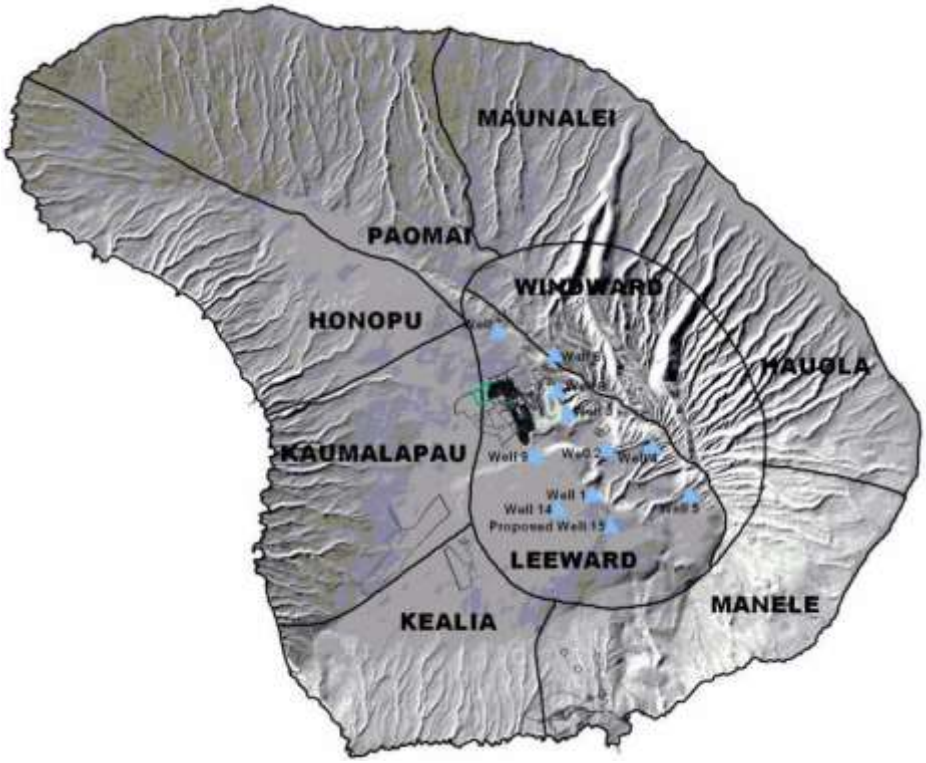
Lānaʻi Water Management Area Matters

The Lānaʻi Island WUDP notes Lānaʻi "faces several regulatory challenges."

Resolving a petition filed in 1989, the CWRM in 1990 decided not to designate any of Lānaʻi's aquifers as groundwater management areas. In lieu of designation the CWRM required ongoing monitoring, preparation of a water shortage plan and annual information status hearings. The CWRM also set conditions that would trigger reconsideration of groundwater management area designation.

"The Commission of Water Resource Management (CWRM) decided in January 1990 to authorize the Chairperson to reinstitute water management area proceedings if the static water level of any production well should fall below one half its original level above sea level. It granted the same authorization should any source of supply in the Company's plans fail to materialize but full land development continues."

"In March of 1991, another trigger was set, to reinstitute designation proceedings should total pumpage exceed 4.3-MGD. Even without these triggers, the State may initiate designation proceedings when the withdrawal from any aquifer reaches 90% of its sustainable yield, which in the case of Lānaʻi's aquifer systems would be 2.7-MGD each in the Windward and Leeward systems of the island's Central Aquifer sector."



Lānaʻi Aquifers and Wells (Lānaʻi Island WUDP 2011)

"In response to such challenges, a resource development strategy, including sufficient conservation and new supply resources to meet expected water demand for the 2030 planning horizon, was developed. … If conservation and leak reduction targets are achieved, this strategy would result in pumpage between 3.3-MGD and 3.66-MGD in the year 2030 assuming expected levels of water demand and build-out of projects with existing entitlements."

"Without implementation of the identified conservation measures, pumpage could exceed the 4.3-MGD trigger for proceedings by the State Commission on Water Resource Management (CWRM) to designate Lānaʻi as a groundwater management area. Measures for watershed protection and source protection are identified, as well as recommendations for changes to monitoring and data management." (CWRM 1990)

Status of CWRM decisions on March 29, 1990 and April 16, 1997 (as of February 14, 2019 Public Meeting)

The following summary was part of a CWRM public information meeting presentation on Lānaʻi on February 14, 2019. It notes the conditions and status of each related to prior CWRM decisions on March 29, 1990 and April 16, 1997. Summary:

- Monitoring of Ground Water conditions is acceptable
- All conditions of non-designation decisions have been met
- Acceptance of Lānaʻi WUDP meets intent of LWAC

Note that Lānaʻi Water Company is in full compliance with all conditions noted in the CWRM actions.

The following lists (numerically/alphabetically) various conditions associated with the prior CWRM analysis on whether a Water Management Area should be implemented on Lānaʻi. Below each is the CWRM statements of response to each condition (bullet points) for each condition. This information was part of the public update presentation CWRM staff conducted on Lānaʻi on February 14, 2019.

Assessment of March 29, 1990 CWRM Non-Designation of Lānaʻi Groundwater Management Area Decision Conditions:

1. Require Lānaʻi Company to immediately commence monthly reporting of water use to the Commission, under the authority of Chapter §174C-83, HRS, which would include pumpage, water level, temperature, and chloride measurements from all wells and shafts.
    - Lānaʻi Co. reports every 4 weeks which results in a 13-period reporting frequency. This is in compliance with the frequency portion of condition 1. Overall, condition 1 is followed.

2. In addition to monthly water use reporting and pursuant to Secs. 174C-43 & 44, HRS, require Lānaʻi Company to monitor the hydrologic situation so that if and when ground-water withdrawals reach the 80-percent-of-sustainable-yield rate, the Company can expeditiously institute public informational meetings in collaboration with the Commission to discuss mitigative measures.
    - Monthly water use reports provide the means for monitoring hydrologic conditions. Condition was mainly to notify the public of 174C-43 & 44 concerning the requirement of public involvement for mitigative actions when 80 percent sustainable yield actual use is occurring. Based on current public involvement with the Lānaʻi Water Subcommittee monthly monitoring this condition is followed.

3. Require Lānaʻi Co. to formulate a water shortage plan that would outline actions to be taken by the Company in the event a water shortage situation occurs. This plan shall be approved by the Commission and shall be used in regulating water use on Lānaʻi if the Commission should exercise its declaratory powers of a water emergency pursuant to Section 174C-62(g) of the State Water Code. A draft of this plan should be available for public and Commission review no later than the beginning of October 1990 and shall be approved by the Commission no later than January 1991.
    - Should be incorporated in the Water Use and Development Plan update.

4. That the Commission hold annual public informational meetings on Lānaʻi during the month of October to furnish and receive information regarding the island's water conditions. The public shall be duly notified of such meetings.
    - Public informational meetings have been held annually since 1990, usually in October. The last one information mtg was held on January 18, 2001. Since then, the Lānaʻi Water Advisory Committee has been formed, which relieved the Commission of public information meetings per the Commission's 1997 reconsideration of designation.

5. Authorize the Chairperson to re-institute water-management-area designation proceedings and, hence, re-evaluations of ground-water conditions on the island if and when:
    a. The static water-level of any production well falls below one-half its original elevation above mean sea level, or
    b. Any non-potable alternative source of supply contained in the Company's water development plan fails to materialize and full land development continues as scheduled.
    c. Items 1, 2, and 3 are not fulfilled by Lānaʻi Company.
    d. When actual water use exceeds 4.3-MGD.
        - No part of condition 5 has materialized to warrant chairperson action. For clarification, item 5.b. referred to non-potable alternatives of wastewater reuse and wells 12 & 13 at the time of designation and full (both existing and future) land development continued. Since 1990, pineapple has been phased-out resulting in less than the full development scenario and a much reduced water consumption. Nevertheless, alternative water projects are continuing. Kōʻele & Mānele G.C.s now use treated effluent.
        - Should be incorporated in the Water Use and Development Plan update.

Assessment of April 16, 1997 Non-Designation of Lānaʻi Groundwater Management Area Decision

1. Deny without prejudice the petition to designate the island of Lānaʻi as a ground water management area.

2. Continue to conduct annual public informational hearing in October to monitor conditions until the formation of a permanent advisory group to monitor implementation of the Lānaʻi Working Group Report.
    - Formation of the Lānaʻi Water Advisory Committee (LWAC) satisfies this condition.

3. Accept the LWGR as a guide for decision making until the Lānaʻi WUDP is adopted by the Maui County Council by ordinance.
    - WUDP adopted August 15, 2012

4. Request the County to provide quarterly progress reports on the formation of the ongoing community-based advisory committee, and the adoption process of the Lānaʻi Community Plan and Lānaʻi WUDP.
    - Formation of the Lānaʻi Water Advisory Committee satisfies this condition.

5. Request Lānaʻi Company quarterly progress reports on its watershed management activities.
    - Submitted to LWAC on fencing and hunting issues which satisfies this condition. October 2018 Pūlama Watershed Report submitted to DLNR DOFAW. 2019 an island-wide Natural Resources Management Plan expected.

6. Request the LUC to provide regular updates as to the status of Lāna‘i-related issues before the LUC, including a copy of court decisions that may affect these issues.
    - Should be incorporated in the Water Use and Development Plan update.

Ground Water Pumping and Reporting

Under the Hawai‘i Administrative Rules Title 13 Chapter 168 Subtitle 7, the collection & submittal of monthly water use reporting, including pumpage, chloride concentrations, temperature, and (pump off) water level data, is required.

The 12-Month Moving Average (12-MAV) is used to smooth out short-term fluctuations and highlight longer-term trends or cycles in pumpage. To determine the 12-MAV for a selected month: the pumpage in million gallons per day (MGD) for the selected month is added to the pumpage in MGD for the previous 11 months then this total is divided by 12 (or averaged) which gives the 12-MAV for the selected month.

The reported 12-month moving average of pumping from Lāna‘i wells in 2018 were 1.527-MGD (as of December 2018) and 1.555-MGD (in August 2019). In a May 21, 2018 letter to Kurt Matsumoto, Chief Operating Officer of Pūlama Lāna‘i, Water Commission Deputy Director, Jeff Pearson, noted

> “The Commission also continues its active monitoring involvement through monthly water use reports, where Lāna‘i Water Company Inc. has always shown exemplary reporting. As such, Lāna‘i is the only island we can confidently post total historical island-wide pumpage against Lāna‘i’s sustainable yield to show that the resource is not threatened. …
>
> If more data is desired to be posted we can do that; however, it should be understood that pumpage within the adopted estimates of sustainable yield indicates that the public trust resource is not threatened.”

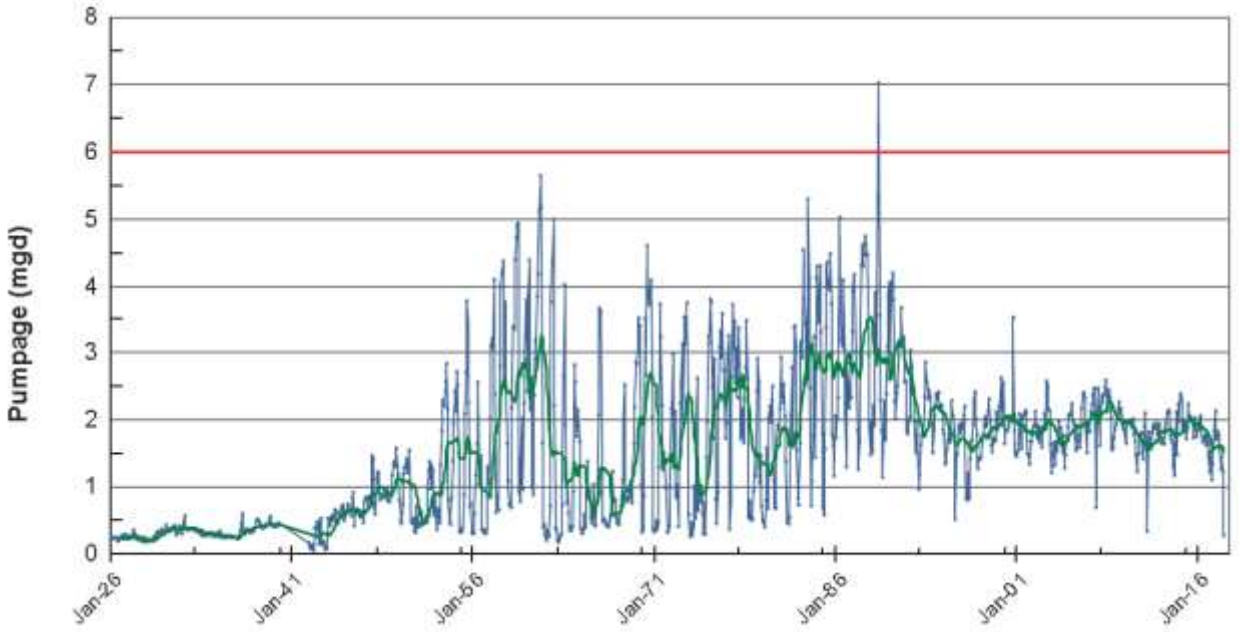
As noted in the following, Lāna‘i is the only Island with regular reporting (WRPP 2019; page 14).

Water Use Reporting by Island 2016

Island	Total # of Production Wells[1]	# Wells Reporting Water Use	Compliance Rate
Kaua‘i	288	139	48.3%
O‘ahu	818	491	60.0%
Moloka‘i	89	40	44.9%
Lāna‘i	10	10	100.0%
Maui	567	240	42.3%
Hawai‘i	927	331	35.7%
TOTAL	2,699	1,251	46.4%

1. Production Wells are defined as all wells that are not abandoned, observation, or unused wells.

The following notes the monthly pumpage and 12-month moving average for Lānaʻi wells from 1926 through early 2018:



Monthly Pumpage (blue) – 12-month moving average (green) and Sustainable Yield (red) for Lānaʻi **wells (CWRM)**
(Note peak withdrawal years in the 1950s to early 1990s were during pineapple cultivation on the Island.)

The following summarize existing demands as of December 2016 in relation to aquifer system area sustainable yields for the Island of Lānaʻi. Water use is based on reported pumpage as of December 31, 2016, unless otherwise noted. Aquifer sustainable yields are those noted in the 2019 update of the WRPP (2016 data). (WRPP 2019 Appendix H)

Existing Demands by Aquifer System Area, Island of Lānaʻi, December 2016

(Aquifer Code Number) Aquifer System	Sustainable Yield (SY) (MGD)	Existing Water Use (MGD) 12 MAV	SY minus pumpage (MGD)	Existing Water Use as a Percent of SY
(50101) Windward	3	0.27	2.73	8.9%
(50102) Leeward	3	1.51	1.49	50.4%
(50201) Hauola	0	NRU	NRU	NRU
(50202) Maunalei	0	NRU	NRU	NRU
(50203) Paomaʻi	0	NRU	NRU	NRU
(50301) Honopū	0	NRU	NRU	NRU
(50302) Kaumalapau	0	NRU	NRU	NRU
(50401) Lealia	0	NRU	NRU	NRU
(50402) Mānele	0	NRU	NRU	NRU
LĀNAʻI TOTAL	**6**	**1.78**	**4.22**	**30%**

NRU: No reported water use. There are no reports of ground water use to CWRM for this aquifer system.

NOTE: Lānaʻi aquifers are not designated ground water management areas; therefore, withdrawals do not require water use permits.

Water Source, Demand and Distribution

Water for the existing industrial uses adjoining the proposed 200-acre Miki Basin Industrial Park is currently provided by the Mānele Water System which is owned, operated and maintained by the Lānaʻi Water Company. The system, sourced by Wells No. 2 (State Well No. 5-4953-001) and 4 (State Well No. 5- 4952-002), currently services Mānele, Hulopoʻe and the Pālāwai Irrigation Grid.

Well No. 2 has a pump capacity of 500 gallons per minute (gpm) or an average day capacity of 320,000 gallons per day (GPD) based on an operating time of 16 hours. According to the 2011 Lānaʻi Water Use and Development Plan, the well can be outfitted with a pump with a capacity of up to 1,200 gpm or an average day capacity of 768,000 GPD.

Well No. 4 has a pump capacity of 900 gpm or an average day capacity of 576,000 GPD.

The existing average daily water usage from the Mānele Water System is currently estimated at 418,000 GPD. The operation of Sensei Farms is anticipated to increase water usage to approximately 469,000 GPD at full operation.

The Water System Standards requires sources be able to meet maximum day demand with an operating time of 16 hours, assuming that the largest pumping unit is down.

Since Well No. 2 has the larger pump capacity of the two wells, available source capacity for the system is governed by Well No. 4. Based on the existing water use, an average day capacity of 107,000 GPD is available to initially support the development of the 200-acre Industrial Park.

According to the Lānaʻi Water Company Periodic Water Report, the current moving average pumping is 1.555-MGD (in August 2019).

Water from the wells is either stored in the existing 0.5 MG Hiʻi Tank or 1.0 MG concrete Hiʻi Reservoir or fed directly into the distribution system depending on need.

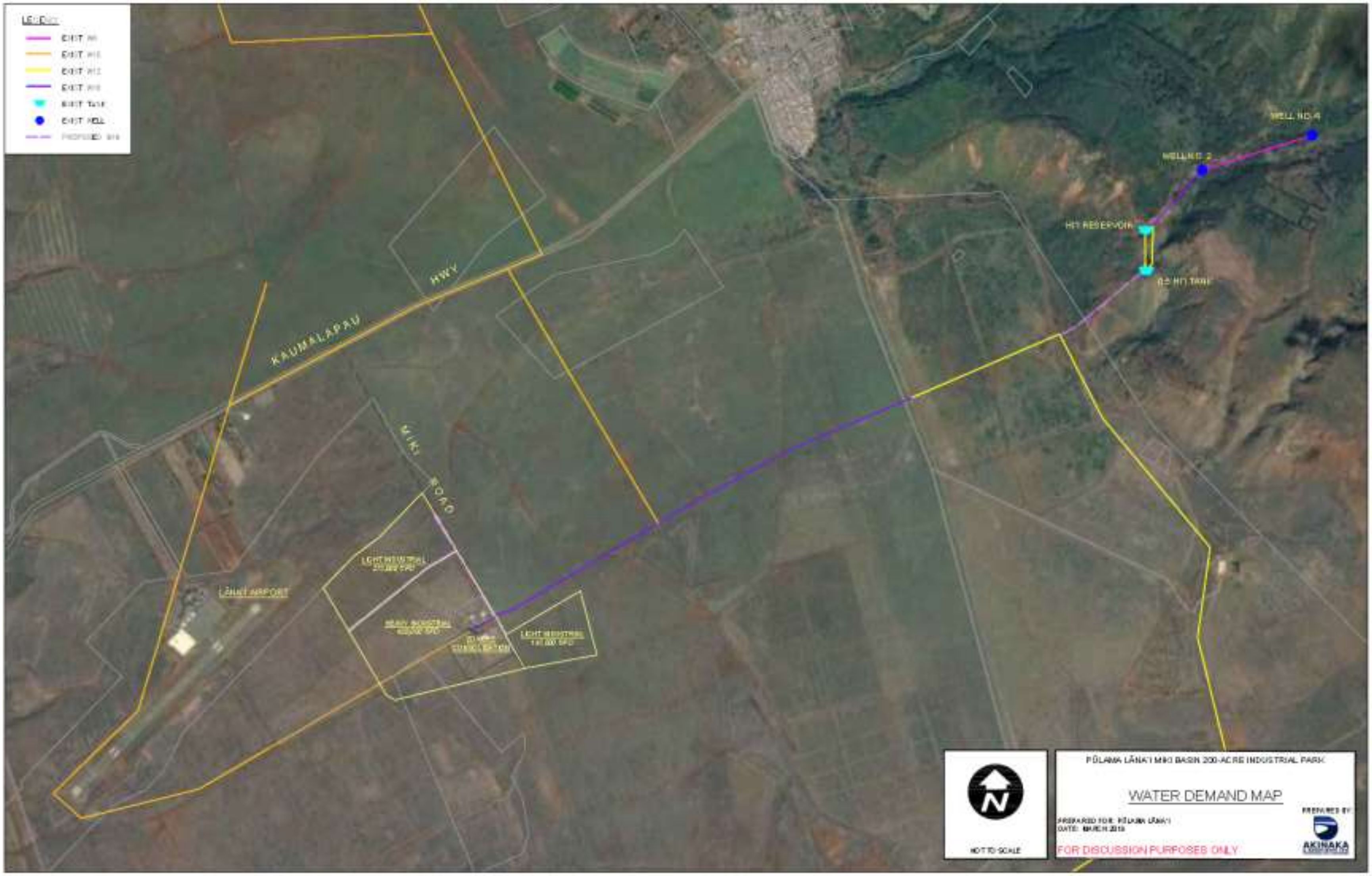
The 0.5-MG Hiʻi Tank (elevation 1823') serves as the water distribution storage tank for Mānele, Hulopoʻe and the Pālāwai Irrigation Grid. The 1,000,000 gallon Hiʻi Reservoir (elevation 1823') primarily serves as storage for the two well water sources to supply water into the distribution system.

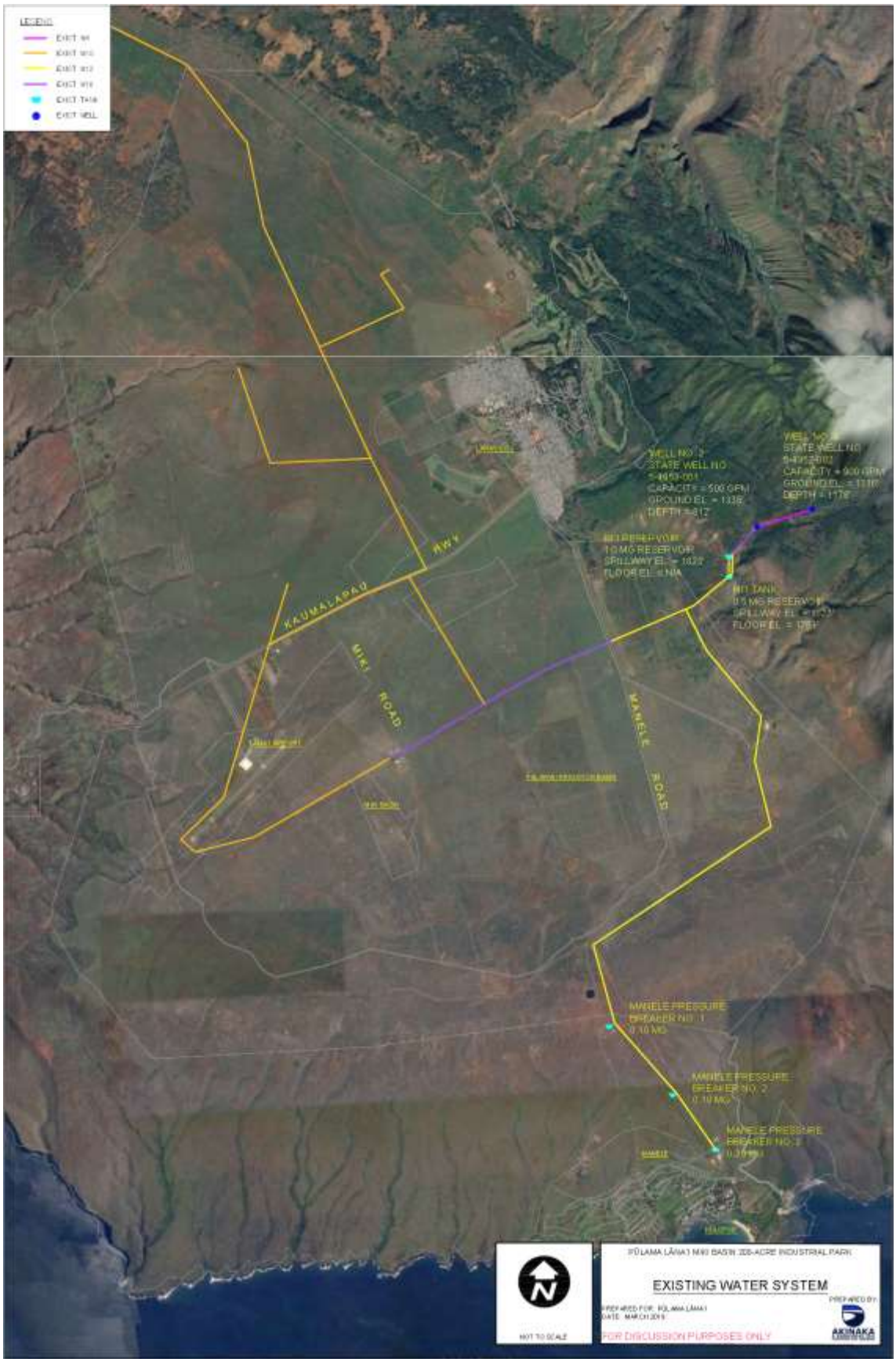
The existing Mānele Water System consists of 10-inch, 12-inch and 16-inch transmission mains. The Mānele Water System is interconnected with the Lānaʻi City Water System. During emergencies, the Lānaʻi City System can supply water to the Mānele Water System by opening a valve.

12 and 16-inch high density polyethylene transmission mains transport water from the 500,000 gallon Hiʻi Tank into the Mānele Water System. The 12-inch main splits at a junction to serve both Mānele and Pālāwai Irrigation Grid.

To Mānele and Hulopoʻe – From the junction, the 12-inch line feeds into three pressure breaker storage tanks that service Mānele.

To Pālāwai Irrigation Grid – From the junction, the waterline upsizes to a 16-inch main that delivers water to the Pālāwai Irrigation Grid area. The existing 12-inch Pressure Reducing Valve (PRV) downstream of the junction reduces the pressure in the waterline to 95 psi.


KAUMALAPAU
HWY
MIKI
ROAD
WELL NO. 4
WELL NO. 2
LANAI AIRPORT
WATER DEMAND MAP
FOR DISCUSSION PURPOSES ONLY
NOT TO SCALE
AKINAKA


LEGEND
EXIST WELL
KAUMALAPAU
HWY
MIKI
ROAD
MANELE
ROAD
MANELE PRESSURE BREAKER NO. 1
0.10 MG
MANELE PRESSURE BREAKER NO. 2
0.10 MG
MANELE PRESSURE BREAKER NO. 3
0.30 MG
NOT TO SCALE
EXISTING WATER SYSTEM
FOR DISCUSSION PURPOSES ONLY
AKINAKA

4.6.2 Potential Environmental Impact & Mitigation Measures

Since development plans for the Industrial Park are not yet available, proposed water use for buildout of the Industrial Park is based on the proposed land use and an estimated developable area for each parcel. The developable area of each parcel estimates that up to 70 percent of the total parcel area will require water; the remaining 30 percent will consist of areas with no water use such as roads and parking areas.

In accordance with the Water System Standards, available source capacity is governed by the well with the smallest pumping unit. Well No. 2 can be outfitted with a pump with a capacity of up to 1,200 gallons per minute (gpm) while Well No. 4 has a pump capacity of 900 gpm.

Since Well No. 4 has the smaller pump capacity, available source capacity for the water system is governed by Well No. 4, which has an average day pumping capacity of 576,000 GPD, which is equivalent to a maximum day pumping capacity of 864,000 GPD. Once this capacity is used/committed, construction of a new well will be required.

Water to support the project is intended to come from the Leeward and Windward aquifers. As noted, full buildout of the proposed 200-acre Miki Basin Industrial Park will be developed incrementally over a period of 30-years (not all at once.)

The proposed average day demand for full buildout of the Industrial Park, including existing use is 1,309,000 GPD. The existing water system does not have adequate source capacity and reservoir storage to support full buildout of the Industrial Park. In addition, the transmission mains do not meet Water System Standards for fire flow protection.

The following improvements will be required to support full buildout of the Industrial Park:

- Drilling of a new source or multiple sources to obtain a total minimum pump capacity of 1,546 gpm.
- Construction of a new storage tank with a minimum capacity of 500,000 gallons.
- Upsizing of an existing 12-inch water main between Hi'i Tank and the Pālāwai Pressure Reducing Valve to a 16-inch main or installation of a parallel 6-inch water main to meet fire flow requirements. Alternatively, the construction of a new storage tank could provide fire flow protection in additional to storage capacity.
- Construction of new 16-inch distribution mains to provide service to currently undeveloped areas.

The intent is to use available water capacity to handle the initial needs. As needs increase over time and the development of industrial park expands, then new wells will be drilled in the Leeward and Windward aquifers.

Well Pump Sizing

i. Existing average day capacity = 576,000 GPD
   Existing maximum day capacity = 864,000 GPD

ii. Full buildout average day demand = 1,309,000 GPD
    Full buildout maximum day demand = 1,963,500 GPD

iii. Additional average day capacity required = 733,000 GPD
Additional maximum day capacity required = 1,099,500 GPD
1,099,500 gallons / 16 hours / 60 min = 1,146 gpm
Total required pump capacity = 1,146 gpm

Full buildout of the Industrial Park will require the development of a new well or multiple wells with a total minimum total capacity of 1,146 gpm.

The Lānaʻi Water Use and Development Plan (WUDP) discusses the following options for development of a new well to meet future water demand requirements:

i. Drill a Leeward high level well between Hiʻi Tank and Well 3 (Windward wells are also considered)
ii. Well 7 is currently out of service. Recommissioning the well would provide reliability for both the Lānaʻi City system and the Irrigation Grid.
iii. Install a permanent interconnection with the Lānaʻi City System.

Reservoir Capacity

i. Case A: Meet maximum day demand in 24-hours
Capacity required = 1,963,500 gallons

Case B: Meet maximum day + fire flow, reservoir ¾ full
Max day rate = 1,963,500 GPD = 1364 gpm
Fire flow = 2,500 gpm

Max day rate + fire flow for 120 minutes
= 3,864 gpm x 120 min
= 463,680 gallons

Size required = 463,680 * ¾ = 347,760 gallons
Case A governs:
Minimum Reservoir Capacity = 2,000,000 gallons
Existing Reservoir Capacity = 1,500,000 gallons

Additional Storage Required = 500,000 gallons

Construction of a new storage tank for the Industrial Park could also satisfy fire protection requirements for the Industrial Park. In order to provide service to the Industrial Park, the tank would need to be located at a minimum elevation of 1,414 feet.

Presently, Pūlama Lānaʻi is under contract with Brown and Caldwell to do the preliminary engineering on the transmission line. In addition, a proposal is being submitted for a 1.5-MG storage tank on Hiʻi (0.5-MG for this project and 1-MG for abandoning the old underground storage).

Regulatory Provisions Call for Timely Action in the Event Issues are Noted

The Commission on Water Resource Management uses regulatory controls to implement its policies and Hawaiʻi Water Plan requirements for well development and water use. Regulations are also used to protect ground water quantity and quality, optimize ground water availability, and obtain maximum reasonable-beneficial uses.

State law address designation of water management areas as noted in the following (§174C-41):

> §174C-41 Designation of water management area.
> (a) When it can be reasonably determined, after conducting scientific investigations and research, that the water resources in an area may be threatened by existing or proposed withdrawals or diversions of water, the commission shall designate the area for the purpose of establishing administrative control over the withdrawals and diversions of ground and surface waters in the area to ensure reasonable-beneficial use of the water resources in the public interest.
> (b) The designation of a water management area by the commission may be initiated upon recommendation by the chairperson or by written petition. It shall be the duty of the chairperson to make recommendations when it is desirable or necessary to designate an area and there is factual data for a decision by the commission. The chairperson, after consultation with the appropriate county council, county mayor, and county water board, shall act upon the petition by making a recommendation for or against the proposed designation to the commission within sixty days after receipt of the petition or such additional time as may be reasonably necessary to determine that there is factual data to warrant the proposed designation.
> (c) Designated ground water areas established under chapter 177, the Ground-Water Use Act, and remaining in effect on July 1, 1987, shall continue as water management areas.

Likewise, Hawai'i Administrative Rules set provisions for designation and regulation of Water Management Areas (HAR §13-171). As noted in the rules (§13-171-1):

> The purpose of this chapter is to provide for the designation and regulation of hydrologic areas where water resources are being threatened by existing or proposed withdrawals or diversions of water, water quality problems, or serious disputes. It shall be the duty of the commission to designate areas for the purpose of establishing administrative control over the withdrawals and diversions of ground and surface water in threatened areas to ensure the most beneficial use, development, or management of the water resources in the interest of the people of the state.

Ground water criteria for designation, as stated in the rules, are:

> §13-171-7 Ground water criteria for designation. In designating an area for ground water use regulation, the commission shall consider the following:
> (1) Whether an increase in water use or authorized planned use may cause the maximum rate of withdrawal from the ground water source to reach ninety percent of the sustainable yield of the proposed water management area;
> (2) That the rates, times, spatial patterns, or depths of existing withdrawals of ground water are endangering the stability or optimum development of the ground water body due to upconing or encroachment of salt water;
> (3) That the chloride contents of existing wells are increasing to levels which materially reduce the value of their existing uses;
> (4) Whether excessive preventable waste of water is occurring;
> (5) There is an actual or threatened water quality degradation as determined by the department of health;
> (6) Serious disputes respecting the use of ground water resources are occurring;

(7) Whether regulation is necessary to preserve the diminishing ground water supply for future needs, as evidenced by excessively declining ground water levels; or
(8) Whether water development projects that have received any federal, state, or county approval may result, in the opinion of the commission, in one of the above conditions.

Notwithstanding an imminent designation of a water management area conditioned on a rise in the rate of ground water withdrawal to a level of ninety percent of the area's sustainable yield, the commission, when such level reaches the eighty percent level of the sustainable yield, may invite the participation of water users in the affected area to an informational hearing for the purposes of assessing the ground water situation and devising mitigative measures. (HAR §13-171-7)

Preliminary Precautionary Steps Prior to Designation

As noted in the law and rules, certain preliminary precautionary steps may be taken as monitoring of production of wells indicate any issues/concerns related to pumpage approaching the Sustainable Yield.

Full buildout of the proposed 200-acre Miki Basin Industrial Park will be developed incrementally over a period of 30-years (not all at once.) So, there is time to monitor as the incremental development moves forward.

The 90% threshold does not automatically trigger designation; it triggers the commission to consider impacts.

The rules also note that the commission may invite the participation of water users in the affected area to an informational hearing for the purposes of assessing the ground water situation and devising mitigative measures when the level of pumping reaches the eighty percent level of the sustainable yield. So, in the event pumpage approaches these levels, there is ample time to address the matter.

Other Near-term Anticipated Water Demands on Lānaʻi

A couple proposed projects pending approval and final decisions for implementation relate to the Hōkūao 201H Housing Project and Amendment to the Kōʻele Project District.

Water Demand for the Hōkūao 201H Housing Project

The proposed Hōkūao 201H Housing Project comprises approximately 50-acres of land in the Kamoku Ahupuaʻa of Lānaʻi Island.

201H affordable housing projects are eligible if at least fifty-one percent (51%) of the units are made affordable to income target groups established by County rules, based on guidelines provided by the U.S. Department of Housing and Urban Development (HUD).

Hōkūao is proposed to be developed as an affordable housing project under provisions of Chapter 201H (Hawaiʻi Revised Statutes). The target groups are defined as a percentage (usually 80% to 140%) of the median income as determined by HUD. A little more than half of the homes in the Hōkūao project will have affordable prices based on County and HUD guidelines.

The Hōkūao project proposes:

- 200-single family homes
    - 102-affordable homes (prices at 201H guidelines)
    - 98-market-rate homes
- Lot sizes will generally be 6,000-square feet
- One-acre park, community pavilion and parking area will be included

Most of the project area topography consists of flat to gently sloping open scrub lands. An existing drainage swale on the western boundary of the site carries storm water away from the existing town and community center. On the western flank, the project sets back from the existing wastewater treatment plant with a 600-foot buffer between the closest lot and the WWTP edge.

The R. M. Towill Corporation Preliminary Engineering Report for the Hōkūao 201H Housing Project included information related to the water demands and supply for the project. The "Water System Standards" for the four respective counties in Hawai'i estimates that the Average Daily Demand for water per residential unit (whether single-family or multi-family) in Hawai'i County is 400-gallons per unit; Kauai – 500-gals/unit; Maui – 600-gals/unit and Oahu – 500-gals/unit).

Conformance with the County standards provides accepted criteria for water system planning and design, although the water system, inclusive of water source, storage, and piping, will remain privately-owned and will not be subject to all County requirements.

Using the County of Maui Department of Water Supply Standards of 600 gallons per day per single family unit and 1,700 gallons per acre for a park as guides, the proposed average daily domestic water demand for the 200 single family units and the 1-acre park with future 1,500 square foot pavilion with comfort stations and parking is estimated to be 121,700 GPD.

Well 7 was drilled in 1987, it will be the water source for the Hōkūao project. Well 7 is at ground level of 2,100 feet; the well depth is 1650 feet.

The estimated total water demand of the project is 121,700 GPD. The Lāna'i Water Company has indicated that:

> "the project will have a long-term, reliable supply of water in accordance with Chapter 14.12, Water Availability, Maui Code, upon completion of new source development."
>
> "The Lāna'i Company is in the process of permitting the development of Well #7 which is anticipated to be the source of water for the project."

Water Demand for the Kō'ele Project District Amendment

Pūlama Lāna'i is also proposing to make amendments to the existing Kō'ele Project District. The purpose and intent of the Project District remain unchanged; its existing and continued purpose and intent are to provide for a flexible and creative approach to development at Kō'ele that is complementary and supportive of services offered in the adjoining Lāna'i City.

The Project District calls for a low-density residential and recreational development with hotel facilities in an upland rural setting that considers physical, environmental, social and economic factors in a comprehensive manner.

The proposed amended Project District will provide housing and recreational opportunities to island residents. Uses include, but are not limited to, single-family residential, multifamily residential, hotel, open space, park, golf course and resort commercial.

The existing Kōʻele Project District is a 618-acre area, located just north and east of Lānaʻi City, between the elevations of 1,700' and 1,800'. At full build-out, under existing provisions, the Project District would have 535-single family units, 156-multifamily units, 253-hotel units, 11.5-acres of park, 1-acre of public facility space, 12-acres of open space and 332.4-acres in golf course use.

The proposed Kōʻele Project District Amendment will result in a 564-acre land area. At full build-out, under proposed provisions, the Project District would have a maximum of 18-single family units, 53-multifamily units, 137-hotel units, 271.7-acres of park, 89.5-acres of open space, 78-acre golf course and 5.7-acres of resort commercial uses.

The following shows a comparison of land use allocations between the existing approved land uses and the land use allocations in the Proposed Action.

Type of Use	**Existing Land Area**	**Proposed Land Area**
Single Family	214.0-acres	9.8-acres
Multifamily	26.0-acres	18.7-acres
Hotel	21.1-acres	39.1-acres
Open space	12.0-acres	89.5-acres
Public	1.0-acres	0.0-acres
Park	11.5-acres	271.7-acres
Golf course	332.4-acres	78.0-acres
Resort Commercial	0.0-acres	57.2-acres
Total	618.0-acres	564.0-acres

Outcomes of some of the proposed changes include:

* Overall land area is reduced from 618-acres to 564-acres
* Maximum Density (Units per Acre) reduced for Single Family, Multifamily and Hotel
* Maximum Units Allowed reduced for Single Family, Multifamily and Hotel

Single Family Residential

- Land area for Single Family Residential is reduced from 214-acres to 9.8-acres
- Maximum Density for Single Family Residential reduced from 2.5-units/ac to 2-units/ac
- Maximum Units Allowed for Single Family from 535-units to 20-units

Multifamily Residential

- Land area for Multifamily Residential is reduced from 26.0-acres to 18.7-acres
- Maximum Density for Multifamily Residential is reduced from 6-units/ac to 3-units/ac
- Maximum Units Allowed for Multifamily is reduced from 156-units to 56-units

Hotel

- Land area for Hotel increases from 21.1-acres to 39.1-acres
- Maximum Density for Hotel is reduced from 12-units/ac to 3.5-units/ac
- Maximum Units Allowed for Hotel is reduced from 253-units to 137-units

The R. M. Towill Corporation Preliminary Engineering Report for the Kōʻele Project District Amendment included information related to the water demands and supply for the project.

Overall, the proposed Kōʻele Project District will cause a reduction in water demand, compared to the existing Kōʻele Project District, as a result of a reduction in developable land and reduction in densities.

The calculated water demands for the existing and proposed, in full buildout condition, are summarized below (RM Towill Preliminary Engineering Report).

Water Demand Summary		
Land Use	**Existing Koele PD Average Daily Demand (gpd)**	**Proposed Koele PD Average Daily Demand (gpd) [a]**
1. Hotel	185,000	162,782
2. Multi-Family Residential	54,000	31,800
3. Single-Family Residential	153,000	10,800
4. Park	19,550	750
5. Open Space	0	0
6. Golf Course [b]	20,750	20,000
7. Public	1,700	N/A
8. Resort/Commercial	N/A	20,260
TOTAL	**434,000**	**246,392**

a. *Proposed demands are based on Pulama Lanai program, which limits unit counts and developed area.*
b. *Clubhouse and Cavendish only. The Experience at Koele irrigation provided by effluent.*

With the amendment to the Kōʻele Project District, the additional water demand (beyond existing withdrawals) is estimated to be 106,260-GPD (74,000 GPD for Hotel, 12,000 GPD for Multi-Family Residential and 20,260 GPD for Resort Commercial.)

Mānele Project District Decreasing Water Demand for Residential Uses

The Mānele Project District Phase I was conceived as an 869-acre area located at sea level on the southeastern shore of Lānaʻi. At full build-out, this Project District would have 282-single family units, 184 multi-family units, 500-hotel units, 5.25-acres of commercial space, 66.33-acres of park, 2-acres of public facility space, 152.02-acres of open space, and a 172-acre golf course. (Lānaʻi WUDP; 4-68)

According to the Mānele Project District ordinance (19.70.0900), the initial land use categories and maximum acreages for various land use categories within Mānele Project District are:

Residential (SF)	328.80 acres
Multi-family	55.00 acres
Commercial	5.25 acres
Hotel	56.60 acres
Park	66.33 acres
Open space	152.02 acres
Golf course	172.00 acres
Roads	32.00 acres

The Ordinance also notes the maximum permitted density for various land use categories; the computed total number of units for residential uses (single-family and multi-family) and hotel are noted below:

	Acres	**Density (Units per Acre)**	**Maximum Units**
Single-family	328.8	0.8576	282
Multi-family	55	3.34	184
Hotel	56.6	10	566

Although these maximum single-family and multi-family unit counts had been conceived in the initial Project District approval in 1986, in 1995, the Lānaʻi Planning Commission approved a total of 166-single-family and 54-multi-family units at Mānele. Since then, the residential unit maximum has been renewed every five years to retain the 166-single-family/54-multi-family count.

By December 2017, only a total of 40-single-family lots had been developed and 53-multi-family units had been constructed. At that time, the Lānaʻi Planning Commission approved a request by Pūlama Lānaʻi to reduce a total maximum allowable units in the Project District to 80-single-family residential lots (the 40-existing and allowing only another 40-single-family lots).

	Total Units Initially Conceived (1986)	**Total # of Units Allowable (1995)**	**Maximum Units Permitted (2017)**
Single-family	282	166	80
Multi-family	184	54	54

This reduction in allowable units significantly reduces the water demand within the Mānele Project District.

Using the County of Maui Department of Water Supply Standards of 600-gallons per day per single family unit, rather than an overall water demand based on the previously allowed number of units (99,600-GPD as suggested in the Lānaʻi WUDP (166-units at 600-GPD)), the added demand for Water at Mānele Project District for the residential uses is only an additional 24,000-GPD. This is a reduction in overall water demand of 75,600-GPD that had been estimated and reflected in the Lānaʻi WUDP.

This is significantly less than the anticipated water demands previously contemplated in the Lānaʻi WUDP and other planning documents. However, it is not clear when the additional residential units will move forward, as there remain unsold properties at Mānele.

Existing Moving Average Well Pumping (August 2019) and Existing/Proposed Uses of Water

The following listing notes the different water sources (both brackish and drinking) and moving average pumping (gallons per day - GPD) submitted to and reviewed by CWRM as of August 2019, as well as a summary of the total existing and proposed uses of water on Lānaʻi.

Leeward (SY 3-MGD)		
Existing Use		
Brackish (Lanai Water Co data - 08/22/19)		
Well 1	109,675	
Well 9	0	
Well 14	100,108	
Well 15	370,825	
Subtotal Brackish	**580,608**	
Drinking (Lanai Water Co data - 08/22/19)		
Well 2/Shaft 3	194,983	
Well 3	148,006	
Well 4	256,894	
Well 7	0	
Well 8	227,291	
Subtotal Drinking	**827,174**	% of SY
Existing Use (Leeward)	**1,407,782**	46.93%
Proposed Use (Leeward)		
Hokuao 201H Housing (Well 7)	121,700	
Kōʻele Project District New Uses *	106,260	
DHHL Water Reservation (Well 7) **	67,200	
Mānele New Residential	24,000	
Subtotal Proposed (Leeward)	**319,160**	% of SY
Total Leeward (Existing & Proposed)	**1,726,942**	57.56%
Windward (SY 3-MGD)		
Drinking		
Well 6	147,480	% of SY
Existing Use (Windward)	**147,480**	4.92%
Proposed Use (Leeward & Windward)		
Miki Industrial (Existing Capacity & New Wells over 30-years)	1,309,000	
Subtotal Proposed (Leeward & Windward)	**1,309,000**	
Comparison of Existing and Proposed to Overall SY of 6-MGD		% of SY
Subtotal Existing Use (Leeward & Windward)	**1,555,262**	25.92%
Subtotal Proposed Use (Leeward)	**319,160**	5.32%
Subtotal Proposed Use (Leeward & Windward)	**1,309,000**	21.82%
Anticipated Total (Leeward & Windward)	**3,183,422**	53.06%

Notes:

* Per the Kōʻele Project District Amendment Preliminary Engineering Report, the Existing Kōʻele Project District (existing and proposed uses) has an average daily demand of 434,000-GPD. Under the Kōʻele Project District Amendment, permitted densities and unit counts for a variety of uses (hotel, single family and multi-family) are significantly reduced. This results in an estimated reduction in the estimated water demand for uses in the project district to a total estimated demand (existing and proposed uses) of 246,392-GPD (an overall reduction of 187,608-GPD).

** Per the DHHL State Water Projects Plan Update (2017) (page 4-25), "The potable water requirement for the Lānaʻi City tract is 0.0672-MGD, all from Residential land use. The tract is within the service area of the existing water system managed by the Lānaʻi Water Company; however, with the new ownership of the island, it is unclear how the existing municipal operations will be affected. The DHHL development is not scheduled until the final year in the 20-year timeline; therefore, it is recommended that DHHL monitor the operational situation and establish contact if changes are made."

Addressing Water Demands for Other Proposed Developments

The Lānaʻi Community Plan, approved in 2016, identifies a number of additional proposed projects across the Island. Some of these are noted in the following chart and summaries from that plan follow the chart:

Table 9.2 Lānaʻi Community Plan
Acreage by Growth Area and Land Use Designations

Growth Area	Land Use Designations								Total Acres
	Mixed-Use Residential	Hotel	Airport	Light Industrial	Heavy Industrial	Public/ Quasi-public	Park	Rural	
Lānaʻi City									**1,488**
Lānaʻi City Expansion*	546								
University Campus						524			
Tennis Academy							50		
Linear Park/Drainage							280		
Gateway Park							16		
Rural Residential								50	
Film Studios				22					
Airport									**246**
Enhancement of present airport facilities			46						
Miki Basin Industrial				100	100				
Mānele									**181**
Mānele Mauka	105								
Rural Residential								76	
Kaumālapaʻu									**60**
Ocean Resources Heavy Industrial					10				
Kaumālapaʻu Mixed-Use Residential	50								
TOTAL ACRES	**701**		**46**	**122**	**110**	**524**	**346**	**126**	**1,975**

*Note: Includes proposal to incorporate County Affordable Housing Project into new land use designation

Chart noting Land Uses identified in the Lānaʻi Community Plan (9-7)

Mixed-Use Residential – Lānaʻi City Expansion

This area will consist of approximately 546-acres on the west end of the existing town. It will include part of the County's affordable housing lands and extend south, below 9th Street, to

include the land area of the current WWTF. The WWTF will possibly be moved north of Paliamano Gulch.

The Lāna'i City Expansion will be a mixed-use residential project, which includes primarily residential development, with neighborhood parks, commercial/business, and public/quasi-public development. Street pattern and housing form will be similar to the historic areas of Lāna'i City.

Land for some of the housing is proposed for exchange by Pūlama Lāna'i for land within the County's affordable housing project, which currently has a 73-acre site.

If approved, this will allow construction of mixed-use housing to occur at an earlier date and, over time, will blend the affordable housing with other housing throughout the area, resulting in a mixed-income housing community.

Extensions of 5th Street and 9th Street will intersect with a new bypass road that will cross the Kaumālapa'u Highway and loop north then east to end at the corner of Lāna'i Avenue and Keomuku Road. (Lāna'i Community Plan; 9-5)

Note, related to the status of the proposed County Affordable Housing Project:

Per the Unilateral Agreement for Conditional Zoning, dated February 1992, Castle & Cooke deeded 115-acres of land for affordable housing to the County.

Approximately 73-acres is now identified for an Affordable Housing project (42-acres are for DOE as a school expansion area). It is identified a Tax Map Key: (2) 4-9-002:058. It remains in the same vacant land condition as in 1992.

In January 2010, a Final Environmental Assessment was prepared that noted that the project was proposed to include approximately 412-residential units – 293-house lots and 173-multifamily units - and two parks.

It was estimated that the proposed project would need approximately 0.278-MGD from the Lāna'i Water Company.

A November 26, 2015 Hawaii News Now report noted that the "affordable housing project planned for the island of Lanai has stalled … The project stalled because the county would have to spend $7 million just to build sewer and water lines to the property, a huge expense, before any buildings were built."

An October 15, 2018 meeting was held on Lāna'i, with the County proposing to change the configuration to multiple phases in slightly different locations, with the first phase being 12-single family lots and 24-multi-family units. The single-family lots would be available for construction by the purchaser.

A 201H application is needed to be initiated with the new proposal. The County estimated that the funds for the project could be raised over the next few years. This did not receive favorable response from the Lāna'i community. It is not clear when the project will move forward.

University

Approximately 524 acres are proposed for a new university and research institute on the western edge of the Lānaʻi City Expansion. The proposed acreage reflects the intent to reserve enough space to achieve an attractive campus design. (Lānaʻi Community Plan; 9-6)

Note, related to the status of the suggested University on Lānaʻi:

> Other than references in the Lānaʻi Community Plan and prior (2013) references to Larry Ellison and the Lanai Community Plan Advisory Committee, "The planned Lanai campus, which would be located just south of Lanai City is years down the line". It is not clear what the project scale will be and when the project will move forward.

Tennis Academy Park

The tennis academy is proposed on approximately 50-acres of park land in the central education and recreation core. The concept is modeled after similar programs that train professional tennis players.

The academy will have dormitory housing nearby and complete tennis facilities. Students will come from around the world to train for international level competition. (Lānaʻi Community Plan; 9-5 & 6)

Note, related to the status of the suggested Tennis Academy:

> Other than references in the Lānaʻi Community Plan and prior (2015) references to Larry Ellison, there have been no additional, timely information on the proposed project. The land area where the Tennis Academy was to be placed is now part of the area where the Hōkūao housing project is located.
>
> There is no other land area indicated for the Tennis Academy. It is not clear what the project scale will be and when the project will move forward.

Gateway Park

This 16-acre site will expand the existing undeveloped park at the junction of Mānele Road and Kaumālapaʻu Highway. The park will provide an attractive gateway entrance to Lānaʻi City. (Lānaʻi Community Plan; 9-6)

Note, related to the status of the suggested Gateway Park

> A 10-acre site at the corner of the Mānele and Kaumālapaʻu roads was transferred to DHHL from DLNR, and is planned by DHHL to be a commercial area. There has not been any progress on this project.

Rural Residential

A rural residential area is proposed adjacent to Kōʻele stables. The 50-acre area is located between Keomuku Road and Kopolihua Road. It will be served by a proposed extension of Fraser Avenue for additional road access.

This area is intended to provide larger lots than the lots within Lānaʻi City, and to allow farming. Lot sizes could range from 0.5 acre to 10 acres or more under the County's current zoning code for rural lands. (Lānaʻi Community Plan; 9-8)

Note, related to the status of the suggested Rural Residential:

> A 9.5-acre portion of this area is included in the Kōʻele Project District amendment and will not be used as rural residential. It is not clear what the project scale will be and when the project will move forward.

Film Studio

Twenty-two acres of light industrial land will be used for film studio facilities. The warehouse-type structures will be sited to prevent the buildings from being visible from Mānele Road.

Note, related to the status of the suggested Film Studio:

> It is not clear what the project scale will be and when the project will move forward.

Lānaʻi Airport

"The projected airport requirement increases gradually, reaching 2,900 in the year 2015 and 3,900 in the year 2020. In calendar year 2008, consumption at the Department of Transportation's airport meter averaged 1,502 GPD. There is also a meter at the airport tank. Total consumption between the two meters was 5,624 in 2008, and has exceeded 6,000 GPD in past." (Lānaʻi WUDP; 4-67)

Mixed-Use Residential – Mānele Mauka

The conceptual plan proposes approximately one hundred and five acres, with approximately eighty-three acres for primarily residential use, with some commercial uses and amenities, such as neighborhood parks and a community center.

Mānele Mauka will be a compact walkable neighborhood with single-family and multifamily units and a variety of housing types, including housing for seniors. Mānele Mauka is located south of the junction of Mānele Road and Kaupili Road, with open agricultural lands bordering both roads to retain views. Road access will initially be via Mānele Road and Kaupili Road; Hulopoʻe Drive will be opened at a later time to connect to the Mānele PD. (Lānaʻi Community Plan; 9-8)

Note, related to the status of the suggested Mānele Mauka:

> Other than references in the Lānaʻi Community Plan and prior (2013) references to Larry Ellison, there are been no additional, timely information on the proposed project. It is not clear when the project will move forward.

Kaumālapaʻu Harbor Mixed-Use Residential

The concept proposes creating a mixed-use residential area on approximately 50-acres of land above the harbor and south of Kaumālapaʻu Highway. There will be ocean-view residential lots, limited neighborhood service commercial uses, a community garden/farm, and neighborhood

parks. The development will be sited to reduce visibility of buildings from the highway and to retain view corridors from the highway to the coast.

Note, related to the status of the suggested Kaumālapaʻu Harbor Mixed-Use Residential:

It is not clear what the project scale will be and when the project will move forward.

A general note on "Mixed-use Residential" as noted in different uses noted above – this land use type is not presently noted in Maui County Zoning Ordinances. Prior to any planning, permitting or construction that could occur, a new Zoning Ordinance would need to be proposed and approved by Maui County.

Uses noted in Lānaʻi Community Plan and Lānaʻi WUDP

Lānaʻi Agricultural Park

On July 15, 1994, Pūlama Lanai entered into an agreement leasing 100-acres of land for 55 years at a nominal lease rate of $100 per year for use as the Lānaʻi Agricultural Park. The lease states that the State "shall have the right to purchase from the public utility and to use up to, but not more than 0.20 MGD on the average annual basis."

An Amendment of lease states that, notwithstanding this quoted sentence of the Lease, "the parties further agree that additional water will be allocated to the agricultural park in the future, but that the need for such additional water will be the [State's] responsibility to justify and that any costs incurred for this additional water will be borne by the [State]." There has not been any further change in status since the amendment." (2017 Annual Report from Pūlama Lānaʻi to the Land Use Commission Docket No. A89-649 (Mānele Golf Course)) (Note that the Lanai WUDP suggests a water demand of 500,000-GPD.)

Note, related to the status of the Lānaʻi Agricultural Park:

In its May 2017 review of the possible demand for agricultural lots, the Department of Agriculture apparently concluded that there had not been any substantial change from its position in November, 2006, that there was insufficient interest to go forward with the agricultural park.

Mānele Harbor

The combined potable and non-potable estimates for Mānele Harbor, in the amount of 5,000 GPD, are lower than the average use of 21,179 in 2008.

Lānaʻi Water Use and Development Plan Identifies Various Means to Meet Future Water Demands

The Lānaʻi Water Use and Development Plan anticipates a number of actions to meet the water needs on the Island.

The Island of Lānaʻi has a total sustainable yield of 6 million gallons per day (MGD). Virtually all of the island's available ground water resources are confined to dike compartments in the Central Aquifer Sector Area, which is divided into two aquifer system areas having sustainable yields of 3-MGD each Recharge is highly dependent on the forested mauka watershed, with a significant amount deriving from fog drip.

Although historical evidence suggests the existence of perennial streams, no surface water sources currently exist on the island. Lānaʻi has two drinking water systems, one brackish water system used for irrigation, and two recycled water systems, also used for irrigation. …
Future water demands were assessed based on the estimated rate of increase in demand predicted by economic and demographic considerations through 2030 and based on build-out of known projects and projects with Phase II approval.

The resource development strategy includes new ground water source development, water reuse expansion, and desalination, in addition to both supply-side and demand-side conservation. (CWRM Staff Submittal August 15, 2012)

Water Supply Options

The Lānaʻi Water Use and Development Plan includes a list of potential supply options sufficient to meet the forecast land uses. These sources include recommissioning old wells, drilling new wells, desalination and other source options. (Information from Chapter 5 of the Lānaʻi WUDP follows.)

New supply resource options that were examined include:

- High level potable well near Well 5 in the Leeward Aquifer
- Well 2-B at the site of Shaft 3 in the Leeward Aquifer
- Recommissioning Well 7 in the Leeward Aquifer
- New wells in the Windward Aquifer at Malaʻau
- Recommissioning the Maunalei Shaft and Tunnels in the Windward Aquifer
- New wells in the Windward Aquifer at or near the Maunalei Shaft and Tunnel sites
    - Two (2) new wells using existing transmission
    - Three (3) new wells using existing transmission
    - Three (3) new wells using new transmission
- New wells in the Windward Aquifer at Kauiki
    - Assuming that these wells can tie into Maunalei Wells transmission
    - Assuming new transmission had to be constructed
- New wells in the Windward Aquifer at Kehewai Ridge
    - At 2,250’ elevation
    - At 2,750’ elevation
- New Brackish Well 15 in the Leeward Aquifer
    - Used without additional desalinization
    - Used with desalinization
- “General” Desalinization Options
    - Brackish to potable
    - Seawater to potable
    - Seawater to brackish for irrigation

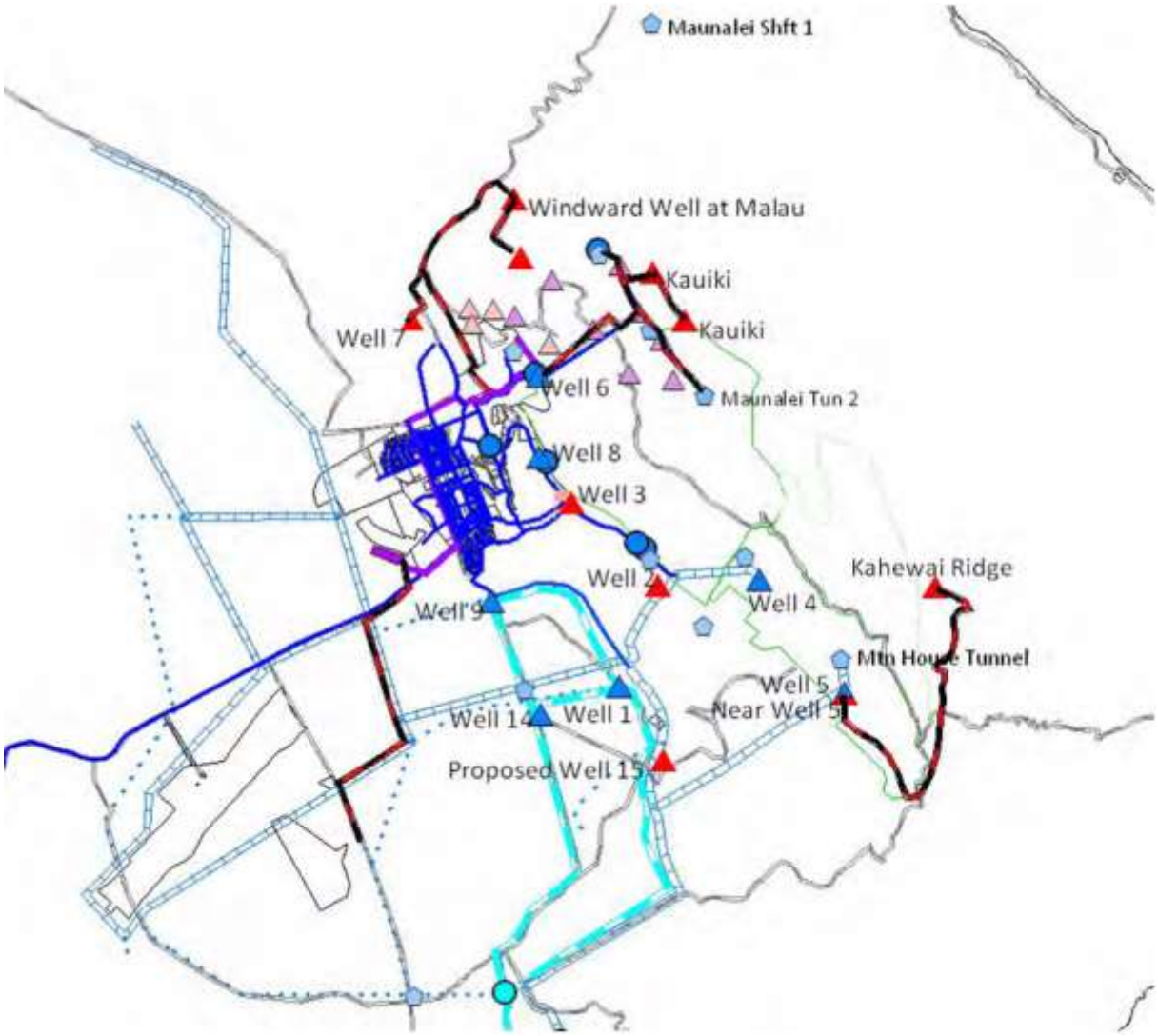
Supply Side Efficiency Options include:

- Loss Reduction - Repair of Pālāwai Grid Pipes
- Loss Reduction - Cover for the 15 MG Brackish Reservoir
    - Floating cover
    - Aluminum cover
    - Hypalon balls

- Expanded use of Lāna‘i City Reclaimed Water
    - Lāna‘i City to Miki Basin
    - Lāna‘i City to Mānele
    - Lāna‘i City to Mānele via Miki Basin

In discussing new wells, the WUDP notes that new wells “could be developed to provide additional water supply for Lāna‘i. Aside from additional supply, benefits provided by additional wells would include improved geographical distribution of well pumping, increased production redundancy for system reliability, and potentially increased flexibility of operations.”

With respect to Leeward versus Windward well development strategies, the Lāna‘i WUDP (2011) notes the need to “Plan and ultimately develop operable groundwater sources in the Windward aquifer to distribute groundwater pumping and provide resources, as necessary, to provide for system growth beyond the capacity of the Leeward aquifer.” (Lāna‘i WUDP; 31)



Lāna‘i Source Options Considered in Lāna‘i WUDP; 5-11

Desalination

The Lānaʻi Water Use and Development Plan notes that "Desalination of seawater offers essentially unlimited ultimate source capacity but is more expensive than other available options." (Lānaʻi WUDP; 5-38)

"Desalination facilities can reduce the chloride level of brackish water to potable drinking standards. The cost of desalination is very dependent on the amount of required reduction in chloride level. Desalinating a brackish water source that is close to potable standards is much less expensive than desalination of seawater." (Lānaʻi WUDP; 5-36)

The Lānaʻi Community Plan notes that "The new landowner is exploring the option of developing desalination plants that would create potable water out of saltwater. Producing potable water through desalination would greatly decrease the potential of over-pumping the aquifer."

"Increased production of potable water for human consumption means there could be adequate water supply for the re-introduction of agricultural operations. Potable water can be saved by using brackish and treated water for the irrigation of the golf courses and resort landscaping." (Lānaʻi Community Plan; 2-7)

In 2013, Pūlama Lānaʻi submitted an application for "a reverse osmosis desalination water treatment facility located on property described as Tax Map Key (TMK) (2) 4-9-002:001 (por.)" The request was for a "proposed Reverse Osmosis ("RO") Well No. 3 (source well), water transmission lines, and access roads."

The information here comes primarily from the Lānaʻi Planning Commission FOF, COL and Decision and Order, signed January 21, 2015. The State Special Use Permit covers an area less than 15 acres; as such, the Lānaʻi Planning Commission has the authority to act on the application.

In 2014, announcements were made that a

> … state-of-the-art, multi-million dollar Hawaii desalination plant, which will supplement the island of Lānaʻi's existing water supply and enhance its groundwater reserves, is scheduled to begin in 2014-15 with plans to provide five million gallons of water per day.
>
> The first phase of the project will provide 2.5 million gallons of fresh water each day, according to Pūlama Lānaʻi, the operations firm owned by the billionaire technology mogul, who bought 98 percent of the Pineapple Island in 2012.
>
> The facility, which will be located about one-half mile above The Challenge at Mānele Bay golf course, where test tells are currently being drilled, will be built by IDE.
>
> The Israel-based firm has installed 400 desalination facilities in 40 countries.
>
> Desalination turns salt water into fresh water that's suitable for drinking. (Pacific Business News, February 27, 2014)

In 2015, the Lānaʻi Planning Commission found "that the uses proposed in the Project District Application are "accessory uses" as defined in MCC § 19.04.04, being incidental and subordinate to the principal uses of the land, which is single-family residential, multifamily residential, hotel, commercial, park, golf course,

open space, and public. The Commission further finds that the proposed uses are located on the same zoning lots as the principal uses."

The Commission further found that "The proposed project could prove to be a dependable alternative water supply that reduces the island's reliance on the High Level Aquifer, and could positively contribute to the availability of potable and non-potable water on the island and meeting the anticipated long-term water demand."

"The project could have a beneficial impact on agricultural production and land in that a portion of the water produced by the project will be used for irrigation and agriculture in the Pālāwai Basin".

"Groundwater on Lānaʻi occurs in two (2) different modes: high level and basal. The island of Lānaʻi's primary current water source is a High Level Aquifer located in the central section of the island and extending across the Pālāwai Basin. The total sustainable yield from the High Level Aquifer is 6 million gallons per day. Basal groundwater exists in the areas between the High Level Aquifer and the shoreline."

"Basal groundwater is a lens of brackish water floating on denser saline groundwater beneath it. The proposed project's source wells draw water from below the basal groundwater lens at a depth of 50-145 feet below sea level."

"The proposed desalination water treatment facility's groundwater supply wells are located approximately six-tenths (.6) of a mile from the coastline. The project will not draw water from the High Level Aquifer and is not anticipated to have an adverse impact on hydrogeologic conditions and features."

"Disposal of the hypersaline concentrate ("brine") from the reverse osmosis process occurs in two deep disposal wells, at a depth of 160 to 300 feet below sea level."

"The brine, being 1.8 times saltier than sea water, is denser than the receiving saline groundwater and will sink deeper as it travels seaward and is anticipated to discharge approximately 2 miles offshore at an ocean floor depth of approximately 650 feet. At the point that the brine comingles with the open ocean water, it will be approximately the same salinity level as the receiving water."

"The Planning Department recommended approval of the Project District Application and recommended approval of the [Special Use Permit] SUP Application, subject to 22 conditions".

In review of the application, "The Planning Department recommended a 30 year Special Use Permit time limit based on the anticipated useful life of the desalination plant, and stated that this was consistent with other long-term projects granted extended permit time limits although no other 30-year permit was identified."

"The Applicant [Pūlama Lānaʻi] testified that the 30 year limit was necessary due to the significant financial cost of the project, and that any shorter time period would render the project unfeasible."

"The project was designed to meet long-term needs for potable and non-potable water on the island of Lānaʻi, as identified in the 2011 Lānaʻi Water Use and Development Plan."

However, “The [Lānaʻi Planning] Commission found that the SUP 30-year time limit recommended by the Department and proposed by the Applicant was too long and further that the Commission should review requests for time extensions beyond the initial permit term.”

“The Commission found that the Special Use Permit should not be 30 years due to the Commission's desire to review the project's operational status and the island's economy, after the project had been in operation for a period of time and prior to any extension of the SUP.”

The Lānaʻi Planning Commission granted the Special Use Permit, however, rather than a 30-year term, the “Special Use Permit shall be valid until June 17, 2029” (for 15-years).

In addition, the Lānaʻi Planning Commission imposed an additional condition (condition 23) that states,

> “Once the desalination plant is operational no High Level Aquifer water will be pumped to or used in the Mānele Project District except in the event of an emergency as determined by the Lānaʻi Water Company and the Lānaʻi Water Advisory Committee, and then only for human consumption.” (Lanai Planning Commission Pūlama Lānaʻi Desalination FOF, COL and D&O, January 21, 2015)

“(C)onstruction of the planned desalination plant was halted on September 12 (2014).” (Daily Mail, September 25, 2014).

In follow-up media reports,

> Lānaʻi Planning Commission Chairman John Ornellas said Pūlama Lāna’i sought a special use permit for the desalination plant last year.
>
> “We spent four months reviewing it,” he said.
>
> But the commission concluded that instead of a 30-year permit for the plant, it would grant 15 years, Ornellas said. The permit was approved, and he said commission members heard later that they were being “blamed” for “Pūlama shutting down the desal plant.” …
>
> Kurt Matsumoto, chief operating officer of Pūlama Lāna’i, said … that the company had not given up on development of a desalination plant, but its plans were being reassessed in light of the planning commission’s actions in June. He said the company had invested substantially toward developing the plant.” (Maui News, January 20, 2015)

Water Conservation Measures

Efficient use of water and reductions in supply system leakage are essential to reduce waste of Lānaʻi’s limited water resources. The following are stated provisions from the WUDP and the Lānaʻi Water Company (LWC) responses and status of these provisions (indented bullet) (2016):

- Lānaʻi’s water and wastewater utilities should implement water recycling and water conservation programs targeting landscape and indoor water uses to substantially reduce water consumption to the extent allowed by the Public Utilities Commission.
    - All wastewater on the island is currently reclaimed from the two wastewater plants.

LWC currently promotes conservation messages on its website and in public meetings.

A more extensive conservation program is being developed and LWC is working on implementation of the plan. HRWA (Hawaii Rural Water Association) staff assisted with a residential "Direct Install" program to replace all existing, non-conserving toilets, showerheads and faucet aerators and clothes washers on the island.

Reduction in water use will also be promoted by the use of native species requiring less irrigation. These plant types will be promoted in the community,

Lānaʻi Water Company has completed a 100% replacement program for all water meters on Lānaʻi with the installation of Smart Meters. These meters allow 15 minute increment readings for all meters, and have an App that consumers can use to see their usage. The system also provides notifications to LWC and the consumer if there appears to be a leak.

This will induce conservation as customers see what their water use and change behaviors to more efficiently use their water. A pilot program was started at the end of 2015 and is now complete.

- The County and public utilities should implement education and supporting measures to encourage planting of low-water-use plants for new and existing landscaping.
    - LWC currently promotes conservation messages on their website and in advertisements in the Lānaʻi monthly newspaper. Several xeriscaping projects have been implemented in the Mānele area on roadside irrigation and LWC is working with homeowners and associations in the reduction of water use, install drip irrigation, and plant xeriscaping where appropriate LWC encourages best practices in irrigation conservation for all our customers, homes, hotels, commercial space, etc.

- Lānaʻi's public water utility should reduce unaccounted for water to reasonable levels including implementation of the following measures:
    - Replace and/or repair deteriorating or leaking supply pipes including replacement of deteriorated Pālāwai grid pipeline
        - LWC has replaced the entire section from Hiʻi to Miki pipeline with a new PVC pipe.

          LWC has also budgeted amounts for future years to replace sections of pipe each year. Some of these funds are part of the approved PUC agreement and the $10 million in funds for infrastructure improvements committed to by Pūlama Lānaʻi. A report is filed regularly with the PUC.

    - Implement programmatic leak detection and repair programs
        - LWC has implemented an unaccounted for water program to find unmetered water and leaks. Utilizing data, leak detection equipment, meter information,

meter installations, and monitoring water lines, we have reduced unaccounted for water.

Also, by reducing the pressure in the Pālāwai Ag system utilizing a pressure reducing valve (PRV) station, we have significantly reduced the leaks in that area. We call on all departments and residents to report leaks or water loss.

These actions have reduced the overall unaccounted for water on the island between pumping and billing from 28.36% in 2008 as reported in the WUDP to 17% in recent years and now down to approximately 15%. The WUDP calls for a reasonable goal of 15% and a better goal of 12%. We continue to look for leaks and unmetered water.

- Install floating ball or blanket type cover on existing 15MG brackish water reservoir
    - This is part of the PUC funding and the options of a solid cover versus the proposed floating balls are being explored.

      LWC conducted a test of a Monolayer technology to inhibit water evaporation but the results were in the 7-9% reduction range and not as much as hoped for (30-40%).

Notes on Other Water Savings Efforts

In March 2017 changes were made to the Mānele Hotel which reduced the overall number of rooms (by combining rooms to become suites).

Likewise, the proposed irrigation and pool water in the refreshed areas went from 26,717 to 22,715-GPD.

"With respect to the development and utilization of alternative non-potable water sources (brackish water and reclaimed sewage effluent), [Pūlama Lāna'i] has developed a high capacity system for Golf Course irrigation. [Pūlama Lāna'i] has developed a non-potable water system for irrigation purposes that utilizes brackish well-water and stores this non-potable water in a 15-million gallon open reservoir."

"[Pūlama Lāna'i] also utilizes reclaimed water from the Mānele Wastewater Treatment Plant for Golf Course irrigation, which provides "R-1" quality water and produces between 60,000 and 120,000 gallons per day (approximate) of reclaimed water (with an expanded capacity of 140,000 gallons per day). The County of Maui concluded that Petitioner has developed an adequate brackish and non-potable water system for the Golf Course." (2017 Annual Report to LUC)

In addition, in August, 2017, the Mānele Golf Course started the project to replace the irrigation lines in the golf course. This has resulted in an average of 10,668-GPD reduction from the average brackish pumpage of 42,975-in August, 2017. This does not include the R1 water from the Mānele Waste Water Treatment facility.

Ongoing Measures to Reduce/Monitor Water Use on Lānaʻi

Pūlama Lānaʻi has made significant progress in reduction of leaks, conservation efforts and changes to existing projects resulting in reduced water demands and usage.

In addition to the reduced scale, densities and number of units called for in the proposed amended Kōʻele Project District noted above, during the recent refresh at Mānele, there was also a reduced number of hotel units at Mānele Hotel.

Likewise, at Mānele, Pūlama Lānaʻi reduced the irrigation and pool water usage for the pool area changes. They changed types of plantings and left large areas to be in a natural state, rather than grass; so there is no irrigation needed. The pool area uses artificial turf rather than grass. And Mānele went with two pools, rather than the proposed three.

4.6.3 Level of Impact after Mitigation

Pūlama Lānaʻi intends to move ahead with the proposed 200-acre Miki Basin Industrial Park and use the existing excess capacity from the Lānaʻi Water Company water system and will add to the capacity with new wells, prior to future expansion beyond that point.

Full buildout of the Industrial Park will require the development of a new well or multiple wells. Full buildout of the proposed 200-acre Miki Basin Industrial Park will be developed incrementally over a period of 30-years (not all at once.)

Pūlama Lānaʻi will conform with the requirements of the Commission on Water Resource Management, Department of Health, County of Maui and other regulatory entities as it relates to installation, inspection and maintenance of water systems associated with the project.

The impact of the proposed project on water resources will have a less than significant impact.

4.7 Solid Waste & Material Management

This section discusses the solid waste and materials management practices within the project area and potential impacts of the project on those practices.

4.7.1 Environmental Setting

The Lānaʻi Landfill on Kaumālapaʻu Highway accepts municipal solid waste and construction debris dropped-off from commercial and residential customers. In addition, personal delivery to the landfill of municipal solid waste, green waste, and trash is available.

Pūlama Lānaʻi sponsors rural recycling collection events for hard to recycle items including: appliances, small scrap metal and vehicle batteries & tires. The County has recycling programs for computers/ electronics and household batteries.

Pūlama Lānaʻi provides green waste recycling with subsequent compost available to residents.

Hawaiʻi DOH, in conjunction with Maui Disposal, provides refundable glass and can recycling.

The County, through the Department of Environmental Management provides residential application-based refuse pick up and disposal services on Lānaʻi. Fees for Residential Solid Waste Services are $192 for Lānaʻi per year and are billed semi-annually in June and December.

4.7.2 Potential Environmental Impact & Mitigation Measures

During the initial short-term construction phase of the project, the contractor will develop and implement a construction-generated waste disposal plan.

Over the long term, individual homeowners will dispose of their solid waste, recyclables and green waste consistent with the County programs on the Island.

4.7.3 Level of Impact after Mitigation

The handling of solid waste, as proposed, will ensure that the project will have a less than significant impact in regards to solid waste management.

4.8 Socioeconomic Conditions & Fiscal Impacts

This section discusses the socioeconomic conditions and public services and facilities in the region and in the project area, and the potential long-term socio-economic impacts of the proposed uses. Plasch Econ Pacific Inc. and Munekiyo Hiraga prepared an Economic and Fiscal Impact Assessment for the proposed project.

4.8.1 Environmental Setting

According to the 2017 Maui County Data Book, the 2017 population of the County of Maui was 166,260 residents. The American Community Survey's five-year estimate reports that between 2013 and 2017, the County of Maui's population was about 164,094 residents, up 6.0% since 2010.

Residents include those who live full-time or permanently in the County, and exclude visitors and part-time residents (i.e., those who reside most of the time in a primary home located elsewhere).

Between 2013 and 2017, the island of Lānaʻi was estimated to have a resident population of approximately 3,203, or 1.95% of the County's population. The population on Lānaʻi grew at a slightly slower rate than the County as a whole, increasing by 2.2% from 3,135 residents in 2010.

With an average household size of 2.57 people per household, households on Lānaʻi are slightly smaller than households in the County as a whole. The mean household income on the island is estimated at $67,944, 38.3% lower than the County of Maui. An estimated 53.4% of Lānaʻi residents attended some college or received a higher education degree.

The Lānaʻi Community Plan, which was updated and approved by the Maui County Council in 2016, notes that an additional 885 residents are forecasted to live on the island by the year 2030, for a total population of 4,020 (based on the County's Land Use Forecast produced in December 2012).

Governmental services, including Police, Fire, Medical and Education are available through respective governmental agencies.

The Lānaʻi Community Plan notes that Police services for island residents is provided by the Maui Police Department (MPD). The current Lānaʻi Police Station is situated in Lānaʻi City. The island makes up Maui Police Department (MPD) District II that includes two motorized beats, each patrolled by one officer.

There are 11-full time officers on Lānaʻi including one Lieutenant and two Sergeants and a School Resource Officer. They work out of an 8,000-square-foot facility that includes three jail cells, a juvenile cell, and office space.

The number of officers slightly exceeds the estimate of need in the Public Facilities Assessment Update published in 2007. This level of staffing is necessary, however, because of the many remote places on the island. According to the assessment, 'expansion of existing service within the study period (to 2030) is not required.' (Lānaʻi Community Plan, 2016)

Lānaʻi Fire Station has a total staffing of 18 personnel. Three captains, six Firefighter III, and nine Firefighter I. Lānaʻi Station houses one Engine Company and one Tanker. There are six personnel on duty daily. (Fire's latest posted Annual Report 2014-2015)

On July 1, 2017, Maui Memorial Medical Center, Maui Memorial Medical Center Outpatient Clinic, Kula Hospital, Kula Clinic, and Lānaʻi Community Hospital became part of Maui Health System, which is affiliated with Kaiser Permanente. These facilities will continue to operate as vital community hospitals, open to everyone regardless of health coverage.

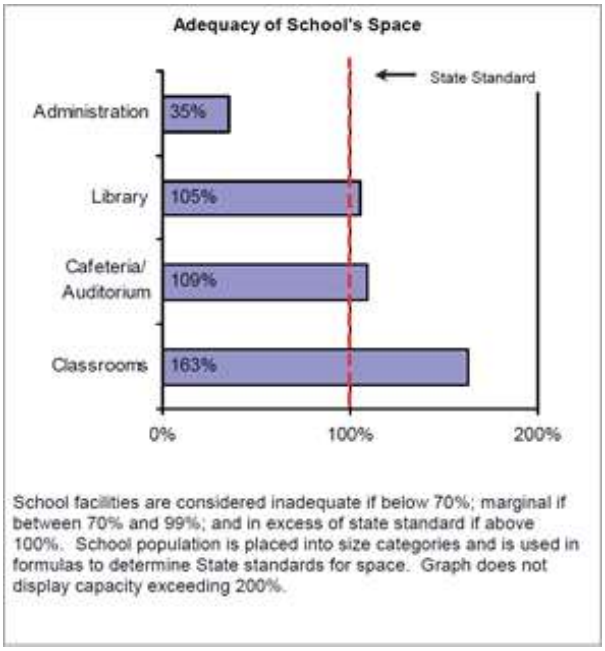
Lānaʻi Community Hospital is the only hospital on the island of Lānaʻi. It is the sister hospital to Kula Hospital and Maui Memorial Medical Center. It has limited 24-hour emergency care, acute care and diagnostic imaging. It also provides long-term care (including skilled and intermediate nursing care).

Education

Lānaʻi High and Elementary School consists of seventeen permanent structures, nine portable classrooms, two parking areas, and faculty housing spread over the 10.39 acre campus. Capacity is indicated as 700-students. Present and recent enrollment has been relatively steady with at around 550- to 575-students.

It is the largest of six (6) kindergarten through grade 12 public schools in the DOE system. It is the only school that serves educational needs on the island of Lānaʻi.

One of the unique features of the school is the availability of faculty housing on-campus consisting of eight buildings with a capacity of 26 units.



The Department of Education has prepared a Lānaʻi High and Elementary School Master Plan to guide the physical expansion and development of the school over the next 25+ years. The Master Plan encompasses the existing school facilities and grounds and approximately 50.017 acres makai or to the west of the school. (The 50+ acres, while being listed in the master plan, are still owned by the County of Maui and consideration for future uses will need to be a cooperative effort.)

That master plan incorporates Pre-school, Elementary School, Middle School, High School, and Community College components on one campus.

The Master Plan is predicated on a design enrollment of 700-students. The design enrollment by schools is 320-students for high school (Grades 9-12), 170-students for middle school (Grades 6-8), and 210-students for elementary school (Grades K-5) (Information is from a final EA for the school master plan (2011) and School Status and Improvement Report (2017.))

Recreation

Public parks and recreational facilities are administered and maintained by the Maui County Department of Parks and Recreation, as well as associated with the Lānaʻi public schools. County parks and facilities in Lāna'i City include: the Lāna'i Community Center, the Lanaʻi Gym and Tennis Courts, and the Lāna'i Little League Field, Fraser Avenue Park and Kaumālapa'u Highway/Fraser Avenue Park.

The use of the schools' athletic ball fields by entities other than the DOE is determined by the Principal through Use of Facility requests. The Lānaʻi High and Elementary School Master Plan Environmental assessment notes plans for replacement/additional recreational facilities.

There are also a number of Pūlama Lānaʻi-owned and maintained recreational facilities that are available for public use. Situated in Lāna'i City, Dole Park is a Pūlama Lānaʻi-owned park utilized by the public. Additional Pūlama Lānaʻi-owned parks utilized by the public include Olopua Woods Park and Waialua Park in Lānaʻi City and Hulopoe Beach Park near Mānele Small Boat Harbor.

The Lāna'i Recreation Center is a Pūlama Lāna'i-owned and maintained recreational complex which is utilized by the public. The Center encompasses a heated swimming pool, basketball court, exercise track, fitness course, softball fields, football field, recreational building, and playground.

Other Pūlama Lāna'i-operated recreational facilities on Lānaʻi include the 18-hole championship golf course at Mānele Resort. Pūlama Lāna'i also owns the 9-hole Cavendish Golf Course, which provides recreational opportunities for Lānaʻi residents at no cost.

4.8.2 Potential Environmental Impact & Mitigation Measures

The development of the Project will involve the following activities: (1) grading and other work to prepare the site for development; (2) construction of internal roads, a water delivery system, sewer systems, drainage systems, utilities systems, etc.; (3) sale/lease of sites to component developers; and (4) construction of buildings.

The assumed development period is approximately 30 years. Given the current economy and population, along with projected growth, significant demand for industrial space is expected during this period.

However, development could require more or less time, depending on future market conditions, lot sales, and the construction of buildings.

The State derives substantial revenues from development activity. Over the 30-year development period, Project development activities are expected to generate about $28.3 million in revenues for the State, for an average of about $0.94 million per year.

Most of the revenues will be derived from (1) excise taxes, (2) corporate and personal income taxes, and (3) conveyance taxes. There are no State Department of Education (DOE) school impact fees for the island of Lānaʻi.

County expenditures to support the Project are expected to be negligible. As with other major projects in the County, the developer and builders will provide or finance their fair shares of infrastructure and facilities to support the Project.

This will include interior roads, interior water distribution, sewer systems, drainage systems, etc. Also, construction activities require few onsite services from the County. Furthermore, construction companies will provide their own security, sanitation, transportation, etc.

The proposed action is not expected to generate a need for additional recreational facilities. There are no anticipated adverse impacts to existing recreational facilities and resources. No socio-economic or public service/facilities will be negatively impacted through the proposed use.

4.8.3 Level of Impact after Mitigation

Inasmuch as the Miki Basin Industrial Park is expected to be developed in conjunction with forecasted population growth for Lānaʻi, the County is not expected to realize significant additional increases in expenditures as a direct result of the project.

Over the construction period, the State will net about $28.3 million from construction and related economic activities associated with the Project. At full development, the Project is expected to generate net income to the State of about $1.9 million per year.

The positive return to the State reflects the various taxes on economic activities associated with the Miki Basin Industrial Park.

State expenditures to support Project development activities are expected to be negligible. Infrastructure and facilities to support the Project are primarily a County responsibility, with most of the fair share provided or financed by the developer.

Also, construction activities will require few onsite services from the State. Furthermore, most required services will be provided by construction companies.

Over the 30-year development period, the State will net about $28.3 million from development activities associated with the Project, for an average of about $0.94 million per year.

Project development activity is expected to have a negligible impact on County finances inasmuch as the developer will provide or pay its fair-share of support infrastructure (interior roads, water distribution, wastewater, drainage, etc.).

At full development, the Project is expected to generate net income to the County of approximately $2.0 million per year. Net revenues are positive largely because of the property taxes.

Inasmuch as the Miki Basin Industrial Park is expected to be developed in conjunction with forecasted population growth for Lānaʻi, the County is not expected to realize significant additional increases in expenditures as a direct result of the project.

There will be a beneficial impact to the local economy through the proposed use with increased employment. No significant negative impacts are anticipated.

4.9 Traffic

This section discusses the traffic in the region and the specific project area, the potential impacts of the project on traffic, and the mitigation measures to mitigate potential impacts.

4.9.1 Environmental Setting

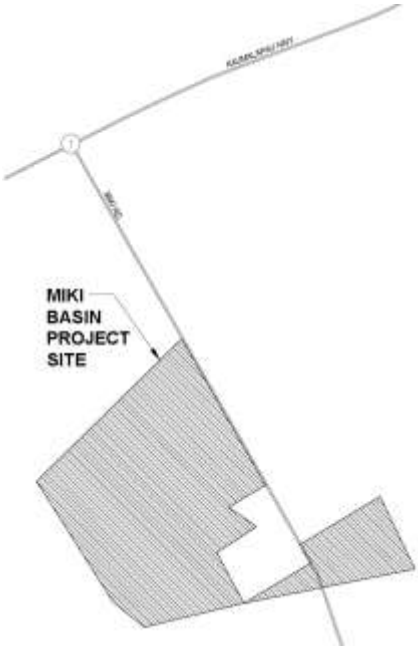
The traffic analysis, conducted by Austin Tsutsumi & Associates, considered the proposed Miki Basin Industrial Park with 100 acres of light industrial and 100 acres of heavy industrial land uses.

Access to the project will be provided via Miki Road, off of Kaumālapaʻu Highway. It is assumed that once approved, the 200-acre industrial subdivision will develop gradually over a 30-year period. Thus, full build-out of the Project is anticipated by year 2050.

Kaumālapaʻu Highway is generally an east-west, two-way, two-lane state-owned roadway that runs perpendicular to Miki Road.

This roadway begins to the west at the Fuel Depot and terminates to the east at its intersection with Lānaʻi Avenue/Queens Street. The speed limit along Kaumālapaʻu Highway is 45 miles per hour (mph) near Miki Road.

Miki Road is generally a north-south, two-way privately-owned roadway that begins to the north at is intersection with Kaumālapaʻu Highway and extends approximately 2.95 miles to the south – primarily through undeveloped land.



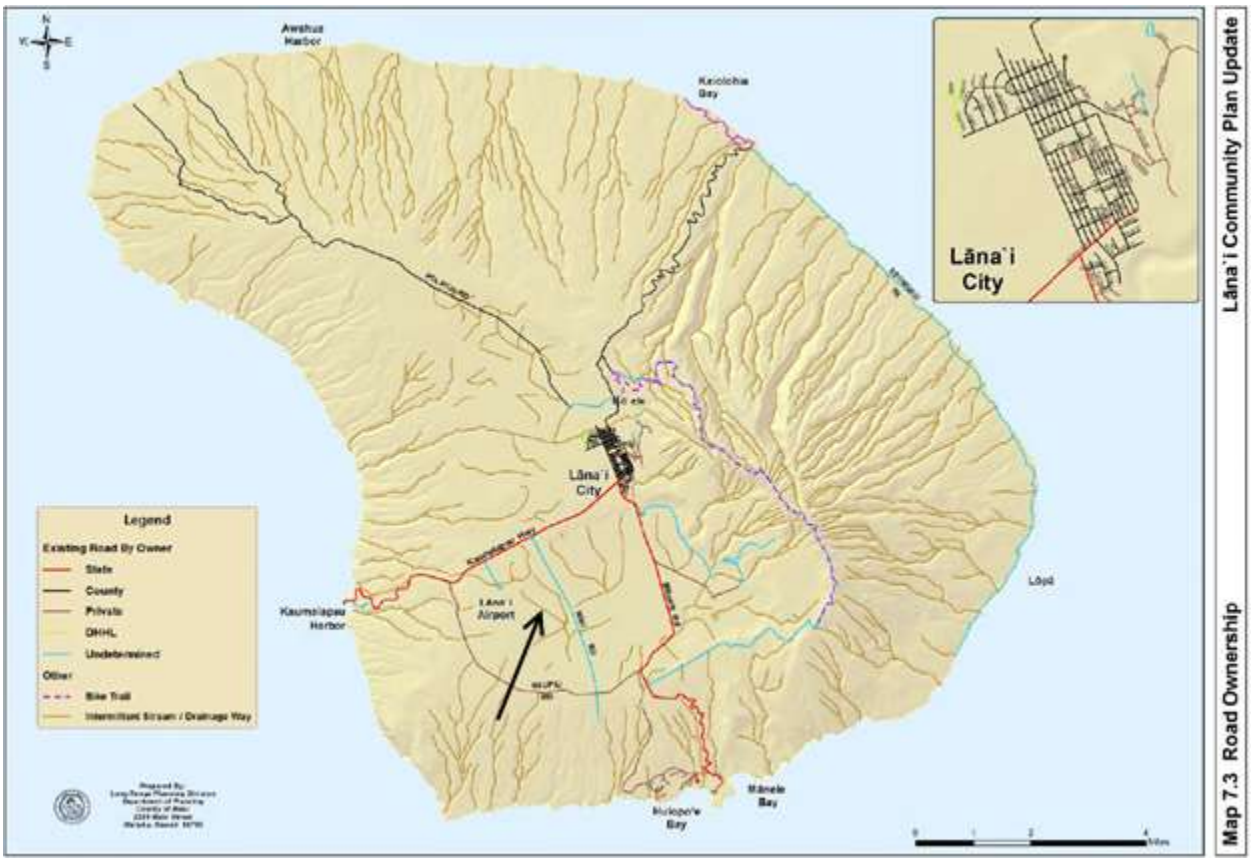
Miki Basin Industrial Park with Access from Miki Road off Kaumālapaʻu Highway (Austin Tsutsumi & Assoc)

The roadway is only approximately 13-15 feet wide, and therefore requires vehicles to pull off to the unpaved shoulder when encountering approaching vehicles traveling in the opposite direction.

The property is served by a secondary dirt road, as noted on the following map (from the Lānaʻi Community Plan Update 2013:)

To analyze existing conditions, 12-hour traffic count data was taken between 6:00 AM and 6:00 PM at the Kaumālapaʻu Highway/Miki Road intersection between Wednesday, October 24, 2018 and Friday, October 26, 2018.

The Wednesday AM and PM peak hours were the heaviest days in terms of traffic generation, and were therefore used as the basis for the intersection analyses contained within this report. The AM and PM hours of traffic were determined to be 6:30-7:30 AM and 1:00-2:00 PM, respectively.



Lānaʻi Roads (Lānaʻi Community Plan Update (2013) (Black Arrow noting general location)

The Kaumālapaʻu Highway/Miki Road intersection currently operates at LOS B or better during the AM and PM Peak hours of traffic. (Level of Service (LOS) is a qualitative measure used to describe the conditions of traffic flow at intersections, with values ranging from free-flow conditions at LOS A to congested conditions at LOS F.)

No significant delays or queuing were observed at any of the intersections during the peak hours of traffic.

4.9.2 Environmental Impacts & Mitigation Measures

It is assumed that at least two driveway access points to the Project site will be provided along Miki Road. Project Driveway 1 provides access to the light and heavy industrial areas west of Miki Road and Project

Driveway 2 provides access to the light industrial area east of Miki Road. Project Driveway 2 was assumed to align with the existing driveway west of Miki Road.

The Lānaʻi Community Plan Update identified two proposed private roadway connections near the Project site. One roadway will travel parallel to Miki Road, east of the Project site connecting Kaumālapaʻu Highway and Mānele Road. The other roadway will travel between Miki Road and the proposed road, described in the previous sentence. To be conservative, it is assumed that these proposed private roadways will not provide access to the Project site, which would require all Project traffic to travel along Miki Road.

The developable area of each large light and heavy industrial parcel (100-acres each) is estimated to be up to 70 percent of the total parcel area. For the traffic analysis, a floor-to-area ratio (FAR) of 0.3 of overall area was used, which is consistent with other industrial developments within the Maui County.

The Institute of Transportation Engineers (ITE) publishes trip rates, Trip Generation Manual, 10th Edition, based upon historical data from similar land uses. These trip rates/formulae and their associated directional distributions were used to estimate the increase in the number of vehicular trips generated by the proposed Project. The rates selected were based on the land use description.

The following table shows the projected traffic generated by the Project during the AM and PM peak hours.

Land Use	Independent Variable	Weekday AM Peak Hour			Weekday PM Peak Hour		
		Enter (vph)	Exit (vph)	Total (vph)	Enter (vph)	Exit (vph)	Total (vph)
General Light Industrial (ITE Code 110)	1,306,800 SF GFA	263	36	299	28	190	218
Manufacturing (ITE Code 140)	100 Acres	119	13	132	58	78	136
Total		**382**	**49**	**431**	**86**	**268**	**354**

The Project is anticipated to generate 431 trips during the AM peak hour of traffic and 354 trips during the PM peak hour of traffic.

Approximately 75 percent of the trips were assumed to originate from and be destined towards the east and the remaining 25 percent of the trips were assumed to originate from and be destined towards the west.

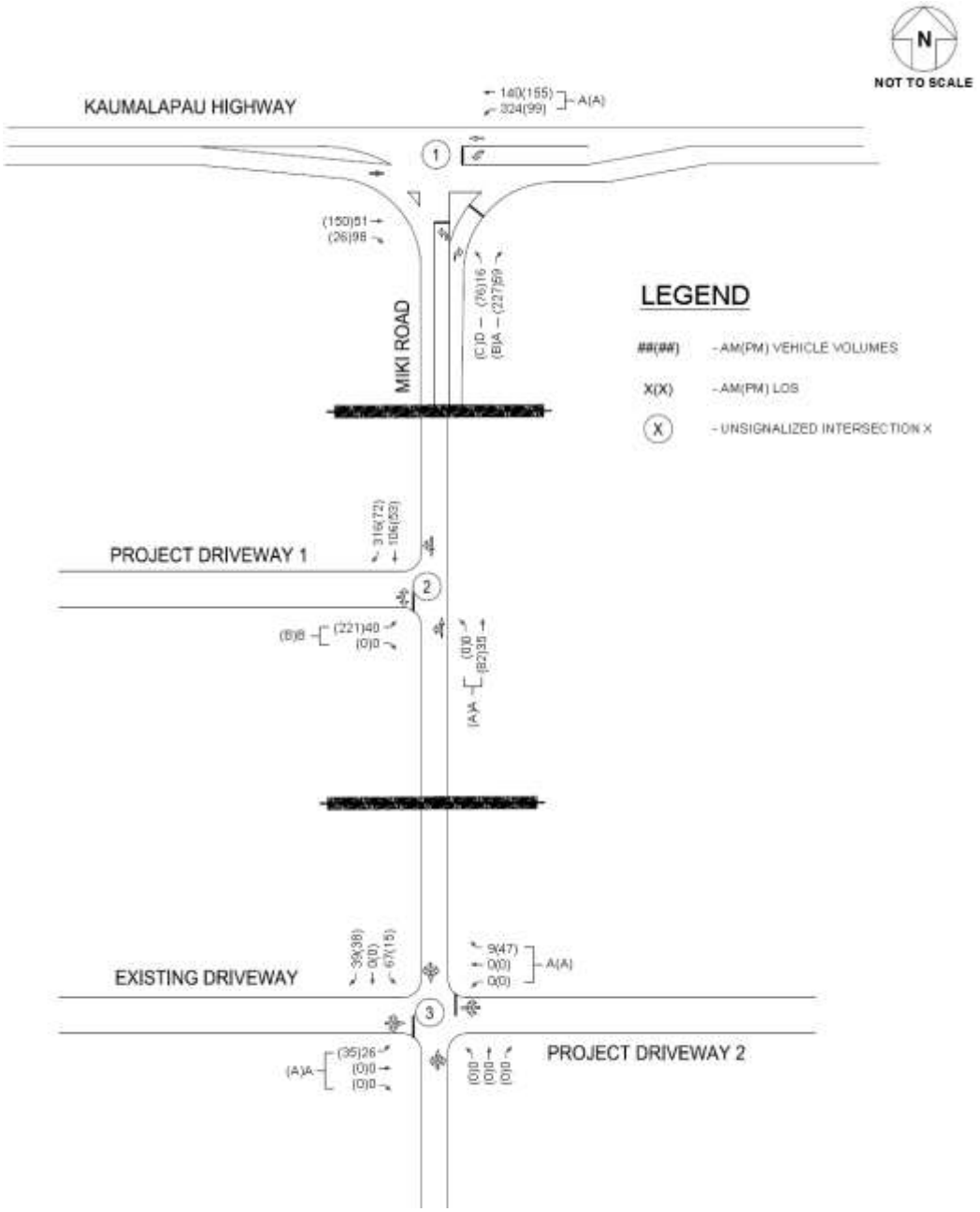
An exclusive northbound left-turn lane is recommended to reduce the northbound right-turn vehicle delay. A westbound left-turn deceleration lane is recommended based upon the left-turn lane Warrant. The Kaumālapaʻu Highway/Miki Road intersection is not anticipated to warrant a traffic signal by Year 2050 with the Project. The current intersection geometry provides a single, approximately 13-foot wide bi-directional lane at its southern Miki Street approach, which is inadequate to accommodate vehicles traveling side-by-side.

As a result of the significant anticipated increase in travel demand, large design vehicle (lowboy with crane), and the 45 mph posted speed along Kaumālapaʻu Highway in the vicinity of Miki Road, widening

to two lanes is recommended between the Project site and Kaumālapa‘u Highway with intersection geometries capable of accommodating turning movements by the design vehicle.

The traffic analysis recommended the following geometric modifications:

- Widen Miki Road between its intersection with Kaumālapa‘u Highway to the Project Driveway(s). Miki Street is currently estimated to be 13 feet wide, and should be widened to accommodate the design vehicle (lowboy with crane) and full side-by-side bidirectional travel with intersection geometries capable of accommodating turning movements.
- Provide an exclusive northbound left-turn lane.
- Provide an exclusive westbound left-turn deceleration lane.



Future Year Lane Configuration (Austin Tsutsumi & Assoc)

4.9.3 Level of Impact after Mitigation

The traffic analysis was performed using the traffic analysis software Synchro, which is able to prepare reports based on the methodologies. These reports contain control delay results as based on intersection lane geometry, signal timing, and hourly traffic volumes.

Based on the vehicular delay at each intersection, a LOS is assigned to each approach and intersection movement as a qualitative measure of performance. These results, as confirmed or refined by field observations, constitute the technical analysis that will form the basis of the recommendations outlined in the traffic report.

Several mitigation measures were recommended in the traffic analysis. These will be incorporated into the project design. Upon completion of the Project, all intersection movements are forecast to operate at LOS C or better during the AM and PM peak hours of traffic, with the exception of the northbound left-turn lane which is expected to operate at LOS D. As noted in the traffic analysis, Miki Road is privately-owned; the levels of service for the proposed uses on such are acceptable and not significant.

4.10 Electrical Power & Communication

This section discusses the electrical power and communications facilities in the region, the potential impact of the project on those facilities, and mitigation measures that will be employed to mitigate potential impacts.

4.10.1 Environmental Setting

Power
The MECO powerplant is adjacent to the proposed project.

4.10.2 Environmental Impacts & Mitigation Measures

The project will not have a significant impact on the Island's electrical or communication infrastructure or services.

4.10.3 Level of Impact after Mitigation

The project will not have a significant impact on the existing electrical infrastructure, nor the communication resources or services.

4.11 Noise

This section discusses the noise conditions in the region and in the project area, the potential impacts of the project on those conditions, and the mitigation measures Miki Basin Industrial Park will employ to mitigate those potential impacts.

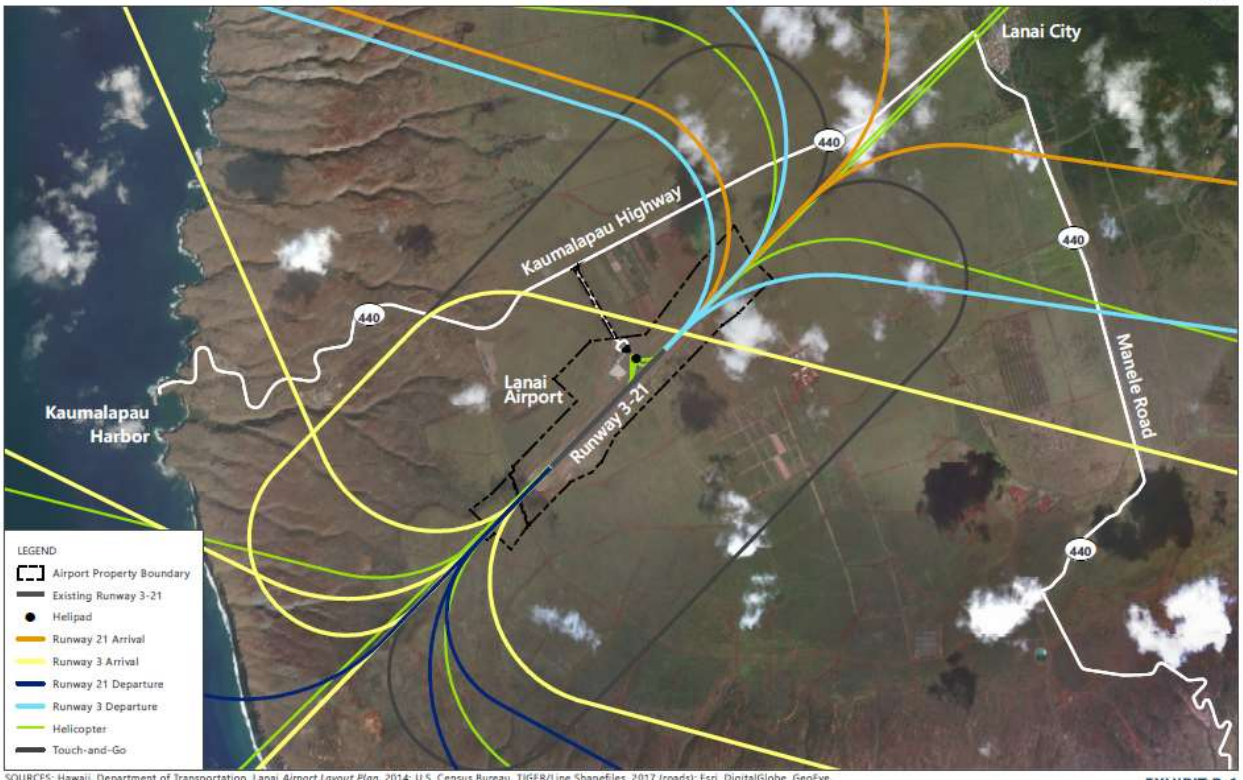
4.11.1 Environmental Setting

The project is situated adjacent to the Lānaʻi airport. DOT is proposing construction of a 500- foot runway extension of Runway 3-21 to the northeast (Runway 21 end), construction of associated airfield improvements, and grading of the runway safety area. Per a recent (2018) draft environmental assessment on anticipated runway increments at Lānaʻi Airport:

> Several federal laws pertain to aircraft noise and noise-compatible land use impacts including the Noise Control Act of 1972, Aviation Safety and Noise Abatement Act of 1979, Airport and Airway Improvement Act of 1982, and Airport Noise and Capacity Act of 1990.
>
> These laws and regulations provide a basis for the local development of airport plans, an analysis of potential impacts from airport development, and land use compatibility policies.
>
> The FAA has determined that the cumulative aircraft noise exposure experienced by individuals must be evaluated in terms of the yearly Day-Night Average Sound Level (DNL) metric.
>
> Sound levels (decibels [dB]) reported in this EA are expressed in A-weighted decibels (dBA), which filter sound to reduce the effect of very low and very high frequency sounds, much as the human ear filters sound frequencies.
>
> DNL represents the noise level over a 24-hour period and includes penalties to account for the increased sensitivity to noise events that occur during nighttime periods by applying a DNL 10-dB penalty during the hours of 10:00 p.m. to 7:00 a.m.
>
> DNL is employed to describe existing and predicted noise exposure in communities in airport environs, based on the average daily operations over the year and the average annual operational conditions at an airport.
>
> The existing noise environment in and around the project Study Area is dominated by noise from Airport-related activities, including roadway use and aircraft taxiing, taking off, and landing at the Airport.
>
> The nearest noise-sensitive areas to the project Study Area are located in Lānai City, approximately 2 miles to the northeast of the Airport. The existing DNL 65 dB contour is contained to on-Airport property and does not encompass any noise sensitive land uses.
>
> Portions of the project Study Area are exposed to aircraft noise levels of DNL 60 dB and higher.
>
> However, no noise-sensitive areas are present within the project Study Area, and no incompatible land uses are present within the project Study Area. …
>
> In accordance with FAA Order 1050.1F, a proposed action would be considered to have a significant impact with regard to aviation noise, when compared to the no action alternative for the same timeframe, if it would:
>
> - Cause noise-sensitive areas exposed to noise at or above the DNL 65 dB noise exposure level to experience a noise increase of at least DNL 1.5 dB, or

- Cause an increase of DNL 1.5 dB that introduces new noise-sensitive areas to exposure levels of DNL 65 dB or more.
- No houses, buildings, structures, or sensitive land uses are within the existing or future DNL 65 dB or greater contours (or within the DNL 60 dB contours) for both the No Action and Proposed Action scenarios. No aircraft noise impacts would occur from either the No Action or Proposed Action alternatives.
- The nearest residential populations to the limits of physical disturbance (LOPD) are located in Lānaʻi City, approximately 11,500 feet to the northeast. An animal shelter is located approximately 5,200 feet to the southwest of the LOPD.
- (With respect to construction noise) Using the RCNM tool, the construction noise levels from construction equipment (cumulative total noise) would be Leq 47.5 dBA at residential receptors without considering any existing shielding, barriers, or hills. Construction noise at the animal shelter would be Leq 57.2 dBA without considering any existing shielding, barriers, or hills.

Construction noise would be in compliance with Maui County and State of Hawaiʻi policies, and thus, would not be significant.



SOURCES: Hawaii, Department of Transportation, Lanai *Airport Layout Plan*, 2014; U.S. Census Bureau, TIGER/Line Shapefiles, 2017 (roads); Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, March 2018 (aerial basemap).

NORTH 0 4,000 ft.

EXHIBIT B-1

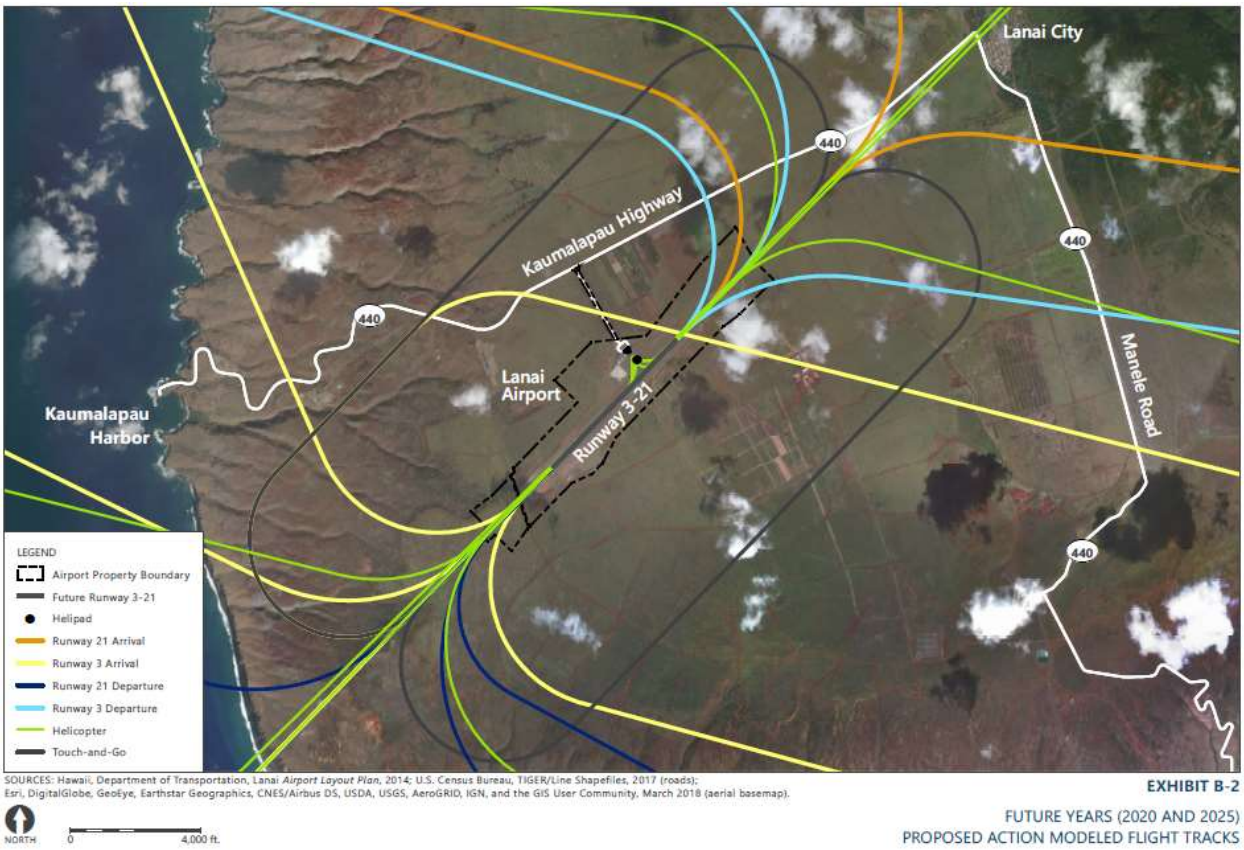
EXISTING (2016) AND FUTURE YEARS (2020 AND 2025)
NO ACTION MODELED FLIGHT TRACKS

SOURCES: Hawaii, Department of Transportation, Lanai *Airport Layout Plan*, 2014 (airport linework); U.S. Census Bureau, TIGER/Line Shapefiles, 2017 (roads); Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, March 2018 (aerial basemap); Ricondo & Associates, Inc., August 2018 (noise contours).

NORTH 0 3,000 ft.

EXHIBIT B-7

2025 PROPOSED ACTION DNL NOISE CONTOURS



4.11.2 Environmental Impacts & Mitigation Measures

A temporary increase in noise during repair, maintenance and construction is anticipated; however, this impact will be a minor, short term inconvenience and will be minimized by the limitations on the hours of construction activity.

As noted in various drafts of the Lāna‘i Community Plan, “The island’s primary industrial areas are located southwest of Lāna`i City, near the Lāna‘i Airport, and at Kaumālapa‘u Harbor.”

These are purposefully placed to be removed from residential and other uses that may be negatively impacted by associated noise.
Miki Basin Industrial Park is not expected to experience a significant noise impact, and no mitigation measures beyond compliance with applicable regulations, requirements, and standards, are required.

Pūlama Lāna‘i acknowledges that there may be potential for impacts to the project site by fumes, smoke, noise, vibrations, etc. from aircraft flight operations at Lāna‘i Airport.

4.11.3 Level of Impact after Mitigation

It is expected that the proposed light and heavy industrial park adjoining the Lāna‘i Airport and MECO power plant will result in a negligible increase in noise that will result in a less than significant impact.

4.12 Air Quality & Lighting

This section discusses the air quality and lighting conditions in the region and specific subject area, the potential impact of the project on those resources, and mitigation measures to be incorporated into the proposed light and heavy industrial park to mitigate potential impacts.

4.12.1 Environmental Setting

Air Quality
In the State of Hawai'i, both federal and state environmental health standards pertaining to outdoor air quality are generally met due to prevalent trade winds and the absence of major stationary sources of pollutant emissions.

There are no non-attainment areas for air quality in the State of Hawai'i, and air quality monitoring data is thus, very limited. The ambient air quality of the project site is typically clean and subject to the prevailing on shore winds.

There are no major sources of air pollution in the immediate vicinity such as agricultural burning, manufacturing plants and incinerators.

Lighting
The proposed light and heavy industrial park is situated adjacent to the Lāna'i Airport, MECO powerplant and Miki Basin Industrial Condominium. All have various forms of night lighting.

4.12.2 Environmental Impacts & Mitigation Measures

Air Quality
Air quality refers to the presence or absence of pollutants in the atmosphere. It is the combined result of natural conditions (e.g. dust from wind erosion) and emissions from a variety of pollution sources (e.g. automobiles, power-generating plants).

Local winds such as land/sea breezes and/or upslope/down slope winds also influence the wind pattern for the area when the trade winds are weak or absent. At night, winds are often drainage winds that move down slope and out to sea.

Air quality in the immediate project area is primarily affected by pollutants from vehicular, aircraft, industrial, natural, and/or agricultural sources. Most of the man-made particulate and sulfur oxides emissions on Maui originate from point sources, such as power plants and other fuel-burning industries.

Nitrogen oxides emissions are roughly equally divided between point sources and area sources (mostly motor vehicle traffic). The majority of carbon monoxide emissions occur from area sources (motor vehicle traffic, aircraft), while hydrocarbons are emitted mainly from point sources. The major source of air pollution in the project area is associated with airport and agricultural operations.

In accordance with Chapter 11-60.1, HAR entitled Pollution Control and Section 11-60.1-33, HAR pertaining to Fugitive Dust, appropriate dust control measures will be implemented during construction to minimize the effects of fugitive dust.

Examples of such measures include but are not limited to the following:

1. To control dust, active work areas and any temporary unpaved work roads will be watered at least twice daily on days without rainfall.

   While air quality will be impacted to a certain extent during the course of refurbishment, maintenance and construction, such as exhaust emissions from on-site construction equipment, the impact will be short-term.

2. The use of wind screens and/or limiting the area that is disturbed at any given time will help contain fugitive dust emissions.

3. Mulching or chemical soil stabilizers will be used on disturbed, inactive areas of the site to help control wind-generated erosion.

4. Dirt-hauling trucks will be covered when traveling on roadways to prevent windborne particulates.

5. A routine road cleaning and/or tire washing program will help reduce fugitive dust emissions from trucks tracking dirt onto paved roadways in the project area.

6. Establishing landscape plantings early on during the construction phase will help dust control.

7. Monitoring dust at the project boundary during construction will be considered as a means to evaluate the effectiveness of the project's dust control program. Adjustments will then be made if necessary.

8. During construction, onsite construction equipment, vehicles used by construction workers, and trucks traveling to and from the project will be the primary source of vehicle emissions (carbon monoxide, nitrogen oxides).

   Increased emissions resulting from traffic disruptions attributable to construction equipment and/or commuting construction workers can be alleviated by moving equipment and personnel onto the site during off-peak traffic hours. To the extent possible, non-drinking water will be used for dust control during construction activities.

In addition, best management practices that include performing construction-related activities in strict compliance with all applicable air regulations will mitigate any temporary impacts. Contractors will be required to comply with Hawai'i Administrative Rules, Chapter 11-60.1, "Air Pollution Control."

Lighting

Hawaiian petrels may traverse the project area at night during the breeding, nesting and fledging seasons (March 1 to December 15). Outdoor lighting could result in seabird disorientation, fallout, and injury or mortality.

Seabirds are attracted to lights and after circling the lights they may become exhausted and collide with nearby wires, buildings, or other structures or they may land on the ground. Downed seabirds are subject

to increased mortality due to collision with automobiles, starvation, and predation by dogs, cats, and other predators.

Young birds (fledglings) traversing the project area between September 15 and December 15, in their first flights from their mountain nests to the sea, are particularly vulnerable.

The proposed project will use appropriate lighting so as not to unnecessarily attract seabirds. In order to further avoid and minimize potential project impacts to seabirds the project will not have nighttime construction occurring during the fledging season (September 15 through December 15).

To avoid and minimize potential project impacts to seabirds the following applicable mitigation measures will be taken:

- Use of lower-power (180 Watt) monochromatic and low-pressure sodium lighting (as opposed to the more common full-spectrum and high-pressure sodium lighting), which provides high contrast with sharply reduced brightness and glare, yet the yellow light does not attract insects and is not believed to be used for avian navigation.
- Use of light fixtures with "top-visor" shielding to minimize the potential for stray light up-scatter and side-scatter, so that the bulb is not visible at lamp height from the side.
- Installation of automatic motion sensor switches and controls on all outdoor lights or turn off lights when human activity is not occurring in the lighted area.
- Limiting light levels and hours of use to the minimum levels allowable under Occupational Safety and Health Administration (OSHA) worker safety and security.

4.12.3 Level of Impact after Mitigation

Compliance with existing requirements and the implementation of mitigation measures described above will ensure that the air quality and lighting will remain in compliance with the State laws and regulations and therefore impacts will be less than significant.

In the short term, air quality will be temporarily affected by fugitive dust and emissions from construction activities.

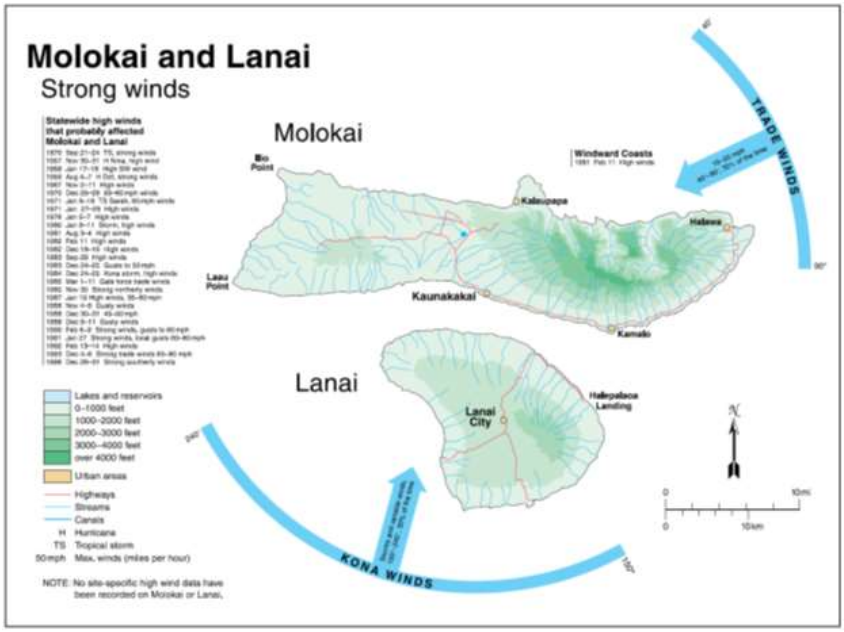
The development of the proposed project will comply with all applicable regulations for the control of air pollution, including Chapter 11-60, HAR (Air Pollution Control). From a long-term perspective, project-related emissions should have a negligible effect on air quality in the project area and should remain within State and Federal ambient air quality standards. The project will not have a significant adverse impact on air quality or climate, even without mitigation.

4.13 Natural Hazards

This section discusses the natural hazards which may affect the subject property including high winds, flooding, hurricanes, volcanic activity, tsunami and earthquakes.

4.13.1 Environmental Setting

The Hawaiian Islands are susceptible to potential natural hazards, such as flooding, tsunami inundation, hurricanes, volcanic eruptions, earthquakes, and wildfires.



Molokaʻi and Lānaʻi Hazards Summary - USGS

Lānaʻi is one of the least populated and smallest of the main Hawaiian Islands. It is relatively arid. Lānaʻi is largely sheltered from high annual north and northwest swell by the Islands of Molokaʻi and Maui.

Seismicity is a concern due to their proximity to the Molokaʻi Seismic Zone and the active volcano on the Big Island. The site of the Proposed Action could be potentially affected by hurricanes. The three major elements that make a hurricane hazardous are: (1) strong winds and gusts, (2) large waves and storm surges (not applicable), and (3) heavy rainfall.

Flood Zone

As noted in the following image, the subject property is within the X flood zone.

Flood Zone Map (DLNR's Flood Hazard Assessment Tool

Property is in Zone X - Areas determined to be outside the 0.2% annual chance floodplain. "Floods caused by heavy rainfall and strong winds normally occur during the winter months with January typically being the most frequent flood period. Heavy rainfall can also be associated with the tropical storm and hurricane season between the months of June and October."

"Areas subject to recurrent rainstorm floods are the coastal plains and flood plains of Maui, Kauai, and Oahu. Flooding tends to be less intense by comparison on Hawai'i, Moloka'i, and Lāna'i. Lāna'i, lying in the rain shadow of Moloka'i receives relatively less precipitation." (Atlas of Natural Hazards-USGS)

Volcanic

The Island of Lāna'i is the sixth largest of the main Hawaiian Islands, with an area of 141 square miles. The island was formed from a single shield volcano that last erupted about 1.3 million years ago. A low-lying basin in the center of the island is what is left of the volcano's caldera.

Hurricane

The site of the Proposed Action could be potentially affected by hurricanes. The three major elements that make a hurricane hazardous are: (1) strong winds and gusts, (2) large waves and storm surges (not applicable), and (3) heavy rainfall.

Tsunami

Because of its elevation and distance from the shore, the project site is not subject to tsunami inundation and is not within a designated tsunami evacuation zone.

Wildfire

The bulk of Lāna'i, including the area of the Subject is in a non-rated Fire Risk Area. (Hawai'i Statewide GIS Program)

"Lanai is susceptible to drought conditions and wildfires. Nine out of ten wildfires are caused by people and threaten life property and natural resources Lanai has been fortunate to experience only two wildfires in the past 27 years but these two fires alone burned over 3500 acres. Currently Lanai City contains the island's only fire station which is staffed with a five-person crew." (Lāna'i Community Plan, 2016)

Sea Level Rise

Rising sea level and projections of stronger and more frequent El Niño events and tropical cyclones in waters surrounding Hawai'i all indicate a growing vulnerability to coastal flooding and erosion.

Rising sea levels continues to be a concern in Hawai'i, especially in areas near the ocean. Sea level rise is predicted to increase by 3-feet over the 21st Century (Fletcher, et. al., 2002). Although the Miki Basin Industrial Park will not affect sea level rise and is not directly affected by such rise.

Research currently indicates that global mean sea level may reach approximately 1 ft by mid-century and 2.5 to 6.2 ft by the end of the century, but there are significant unknowns in predicting future sea level.

The site is located approximately three and a half miles to the east of the Pacific Ocean, the Site topographic elevation is approximately 1,247 feet above mean sea level (MSL), and local topography slopes to the west-southwest.

The proposed project is at a significantly high elevation and is not subject to any foreseeable negative impacts from sea level rise. Sea level rise was considered in the analysis of this project. The project will not have nor be significantly negatively impacted by sea level rise.

Civil Defense

The Maui Emergency Management Agency (MEMA) has the responsibility for the administration and operation of the various local, state, and federal civil defense programs for the Mayor. The MEMA is tasked with planning, preparing and coordinating operations with all service-providing entities in the County to address major natural and human-caused disasters, wartime conditions for the preservation of life and property, and the recovery of the community from the effects of such disasters.

Representatives from numerous Maui County departments and agencies collaborated with MEMA in the preparation and update to the County's Hazard Mitigation Plan. That Plan addresses various hazards, risks, vulnerability and mitigation within the County and assigns lead agencies and their responsibilities.

Emergency shelters are established and operated by volunteers from the American Red Cross. Maui Emergency Management Agency does not manage emergency shelters. MEMA assists the American Red Cross by ensuring access to facilities that have been identified as shelter locations.

Maui Emergency Management Agency periodically conducts Community Emergency Response Team Training on Lānaʻi. This training is a multi-day course, taught in several sessions. MEMA notes that disaster preparedness is an individual and family responsibility. MEMA notes that the two most important precautions people need to take include developing a Personal Preparation Plan and assembling an Emergency Survival Kit.

Pūlama Lānaʻi created an emergency management structure for the company, prepared an Emergency Operations Plan and designated the Company's Emergency Manager who has the Company's authority to implement the Emergency Operations Plan, and to take necessary action to provide for the safety and protection of the island's population, and the property and natural assets of the Island of Lānaʻi.

This emergency operations plan is intended to guide Pūlama Lānaʻi's response to disasters and emergencies by defining potential hazards, identifying response assets and capabilities, organizing the Company's Emergency Management Team (CEMT), defining and implementing a concept of operations for the Company, and integrating the Company's response efforts with the efforts of other stakeholders, Maui County, and the State of Hawaiʻi.

The company incident management is organized consistently with principles of the National Incident Management System {NIMS) and the incident command system. Company incident management also incorporates certain emergency support functions (ESFs) that are consistent with the Federal ESFs described in the National Response Framework.

4.13.2 Potential Environmental Impact & Mitigation Measures

The area of construction for the light and heavy industrial project and related improvements will be designed and constructed in accordance with the appropriate County, State and Federal standards. No mitigation beyond compliance with the appropriate standards are proposed.

4.13.3 Level of Impact after Mitigation

The occurrence of a natural disaster cannot be predicted, and should one occur, it could pose a risk of life and property within the proposed project. The proposed development, however, will not exacerbate any natural hazard conditions.

The creation of the proposed project will mitigate the potential for wildfires on the Property through its landscape design. In large part, vegetative fuel for fires will be replaced by buildings and landscaping of the community.

Impacts from natural hazards can be further mitigated by adherence to appropriate civil defense evacuation procedures. Pūlama Lāna‘i will coordinate with the State and County regarding civil defense measures necessary to serve the project. The project faces similar issues as the rest of the mauka portions of the Island relative to natural hazards and threats. As such, the project will not have a significant impact related to natural hazards.

4.14 Phase I Environmental Site Assessment

TRC Environmental Corporation (TRC) has prepared a Phase I ESA for Lāna‘i Resorts, LLC. The purpose of this assessment is to identify Recognized Environmental Conditions (RECs) at the Site, as defined by the ASTM E 1527-13 standard.

The completion of the Phase I ESA report may be used to satisfy one of the requirements for the Users to qualify for the innocent landowner, contiguous property owner, or bona fide prospective purchaser limitations pursuant to Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), thereby constituting all appropriate inquiry into the previous ownership and uses of the property consistent with good commercial or customary practice as defined by 42 U.S.C. §9601(35)(B) of CERCLA.

4.14.1 Environmental Setting

TRC was retained by Lāna‘i Resorts, LLC to perform a Phase I Environmental Site Assessment (ESA) of approximately 200 acres of undeveloped land primarily located on the west side of Miki Road with approximately 35 of the 200 acres located on the east side of Miki Road.

TRC’s assessment was conducted in connection with the Clients’ planned renovation of the Site to include light and heavy industrial areas. The Phase I ESA described in this report was performed in accordance with the scope and limitations of the American Society of Testing and Materials Practice E 1527-13 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process (ASTM E 1527-13).

The Site is currently undeveloped land.

4.14.2 Potential Environmental Impact & Mitigation Measures

No transformers were observed on the Site. Utility owned pole-mounted transformers are located adjacent to the property area. It is unknown if the transformers may contain polychlorinated biphenyls (PCBs).

Based on information obtained from the site reconnaissance and available information, no underground storage tanks (USTs) or above ground storage tanks (ASTs) are located on the Site.

Freedom of Information Act (FOIA) record reviews were completed by TRC of Hawai'i Department of Health's (DOH) available records. DOH records did not indicate any concerns associated with the Site.

As a result of the Phase I ESA, including but not limited to the visual observation of the Site; review of historical information, environmental databases, and information provided by the User; interviews with the current Site representative; and TRC's professional judgment, no recognized environmental conditions (RECs) associated with the Site, as defined by the ASTM E 1527-13 standard, were identified.

However, potential Vapor Encroachment Conditions (VECs) were identified with respect to the permanently out of use underground storage tank (UST) listing for the nearby Lāna'i Airport and the following listings for the Maui Electric Company (MECO) facility: Resource Conservation and Recovery Act (RCRA) Conditionally Exempt Small Quantity Generator (CESQG), Toxic Chemical Release Inventory System (TRIS), PCB Activity Database System (PADS) and SPILLS.

As such, vapor encroachment onto the Site from this adjacent property could be a possibility, and based on Clients perceived risk, liability and/or corporate policy, may warrant further investigation.

However, based on the lack of reported releases and/or associated regulatory status, the Lāna'i Airport UST and MECO facility identified as VECs have not likely caused a vapor encroachment onto the Site.

4.14.3 Level of Impact after Mitigation

The ESA I assessment has revealed no evidence of Recognized Environmental Conditions (RECs) in connection with the Site.

The ESA I assessment has revealed no evidence of Historical Recognized Environmental Conditions (HRECs) in connection with the Site.

The ESA I assessment has revealed no evidence of de minimis conditions in connection with the Site.

TRC has made an appropriate inquiry into the commonly known and reasonably ascertainable resources concerning the historical ownership and use of the Site back to the first development per 40 CFR Part 312.24 (Reviews of Historical Sources of Information). TRC did not identify any data gaps during The ESA I assessment.

Therefore, the information from the Phase I ESA notes impacts that will be less than significant.

4.15 Impacts on Agriculture

Plasch Econ Pacific Inc. and Munekiyo Hiraga prepared an Impacts on Agriculture report, analyzing potential impacts the project has on Agricultural resources.

The report considers the agricultural conditions of the Project Area, past agricultural uses of the land, the impact of the Project on existing agricultural operations in and near the Project Area, the impact of the Project on the growth of diversified-crop farming, benefits of the Project that would offset adverse agricultural impacts, and consistency of the Project with State and County agricultural policies.

4.15.1 Environmental Setting

The Project Area and surrounding fields were used for a pineapple plantation from the 1920s to 1992. Since then, the Project Area and the surrounding fields have been fallow.

The Project Area has agronomic conditions that are unsuitable for field farming to supply crops to Lānaʻi markets, or for export to Oʻahu or the mainland. The problem is a lack of irrigation water.

Lanaʻi has five (5) water systems, including two (2) drinking water systems, one (1) brackish water system used for irrigation, and two (2) reclaimed water systems, also used for irrigation. Historically, fields on the island of Lānaʻi were irrigated with a combination of surface water from Maunalei Valley and groundwater from wells once used for pineapple cultivation.

All waterlines near the Project Area convey chlorinated water, or they have been abandoned.

Due to a limited amount of potable water on Lānaʻi, brackish groundwater and treated wastewater are used to irrigate the golf courses and resort landscaping. Water is not available to support extensive diversified crop farming on the Lānaʻi fields.

Except for water, the Project Area has favorable agronomic conditions: soils are good; solar radiation is moderate; and the trucking distances to Lānaʻi City and Mānele Resort are short. However, Lānaʻi farmers are at a competitive disadvantage in supplying the Oʻahu and mainland markets because of shipping costs.

Currently on Lāna`i there are only part-time farmers who grow crops for personal consumption, and some sell to grocery stores and the hotels.

There is a plan for a 100-acre agricultural park on the island of Lānaʻi. In 1992, the Land Use Commission required Castle & Cooke's Lānaʻi Resort to set aside 100 acres for the development and operation of an agricultural park by the State Department of Agriculture and County of Maui for the residents of Lānaʻi. This was a condition for approving the Manele Golf Course. However, there has not been any progress on developing the park due to a lack of interest.

Sensei Farms Lānaʻi is developing a hydroponic farm to supply fresh produce to local markets, and possibly to off-island markets. Ten (10) greenhouses are planned, which will be powered by an off-grid photovoltaic system. One of the major advantages of hydroponic farming is that it requires relatively little water compared to field farming.

A Head House building is also planned, which will include a lab, conference rooms, a dining room for employees, offices, a locker room, multi-function space, and a kitchen. The kitchen will be used for cooking demonstrations and meal preparation using produce from the hydroponic farm.

4.15.2 Potential Environmental Impact & Mitigation Measures

The development of the Project will result in a loss of 200 acres of fallow agricultural lands on Lānaʻi. However, there are approximately 18,000 acres of former plantation lands on Lānaʻi which remain available for agricultural use, and over 200,000 acres statewide.

The lack of significant growth of diversified crops reflects increased competition from overseas resulting from technology and other advances that have improved the delivery of fresh produce (faster, less spoilage, better coordination of supply to demand), along with trade agreements which increased food exports to the U.S. from low-cost producers in Mexico, Central America, South America, and elsewhere.

The loss of 200 acres of agriculture land on Lānaʻi, plus the loss of agricultural land due to other projects (i.e., the cumulative impact), is too small to affect the growth of diversified agriculture on Lānaʻi or Statewide.

The Hawaiʻi State Constitution, the Hawaiʻi State Plan, the State Agriculture Functional Plan, the County of Maui 2030 General Plan, and the County's Lānaʻi Community Plan call directly or implicitly for preserving the economic viability of plantation agriculture and promoting the growth of diversified agriculture. To accomplish this, an adequate supply of agriculturally suitable lands and water must be assured.

With regard to plantation agriculture, the Project Area is no longer part of a pineapple plantation. The last pineapple harvest was in 1992. With regard to diversified agriculture, the Project will not result in the loss of any existing agricultural operation since the Project Area is not currently being cultivated and has not been cultivated since 1992.

4.15.3 Level of Impact after Mitigation

Although the Project will reduce the availability of agricultural land by about 200 acres, the Project will not limit the growth of diversified agriculture statewide or on Lānaʻi since ample agricultural land is available due to the loss of nearly all plantations in Hawaiʻi.

The loss of 200 acres of agricultural land will be offset by the benefits of the Project, including:

(1) employment generated by construction activity and onsite commercial and industrial activity;
(2) offsite economic activity generated by the purchases of goods and services by construction companies and the families of construction workers;
(3) tax revenues derived from County property taxes and State taxes (excise, personal income, and corporate income); and
(4) goods and services provided by businesses of the Project.

The Project will not have any adverse effects on any existing onsite agricultural operations since the land has not been cultivated since the pineapple plantation closed in 1992. Therefore, the impacts on agriculture will be less than significant.

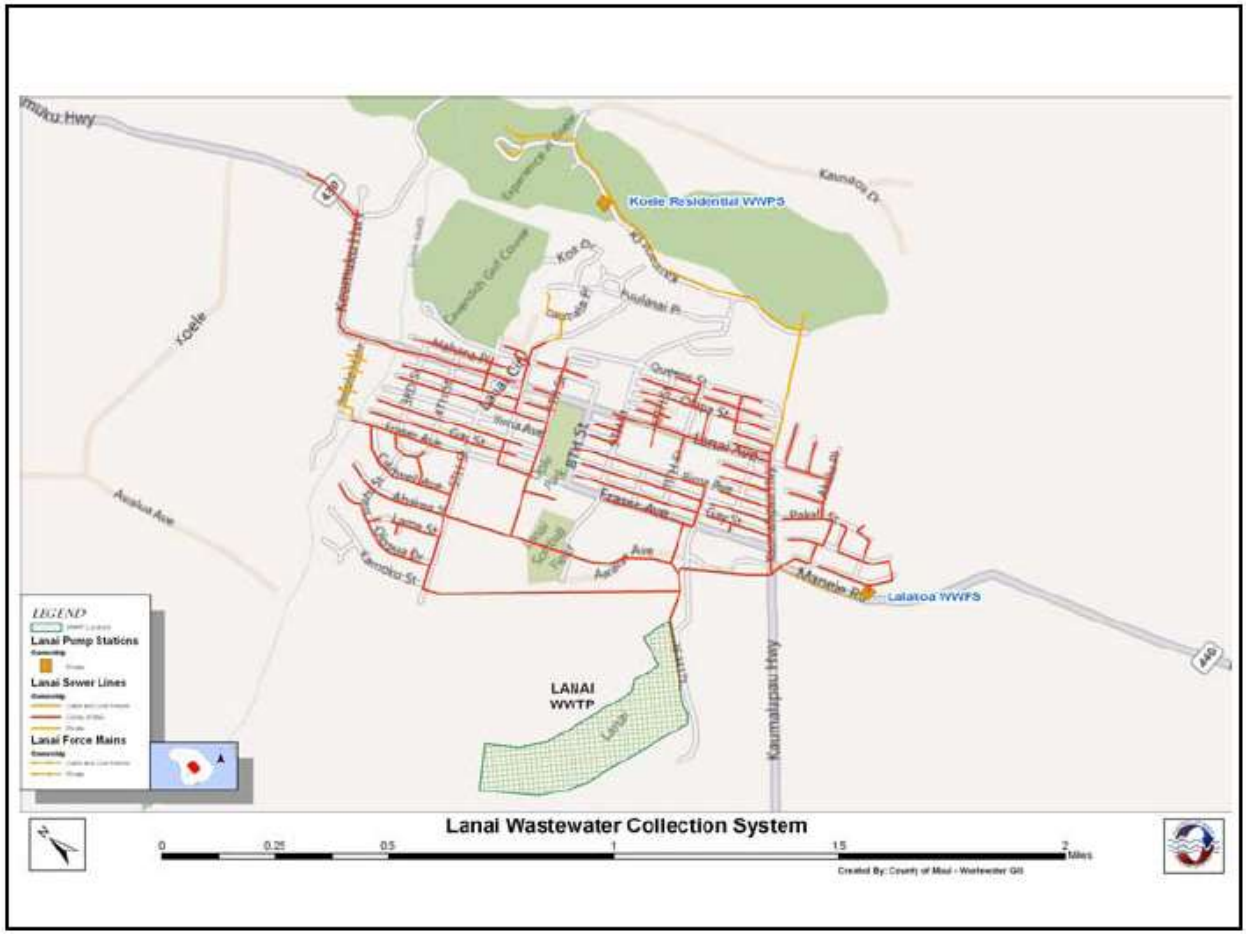
4.16 Wastewater

This section discusses the wastewater in the region and in the subject property area and the potential impacts of the project on the resources, and mitigation measures the project will employ to mitigate those potential impacts.

4.16.1 Environmental Setting

Akinaka & Associates, Ltd. prepared a Wastewater Master Plan to identify and review the condition of the existing systems and analyze the existing systems for projected wastewater estimates for the project. The following wastewater matters are from those reports, as well as other sources, as noted.

Lāna'i's municipal wastewater collection system is situated in and around Lāna'i City, as illustrated in the following map (Maui County Wastewater Reclamation Division.)



There is currently no existing County or privately owned or operated wastewater treatment system in the vicinity of the proposed 200-acre Miki Basin Industrial Park. Per the Akinaka & Associates, Ltd. Wastewater Master Plan for the proposed 200-acre Miki Basin Industrial Park, the construction of onsite Individual Wastewater Systems (IWS), decentralized Wastewater Treatment Plants (WWTP) and collection systems will be required to support development activity.

These systems are ideal for areas that are remote and have factors that can make tying into an existing wastewater system difficult or infeasible.

Each development within the Industrial Park will be required to provide its own wastewater treatment system and associated wastewater collection system. The type of treatment system used will be determined by the size and type of development. Sizing of each system will be determined during the design phase of each development.

Since specific development plans for the Industrial Park are not yet available, proposed wastewater flows for buildout of the Industrial Park are based on the proposed land use and an estimated developable area for each parcel.

For planning purposes, flows are based on estimated occupancy as determined by the standards. The unit flows for the various land uses are as follows:

Land Use	Unit	Average Flows (Gal/Unit/Day)
Factory	Employee	30
Industrial Shop	Employee	25
Laundry (coin operated)	Machine	300
Office	Employee	20
Storage, w/offices	Employee	15
Storage w/ offices and showers	Employee	30
Store Customer bathroom usage	Use	5

The following standards were used to compute the minimum number of units required per land use type:

Office Employees	1 per 200 square feet of floor area
Retail Warehouse Employees	1 per 350 square feet of floor area
Storage/Industrial Employees	1 per 500 square feet of floor area

Since the majority of onsite flows will be generated by employees, the industrial activity with the highest average flow for employees, factory, was used to estimate wastewater flows. Based on the proposed land use, the proposed average flow for full buildout of the Industrial Park is 365,904 GPD.

4.16.2 Potential Environmental Impact & Mitigation Measures

Onside Individual Wastewater System (IWS) systems and decentralized WWTPs are regulated by the Department of Health (DOH) under Chapter 62 of Title 11, Hawai'i Administrative Rules (HAR). Under

Subchapter 3 of the rules, IWS systems can be used as a temporary onsite means of wastewater disposal in lieu of a wastewater treatment works under the following conditions:

1. There is 10,000 square feet of land area for each individual wastewater system;
2. The total wastewater flow of the development does not exceed 15,000 GPD;
3. Area of the lot is not less than 10,000 square feet; and
4. The total wastewater flow into each individual wastewater system will not exceed one thousand gallons per day.

Multiple IWS systems may be used provided that the building is owned by one person. At DOH's discretion, multiple buildings may connect to one IWS system provided that the buildings are located on the same lot and generate wastewater of similar strength and character.

IWS are required to consist of a septic tank and soil absorption system, sand filter, subsurface irrigation system or other treatment unit as approved by DOH. Cesspools are prohibited as adequate treatment is not provided.

Where developments do not meet the requirements for an IWS system, decentralized WWTPs are proposed. WWTPs could be sized to accommodate flows from multiple properties located in the same general area.

Depending on the development timeline, construction of the WWTP can be phased such that the system can be adapted and expanded to accommodate additional flows at a later date. WWTPs should be located in the lowest region of the service area to allow for gravity flow into the WWTP and avoid the use of pump stations and force mains.

4.16.3 Level of Impact after Mitigation

Pūlama Lāna'i intends to move ahead with the proposed 200-acre Miki Basin Industrial Park. Full buildout of the proposed 200-acre Miki Basin Industrial Park will be developed incrementally over a period of 30-years (not all at once.)

Pūlama Lāna'i will conform with the requirements of Department of Health, County of Maui and any other associated regulatory entity as it relates to installation, inspection and maintenance of individual wastewater systems in handling wastewater on the site.

The impact of the wastewater improvements associated with the project will have a less than significant impact.

4.17 Secondary & Cumulative Impacts

The proposed project does not appear to have the potential to involve any significant secondary impacts. While there are anticipated changes in several environmental and social categories, as noted above, these uses are consistent with prior uses in the area. These changes are less than significant.

A cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions.

Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time.

Hence, a cumulative impact will occur when the incremental environmental effects of the Project added to other past, present, and reasonably foreseeable future actions result in substantial significant impacts.

There are direct effects from implementing the alternatives for this project and this section discusses the overall, or cumulative, effects.

4.17.1 Summary of Potential Contribution of the Preferred Alternative to Cumulative Effects

In general, the project will add a limited increment to the current level of cumulative impact. As noted previously, impacts to the resources are estimated to be less than significant; in addition the project would not tip the balance from a less than significant to a significant level on a cumulative basis.

As noted, Lānaʻi Airport is in the planning and environmental review stages for extension of the runway. This does not impact the subject and does add a significant overall cumulative impact to the area.

Sustainability Principles

The Lānaʻi Community Plan (LCP) identifies fostering a robust and diversified economy as a critical component to establishing a sustainable and resilient future for Lāna`i. The LCP explains:

> This requires diversifying the tourism industry, supporting agriculture, encouraging new industries, expanding education and support services for small businesses, and providing necessary infrastructure, land, and affordable sea and air transportation options. Lowering energy costs by reducing dependence on fossil fuels and increasing renewable energy is also key to providing stronger economic opportunities and becoming more sustainable.
>
> This will be achieved by increasing the generation and use of renewable energy sources, promoting the use of electric vehicles, and exploring options for biofuels, biodiesel, and waste-to-energy technology. Water resources will be used in a sustainable and economic manner by recycling one hundred percent of wastewater for irrigation and exploring options for reuse of household graywater for lawn and garden irrigation. (LCP, p. 2 12)

Generally, communities have the following types of light industrial uses: cold storage plants, commercial laundries, craft cabinet and furniture manufacturing, general food, fruit, and vegetable processing and manufacturing plants, laboratories, machine shop or other metal working shops, small boat building, tire repair operation, warehouse, storage and loft building, minor utility facilities, etc.

The heavy industrial uses in communities of this size would include automobile wrecking, lumber yards, machine shops, major utilities facilities, cement manufacture, asphalt manufacture, etc. Based on expected economic and population growth over the next 30 years, there will be a need for industrial-zoned lands on the island of Lāna`i as there is none available at the present time. The Miki Basin Industrial Park will provide space for growth of new businesses.

The site is well-suited for industrial development. It is adjacent to the most significant industrial uses on Lāna‘i, the Lāna‘i Airport, the Miki Basin Industrial Condominium, and Maui Electric Company’s (MECO) generating facility.

At 3.2 miles southwest of Lāna`i City, it is far enough removed from the island’s main business center and residential area as to minimize those impacts common to industrial areas, such as noise, odors, and heavy vehicles. Yet, the Petition Area is close enough to be conveniently accessible to businesses, residents, and the workforce.

Development of the 200-acre industrial park will (i) allow existing industrial facilities currently scattered in business and residential areas in Lāna`i City to relocate to more appropriate locations having the infrastructure and buffers necessary for industrial uses; and (ii) provide opportunities for future industrial development on Lāna`i, which will add to the diversification of Lāna‘i’s economy and thereby contribute to the island’s resiliency and sustainability.

In 2012, Lāna‘i was purchased by Larry Ellison, and Pūlama Lāna‘i was created to manage, preserve and protect Lāna‘i’s precious land and natural resources, and to redefine Lāna`i as a sustainable community. In Hawaiian, pūlama means to cherish or treasure; Pūlama Lāna`i seeks to cherish the unique beauty and deep spirit of aloha on Lāna`i by creating sustainable practices, cultural connections and economic opportunities that support the island and community.

Pūlama Lāna‘i currently has 70 electric vehicles in its light fleet of 350 vehicles. As electric pickup trucks and freight tractor trucks become available, these will replace the existing gasoline power vehicles in the light car fleet.

In keeping with this vision of sustainability, as the master developer of the Miki Basin Industrial Park, Pūlama Lāna‘i will ensure that the industrial park incorporates, to the extent feasible and practicable, measures to promote energy conservation, sustainable design, environmental stewardship and protection of the area’s natural and cultural resources.

Greenhouse Gas Emissions

The Office of Environmental Quality Control (OEQC) has yet to incorporate guidance on how to address climate change and greenhouse gases in EAs and EISs; apparently, the OEQC plans to consider the federal Council on Environmental Quality’s (CEQ) guidance. In part, CEQ guidelines note,

> “Under CEQ regulations and the ‘rule of reason’ … impacts of a proposed action should be discussed in proportion to their significance, and there should only be brief discussion of issues that are not significant. …”
>
> “Agencies should attempt to quantify a proposed action’s projected direct and reasonably foreseeable indirect GHG emissions when the amount of those emissions is substantial enough to warrant quantification, and when it is practicable to quantify them using available data and GHG quantification tools.”
>
> “Agencies should consider whether quantifying a proposed action’s projected reasonably foreseeable GHG emissions would be practicable and whether quantification would be overly speculative. …”

> "Where GHG inventory information is available, an agency may also reference local, regional, national, or sector-wide emission estimates to provide context for understanding the relative magnitude of a proposed action's GHG emissions. This approach, together with a qualitative summary discussion of the effects of GHG emissions based on an appropriate literature review, allows an agency to present the environmental impacts of a proposed action in clear terms and with sufficient information to make a reasoned choice among the alternatives."
>
> "Such a discussion satisfies NEPA's requirement that agencies analyze the cumulative effects of a proposed action because the potential effects of GHG emissions are inherently a global cumulative effect. Therefore, a separate cumulative effects analysis is not required." (Federal Register /Vol. 84, No. 123 /Wednesday, June 26, 2019)

Greenhouse gases (GHG) are gases that trap heat in the atmosphere by absorbing infrared radiation and thereby warming the planet. These gases include carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6).

Greenhouse gases are emitted by natural sources as well as by human activities. For example, CO2 is emitted when an animal exhales or water evaporates from the ocean. In fact, the Intergovernmental Panel on Climate Change (IPCC) estimated that 97 percent of CO2 emissions worldwide in the 1990s came from natural sources.

However, the additional three percent that resulted from human activity was enough to push emissions above the capacity of natural processes (such as photosynthesis) to absorb them. It is in this sense that human activity is responsible for the rising concentrations of CO2 observed in the atmosphere. (Emrath)

The amount of warming caused by each GHG depends on how effectively the gas traps heat and how long it stays in the atmosphere. The Intergovernmental Panel on Climate Change (IPCC) developed the Global Warming Potential (GWP) concept to compare the ability of each GHG to trap heat in the atmosphere relative to the reference gas, CO2.

Hawai'i Greenhouse Gas Emissions Report for 2016 (December 2019)

Hawai'i Greenhouse Gas Emissions Report for 2016 was prepared for the State Department of Health in December 2019. Information in this section comes from that report. This information, provided by a State agency, notes the State's information, analysis and efforts to reduce greenhouse gas emissions.

In 2007, the State of Hawai'i passed Act 234 to establish the state's policy framework and requirements to address GHG emissions. The law aims to achieve emission levels at or below Hawai'i's 1990 GHG emissions by January 1, 2020 (excluding emissions from airplanes). In 2008, the State of Hawai'i developed statewide GHG emission inventories for 1990 and 2007.

To help Hawai'i meet their emissions target, Hawai'i Administrative Rules, Chapter 11-60.1 was amended in 2014 to establish a facility-level GHG emissions cap for large existing stationary sources with potential GHG emissions at or above 100,000 tons per year.

In an effort to track progress toward achieving the state's 2020 GHG reduction goal, the report presents updated 1990, 2007, 2010, and 2015 emission estimates; inventory estimates for 2016; and emission projections for 2020 and 2025.

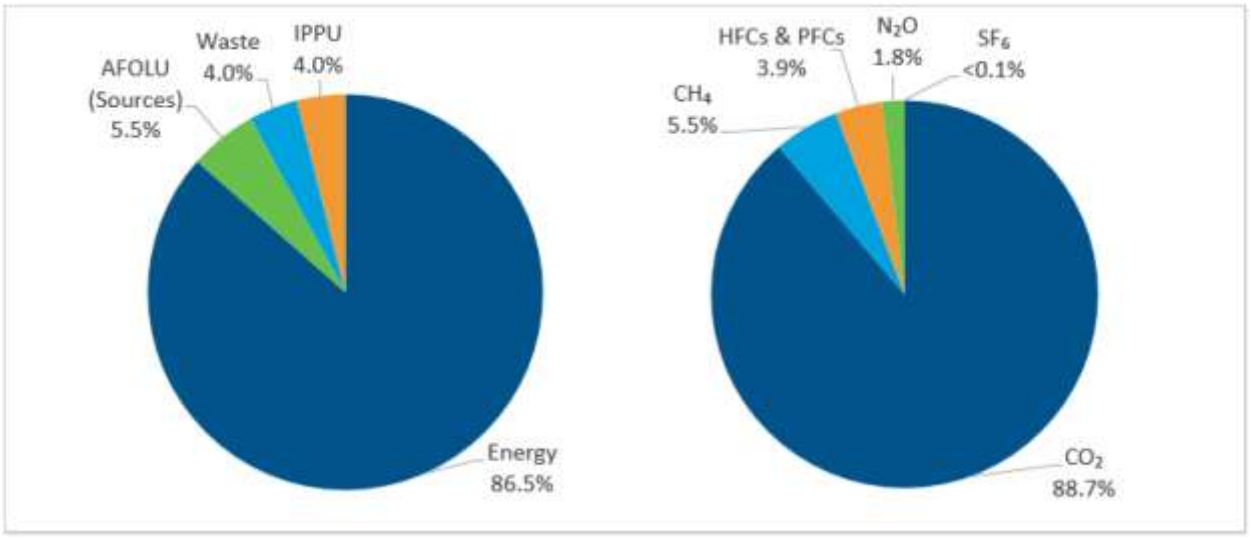
This information will be used by the state to evaluate whether current and planned actions are sufficient to achieve the statewide GHG emissions target. As it is best practice to review GHG emission estimates for prior years, the report includes revised estimates for 1990, 2007, 2010, and 2015 and newly developed estimates for 2016. Best available activity data, emissions factors, and methodologies were relied upon.

Greenhouse gas emissions result from economic activities occurring within Hawai'i. These emissions are impacted by the overall level of economic activities, the types of energy and technologies used, and land use decisions. Estimating future GHG emissions, therefore, relies heavily on projections of economic activities as well as an understanding of policies and programs that impact the intensity of GHG emissions.

The largest components of greenhouse gases generated by human activity over the course of a year result from energy that is produced and consumed. Large GHG emitting sources have had substantial federal and state policy intervention (energy industries and transportation).

The GHG emission estimates presented in the report include anthropogenic GHG emissions and sinks for the state of Hawai'i for 1990, 2007, 2010, 2015, and 2016 from the following four sectors: Energy, Industrial Processes and Product Use (IPPU), Agriculture, Forestry, and Other Land Use (AFOLU), and Waste.

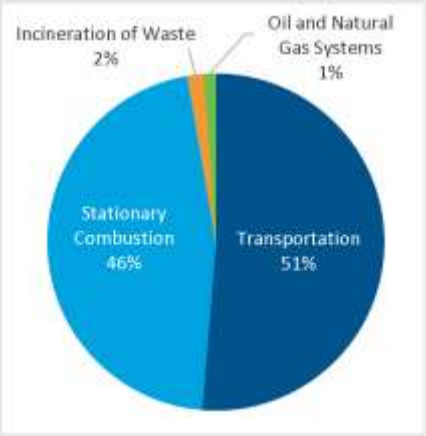
In 2016, total GHG emissions in Hawai'i were 19.58 million metric tons of carbon dioxide equivalent (MMT CO2 Eq.). Net emissions, which take into account carbon sinks, were 13.07 MMT CO2 Eq. Emissions from the Energy sector accounted for the largest portion (87 percent) of total emissions in Hawai'i, followed by the AFOLU sector (6 percent), the IPPU sector (4 percent), and the Waste sector (4 percent).



Hawai'i 2016 GHG Emissions by Sector and Gas

As the largest source of emissions in Hawai'i, the Energy sector is a major driver of the overall emissions trends, accounting for 88 percent of the emissions increase from 1990 to 2007 and 99 percent of reductions between 2007 and 2016. Relative to 1990, emissions from the Energy sector in 2016 were lower by 11 percent.

Transportation emissions—which increased between 1990 and 2007, decreased between 2007 and 2010, and then increased again between 2010 and 2016—accounted for the largest share of Energy sector emissions in almost all inventory years (in 2010 stationary combustion accounted for the largest share of Energy sector emissions).

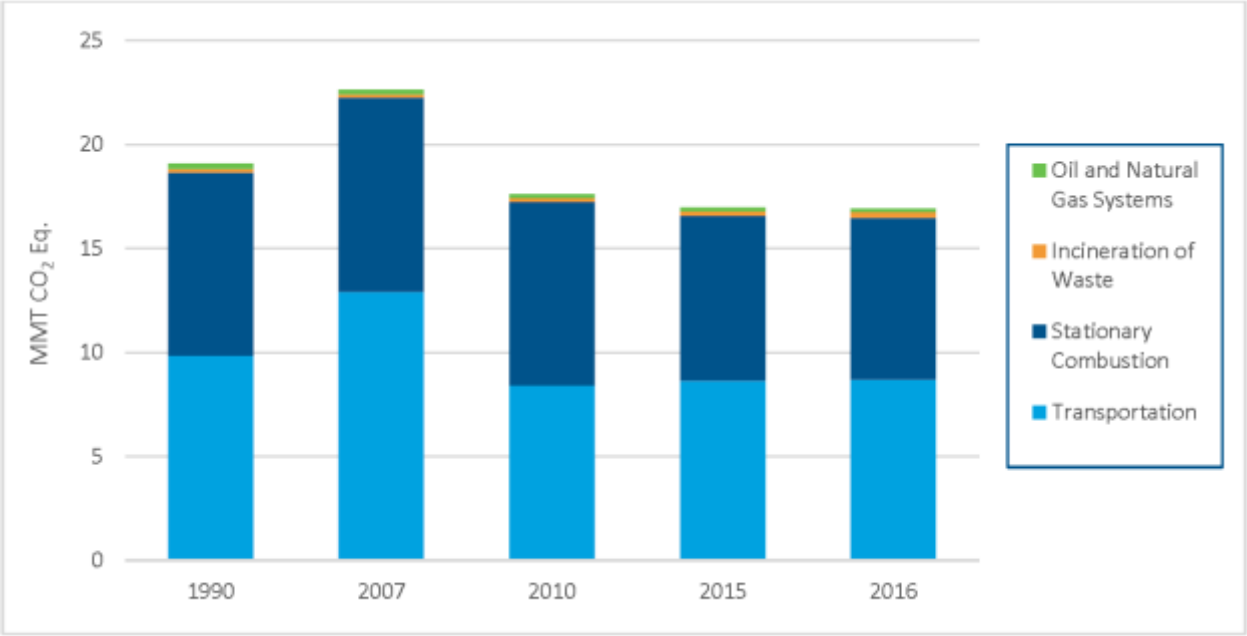


Hawai'i Energy Emissions by Source (2016)

Stationary combustion emissions—which increased between 1990 and 2007, and then decreased from 2007 to 2016—is the second largest share. This trend is largely driven by emissions from energy industries (electric power plants and petroleum refineries) as well as industrial emissions.

Emissions from AFOLU sources and the Waste sector also contributed to the overall reduction in emissions from 2007 to 2016, falling by about 3 percent and 26 percent, respectively, during that period. These reductions more than offset growing emissions from the IPPU sector, which increased by 41 percent from 2007 to 2016.

Relative to 1990, emissions from the IPPU sector in 2016 were more than three times higher, due entirely to the growth in HFC and PFC emissions from substitution of ozone depleting substances (ODS).4 Carbon removals from AFOLU sinks have remained relatively flat since 1990, decreasing by less than 3 percent between 1990 and 2016.



Hawai'i Energy Sector Emissions by Source and Year

The report provides a number of key findings:

- The energy sector makes up the majority - 87 percent - of the state's greenhouse gas emissions. Approximately 53 percent of the energy sector emissions are from transportation, excluding international bunker fuel, and 45 percent are from stationary combustion.
- The decrease in transportation emissions, about 20 percent from 2007 to 2015, was the result of decreases in domestic marine, domestic aviation, and military emissions, which more than offset an increase in ground transportation.
- Stationary combustion emissions from electrical power plants and petroleum refineries decreased by about 15 percent over the five-year period from 2010 to 2015.
- Industrial processes and product use, which includes emissions from cement production, electrical transmission and distribution, and substitution of ozone depleting substances accounted for 4 percent of the state's emissions in 2015.
- Agriculture, forestry, and other land use, which included emissions and sinks from agricultural activities, land use, changes in land use, and land management practices made up 5 percent of the statewide emissions in 2015.
- Waste, including emissions from waste management and treatment activities such as landfills, composting, and wastewater treatment, accounted for 4 percent of statewide emissions in 2015.

These positive trends are expected to continue, primarily because of the Hawai'i Clean Energy Initiative, whose goal is to achieve 100 percent clean energy by 2045.

- Total state emissions are projected to decrease largely because of the combined decrease in emissions from electric power plants and petroleum refineries.
- Electric utilities, specifically, are seeking to meet the state's "renewable portfolio standard" mandates which require increasing use of renewable energy sources to generate electricity until Hawai'i is no longer dependent on fossil fuels and uses 100 percent of renewable energy sources by 2045.
- The state's "energy efficiency portfolio standard target mandates a reduction in energy use—a decrease of 4,300 gigawatt-hours of electricity use by 2030. Based on the average efficiency of fossil fuel electricity generation in Hawai'i, this would be equivalent to about 3.5 million metric tons of greenhouse gas removed. (Governor Release 19-013)

Total GHG emissions in Hawai'i grew by 19 percent between 1990 and 2007 before falling 20 percent between 2007 and 2010 and another 3 percent between 2010 and 2015. Although emissions increased by less than 1 percent between 2015 and 2016, total emissions in 2016 were roughly 8 percent lower than 1990 levels. Net emissions were lower by roughly 11 percent in 2016 relative to 1990.

Based on the analysis, net GHG emissions in 2020 (excluding aviation) are projected to be lower than net GHG emissions in 1990.

Hawai'i State Plan Climate Change Priority Guidelines

HAWAI'I STATE PLAN, HRS CHAPTER 226	Rating
A = ACTIVELY SUPPORTS C= CONFORMS F = FAILS TO MEET PLAN GOAL NA = NOT APPLICABLE	
226-109 Climate Change Priority Guidelines - Priority guidelines to prepare the State to address the impacts of climate change, including impacts to the areas of agriculture; conservation lands; coastal and nearshore marine areas; natural and cultural resources; education; energy; higher education; health; historic preservation; water resources; the built environment, such as housing, recreation, transportation; and the economy shall:	
(1) Ensure that Hawai'i's people are educated, informed, and aware of the impacts climate change may have on their communities;	**C**
(2) Encourage community stewardship groups and local stakeholders to participate in planning and implementation of climate change policies;	**C**
(3) Invest in continued monitoring and research of Hawai'i's climate and the impacts of climate change on the State;	**C**
(4) Consider native Hawaiian traditional knowledge and practices in planning for the impacts of climate change;	**C**
(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;	**C**
(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;	**C**
(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;	**C**
(8) Foster cross-jurisdictional collaboration between county, state, and federal agencies and partnerships between government and private entities and other nongovernmental entities, including nonprofit entities;	**NA**
(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; and	**NA**
(10) Encourage planning and management of the natural and built environments that effectively integrate climate change policy	**C**
Discussion: Implementation of the permitted uses in the proposed project will not negatively impact Climate Change activities. In part, the proposed project will help demonstrate appropriate land use and development that supports the State economy and enhance the social stability and well-being for the people of Lāna'i.	

Carbon Footprint

The introduction and 50-year period of protecting non-native grazing herbivores, such as cattle and sheep, on Lāna'i between 1780 and 1830 had denuded much of the native forest on Lāna'i, thereby reducing the island's ability to absorb carbon dioxide. As part of the effort to redefine Lāna`i as a sustainable community, Pūlama Lāna'i itself, and in partnership with other organizations, is managing and protecting Lāna'i's natural resources with projects such as, but not limited to, native reforestation.

Additionally, in keeping with its vision of sustainability, Pūlama Lāna'i has incorporated energy efficiency and energy conservation in its numerous renovations and redevelopments on the island. They have also been a leader in recycling.

Pūlama Lāna'i sponsors rural recycling collection events for hard to recycle items, including appliances, small scrap metal, vehicles, and vehicle batteries and tires. The County has recycling programs for computers/electronics and household batteries. DOH, in conjunction with Maui Disposal, provides

refundable glass and can recycling. Pūlama Lāna`i provides green waste recycling with subsequent compost available to residents. It also compresses cardboard for shipment to the H-Power plant on Oahu.

The carbon footprint of the Miki Basin Industrial Park cannot be known or even estimated at this time because the particular types of entities and activities that will populate the industrial park will not be known until the backbone infrastructure is developed and parcels are leased or sold for individual development.

However, as the master developer of the Miki Basin Industrial Park, Pūlama Lānaʻi will ensure that the industrial park incorporates, to the extent feasible and practicable, measures to promote energy conservation, sustainable design, environmental stewardship, and protection of the area's natural and cultural resources.

The Miki Basin Industrial Park has the potential of housing a solar farm of a size that could generate a significant amount of renewable energy to offset fossil fuels that are currently used by MECO to generate electricity for the island.

Additionally, landscaping for the industrial park will bring trees into an area that currently has none. Moreover, Pūlama Lānaʻi, as the master developer, as well as landowner of 98% of the island and the island's foremost employer, will encourage and promote the use of products that minimize or reduce carbon emissions, such as carbon encapsulating concrete.

Pūlama Lānaʻi has demonstrated its commitment to be responsible. It currently has 70 electric vehicles in its light fleet of 350 vehicles. As electric pickup trucks and freight tractor trucks become available, these will replace the existing gasoline power vehicles in the light car fleet.

Although the development of the Miki Basin Industrial Park will add to the island's carbon footprint, Pūlama Lānaʻi has made, and will continue to make, strides in minimizing and mitigating the island's overall carbon footprint.

4.17.2 Irreversible & Irretrievable Commitments of Resources

Miki Basin Industrial Park will require minor commitments of both renewable and nonrenewable energy and material resources. Nonrenewable resources that will be used during the project include fuel, water and other resources necessary for the proposed activities.

Resources that are irreversibly or irretrievably committed to a project are those that are typically used on a long-term or permanent basis; however, those used on a short-term basis that cannot be recovered (e.g., non-renewable resources) also are irretrievable.

All uses in the proposed project will conform to applicable County, State and Federal laws, codes, ordinances, rules and regulations.

4.17.3 Conclusion

Implementation of the proposed action will not result in significant impacts that will not be able to be mitigated, to any environmental resource area. Therefore, the proposed action, in conjunction with other actions on and in the vicinity of Miki Basin Industrial Park, will not result in significant cumulative impacts.