4.0 HUMAN ENVIRONMENT

4.1 SURROUNDING LAND USE

4.1.1 Existing Conditions

The Petition Area and its surrounding lands were once part of the Līhuʻe Plantation, and are currently owned by the Applicant, Keālia Properties LLC. The 53.4 acre Keālia Mauka site is part of an approximately 1,000-acre tax map parcel [TMK (4)4-7-004:001] that extends from Kūhiō Highway to the *mauka* lands where Keālia Road intersects with Hauaala Road near the Spalding Monument. This parcel is referred to by the Applicant as the "Kumukumu parcel." *Mauka* of the Petition Area near the Spalding Monument, Keālia Road veers northward and forms the *mauka* boundary of the Kumukumu parcel. The adjacent TMK parcel to the south is also owned by Keālia Properties and is referred to as the "Makee parcel." The Makee parcel extends from Kūhiō Highway to Hauaala Road and is also about 1,000 acres in size. The location of both parcels is shown in Chapter 1, Figure 1-3. The Kumukumu parcel is currently outleased for grazing; the Makee parcel is largely fallow, with some diversified agriculture and equestrian activity.

The Keālia Mauka Petition Area is located at the southern corner of the Kumukumu parcel, adjacent to the existing 38-lot Kaʻao Road subdivision, also known as "Keālia Town Tract." This former plantation neighborhood includes house lots ranging in size from about 7,500 square feet (SF) to about 20,000 SF. The neighborhood is characterized by low rise, plantation-style homes on both sides of Kaʻao Road. Three house lots are accessed off Hopoe Road. All of the lands surrounding the Petition Area to the north and west are former plantation lands and are currently used for cattle grazing.

The Petition Area's eastern (*makai)* boundary is the two-lane Kūhiō Highway, State Route 56. This highway is the primary thoroughfare along the east Kauaʻi shoreline. It connects Līhuʻe and Kapaʻa to Keālia, Anahola and Kīlauea, and to the north shore communities of Princeville and Hanalei.

At the base of Keālia Road near Kūhiō Highway, there remain a number of plantation-era structures. Several of these structures are still in use, including an open shed used by Keālia Farms for staging and a farmers market, the Keālia Post Office, and a rodeo ring. An old school building on the north side of Keālia Road is vacant.

Directly across Kūhiō Highway from the Petition Area is the luxury Keālia Kai subdivision, also known as "Keālia Makai." This exclusive oceanfront development encompasses 300 acres, and includes 35 homesites and 29 lots ranging in size from five to 38 acres. The development fronts Keālia Beach, one of the most popular recreational beaches on the east side.

The nearest large concentration of population is Kapaʻa, located about two miles to the south of the Petition Area. In addition to being a population center, Kapaʻa is a major commercial, industrial and visitor center. To the north of Keālia, Anahola is the next community to the north.

4.1.2 Potential Impacts and Mitigation

The Proposed Action will transform undeveloped grazing land to a visible urban, residential use once the lots are sold and homes are constructed by the owners. The subdivision will expand the existing Kaʻao Road residential area, with similar, modest single family homes. The Applicant has no plans to expand residential use beyond the proposed 235 lots. Although the Proposed Action represents a change in land use for the subject 53 acres, residential use is compatible with the existing subdivision and consistent with the County General Plan. The Petition Area represents only a small portion (5%) of the 1,000-acre tax map parcel, the remainder of which will remain in agriculture/grazing use. The Proposed Action will not impact the ongoing grazing use on the surrounding lands.

4.2 AIR QUALITY

4.2.1 Existing Conditions

Air quality at a given location can be influenced by a number of factors, including geography, climate, the quantity and type of pollutants emitted locally and regionally, and the dispersion rates of these pollutants. The dispersion of pollutants is influenced by wind speed and direction, atmospheric stability, temperature, the presence or absence of inversions, and topography. Air quality is affected by both stationary sources (e.g., industrial development) and mobile sources (e.g., motor vehicles). Ambient air quality at the site is good. Portions of the property fronting Kūhiō Highway may be more impacted by vehicle emissions, but to a relatively minor degree. There is little traffic congestion in the area fronting the Petition Area.

The federal Clean Air Act (CAA), which was last amended in 1990, requires the U.S. Environmental Protection Agency (USEPA) to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. NAAQS have been established for six principal pollutants, called "criteria" pollutants: carbon monoxide (CO), nitrogen oxides (NOx), ozone (O3), particulate matter smaller than 10 microns (PM_{10}), particulate matter smaller than 2.5 microns ($PM_{2.5}$), sulfur oxides (SOx), and lead (Pb). The State of Hawaiʻi has also established its own standards for these pollutants and for hydrogen sulfide. The State AAQS are more stringent than the National AAQS for certain pollutants.

The table below shows the national and State standards for these pollutants. The “primary” standards have been established to protect the public health. The “secondary” standards are intended to protect the nation’s welfare, and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the general welfare. The State of Hawaiʻi issues its ambient air quality standards in terms of a single standard that is designated “to protect public health and welfare and to prevent the significant deterioration of air quality.”

Units of measure for the standards are parts per million (ppm) by volume, milligrams per cubic meter of air (mg/m^3), and micrograms per cubic meter of air ($\mu g/m^3$).

Table 4-1: National and State Ambient Air Quality Standards

Pollutant	Standard		
	Hawai'i State	Federal Primary (Health)	Federal Secondary (Welfare)
Carbon Monoxide (CO)			
1-hour average	9 ppm	35 ppm	None
8-hour average	4.4 ppm	9 ppm	None
Lead (Pb)			
3-month average	1.5 µg/m^3 (calendar quarter)	0.15 µg/m^3 (running 3-month)	Same as primary
Nitrogen Dioxide (NO_2)			
1-hour average	None	100 ppb	None
Annual average	0.04 ppm	53 ppb	Same as primary
Particulate Matter < 10 microns (PM_{10})			
24-hour block average	150 µg/m^3	150 µg/m^3	Same as primary
Annual average	50 µg/m^3	None	None
Particulate Matter < 2.5 microns ($PM_{2.5}$)			
24-hour block average	None	35 µg/m^3	Same as primary
Annual average	None	12 µg/m^3	15 µg/m^3
Ozone (O_3)			
8-hour rolling average	0.08 ppm	0.075 ppm	Same as primary
Sulfur Dioxide (SO_2)			
1-hour average	None	75 ppb	None
3-hour block average	0.5 ppm	--	0.5 ppm
24-hour block average	0.14 ppm	None	--
Annual average	0.03 ppm	None	--
Hydrogen Sulfide			
1-hour average	25 ppb	None	None

Source: State of Hawai'i, Department of Health, Clean Air Branch, NAAQS January 2013. URL= http://health.hawaii.gov/cab/files/2013/05/naaqs_jan_2013.pdf. Accessed 9/2017.

Attainment Status of Study Area

Section 107 of the 1977 Clean Air Act Amendments requires the USEPA to publish a list of geographic areas that are not in compliance with the National AAQS, and these areas are called non-attainment areas. As noted above, the State of Hawai'i is an attainment area for CO, O_3, PM_{10} and PM_{25}.

Monitored Air Quality

The State of Hawai'i Department of Health (DOH) operates a network of air quality monitoring stations at various locations around the State. Each station, however, typically does not monitor the full complement of air quality parameters. The DOH monitoring station closes to the Petition Area is

located in the Niumalu residential subdivision in Līhuʻe, about 13 miles southeast of Keālia. This station is considered a Special Purpose Monitoring Station established in 2011 to monitor emissions from the cruise ships in Nawiliwili Harbor, approximately 1.0 mile upwind.

The entire Island of Kauaʻi, like the rest of the state, meets the NAAQS standards and is within an attainment area. As reported in the Annual Summary of Air Quality Data for 2014 (DOH, 2015) (the latest year for which annual data are available), the pollutants monitored at the Niumalu station were particulate matter less than 2.5 microns (PM2.5), nitrogen dioxide (NO2), and sulfur dioxide (SO2). Carbon monoxide (CO) monitoring was shut down as of April 25, 2013. The readings at this location show that criteria pollutant levels were below state and federal ambient air quality standards.

4.2.2 Potential Impacts and Mitigation

4.2.2.1 Construction Period

During construction of subdivision improvements, and to a lesser extent during construction of individual homes, there will be short-term, construction-related impacts to air quality. Fugitive dust will be generated by site grading and excavation, and by earthwork involved during construction of the individual homes. Dust control is of particular concern due to the proximity and downwind location of the Kaʻao Road subdivision.

It is anticipated that the most dust generating activities will be the initial site grading, which will be accomplished in phases and is expected to last about 12 months. The first step in the construction sequence will be the installation of erosion and dust control best management practices (BMP). Grubbing will then be conducted to remove existing vegetation and top soil, followed by mass grading.

The County's Grading Ordinance allows a maximum of 10 acres to be disturbed at any time. Therefore, the 53.4-acre Petition Area would require up to six phases of grading work. The phasing of the grading work will mitigate dust impacts on the adjacent subdivision.

The developer will comply with State DOH Administrative Rules, Title 11, Chapter 60, Air Pollution, which prohibits visible dust emissions at property boundaries. Erosion and dust control BMP will include dust fences, silt fences, mud control at construction entrances, and sediment basins. Dust levels will be monitored at the project boundary fronting the residential area to evaluate the effectiveness of the project dust control program. Other BMPs include watering active work areas, keeping adjacent paved roads clean, and covering open bed trucks.

Because the finished lots will be sold undeveloped, bare areas will be hydro-seeded or mulched to protect exposed soil from wind and water erosion. Similar BMPs will be required for individual lot owners during home construction, and included in the subdivision's Covenants, Conditions and Restrictions (CC&Rs).

The use of construction equipment and vehicles may also lead to temporary increases in airborne pollutants. Exhaust emissions from construction vehicles will be mitigated by moving construction equipment and workers during off-peak traffic hours, ensuring equipment is functioning properly. With these mitigation measures, short term impacts to air quality during construction may be annoying to neighbors, but are not expected to be significant.

4.2.2.2 Operational Period

The project will create 235 individual residential lots that will be sold and developed by their owners. This will result in more cars and trucks coming to and from the area on a regular basis. Lot purchasers may also utilize other types of equipment and machinery to maintain their property and yards, which generate emissions. As a result, there will be some increase in air pollutants over current conditions. Assuming that each residence has a minimum of two vehicles, there will be an additional 470 cars and trucks traveling to the subdivision daily. Because most of the future homeowners are expected to be local residents already living on Kauaʻi, there will not be a net increase in vehicles on the island.

An indirect impact is an increase in emissions associated with the subdivision's electrical power demand and solid waste disposal requirements. However, even under a maximum build out and a worst case scenario, air quality is expected to remain well within both Hawaiʻi state and national ambient air quality standards. Long-term impacts to air quality would be less than significant.

Various energy saving features could be implemented to reduce energy consumption, including the use of solar water heaters, energy efficient lighting systems, and designing homes to maximize natural light and ventilation. Landscaping can also be used to provide shade and reduce the use of air conditioning.

4.3 NOISE

4.3.1 Existing Conditions

The Petition Area is currently used for cattle grazing, and the ambient noise environment consists of the sounds of the wind, ocean, and birds, and depending on proximity to major roadways, vehicle traffic from Kaʻao Road, Keālia Road and Kūhiō Highway. In the *mauka*-most areas of the site which are further from existing roadways, ambient noise is low. The eastern boundary of the Petition Area is located adjacent to Kūhiō Highway, and noise levels are higher in this area.

Although no noise measurements were taken at the Petition Area, a 2014 noise assessment for another proposed residential project provides comparable data on ambient highway noise. The Lima Ola Workforce Housing Development is proposed on a 75-acre site in ʻEleʻele, in west Kauaʻi. The site is bordered on one side by Kaumualiʻi Highway, and surrounded by agricultural fields to the south and west. A 2014 *Environmental Noise Assessment Report for the Lima Ola Workforce Housing Development* in ʻEleʻele, Kauaʻi (D.L. Adams Associates, Ltd., 2014) found that project areas adjacent to Kaumualiʻi Highway had high ambient noise levels during peak traffic hours, ranging from 50 to 68 dBA (dBA is an "A"-weighted decibel, expressing the relatively loudness of sounds in air as perceived by the human ear). In areas of the site far from major roadways, ambient noise levels were relatively low, ranging from 44 to 70 dBA. (D.L. Adams, 2014). It is expected that similar noise conditions exist along the Petition Area's Kūhiō Highway frontage, with lower noise levels further from the highway.

4.3.1.1 Noise Standards

Various local and federal agencies have established guidelines and standards for assessing environmental noise impacts, and have set noise limits as a function of land use. The State of Hawaiʻi's Community Noise Control Rule (HAR §11-46) identifies three classes of zoning districts and specifies maximum permissible sound levels due to stationary noise sources. The Community

Noise Control Rule also regulates noise related to construction activities. For Class A zoning districts, which include residential uses, maximum levels are 55 dBA (exterior) for day hours (7 AM to 10 PM), and 45 dBA (exterior) for night hours (10 PM to 7 AM).

The eastern boundary of the Petition Area borders Kūhiō Highway, which is a source of traffic noise. The Federal Highway Administration (FHWA) regulation 23 CFR 772 contains highway traffic noise abatement criteria (NAC) for seven land use activity categories and assigns corresponding maximum hourly equivalent sound levels ($L_{eq(h)}$) for traffic noise exposure. The Keālia Mauka subdivision would fall under "Category B," defined as residential and has a corresponding maximum $L_{eq(h)}$ of 67 dBA. These limits are viewed as design goals and all projects meeting these limits are deemed in conformance with FHWA noise standards. Under 23 CFR 772, if the predicted noise level approaches or exceeds the NAC, there is considered to be a "traffic noise impact" (FHWA, 2017).

The State of Hawai'i Department of Transportation (HDOT) has implemented the requirements of the FHWA's design goals for traffic noise exposure in its noise analysis and abatement policy. According to the HDOT policy, a traffic noise impact occurs when the predicted traffic noise levels "approach" or exceed FHWA's NAC or when the predicted traffic noise levels "substantially exceed the existing noise levels." "Approach" is defined as 1 dB less than FHWA's NAC and "substantially exceed" is defined as an increase of at least 15 dB.

The U.S. Environmental Protection Agency (USEPA) has identified a range of yearly day-night equivalent sound levels (Ldn) sufficient to protect public health and welfare from the effects of environmental noise. Ldn is the average equivalent sound level over a 24-hour period, with a penalty added for noise during the night time period. The EPA has established a goal to reduce exterior environmental noise to an Ldn not exceeding 65 dBA and a future goal to further reduce exterior environmental noise to an Ldn not exceeding 55 dBA. These goals are not intended as regulations, but are intended to be viewed as levels below which the general population will not be at risk from any of the identified effects of noise.

The U.S. Department of Housing and Urban Development (HUD) has noise standards for new residential construction in high noise areas. All sites whose environmental or community noise exposure exceeds the day night average sound level (Ldn) of 65 Ldn are considered noise-impacted areas. The interior noise standard is 45 Ldn. According to HUD standards, locations with day-night average noise levels above 75 Ldn have "Unacceptable" noise exposure.

4.3.2 Potential Impacts and Mitigation

4.3.2.1 Construction Period

The Proposed Action will result in both short-term and long-term noise impacts. Short-term impacts will be associated with the development of subdivision infrastructure including excavation, grading, and construction of roadways, utilities, drainage, etc. These activities will generate construction-related noise that may affect surrounding land uses. Actual noise levels will depend on the methods employed during each stage of the construction process. The surrounding use most impacted by construction noise will be the adjacent Ka'ao Road subdivision. In particular, the three homes along Hopoe Road which face the Petition Area will be most impacted.

As noted above, the County's Grading Ordinance allows a maximum of 10 acres to be disturbed at any time. The phasing of construction will mitigate noise impacts on the adjacent subdivision.

During construction, earth moving equipment, e.g., bulldozers and diesel powered trucks, will likely be the loudest equipment used. In cases where construction noise is expected to exceed the Department of Health (DOH) "maximum permissible" levels at the property line, a permit will be obtained from the DOH to allow the operation of construction equipment. Additional noise mitigation such as temporary noise barriers, and limitations on work hours/days will be employed as required by DOH.

Once the roads and utilities are complete, the lots will be sold and built out by the individual lot owners. Build out of the subdivision is expected to continue over a number of years, and noise will not be continuous at any one location. However, it is difficult to predict exactly when construction noise will occur. Noise impacts on the Kaʻao Road homeowners will be mitigated by the presence of the detention basin/green space buffer located along the back of the Kaʻao Road lots. There will be no green space buffer for the residences on Hopoe Road, therefore they will be impacted more when homes are constructed near them. Early occupants of the subdivision may be impacted by noise as their future neighbors build their homes. In general, residents will be most affected when construction is occurring on adjacent or nearby lots, particularly upwind.

4.3.2.2 Operational Period

Noise Generated by Residential Use

In the long-term, noise will be generated by the residential uses, people, outdoor mechanical equipment, and by vehicles coming to and from the subdivision. All project activities will comply with the DOH Administrative Rules, Chapter 11-46, Community Noise Control. Noise from stationary mechanical equipment such as air handling equipment and condensing units will be required to meet the maximum permissible noise limits of 55 dBA during the daytime hours and 45 dBA during nighttime hours for single family residential areas.

Impacts of Highway Noise on Residential Use

There is the potential for noise impacts from Kūhiō Highway on some subdivision residents. The Petition Area property line abuts the highway right-of-way (ROW) and the subdivision plan includes a row of 22 lots adjacent to the *mauka* edge of the highway right of way. In the area immediately fronting the Petition Area, the Kūhiō Highway ROW narrows from 140 feet to 100 feet in width. Per County Comprehensive Zoning Ordinance, residential structures must be set back ten feet from a rear property line. With a 100-foot highway ROW, residential structures on these 22 lots would be located 60 feet from the centerline of Kūhiō Highway. If the ROW were widened to 140 feet (as it is for other portions of the highway), structures would be 80 feet from the highway centerline.

Highway noise impact on the 22 residential lots was estimated using HUD's Day/Night Noise Level Electronic Assessment Tool provided by the HUD Environmental Planning Division. This on-line tool calculates Ldn, or noise exposure over a 24-hour period, at an effective distance. The effective distance was set for 80 feet (from the highway centerline), which assumes a "best case" 140-foot highway ROW. Traffic counts were taken from the State of Hawai'i Department of Transportation's 2015 data for the Anahola traffic station on Kūhiō Highway. The HUD model indicated that even at a distance of 80 feet, the day-night average sound level for Kūhiō Highway will exceed 65 Ldn, and be considered a noise-impacted area, requiring attenuation/mitigation. However, the projected day/night noise level is expected to be less than HUD's "unacceptable" level of 75 Ldn.

Potential Highway Noise Mitigation

Noise mitigation is required for the 22 impacted lots along Kūhiō Highway. Even with a 140-foot ROW, these homes will be adversely affected by highway noise. Some areas along the property boundary have existing vegetation and berms, which could provide some degree of noise mitigation, but not enough to reduce noise to acceptable levels. Potential noise mitigation may include:

- Highway sound barriers/walls along Kūhiō Highway

Effective mitigation to reduce interior noise includes:

- air conditioning instead of natural ventilation
- double glazed windows and sound proofed exterior walls
- acoustically softening interior spaces by thick carpeting with padding, acoustical tile ceiling, louvered closet doors, etc.

Other mitigation that may be considered could be to set back the 22 lots further from the highway, or completely relocate these lots to a less impacted area.

4.4 ARCHAEOLOGICAL AND HISTORIC RESOURCES

An archaeological Literature Review and Field Inspection (LRFI) for the proposed Keālia subdivision has been prepared by Cultural Surveys Hawai‘i (CSH) (Appendix D). The Area of Potential Effect (APE) and inspection area encompassed the entire Petition Area. The LRFI included historical, cultural and archaeological background research and a field inspection to identify existing resources in the Petition Area and determine the likelihood that they may be affected by the project.

The LRFI summarized all previous archeological research and historic properties identified in the Keālia *ahupua‘a*. The studies included several investigations conducted in 2007 (Drennan and Dega) of a 2,008-acre property that included the current Petition Area. A summary of all previous archeological investigations is provided in the LRFI. The following provides an overview of the LRFI findings and recommendations.

4.4.1 Existing Conditions

4.4.1.1 Background Summary and Predictive Model

The Keālia Mauka Petition Area is located in the *ahupua‘a* of Keālia in the ancient district of Puna, one of five ancient districts on Kaua‘i. Legends, traditional accounts and *wahi pana* (celebrated places) point to an area rich in pre-Contact history, although much less than that of nearby Wailua. Historic records list a number of *heiau* (temples, non-Christian places of worship) in Keālia. This suggests that Keālia, as well as the Kapa‘a *ahupua‘a*, were probably more politically significant in ancient times. The specific locations of most of these *heiau* are unknown. According to historic documents, the plateau areas north of Keālia Valley were sparsely inhabited with areas bordering Kumukumu and Hōmaikawa‘a Streams hosting the largest settlements.

The earliest successful economic enterprise by a Westerner in the *ahupua‘a* was the Krull Ranch and Dairy, which operated in the Kumukumu area in the 1860s. In 1877, the Makee Sugar

Plantation was established. The Makee Plantation built a mill and landing at Kapaʻa as part of the plantation infrastructure. Following the move of the Kapaʻa mill to Keālia in 1885, a railroad was built from Makee Landing to Keālia with another railroad arm leading into the *mauka* regions of Kapaʻa.

The Makee Sugar Plantation, operating out of Keālia, attracted hundreds of immigrant workers, first the Portuguese and Japanese and later, Filipinos. Keālia town sprang up around these immigrant groups. In addition, there were several plantation camps in Keālia, including in the plateau lands of Kumukumu and Hōmaikawaʻa. Commercial sugarcane cultivation and milling initiated in the mid- to late 1800s was a primary factor in the changes in settlement patterns in the Keālia area. Housing patterns were based on plantation camps of mainly immigrant laborers. A pre-contact subsistence economy was replaced by the market-based economy. Transportation became mechanized, with rail lines from the fields to the mills, and to new landings.

The demise of sugar in the late 20th century occurred concurrently with an increase in tourism and a service-oriented economy. Plantation-era transportation routes were abandoned or were incorporated into present transportation infrastructure. The LRFI notes that modern construction activities in coastal Keālia, however, continue to unearth evidence of pre-Contact, early historic, and plantation era activities (Cultural Surveys Hawaiʻi, 2017).

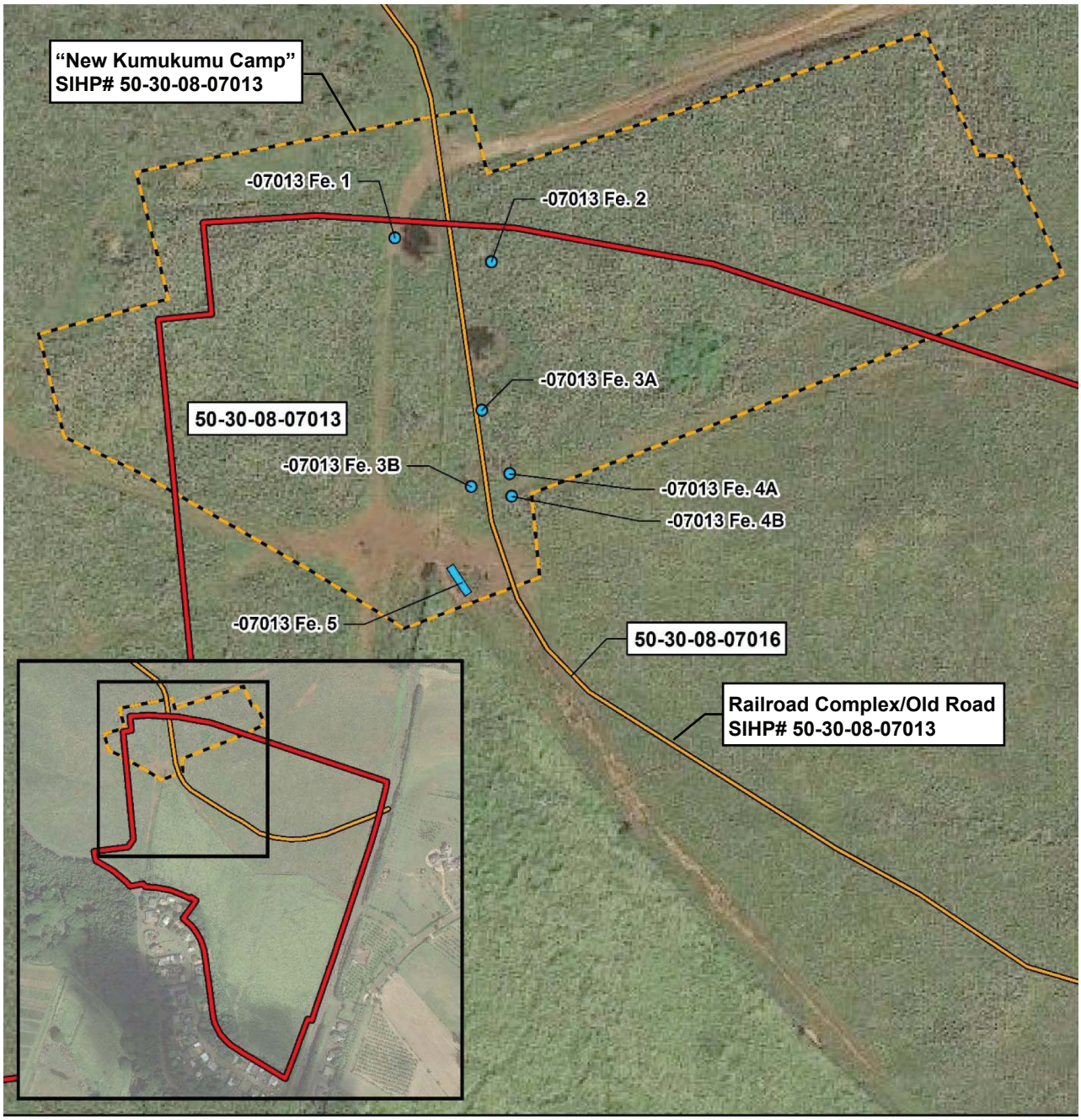
4.4.1.2 Previously Identified Historic Sites

The LRFI noted that based on background research, the Keālia Mauka Petition Area was part of an area under sugarcane cultivation between the late nineteenth century and 2000. Previous archaeological studies in the *ahupuaʻa* have identified numerous archaeological sites around the Petition Area, many associated with post-contact agricultural use. Within the current Petition Area, there are two previously identified historic sites: "New Kumukumu Camp" (State Inventory of Historic Places (SIHP) # 50-30-08-07013) and an old road/railroad complex (SIHP #50-30-08-07016). The locations of these sites is shown in Figure 4-1. The two sites were evaluated during Phase I of a four phase *Archaeological Inventory Survey (AIS) in the Keālia Ahupuaʻa* (Drennan et al. 2006).

The Drennan et al. AIS recommended no further archaeological work for the two historic properties (-07013 and -07016). That AIS was reviewed and accepted by the State Historic Preservation Division (SHPD) in an April 12, 2007 review. The recommendation for no further work may also be reasonably understood to be accepted by the SHPD.

4.4.1.3 Results of 2017 Field Work

The 2017 CSH field inspection focused on the area of the proposed subdivision. The study characterized the Petition Area as consisting of relatively level areas along the western portion and gentle to moderate slope areas to the east. The pedestrian survey was accomplished through systematic sweeps spaced 10 to 15 meters apart due to the low vegetation.



Historic Features Within The Petition Area

Figure 4-1

Keālia Mauka Homesites

Draft Environmental Impact Statement

Kealia Properties, LLC

Historic properties observed within the northwest corner of the project area are features associated with the "New Kumukumu Camp" (SIHP # 50-30-08-07013). A total of five newly identified features within the Petition Area were given feature numbers (SIHP # 50-30-08-07013 Features 1 through 5) The features are associated with the plantation as seen in previous archaeological studies as well as the similar style of construction associated with water control in sugar plantation systems on Kauaʻi.

The 1950 aerial photograph in Figure 4-2 shows a portion of the New Kumukumu Camp with the location of the newly identified features. During the current inspection, SIHP #-07016 could not be re-identified.

Table 4-2. Historic Features Within the Petition Area

SIHP #	Feature Type	Function	Age	Notes
50-30-08-07013 Feature 1	Alignment	Transportation	Plantation era	Abandoned
50-30-08-07013 Feature 2	Concrete slab	Indeterminate	Plantation era	Abandoned
50-30-08-07013 Features 3A and 3B	Concrete posts	Communication	Plantation era	Abandoned
50-30-08-07013 Features 4A and 4B	Culverts	Water Control	Plantation era	Abandoned
50-30-08-07013 Feature 5	Concrete	Indeterminate	Plantation era	Abandoned

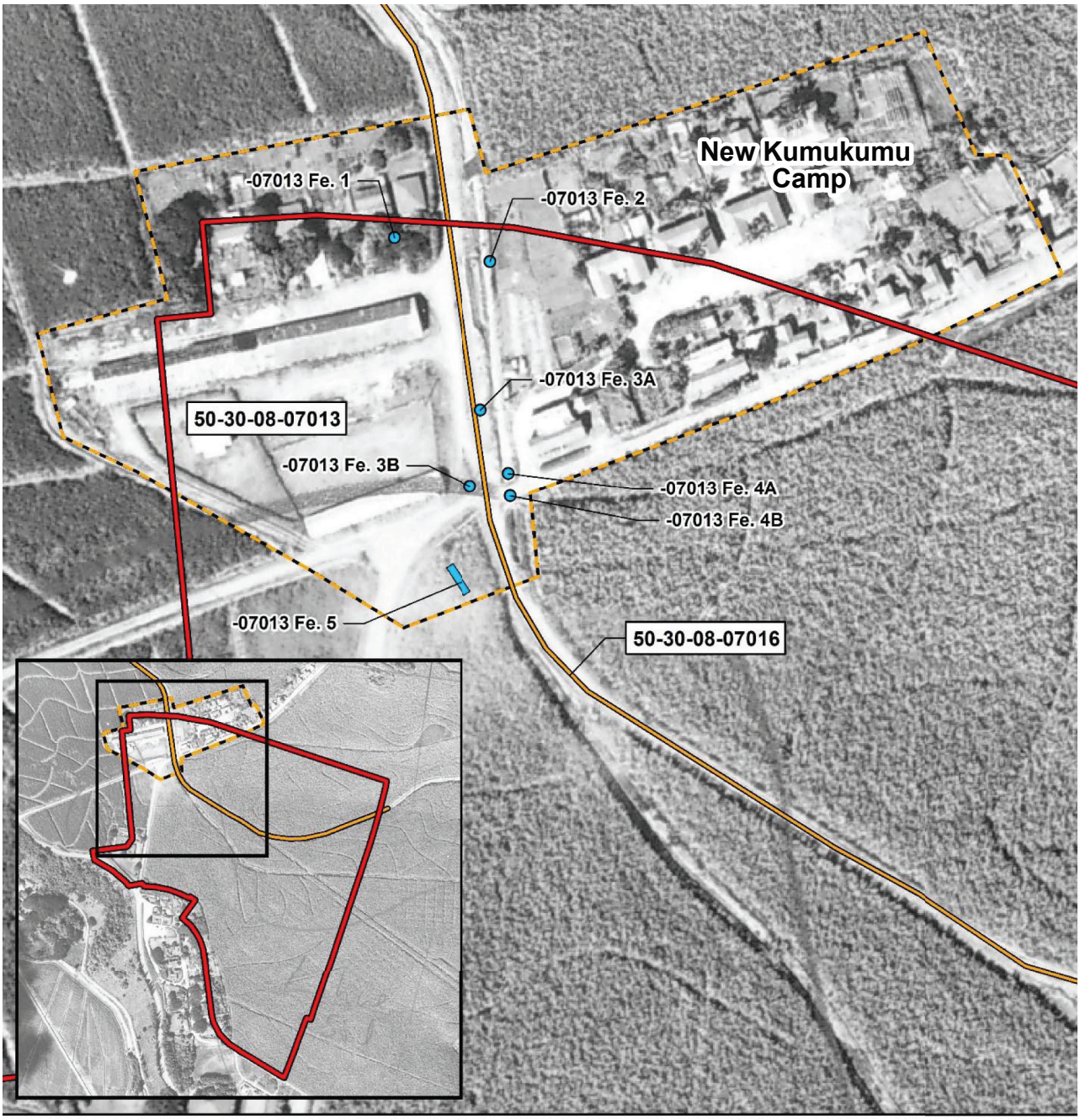
Source: Cultural Surveys Hawaiʻi, 2018

The following are descriptions of the newly identified features, which are thought to be features of the New Kumukumu Camp's irrigation, communication and transport system. Photographs of the features are included in the LRFI (Appendix D).

SIHP #50-30-08-07013, Feature 1, Alignment. This feature is a remnant alignment of concrete, brick, and metal that measures 2.1 m in length by 0.30 m in width and runs in a rough north/south direction. The alignment is in extremely poor condition and the function of the historic property could not be determined. It parallels a dirt road currently in use.

SIHP #50-30-08-07013, Feature 2, Unknown. This feature is a concrete slab measuring 1.49 m in length by 0.42 m in width with a thickness of 0.36 m. The concrete slab was observed along a gently sloping area. Due to its present condition and lack of other information including figures, the formal type and function of this slab is unknown.

SIHP #50-30-08-07013, Feature 3, Posts. This feature consists of two concrete posts (Features 3A and 3B) measuring approximately 30 feet high. Feature 3A is square-shaped and measures 0.20 cm by 0.20 m. The base of the post is thicker at the bottom and tapers at the top. Feature 3B is an octagon-shaped concrete post measuring 0.25 m in radius.



1950 Aerial Photo Showing Historic Features **Figure 4-2**

Keālia Mauka Homesites

Draft Environmental Impact Statement

Kealia Properties, LLC

SIHP #50-30-08-07013, Feature-4, Culverts. This feature consists of two remnant culverts (Features 4A and 4B) constructed of basalt and mortar. Feature 3A is located to the north and measures 3.5 m by 3.5 m with a depth of 0.83 m along the north face. Feature 4A is in extremely poor condition. Feature 4B measures 4.1 m in length (in an east/west direction) by 3.2 m in width (in a north/south direction) and walls measuring from 0.22 m to 0.37 m thick. Feature 4B appears to have been at one time a four-way culvert. Sluice gate slots were observed as well as a single culvert opening on the west side. The opening measures 0.43 m wide by 0.26 m high.

SIHP #50-30-08-07013, Feature 5, Foundation. This feature consists of a large rectangular-shaped concrete slab measuring 10.0 m by 2.45 m with heights from 0.0 m at the northwest corner to 0.43 m at the central-east area. The thickness of the slab varies from 0.12 m to 0.20 m. On the southeast corner of CSH-5, the name "GOMES" was observed. The function of the slab is indeterminate but is understood as related to plantation activities.

4.4.2 Potential Impacts and Mitigation

4.4.2.1 Significance Assessment

The five features of a previously designated historic property, "New Kumukumu Camp" (SIHP #50-30-08-07013), were identified within the current Petition Area and were evaluated for significance according to the broad criteria established by HAR §13-284-6. The five significance criteria are:

a. Be associated with events that have made an important contribution to the broad patterns of our history;

b. Be associated with the lives of persons important in our past;

c. Embody the distinctive characteristics of a type, period, or method of construction, represents the work of a master, or possesses high artistic value;

d. Have yielded, or is likely to yield information important for research on prehistory or history;

e. 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.

SIHP #50-30-08-07013, remnants of a former plantation camp, is assessed as significant under Criterion D (have yielded, or is likely to yield information important for research on prehistory or history). This reflects its value to our understanding of plantation era infrastructure. Water control was essential for sugarcane cultivation, as evidenced by the fact that water was transferred from as far away as Hanalei (Wilcox 1996:70). Communication within the plantation was also important. This is consistent with the significance assessment in Drennan and Dega (2007:110-111) that concluded that SIHP # -07013 was significant under Criterion D (only) of the Hawai'i State Register of Historic Places.

4.4.2.2 Summary and Recommendations

The recent CSH inspection of the Petition Area identified five historic features that are associated with previously designated SIHP # 50-30-08-07013. The newly identified features consist of basalt and mortar culverts, concrete posts, and concrete slabs. Due to its inclusion in, or close proximity to

previous archaeological studies, the features identified during the current investigation most likely date to the early twentieth century and are part of the Keālia and Līhuʻe Plantations' irrigation, communication, and transport system.

The Proposed Action, development of the Keālia Mauka Homesites, will require demolition of the five newly identified site features. As such, the Proposed Action may have an adverse effect on the plantation era infrastructure features of SIHP # 50-30-08-07013. The LRFI supports the recommendation of Drennan and Dega 2007 for no additional archaeological work at this historic property. No additional archaeological work is recommended for the Petition Area (CSH, 2008). The LRFI recommended consultation with SHPD to gain clarity regarding State requirements prior to the Proposed Action.

In a letter dated February 27, 2018, the State of Hawaiʻi Land Use Commission, the EIS accepting agency, notified the SHPD of the Proposed Action and the Petitioner's request for a Land Use District Boundary Amendment. The LUC requested confirmation from SHPD that the entire Petition Area has been reasonably addressed in the prior AIS which recommended no further work or mitigation. A response from SHPD is pending.

4.5 CULTURAL RESOURCES

4.5.1 Existing Conditions

4.5.1.1 Document Purpose and Background

A Cultural Impact Assessment (CIA) for the project was conducted by Cultural Surveys Hawaiʻi (CSH) (CSH, 2018) and is included as Appendix E. The CIA was prepared to comply with the State of Hawaiʻi's environmental review process under Hawaiʻi Revised Statutes (HRS) §343, which requires consideration of the proposed project's potential effect on cultural beliefs, practices, and resources. Act 50, Sessions Laws of Hawaiʻi 2000, amended Chapter 343 HRS to require that environmental impact statements assess the effects of a proposed action on the cultural practices of the community and State, and acknowledged the State's responsibility to protect native Hawaiian cultural practices.

Through document research and ongoing cultural consultation efforts, this report provides information pertinent to the assessment of the Proposed Action's impacts to cultural practices and resources (per the *Office of Environmental Quality Control's Guidelines for Assessing Cultural Impacts*), which may include Traditional Cultural Properties (TCP) of ongoing cultural significance that may be eligible for inclusion on the State Register of Historic Places. The document is intended to support the project's environmental review and may also serve to support the project's historic preservation review under HRS §6E-42 and I Administrative Rules (HAR) §13–284.

Native Hawaiian Rights

In Ka Paʻakai O Ka ʻAina v. Land Use Commission, 94 Hawaiʻi 31, 74, 7 P.3d 1068, 1084 (2000), the Hawaiʻi Supreme Court held the following analysis be conducted:

(1) The identity and scope of valued cultural, historical, or natural resources in the petition area, including the extent to which traditional and customary native Hawaiian rights are exercised in the petition area;

(2) The extent to which those resources – including traditional and customary native Hawaiian rights – will be affected or impaired by the proposed action; and

(3) The feasible action, if any, to be taken by the LUC to reasonably protect native Hawaiian rights if they are found to exist.

Under the Ka Paʻakai case, the required analysis shall end upon the determination that there are no known traditional and customary Native Hawaiian rights exercised in the 53.4-acre project area. The CIA makes a good faith effort to identify the nature and scope of valued cultural, historical, or natural resources in the project area; determine the extent to which these resources will be affected or impaired by the proposed action; and recommend feasible action, if any, to be taken by the Land Use Commission (LUC) to reasonably protect Native Hawaiian rights if they are found to exist.

Community Consultations

As part of the CIA, Hawaiian organizations, agencies and community members were contacted in order to identify potentially knowledgeable individuals with cultural expertise and/or knowledge of the Petition Area and the vicinity. Outreach was initiated in April 2017 through letters, email, telephone calls and in-person contact. CSH attempted to contact 41 individuals and agencies. The organizations consulted included the State Historic Preservation Division (SHPD), the Office of Hawaiian Affairs (OHA), the Kauaʻi/Niʻihau Island Burial Council (KNIBC), Kauaʻi Historic Preservation Review Commission, Kapule Hawaiian Civic Club, and Kauaʻi Council of Hawaiian Civic Clubs, and community members in the Kawaihau District. Four individuals agreed to be interviewed and share their *manaʻo* (thoughts, opinions) and *ʻike* (knowledge) about the Petition Area and the Keālia *ahupuaʻa*. Appendix E includes a summary of all consultations and interviews.

4.5.1.2 Results of Background Research and Community Consultation

The background research for the CIA summarized both pre- and post-contact land uses within the Keālia *ahupuaʻa,* as described previously in Section 4.4. The explosive growth of the sugar industry within Keālia (as well as the rest of East Kauaʻi) starting in the mid to late 1800's, led to the development of a small town comprised mainly of sugar plantation workers, many of whom were immigrants from Portugal, Puerto Rico, the Philippines, Japan, and China (Kauaʻi Historical Society n.d.). However, the decline of sugar also marked the end of Keālia Town. The town slowly dispersed after the incorporation of the Makee Sugar Company into the Lihue Plantation in the 1930s. Many of the plantation workers bought property of their own and moved out of plantation camps. The plantation camps that bordered Kūhiō Highway were disbanded in the 1980s. In 1997, the entire *ahupuaʻa* of Keālia was sold off as an effort to downsize Amfac's landholdings and because Keālia is the most distant from the Lihue Plantation sugar mill, it was considered the least profitable (Honolulu Advertiser, 7 July 1997).

As discussed in Section 4.4 above, previous archaeological studies identified two historic properties within the boundaries of the current Petition Area: "New Kumukumu Camp" (State Inventory of Historic Places (SIHP) # 50-30-08-07013) and an old road/railroad complex (SIHP #50-30-08-07016). Five new features were identified during a 2017 archaeological field inventory.

4.5.2 Potential Impacts and Mitigation

4.5.2.1 Ka Paʻakai v. Land Use Commission Analysis

Based on its findings, the CIA evaluated the Proposed Action using the three required components of the Hawaiʻi Supreme Court's Ka Paʻakai v. Land Use Commission ruling. In evaluating the first criteria of the Ka Paʻakai analysis ("*the identity and scope of valued cultural, historical, or natural resources in the petition area, including the extent to which traditional and customary native Hawaiian rights are exercised in the petition area"*) the CIA found there are no known traditional and customary Native Hawaiian rights exercised in the Petition Area. Under Ka Paʻakai, the required analysis ends after the determination that there are no known traditional and customary Native Hawaiian rights in the Petition Area.

Although the Ka Paʻakai analysis is complete, the CIA's community consultations revealed concerns about cultural and non-cultural impacts outside of the Petition Area. The CIA categorized these into "non-culturally relevant" and "culturally relevant" community concerns. They are discussed further in the CIA and summarized below.

4.5.2.2 Non-Culturally Relevant Community Concerns and Recommendations

Integrity of Halaʻula Reservoir

A concern expressed during the CIA consultation was the integrity of the Halaʻula Reservoir located *mauka* of the current Petition Area. Comparisons were drawn to the Kaloko Dam catastrophe, and a request was made by one informant that efforts be made to prevent a similar tragedy from occurring within Keālia.

Discussion: As discussed in Section 3.5.1.5 of this Draft EIS, the privately-owned Halaʻula Reservoir, as well as other *mauka* dams, are regulated by the State Department of Land and Natural Resources Dam Safety Program. The Dam Safety Program maintains a data base of the dam characteristics and physical conditions. The Petition Area is not within the State-designated dam evacuation zone, the area where the public would be evacuated in the event of a potential or actual dam failure. The Petition Area is not in an at risk area in the event of a potential dam breach. As required by law, Keālia Properties LLC, as the dam/reservoir owner, maintains the dam structures to required standards and has prepared an emergency response plan for use by State and County emergency management agencies.

Chemicals and Pesticides in Petition Area Soils

One CIA informant expressed a concern about the presence of chemical fertilizers and pesticides within the soil. As former sugar cane lands, chemicals once utilized for this industry may be present within Petition Area soils.

Discussion: As discussed in Section 4.8 of this Draft EIS, prior agricultural activity in the Petition Area creates the potential for the presence of hazardous substances in the soil which present unacceptable health risks to future residents, especially children. As recommended by the Hawaiʻi Department of Health and in accordance with State policies, soil testing will be conducted in areas of the Petition Area proposed for residential or recreational use. If identified, contaminated soils and materials will be handled, transported, stored, disposed of and/or remediated in place to levels appropriate for residential use.

4.5.2.3 Culturally Relevant Community Concerns and Recommendations

Potential for Subsurface Cultural Deposits, Including *Iwi Kūpuna*

Despite the lack of ongoing traditional cultural practices and above ground cultural sites, several individuals expressed concerns that subsurface cultural deposits (i.e., *iwi kūpuna, imu, pōhaku*) may be impacted by the Proposed Action.

Discussion: The CIA notes that although the Keālia *Ahupua'a* has a rich cultural history, evidence of pre-contact settlement and land use has largely been obliterated by historic era sugar planting activities. The Petition Area has been highly disturbed through decades of mechanized and intensive agriculture-related activity. Background research indicates that the area was heavily plowed in the historic era, typically to depths of 18 to 24 inches. Due to this disturbance, the likelihood of encountering subsurface cultural deposits (i.e., *iwi kūpuna, imu, pōhaku*) remains low. No burials or traditional cultural material have yet been encountered within the Petition Area.

Although the likelihood of finds remains low, project construction workers will be informed of the possibility of inadvertent cultural finds, including human remains during a preconstruction meeting. Personnel will be educated on the types of cultural materials that may be encountered during ground disturbance. In the event that any potential historic properties are identified, all activity in the area will cease and the State Historic Preservation Division will be notified pursuant to HAR §13-280-3. In the event that *iwi kūpuna* are identified, all earth moving activities in the area will stop, the area will cordoned off, and the SHPD and Police Department will be notified pursuant to HAR §13-300-40. Remains will be reinterred in accordance with an agreed upon burial treatment plan.

Potential Impact to Groundwater Resources

One individual interviewed for the CIA expressed concern about the potential impacts to groundwater resources and the aquifer. Specifically, this individual suggested that the Proposed Action could impact a natural spring feeding his taro *lo'i*, which is located in Keahapana Valley, approximately one mile southeast of the Petition Area.

Discussion: During the preparation of the CIA, the cultural researcher was not able to gain access to the property to verify the location of the *lo'i* or its water source. Subsequently a hydrogeologist was hired to further evaluate this issue. The findings were discussed in Section 3.4 (Water Resources) of this Draft EIS, and the hydrogeologist's letter report is included as Appendix I. The report states that the source of water for this particular *lo'i* is estimated to be about 200 yards from the *lo'i* at a higher elevation. It is either a spring source, as represented by the cultural informant, or is the discharge from the still active plantation irrigation system on the land immediately above.

If the water source is an actual spring at that elevation, it would be a discharge of perched groundwater with no hydrologic connection to the groundwater pumped by the wells supplying Keālia Mauka. The water use by the proposed subdivision would have no impact on the discharge rate of such a spring. If the *lo 'i*'s water supply is from the plantation irrigation system, it is a surface water source, and increased pumping of groundwater for Keālia Mauka would have no impact on its flowrate (TNWRE, 2018, see Appendix I). In either case, the Proposed Action will have no impact on the water source used by the cultural informant.

Finally, as discussed in Section 3.4, the Applicant's water service agreement with Keālia Water Company allocates more than enough water to accommodate the subdivision's needs. The project's water demand is also well below the State-approved pump capacity for these two wells. No adverse impacts to the groundwater aquifer is anticipated.

4.6 VISUAL AND SCENIC RESOURCES

4.6.1 Existing Conditions

In the Petition Area vicinity, public views from Kūhiō Highway include the open pasture lands in the *mauka* areas to the northwest and southwest. In the far distance, there are views of Mt. Kalalea and the Nounou mountain range to the southwest, and the Keālia Forest Reserve to the northwest. Although Kūhiō Highway closely parallels the coastline north of Kapa'a Town, offering shoreline views, past Keālia Road, the shoreline jogs to the east, and Kūhiō Highway continues its northerly route.

The Petition Area is located on the west (*mauka*) side of Kūhiō Highway, just north of the intersection with Keālia Road. The Petition Area is at an elevation of about 100 feet, slightly above the elevation of the highway. In this area, there are no coastal views. The view looking *makai* from the highway is of the manicured landscape of the oceanfront Keālia Kai subdivision.

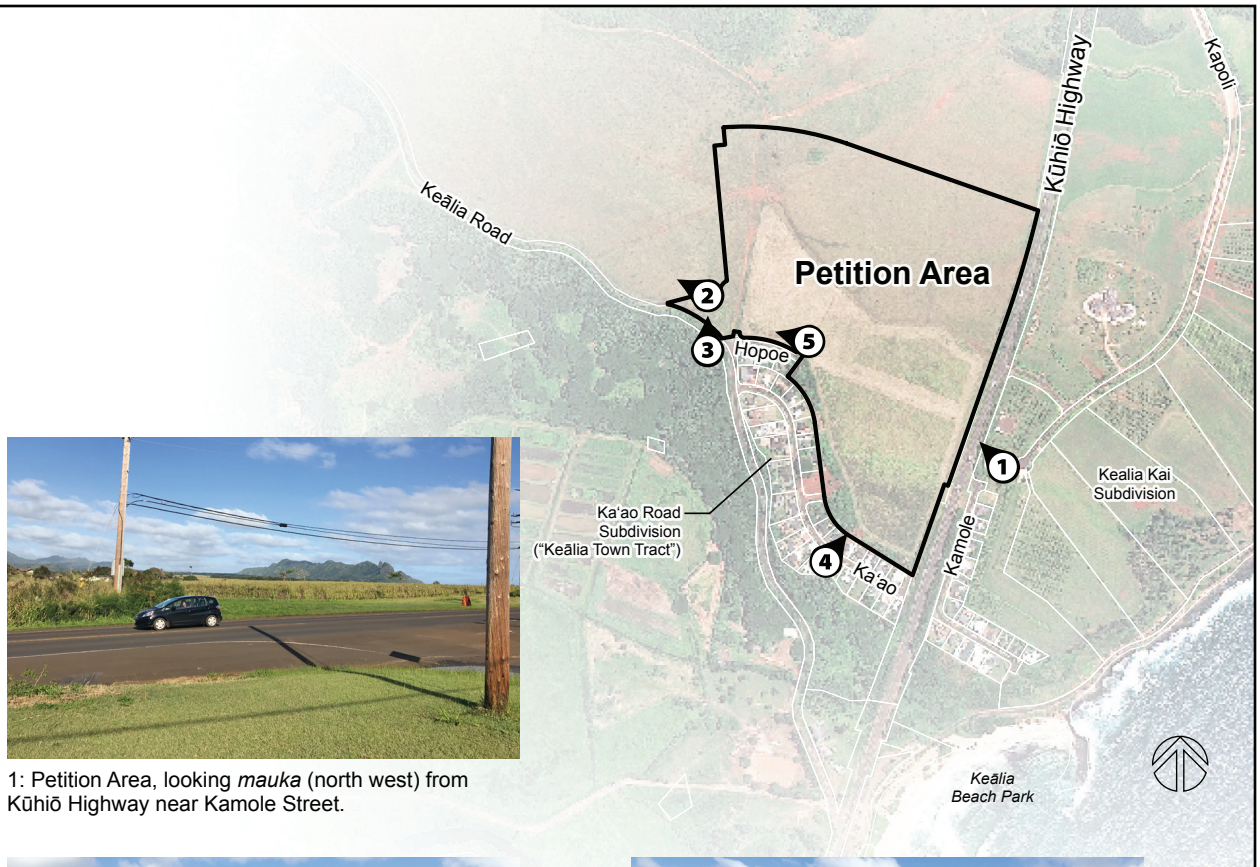
The Keālia Mauka Petition Area slopes gently upward from Kūhiō Highway toward the mountains, reaching an elevation of about 125 feet at its *mauka* boundary. From Kūhiō Highway, views of the Petition Area are limited due to the presence of thick, overgrown vegetation alongside much of the highway. However, there are several sections without this vegetation with unobstructed views of vast pasture lands and the Ka'ao Road subdivision, located about a half mile up Keālia Road.

From Keālia Road, there are expansive views of vacant pasture land beyond the Ka'ao Road subdivision, including the Petition Area. Grazing cattle, fencing, water tanks and gently rolling terrain are clearly visible, with the mountain ranges in the *mauka* areas. Residents on Ka'ao Road and the shorter Hopoe Road currently have an unobstructed view of these *mauka* pasture lands, which include the future subdivision. The photos in Figure 4-3 show the view of the Petition Area from public roads.

The Petition Area is not visible from the Keālia Kai subdivision or from the coastal multi-use path which is at a lower elevation along the shoreline. Scenic views up and down the coast, as well as the distant mountains are available to the public from the County's Ke Ala Hele Makalae multi-use path.

4.6.2 Potential Impacts and Mitigation

The subdivision will include 22 house lots that will back onto a 1,400-foot stretch of Kūhiō Highway. The eastern boundary of the Petition Area is located about 70 feet from the centerline of Kūhiō Highway, which has a 140-foot right-of-way. The County Zoning Ordinance requires structures to be setback a minimum of 10 feet from this (rear) property line. The future homes will be visible when looking *mauka* from the highway. Because there are no sidewalks or pedestrian paths along this stretch of Kūhio Highway, the visual impact will be to individuals driving by. Where new homes are built along the highway frontage, the distant mountains will no longer be visible. Although the change in the *mauka* view will be noticeable, existing terrain and vegetation intermittently obscure the view. The impact to *mauka* views from Kūhiō Highway will only be experienced for a few seconds from a moving car. Posted speeds along this segment of Kūhiō



1: Petition Area, looking *mauka* (north west) from Kūhiō Highway near Kamole Street.

2: Petition Area (right) as seen heading *mauka* on Keālia Road.

3: Petition area with Kalalea Mountain Range in background.

4: Petition Area (in the background), as seen from Ka'ao Road homes. A park/green space buffer will be located between the existing homes and the new lots.

5: Hopoe Road looking west toward Keālia Road. Several lots are proposed directly across three existing homes on Hopoe Road.

Views of the Petition Area

Figure 4-3

Keālia Mauka Homesites

Draft Environmental Impact Statement

Kealia Properties, LLC

Highway are 50 mph in the northbound direction and 40 mph in the southbound direction. A vehicle moving at 40 mph will take about 23 seconds to drive past the entire 1,400 foot frontage of the site.

From Keālia Road, the transformation of an undeveloped grazing area into a residential subdivision will have a very noticeable impact. The future subdivision will be clearly visible to residents living on Kaʻao Road, particularly from the backyards of homes on the north side. The visual impact will be most profound for the residents of the three lots on Hopoe Road, whose front yards will directly face the subdivision. To mitigate the visual impact to residents along Kaʻao Road, the subdivision will be separated by a 4.3-acre detention basin and green space that will serve as an open space buffer. The visual buffer does not extend to the three lots on Hopoe Road.

The proposed subdivision will have no impact on *mauka* views from the Keālia Kai residences, from Keālia Beach or the Ke Ala Hele Makalae multi-use path. The Petition Area is not visible from these areas due to the existing topography, elevations and vegetation.

The visual impact of the development from Keālia Road and Kūhiō Highway can be mitigated through the use of landscaping and screening vegetation. A landscape plan should be prepared and include vegetation adjacent to the subdivision's major entry point (roundabout); along public road frontages; and on major roads within the subdivision. The landscaping should also include screening vegetation in the detention basin/park to minimize impact to Kaʻao Road residents. The landscape plan should be submitted to the County as part of the subdivision application.

4.7 AGRICULTURE

Consideration of the Petition Area as an agricultural resource is complex. Issues relating to agricultural rating systems, the State's effort to identify Important Agricultural Lands (IAL), productivity, and food security are important considerations when discussing the potential impacts of the Proposed Action.

4.7.1 Existing Conditions

4.7.1.1 Historic Agriculture Use

Little is little known about land use in the Keālia *ahupuaʻa* prior to western contact in the late eighteenth century. A twentieth century description of the *ahupuaʻa* described it as being:

> …rather dry, with small streams and gulches and only a few *loʻi* areas. Where Keālia and Kapaʻa Streams join inland there are wide flats that were terraced. Seaward there were formerly many terraced areas. There are clumps of coconut and mango trees where formerly were *kuleana* with their *loʻi*. Inland there were a number of small streams which doubtless once had small *loʻi* developments. (Handy and Handy, 1972).

The Petition Area and surrounding Keālia lands were under active sugar cultivation from the late 1800's, when the Makee Sugar Company began operations in Kapaʻa in 1877. The Makee Sugar Company was later absorbed by Līhuʻe Sugar Company, which then closed in 2000. As far back as the 1930's the project vicinity has been used for housing for sugar company employees. Since the closure of Līhuʻe Sugar Company, the Petition Area has been used for cattle grazing.

4.7.1.2 Important Agricultural Lands

Background

In the years following World War II, Hawai'i experienced a shift from a plantation-dominated economy to one of tourism and federal spending. In response to this economic shift, plus growing public concern about maintaining the viability of agriculture and protecting the State's agricultural lands, the 1978 State Constitutional Convention proposed the identification and designation of Important Agricultural Lands (IAL).

Article XI, Section 3 of the Constitution of the State of Hawai'i sets out the framework for state policies to promote agriculture and the conservation of productive agricultural lands in the State:

> *"The State shall conserve and protect agricultural lands, promote diversified agriculture, increase agricultural self-sufficiency and assure the availability of agriculturally suitable lands. The legislature shall provide standards and criteria to accomplish the foregoing.*
>
> *Lands identified by the State as important agricultural lands needed to fulfill the purposes above shall not be reclassified by the State or rezoned by its political subdivisions without meeting the standards and criteria established by the legislature and approved by a two-thirds vote of the body responsible for the reclassification or rezoning action."*

Nearly 30 years after Hawai'i's voters ratified this 1978 constitutional amendments, the State Legislature adopted legislation to fulfill its intent and purpose. With the passage of Act 183 (Session Laws of Hawai'i (SLH) 2005) and Act 233 (SLH 2008), Hawai'i Revised Statutes (HRS) Chapter 205 was amended to describe the framework for the identification and designation of IAL, and the associated landowner incentives. Pursuant to Chapter 205, each county is required to identify and map lands within its jurisdiction that have the potential for designation as IAL.

Definition of IAL

Important agricultural lands have been defined as those that:

- are capable of producing sustained high agricultural yields when treated and managed according to accepted farming methods and technology;
- contribute to the State's economic base and produce agricultural commodities for export or local consumption; or
- are needed to promote the expansion of agricultural activities and income for the future, even if currently not in production.

IAL Designation Process

The purposes of the IAL process are to identify the best agricultural land in the State; provide incentives for landowners to keep their land in agricultural use; increase the availability of locally-produced food crops; and discourage the urbanization of our best agricultural land.

There are two processes in which important agricultural lands can be designated. A landowner or farmer has the opportunity to voluntarily petition the State Land Use Commission (LUC) directly to designate agricultural lands. The counties can also recommend land for IAL designation to the LUC.

Each County is to develop maps of potential lands to be considered for IAL, to be adopted by a county council resolution and submitted to the LUC.

In 2009, the County of Kauaʻi initiated an *Important Agricultural Land Study*, which was finalized in July 2015. As a primary goal of the County's IAL initiative, the study recommended an initial designation goal of a minimum of 21,158 acres to establish self-sufficiency, based on what it estimated was needed to feed a population of approximately 70,000 people (County of Kauaʻi, 2015).Although the final study was completed in July 2015, it has yet to be transmitted to the Kauaʻi County Council.

As of February 2017, four major landowners on Kauaʻi have received approval from the LUC for IAL designation of nearly 36,000 acres of land, exceeding the minimum of 21,158 acres identified in the County's 2015 IAL study. The subject Keālia Mauka site is not currently designated IAL. There are no lands in the Keālia area that are designated IAL.

4.7.1.3 Soil Classification Systems

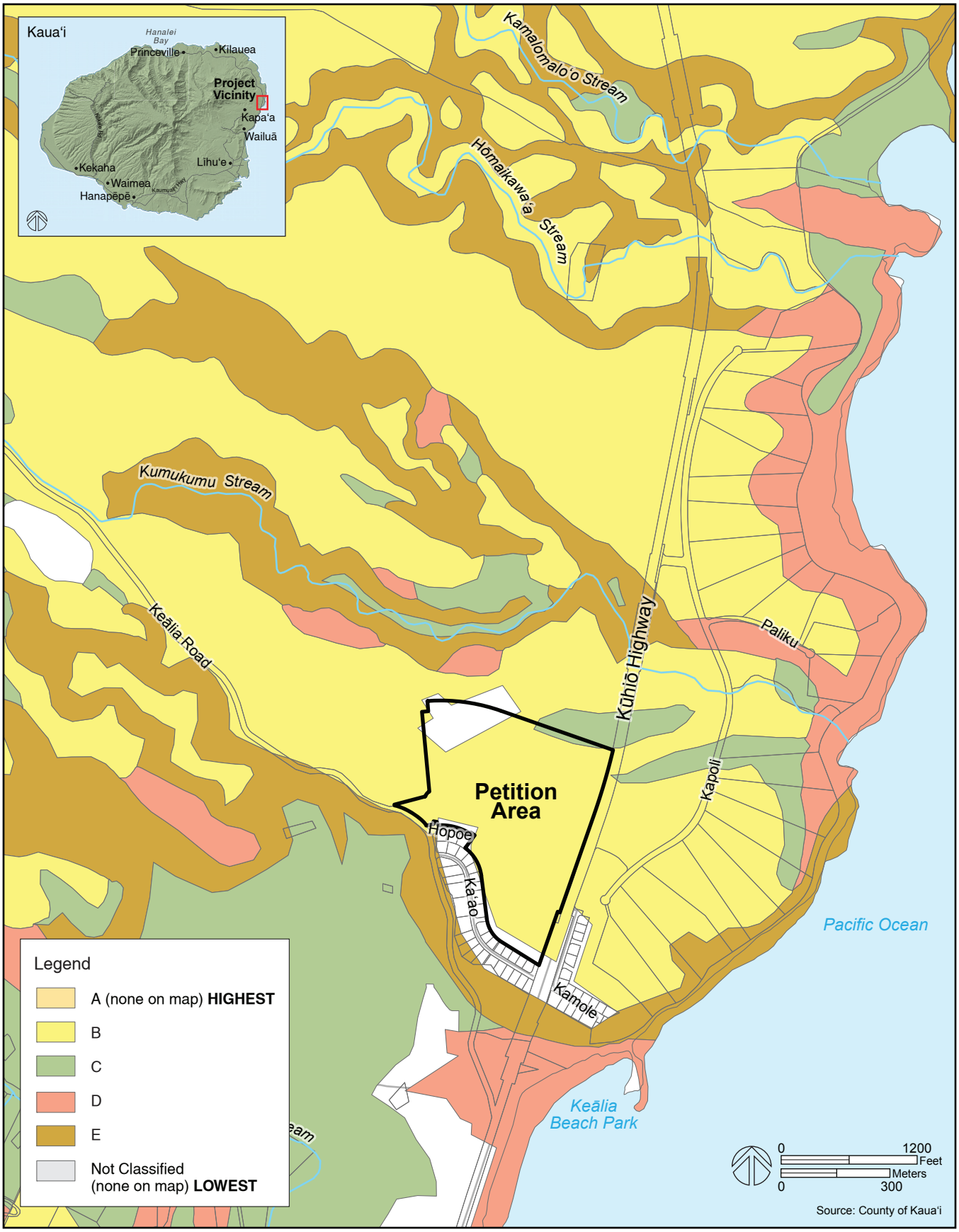
Land Study Bureau (LSB) Soil Productivity

The University of Hawaiʻi Land Study Bureau (LSB)'s 1967 *Detailed Land Classification* provided an inventory and evaluation of the State's land resources. All lands in the State were grouped into similar units of land types, except those in the State Urban District. The LSB also described their condition and environment; rated the overall quality of the land in terms of agricultural productivity; assessed its capabilities for selected alternative crops; and defined land types and groupings based on their soil properties and productive capabilities. A five-tier productivity rating system was developed with "A" representing the highest level of productivity and "E" the lowest. As shown in Figure 4-4, the lands within the Project Area have a productivity rating of B, a fairly high level of productivity.

Agricultural Lands of Importance to the State of Hawai'i (ALISH)

The Agricultural Lands of Importance to the State of Hawaiʻi (ALISH) Classification System was developed and compiled in 1977 by the State Department of Agriculture with assistance from the Natural Resources Conservation Service, U.S. Department of Agriculture (formerly the Soil Conservation Service) and the College of Tropical Agriculture, University of Hawaiʻi. This classification system was developed to identify three classes of agriculturally important lands for Hawaiʻi as part of a national effort to inventory important farmlands. The Hawaiʻi classification system established three classes of agricultural lands that are important to the State: "Prime," "Unique," and "Other." Residual lands that are less suitable for agriculture are "Unclassified."

As shown in Figure 4-5, the ALISH system classifies the entire Project Area as Prime agricultural land, defined as "land which has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops economically when treated and managed according to modern farming methods" (NRCS, 2008).

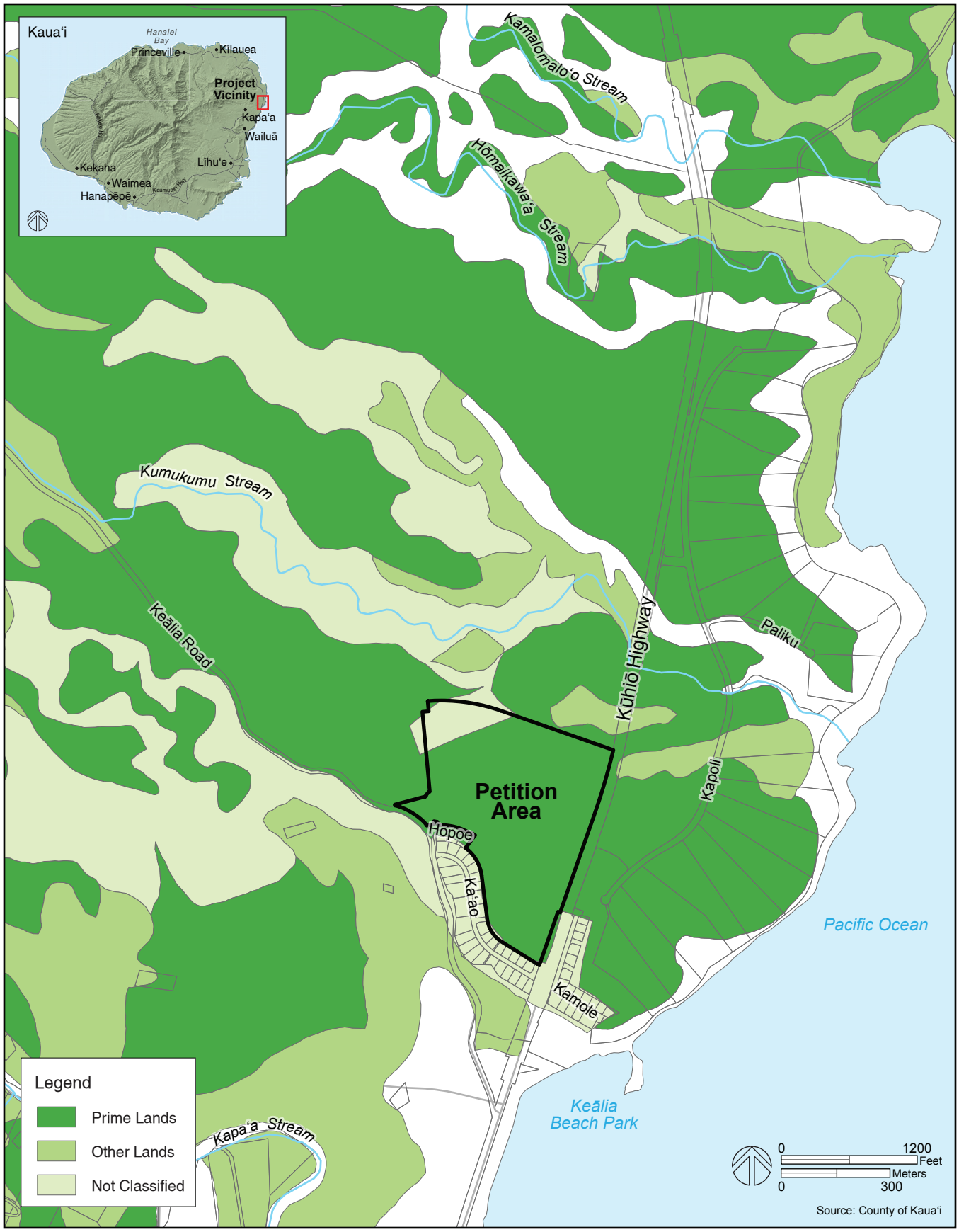


Land Study Bureau Agricultural Productivity Ratings **Figure 4-4**

Keālia Mauka Homesites

Draft Environmental Impact Statement

Kealia Properties, LLC



Agricultural Lands of Importance to the State of Hawai'i **Figure 4-5**

Keālia Mauka Homesites

Draft Environmental Impact Statement

Kealia Properties, LLC

4.7.1.4 Food Security

The State of Hawai'i is placing an increased emphasis on the concept of food security and food self-sufficiency, with the goal of increasing the amount of locally grown food consumed by Hawai'i residents. Currently, about 85 to 90 percent of Hawai'i's food is imported, making the state particularly vulnerable to natural disasters and global events that disrupt shipping and the food supply. The State Department of Business, Economic Development and Tourism, in conjunction with the State Department of Agriculture, has prepared the *Increased Food Security and Food Self-Sufficiency Strategy* (DBEDT, 2012), a State strategic functional plan focusing on increasing food security and food self-sufficiency. The strategy emphases increasing production by strengthening agricultural infrastructure and actions to provide for food safety, pest prevention and control, workforce training, research and extension services, and policy and organizational support. Among its objectives are to increase demand for and access to locally grown foods, and increase production of locally grown foods. The strategy is intended to set an overall direction toward food self-sufficiency, but does not address the issue of how much land is necessary for self-sufficiency. The strategy identifies action and projects that will provide more land for food commodities.

4.7.2 Potential Impacts and Mitigation

The use of the Petition Area for residential use will remove 53.4 acres of agricultural land from active cattle grazing. While the Petition Area meets several of the eight criteria for Important Agricultural Lands, it represents only a small percentage of the suitable agricultural land available in the East Kaua'i region. The Petition Area is a portion of a 1,000-acre TMK parcel ((4)4-7-004:001) that is currently leased to three private entities for agricultural/grazing purposes. In order to accommodate the loss of project acreage, an additional 86 acres has been added to one of the leases.

The Petition Area is adjacent to an existing residential subdivision. Although the Petition Area is in the State Agricultural District, the County has determined that residential use is consistent with the County of Kaua'i General Plan. The County Planning Department has made a written determination (Departmental Determination DD-2016-70) that the Petition Area is located within the area earmarked on the General Plan Land Use Plan for "Residential Community." Since the closure of Līhu'e Plantation, there is more than adequate agricultural land available in the East Kaua'i region for current and foreseeable future agricultural activity. The loss of 53 acres will not have an adverse impact on the region's agricultural resources.

The conversion of the land to residential use will not negatively affect the County and State efforts toward food self-sufficiency. Private landowners on the island have already completed designation of nearly 36,000 acres for IAL, exceeding the goal set by the County's 2015 IAL study. In addition, Keālia Mauka lot purchasers will always have the option to grow backyard crops and establish family gardens. In a small way, these actions can contribute to food security.

4.8 HAZARDOUS AND REGULATED MATERIALS AND WASTE

4.8.1 Existing Conditions

A Phase I Environmental Site Assessment (ESA) was prepared for the previous landowners as part of due diligence activities prior to their purchase of some 2,000 acres of land (Belt Collins Hawai'i Ltd., 2005). The 2,000 acre study area included several TMK parcels, including TMK (4) 4-7-004, which includes the subject 53.4-acre Petition Area. The purpose of the Phase I ESA was to identify

"recognized environmental conditions" (REC), meaning the presence or likely presence of hazardous substances or petroleum products on a property under conditions that indicate an existing release, past release, or material threat of a release.

The Phase I ESA included a review of historic property uses, review of regulatory data bases, site reconnaissance, and interviews with persons associated with the property. The 2,000-acre ESA study area has a history of use throughout the twentieth century for commercial agricultural activities. These activities included the use of fertilizers, herbicides and pesticides (Belt Collins Hawai'i Ltd., 2005). There is a possibility that waste products have been disposed or stored on site, and that the operation of machinery resulted in released fuel, oil, or solvents into the environment. The ESA revealed previous land uses within the 2,000-acre study area included a sugar mill, vehicle storage and maintenance, service station, and rodeo ring. The ESA study area included above and underground storage tanks. According to maps provided in the document, the sugar mill, vehicle maintenance activities and other activities were unlikely to have been conducted within the current Petition Area, which appears to have been limited to sugar cultivation and plantation housing.

4.8.2 Potential Impacts and Mitigation

Although the Phase I ESA was conducted for an area much larger than the current Petition Area, the general conclusions of the ESA are applicable. During construction of the subdivision improvements, there is the potential for ground disturbing activities to encounter areas with existing environmental contamination. Historic herbicide application practices also create the potential for heavy metals (specifically arsenic) in the soil. In its EISPN comment letter (see Chapter 9), the State of Hawai'i Department of Health (DOH), Hazard Evaluation and Emergency Response (HEER) office noted that "agricultural lands, especially those that were in production after about 1912, may include arsenic and pentachlorophenol (with dioxin contaminants) and possibly organochlorine pesticides which were used for weed or insect control." These chemicals are now generally banned due to unacceptable human or environmental health risks, but may persist in the environment for decades at levels that present unacceptable health risks, especially for children. The potential presence of these hazardous substances could pose health concerns for future residential and recreational use.

As recommended by the DOH HEER office, and in accordance with current State policies, soil testing will be conducted in the Petition Areas proposed for residential or recreational use. A soil sampling plan identifying chemicals of potential concern and the proposed testing methodology will be developed based on guidance in the DOH HEER Office's Technical Guidance Manual. The sampling plan will be submitted to the DOH HEER office for review and approval. Test results and recommendations will be submitted to the DOH HEER office for review and approval.

If identified, contaminated soils and materials will be handled, transported, stored, disposed of and/or remediated in place to levels appropriate for residential use, and a "No Further Action Letter" will be obtained from the DOH. All removal and remedial actions to clean up hazardous substance or oil releases will comply with Chapter 128D, Environmental Response Law, HRS, and Title 11, Chapter 451, HAR, State Contingency Plan. With this mitigation, there is unlikely to be an adverse effect on construction workers, project residents or other members of the public from residual soil contamination.

During construction of the subdivision improvements, there is also a potential for release of petroleum products by construction vehicles and equipment. This will be mitigated by implementing best management practices such as proper maintenance of construction vehicles, and

regular inspection for leaks. During occupancy of the subdivision, there is also potential for environmental contamination caused by future residents (e.g., vehicle leaks and improper disposal of hazardous materials). These potential impacts would be reduced by following applicable county and state regulations. Development and occupancy of the proposed subdivision is not expected to have a significant impacts associated with hazardous materials and wastes.

4.9 SOCIAL AND ECONOMIC FACTORS

4.9.1 Population

4.9.1.1 Existing Conditions

According to the 2010 U.S. Census, the population of the State of Hawai‘i was 1,360,301, with the population of the County of Kaua‘i accounting for approximately 67,091 (4.9%) of those residents. The population on Kaua‘i in 2010 was almost 15% more than that in 2000 (U.S. Census Bureau, 2016).

The Keālia area is within the Census Bureau’s Wailua-Anahola Census County Division (CCD). A CCD is a census subdivision of a county used to present statistical data, and may consist of multiple census tracts. In 2010, the total population of the Wailua-Anahola CCD was 12,607 persons, with a median age of 42.5 years. Racial make-up of the CCD was 39.6% white, 38.6% Asian, 13.0% Native Hawaiian and other Pacific Islander, and 27.3% of two or more races. The average household size was 2.7 persons, and median household income (in 2009 inflation-adjusted dollars) was $70,408. Of the housing stock within the CCD, 61.4% was owner-occupied.

Market and Econometric Studies of the Proposed Action were conducted by CBRE in 2017 (Appendix F). The study area for the market study extended beyond the Wailua-Anahola CCD, and encompassed a 16-mile near-coastal and lower elevation corridor along the eastern shore of Kaua‘i, stretching from Līhu‘e to Moloa‘a. In addition to the Wailua-Anahola CCD, this larger “market study area” included the CCDs of Wailua Homesteads, Līhu‘e, Kapa‘a, and Wailua.

Within this East Kaua‘i market study area, there were 34,467 residents in 2010, representing 51.4% of the County total. By the first quarter of 2017, the estimated population of this region had grown to 38,101 persons, or 51.8% of the island. The market study notes that population growth was limited by lack of available housing supply more so than demand. The market study forecast the resident population in this Līhu‘e to Moloa‘a corridor (or greater East Kaua‘i) will increase by 2040 to between 51,650 persons (a gain of 35.6% over 2017 estimate) and 53,554 persons (up 40.6%) (CBRE, 2017).

The current average resident household size in the Līhu‘e to Moloa‘a Corridor is about 2.94 persons (among the largest for the island). Average household size is forecast to decline in coming decades as a result of evolving family/household trends and an increasingly diverse mix of unit types from new development. By 2040, the average household size in the study area is anticipated to lower to 2.85 persons (CBRE, 2017).

4.9.1.2 Potential Impacts

The Proposed Action is expected to have a negligible direct and indirect effect on the population and population growth within the County of Kauaʻi and the State. CBRE market study projections indicate that over the next 20 years, the population of the East Kauaʻi area is expected to increase between 35 and 40 percent, even without the Proposed Action.

The Keālia Mauka residential lots are targeted primarily toward Kauaʻi residents. The market study estimated that approximately 82% of the single family homes at Keālia Mauka (194) will be occupied by full-time Kauaʻi resident families with an average household size of 3.4 persons, totaling 658 full-time residents at buildout and full occupancy.

Because sale of the lots cannot be restricted to Kauaʻi residents, there will inevitably be some non-resident, second home purchasers. This group of part-time, second/vacation homeowners was estimated at 18 percent (42 lots). They are expected to occupy their residential unit 30 percent of the year, and have an average household size of 3.6 persons. This equates to an average of 42 persons daily. Together, the full time resident and non-resident groups will result in an average daily "de facto" population at build-out of 700 persons (658 full time residents and 42 vacationers).

Although it responds to the existing and future market demand for housing, the project will not generate or cause population growth in East Kauaʻi. It is expected that the house lots will respond to the demand for new housing product generated by 1) on-island population growth and 2) new household formation. The Proposed Action is not expected to have an impact on the in-migration of individuals from out of state.

4.9.2 Housing

4.9.2.1 Existing Conditions

The CBRE Market Study evaluated housing conditions within the 16-mile Līhuʻe to Moloaʻa corridor. Within this region, there are an estimated 19,428 single and multifamily housing units, of which 3,428 (or 17.6%) are registered as vacation rentals. Many of these vacation rentals are within the Coconut Plantation community, located about two miles south of Kapaʻa Town. The remaining 16,000 housing units in the study area are considered to be standard residential (non-resort) use. Of these units, 13,120 (82%) house full-time Kauaʻi resident households, with the remaining 2,880 units (18%) used by non-resident second/vacation home owners.

In the first quarter of 2017, the median sales price for a single family residential unit in the East Kauaʻi area was $574,000, a 5.6% increase from the previous year. This compares to a median sales price of $500,000 in Līhuʻe. The CBRE market study indicates that median sale prices are expected to continue to increase into the long-term.

4.9.2.2 Potential Impacts and Mitigation

The Proposed Action will create 235 improved residential lots which will be available for sale to Kauaʻi residents. The Petition Area is appropriate for this use based on its physical conditions, location adjacent to an existing subdivision, proximity to supporting services, and its designation for residential use in the County General Plan.

4.9.3 Economy and Employment

The CBRE Market and Econometric Studies in Appendix F includes three elements: 1) market study; 2) economic impact analysis; and 3) public cost/benefit assessment. The following sections are based on the economic impact analysis and public cost/benefit assessment.

4.9.3.1 Existing Conditions

The Līhuʻe/East Kauaʻi area is one of the three centers of the island's tourism industry, called "the Coconut Coast." Along with Poipu/South Kauaʻi and the North Shore (Princeville/Hanalei), East Kauaʻi has evolved into a primary region for economic activity and employment; attracting significant development and capital investment over the past four-plus decades. This trend is anticipated to continue over the long-term, increasing in cumulative attraction as the economy strengthens further. East Kauaʻi is also the region with most of the commercial and industrial space on the island, the most businesses, and most employment opportunities. It is currently Kauaʻi's focus of economic activity and will continue to be an expanding, increasingly diversified market.

The unemployment rate on Kauaʻi is about 2.4% (approaching effective full employment), down from a high of some nine percent during the depths of the 2008-2009 recession. Median household income has grown at a rate approaching 4.0% compounded annually since 2014; there has been major positive absorption of retail and industrial space since the beginning of 2016 (with some 200,000 square feet absorbed in the first half of 2017), increasing velocity of commercial space development; and, record growth in tourism. Total visitor days and visitor spending have grown at compounded annual rates above five percent and eight percent respectively since 2009.

Though not issued on a County-basis, the most recent State of Hawaiʻi Department of Business, Economic Development & Tourism (DBEDT) *Quarterly Outlook for the Economy* (2nd Quarter 2017) statewide forecasts show continuing gains in 12 economic indicators[1] through 2020. The projections are more optimistic than their prior forecasts, and have been gaining upward momentum for the past several years (CBRE, 2017).

The Petition Area is a former agricultural parcel that is currently leased out for grazing. There is no other revenue generated by the property.

4.9.3.2 Potential Impacts and Mitigation

CBRE developed a computer model to estimate the economic impact of the Keālia Mauka project on the Kauaʻi and Statewide community during its "lifespan," from commencement of site work and infrastructure emplacement through absorption/sell out of the finished lots. The findings are briefly summarized here, with further details and tables provided in the study. No mitigation is required for impacts on employment or the economy.

Economic Impacts

Direct and Indirect Expenditures. The development of the proposed subdivision will generate significant expenditures that will have a positive direct and indirect impact on the Kauaʻi economy.

[1] DBEDT economic indicators include 1) total population; 2) visitor arrivals; 3) visitor days; 4) visitor expenditure; 5) Honolulu Consumer Price Index; 6) personal income; 7) real personal income; 8) non-agricultural wage and salary jobs; 9) civilian unemployment rate; 10) gross domestic product; 11) real gross domestic product, and 12) gross domestic product deflator.

These expenditures will increase the level of capital investment and capital flow in the region, which will in turn create employment and widen the tax base.

Direct expenditures will be associated with the creation of the 235 house lots as well as the eventual construction of homes on the lots. These expenditures include building materials and supplies and construction services. CBRE has estimated that over the project build-out period (estimated to extend to year 2030), the Proposed Action will bring approximately $121 million in new, direct development capital into the Kauaʻi economy, along with significant unquantified indirect expenditures. The Proposed Action will generate an estimated $226 million in total new economic activity islandwide during its build out. Following build out, Keālia Mauka will contribute some $13.7 million in annual economic activity on a stabilized basis, due largely to the discretionary spending by full and part-time residents.

Employment. The project's economic impact includes the creation of employment opportunities by the installation of project infrastructure, the construction of the homes, and in the long term, the provision of continuing services to the community and occupied residences. These jobs will include construction, equipment operators, and specialty trade jobs on- and off-site, directly and indirectly.

CBRE estimated that the construction of project infrastructure and finished single family homes will directly create an estimated 1,048 "worker-years" of employment (the equivalent of 52 work weeks at 40 hours per week) in the trades and supply businesses during build-out, averaging about 81 worker-years annually, with an estimated $55 million in wages (averaging about $4.2 million per year).

Once infrastructure is installed and the individual house lots are developed, there will be some limited permanent jobs associated with the operation of the homeowners association, and related to the upkeep, maintenance, and renovations of the homes. CBRE has estimated that the community homeowners association and the upkeep, maintenance, and renovations of the 235 homes will create 59 worker-years of employment from 2021 through 2030 and associated wages of $3 million. Once stabilized, the project will support 15 full time equivalent (FTE) positions (most made up of many short-term workers) and annual wages of $492,000 (CBRE, 2017).

Associated secondary/off-site employment during the overall development and absorption time frame (estimated through year 2030) will total 262 worker-years with wages of $14.2 million and a stabilized FTE job-count of 5, with total wages of $267,000 per year.

Islandwide Economic Impact. The general island economy also will benefit from the Proposed Action, as Keālia Mauka's full and part-time residents will spend discretionary income on goods and services and in shops, restaurants, and service establishments. It should be noted that because most future subdivision residents are expected to be current Kauaʻi residents, much of this discretionary spending is not "new," but rather continued spending from existing households. The only "new" spending will come from non-resident second-home owners. The market study estimated that about 42 of the expected population of 700 will be new non-resident second-home owners and their guests.

Islandwide economic impacts will result as wages, profits and expenditures associated with the project move through the regional economy, having a ripple or multiplier effect which increases the amount of capital flowing to the entire community.

Secondary Impacts. The Proposed Action will have nominal to minor impacts on the real estate market and on home prices in the region. The subdivision lots are sized to appeal primarily to local buyers, and the project is located adjacent to an existing subdivision of comparable density and moderate price. The new subdivision is not expected to contribute to upward pricing pressures in the region. The Keālia Mauka Homesites will not itself drive regional market values or real property assessments of nearby real estate. The Proposed Action is not expected to cause in-migration to Kauaʻi, as it is intended to provide housing for existing island residents.

Public Fiscal Impacts

Public fiscal impacts looks at the public costs and benefits of the proposed development. Many of the government costs associated with the projected 658 current Kauaʻi residents will not be "new," but are already factored into existing County and State budgets. The only new fiscal contributions from the full-time resident households will be:

- Additional assessments to the County real property tax rolls; and,
- Maintenance/renovations associated with the houses, which will expand general economic activity.

The fiscal impacts associated with the estimated 42 non-resident, second home owners and their guests do represent "new" costs and benefits for the State and County. CBRE applied the Hawaiʻi State Input-Output model which estimates primary tax receipts generated during the project life. The model used a conservative assumption that each new person added to the Kauai community is "responsible for" a similar tax cost/obligation as every other person on the island. CBRE noted the actual additional costs and impact on services from the estimated 42 part-time residents will be minimal. Typically, part-time residents place limited demands on schools, administrative infrastructure, most governmental services and facilities, and are unlikely to push emergency services beyond an expansion-requiring threshold. The conclusions of the analysis are:

- The County of Kauaʻi will realize "new" real property taxes ($5.4 million), and other secondary receipts and development fee totaling $9 million during the build-out projection period (estimated at 2018-2030), and $1.3 million annually on a stabilized basis thereafter. These figures incorporate exemptions for real property tax resident owner-occupants.

- The State of Hawaiʻi will receive "new" gross excise and income taxes and secondary revenues, of $12.7 million during the 2018-2030 modeling period, and $276,000 per year thereafter.

4.9.4 Market Assessment

The purpose of the market assessment was to determine whether there will be sufficient demand in the (Līhuʻe to Moloaʻa) study corridor single family residential real estate market sector to absorb the finished vacant house lots in a timely manner. The time frame for the market study was to 2040, although it is anticipated that the 235 subject lots will be absorbed by the market in a much shorter period.

4.9.4.1 Existing Conditions

Housing Market

The State of Hawai'i has steadily rebounded from the 2008-09 recession and associated down-cycle in the real estate market. On Kaua'i, favorable economic indicators and trends include a decrease in the unemployment rate, the growth in median household income, and positive absorption of retail and industrial space since the beginning of 2016. Tourism continues to reach all-time records with increases in total visitor days and visitor spending.

Although experiencing some instability in the first quarter of 2017, the Kaua'i residential real estate market has also shown post-recession recovery and growth. Island-wide, the single family residential, condominium and vacant lot sectors are experiencing the highest level of sales activity since 2004-07. In the Līhu'e/East Kaua'i area, median single-family home prices in Kapa'a were up by nearly six percent in 2016 (over 2015) and are continuing to rise. General indicators point to continued increase in demand, sales velocity, and prices, particularly given the limited supply of new residential inventory.

Residential Demand

The market study estimated that the demand for new residential (non-vacation rental) units in the Lihue/East Kaua'i region through 2040 will be between 6,654 and 8,240 units (mid-point of 7,447 units). The demand projection was based on the County's regional population projections to 2040. It also considered recent trends, including a declining average household size, and an increasing share of units being used by non-residents and visitors.

The CBRE study estimated that about 66% of the total future demand will be for single family homes and lots, with about 34% for condominium units. CBRE estimated that approximately 72% of the demand for finished single family homes in the primary study area over the next 24 years will be for houses with a current price of $539,000 or less. This price is approximately the upper-price threshold that will meet County affordability standards (i.e., affordable to those earning 140% of median household income). For multifamily units, CBRE estimated that 76% will need to be priced at $480,000 or less (consistent with household incomes at 140% or below of median).

Existing and Projected Inventory

As discussed in Section 4.9.2 (Housing) above, of the 19,428 housing units in the study area, 17.6% (3,428 units) are registered as transient vacation rentals (TVR) and unavailable for meeting standard residential housing needs. Of the remaining 16,000 non-resort units, 18 percent (2,880 units) are used by non-resident second/vacation home owners.

According to the County Planning Department, there are there are up to 5,197 single and multi-family residential units proposed for the Lihue/East Kauai study region, not including the Keālia Mauka lots. Approximately 30% of these proposed units are resort residential and oriented toward visitors and vacation/second home buyers.

Even if all 5,197 proposed residential units were offered as non-resort product and constructed in a timely manner, the supply would still be insufficient to meet anticipated demand, with a shortfall of approximately 2,250 units (5,197 unit proposed vs. 7,447 unit demand). In reality, many proposed units will not be completed within the projection period, and others will be priced at levels that are

unaffordable to virtually all Kauaʻi resident households. The market study forecast a shortfall of more than 3,500 single and multi-family residential units in the study corridor through 2040. The shortfall in the single-family sector will be more than 2,000 home/lots.

4.9.4.2 Potential Impacts and Mitigation

The Proposed Action will create 235 finished house lots. Although this offering will not come close to meeting the anticipated shortfall of single family homes/lots, it will have a beneficial impact on the supply of residential housing in the Līhuʻe/East Kauaʻi region.

Residential development in the East Kauaʻi region is appropriate due to the area's desirable climate, expanding population, and a favorable economic outlook. Residential development on the Petition Area is compatible with adjacent residential use, and consistent with County of Kauaʻi General Plan land use guidance. The Petition Area provides convenient access to Kūhiō Highway, Kapaʻa Town, schools and other supporting services. The subdivision will provide homeownership opportunity for large numbers of Kauaʻi residents and households. The market study indicates that the subdivision will have the attributes necessary to be competitive in the workforce and market single family housing product sectors, and will capture a reasonable market share during its offering period. Although the home sites will be somewhat desirable for non-resident second-home purchasers, it will be less so than other projects with large lots, ocean views or in resort communities (CBRE, 2017). No mitigation is required.

4.10 INFRASTRUCTURE AND UTILITIES

The information in this Infrastructure and Utilities section is from a Preliminary Engineering Report (PER) for the Proposed Action prepared by Kodani & Associates (2017). The PER is included as Appendix G.

4.10.1 Electrical and Communications

4.10.1.1 Existing Conditions

Kauaʻi Island Utility Cooperative (KIUC) is Hawaiʻi's only member-owned electric utility. The utility currently has a generating capacity of 125 megawatts (MW). More than 40% of the electricity generated by KIUC comes from renewable energy resources.

The Keālia Mauka Homesites project is part of the KIUC's Kawaihau region. According to the Kaua'i General Plan, this region is served via a tap off of the *mauka* transmission line that connects the Wainiha Hydroelectric Plant with Port Allen. This tap provides power via the Kapaʻa Switchyard to Kapaʻa Town and other developed coastal areas, as well as to residential communities in Kapaʻa and Wailua homestead areas. Kapa'a Switchyard is also linked to the Lydgate Substation and the Līhuʻe switchyard. Power is also supplied through the Anahola Substation, which was recently completed.

KIUC transmission lines are located along Kūhiō Highway in the vicinity of the Petition Area. Within the last five years, KIUC completed a project relocating overhead lines along Kūhiō Highway to underground. This project was part of an effort to reduce harm to endangered seabirds such as the Newell's shearwater, which often collide with overhead power lines. There are still overhead electrical distribution lines serving residences along Keālia Road, Kaʻao Road, and Hopoe Roads.

4.10.1.2 Potential Impacts and Mitigation

KIUC representatives have indicated that there is sufficient generating capacity to serve the proposed residential development. Standard electrical power transmission improvements would be required to serve the proposed project. However the improvement would likely be limited to the distance from Kūhiō Highway to the Petition Area (Kodani & Associates, 2017).

For planning purposes, KIUC utilizes a unit demand of 3 kilovolt amps (KVA) of power per lot. KIUC typically provides 100 amp services for lots of the size proposed for this development. For 235 lots, electrical demand is estimated at 705 KVA. The utilities for the subdivision will mainly be placed underground. KIUC may utilize the remnant lot near the proposed roundabout that intersects with Keālia Road for switchgear equipment.

Currently, there are overhead utility lines in place that serve the existing lots along Keālia Road and the existing dwellings on Ka‘ao and Hopoe Roads. With the proposed subdivision, these overhead lines will need to be upgraded to accommodate the new development. With these upgrades to the utilities, Keālia Road will also need to be improved to further accommodate the new development. The cost of these improvements will be paid for by the developer. The development will tie into KIUC’s existing main line that runs along Kūhiō Highway (Kodani & Associates, 2017).

4.10.2 Potable Water

4.10.2.1 Existing Conditions

Existing residential uses in the vicinity, including lots along Ka‘ao and Hopoe Road, are serviced through a private domestic water system called the Keālia Water System (KWS). The KWS is owned by the entity, Keālia Water Company Holdings, LLC (Water Company). It is identified by the State of Hawai‘i Department of Health as Public Water System #423.

Source water is provided by two wells located on the western side of Keālia Road on TMK (4) 4-7-003:002. Keālia Wells 1A and 2A (State Well No. 3-0618-009 and 010, respectively) currently report average use between 30,000 to 40,000 gallons per day (gpd) since 2008. (Kodani & Associates, 2017). According to the State of Hawai‘i Department of Land and Natural Resources (DLNR) Commission on Water Resource Management (CWRM), certificates of well construction and pump installation for these two wells were issued on 9/19/2008. The approval pump capacity is 650 gpm for well 3-0618-009 (936,000 gpd) and 540 gpm for well 3-0618-010 (777,600 gpd) (personal communication with Queenie Komori, 3/12/2018).

A 12-inch waterline runs north along Keālia Road and connects the wells to two 67,000 gallon water tanks. This water system services lots along Ka’ao and Hopoe Road with an 8-inch waterline branching off from Keālia Road. There is also a 12-inch waterline that branches off of Keālia Road to serve the Keālia Kai Subdivision on the *makai* side of Kūhiō Highway. This waterline intersects the proposed Petition Area.

Community water systems that serve the same people year-round are required to provide an annual Consumer Confidence Report (CCR) or annual drinking water quality report to their customers. According to the Keālia Water System 2017 Consumer Confidence Report, water for the System is obtained via a groundwater source. The Water System provides water to approximately 60 homes in the former Keālia Plantation Camp and has 35 service connections at the Keālia Makai Subdivision. Water from the Keālia Water System met all U.S. Environmental Protection Agency and

state drinking water health standards. Data was collected from testing done from January 1, 2016 through December 31, 2016 (Kodani & Associates, 2017).

According to the DLNR CWRM, there are two other wells, Keālia 6 and 7 (Well No. 3-0618-006 and 005, respectively) that are reporting no use and are not part of the Keālia Public Water System. There are also five abandoned wells in the vicinity of the water system wells. Two have been properly sealed and three which cannot be found are considered lost. If any of these three wells are discovered they should be properly sealed in accordance with the Hawai'i Well construction and Pump Installation Standards, 2004, with work permitted through the DLNR Commission on Water Resource Management.

4.10.2.2 Potential Impacts and Mitigation

The Applicant has a water service agreement with Keālia Water Company which allows a daily aggregate of 300,000 gallons per day (gpd) of potable water to be reserved for the use of the future owners in the Petition Area.

Proposed Water System

Figure 4-6 shows the existing and proposed water system. The State of Hawai'i, Water System Standards is the guiding standard for potable water systems. The standards require that the planning and design of a water system allocate each single family unit an average of 500 gallons of water per day. Furthermore, the maximum daily demand calculations require that the average daily demand allocation be multiplied by a factor of 1.5. Based on the Water System Standards, domestic water demand was estimated at 118,000 gallons/day (average daily demand) with a maximum daily demand of 177,250 gpd (*note: PER calculated water demand for 236 housing units*).

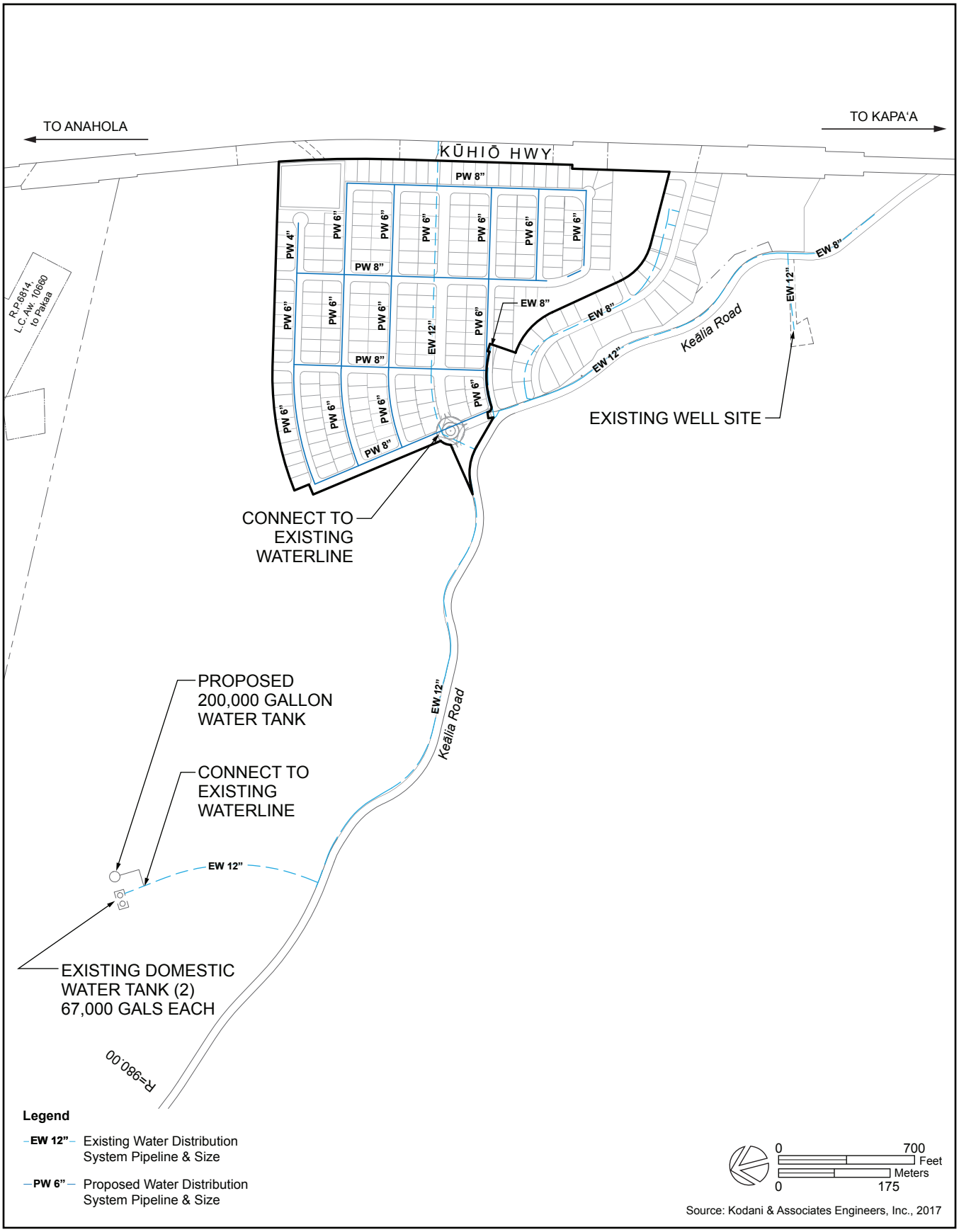
The existing water wells within the KWS will provide the required source capacity of 177,250 gallons per day. Upgrading of the existing well pump assembly may be necessary to achieve the required demand. As noted previously, the existing water service agreement allows for drawing up to 300,000 gallons per day, which will meet project demand.

Groundwater Capacity

The existing and proposed pumpage quantities from the two Keālia wells 1A and 2A will be well within the CWRM's approved pump capacity of 936,000 gpd for Well 1A (3-0618-009) and 777,600 gpd for Well 2A (3-0618-010). The Proposed Action is not expected to have an adverse impact on the groundwater aquifer.

Storage Requirements

The State's Water System Standards also have standards for the sizing of water storage reservoirs. The standards require that the water reservoir for the development have enough capacity to meet fire flow requirements in addition to the maximum daily demand. Fire flow requirements are based on land use and zoning. The proposed subdivision will have density that is roughly equivalent to R-6 zoning. Accordingly, the fire flow requirements include being able to produce a flow of 1,000 gallons per minute, for a duration of 2 hours.



Existing and Proposed Water System

Figure 4-6

Keālia Mauka Homesites

Draft Environmental Impact Statement

Kealia Properties, LLC

The Water System Standards require that the reservoir capacity will be sized as follows:

1. Meet maximum daily consumption. Reservoir full at the beginning of the 24-hour period with no source input to the reservoir.

2. Meet maximum day rate plus fire flow for duration of fire. Reservoir ¾ full at start of fire, with credit for incoming flow from pumps, one (1) maximum size pump out of service.

3. Minimum size reservoir shall be 0.1 MG. Reservoir size shall be as specified in Section 105.10 – RESERVOIR. Subsection A – Size.

The proposed Keālia Mauka subdivision will have a maximum daily demand of 177,250 gallons per day. Therefore, in accordance with the Water System Standards sizing method, 177,250 gallons water storage capacity is needed. It is proposed that a 200,000 gallon tank be installed adjacent to the two (2) existing 67,500 gallon tanks to satisfy the storage requirements. The proposed water tank will also connect to the existing water system.

The existing potable water transmission and distributions system will be upgraded to service the proposed development. All expansions and improvements of the Keālia Water System shall be in accordance with the Water Service Agreement and the Water System Standards (Kodani & Associates, 2017).

4.10.3 Wastewater

4.10.3.1 Existing Conditions

The County of Kauaʻi operates four wastewater systems serving: 1) Waimea; 2) Hanapepe-ʻEleʻele; 3) Līhuʻe-Hanamaʻulu; and the 4) Kūhiō Highway corridor between Wailua and Kapaʻa. All but the Waimea plant have substantial amounts of available treatment capacity, but this capacity is already committed to existing and planned developments (Kodani & Associates, 2017).

In the Wailua-Kapaʻa area, where the Petition Area is located, wastewater treatment is accomplished with either Individual Wastewater Systems (IWS), such as cesspools or septic tanks, or at the County-owned and operated Wailua Wastewater Treatment Plant (WWTP). IWSs generally used in the parcels that have water service but no sewer service.

The County completed a study of the Wailua-Kapaʻa wastewater system, entitled *Final Wailua Facility Plan2*. According to the *Wailua Facility Plan*, the Wailua Wastewater Treatment Plant was originally constructed in 1964, and is located on approximately 2.1 acres of County owned land next to Lydgate Beach Park. It receives wastewater from Kapaʻa, Papaloa, Waipouli, and Wailua areas. It was originally designed to treat an average flow of 0.5 mgd, but the plant has gone through four (4) phases of construction to expand. The treatment plant's current average daily flow capacity is 1.5 mgd, with a peak flow capacity of 5.03 mgd. The wastewater treatment plant currently receives about 0.7 million gallons per day (mgd) of flow. However, it is considered to have a capacity of about 1.0 mgd due to the estimated treatment capacity of the aeration basins and the chlorine contact tank.

Because the discharge of raw waste into the ground is not beneficial to the environment, the State of Hawai'i Department of Health prohibits the construction of any new cesspools. According to the Wailua Facility Plan, approximately 12% of the cesspools in the Wailua-Kapa'a area have reported cesspool failures. A cesspool failure occurs when a cesspool overflows and is reported to the Department of Health.

4.10.3.2 Potential Impacts and Mitigation

Based on preliminary discussions with representatives from the County of Kaua'i, Department of Public Works, Wastewater Management Division, the County will provide service to the proposed subdivision. The County indicated that a "will serve" letter will be issued after the project has received zoning approval (Kodani & Associates, 2017).

Wastewater generation by the project was estimated using the County of Kaua'i, Department of Public Works, Sewer Design Standards. According to the standards, it is assumed each household has four (4) occupants, with an average daily per capita flow of 100 gallons per day, or an average of 400 gallons of wastewater per household per day. At total build out, the Keālia Mauka subdivision will produce an average daily flow of approximately 94,400 gallons of wastewater per day. The maximum flow of sewage from the development is approximately 472,000 gallons per day (0.472 mgd), calculated by multiplying the average daily flow by a flow factor of 5 (from Sewer Design Standards). The peak flow of sewage is the sum of the maximum flow of sewage and the rate of groundwater infiltration. (*Note: PER calculated wastewater demand for 236 housing units*).

The Preliminary Engineering Report (PER) by Kodani & Associates, Engineers (Appendix G) includes illustrations of the proposed sewer collection layout on site and the location of off-site improvements. The project proposes construction of a new 8-inch diameter gravity main on Keālia Road. The proposed Keālia Mauka Homesites will connect to the County's Wailua-Kapa'a system. It is anticipated that construction of a wastewater lift station and transmission pipeline on Kūhiō Highway will be necessary for connection to the County system.

4.10.4 Drainage

The PER includes a preliminary drainage study which estimates existing flow patterns and runoff quantities, as well as post-development flow patterns and runoff quantities. The drainage study looked at the entire 1,000-acre "Kumukumu parcel" [(4) 4-7-004:001], which contains the 53.4 acre Petition Area. The U.S. Department of Agriculture, Soil Conservation Service, Technical Report #5510 (TR-55), a hydrologic modeling program, was used to study drainage patterns for the existing and proposed conditions of the Petition Area. A detailed Drainage and Erosion Mitigation Plan will be prepared and submitted to the County Engineer for approval during the design and development stages (Kodani & Associates, 2017).

4.10.4.1 Existing Conditions

The larger "Kumukumu parcel," which includes the 53.4-acre Petition Area, is mostly pasture land that is utilized for cattle ranching. The entire parcel is undeveloped and the few existing drainage structures are remnants of an old irrigation system from the plantation era.

Figure 4-7 illustrates existing drainage conditions on the Keālia Mauka Petition Area. The site generally drains from the *mauka* side towards Kūhiō Highway. A relatively mild ridgeline aligned in the east-west direction causes water north of the ridgeline to run off to a northern exit, and water south of the ridgeline to run off to a southern exit. For analysis purposes, the engineers split the Petition Area into two (2) subareas, Subarea 1 and Subarea 2, with the high ground as the dividing point as shown in Figure 4-7. Stormwater runoff was estimated using the TR-55 model.

Subarea 1 had a land area of 25.44 acres. Two-year storm runoff was calculated at 14.32 cubic feet per second (cfs). Subarea 2 had a land area of 28.10 acres, and two-year storm runoff was calculated at 13.69 CFS. The figure shows three (3) existing drainage outlet points from the Petition Area:

- Subarea 1 outlets to a two (2) foot diameter concrete pipe culvert on the north-east end of the proposed development area that runs under Kūhiō Highway and outlets on the *makai* side of the highway,

- Subarea 2 partially outlets with overland flow via a natural drainage way that spills into an existing concrete swale on the *mauka* side of Kūhiō Highway, and

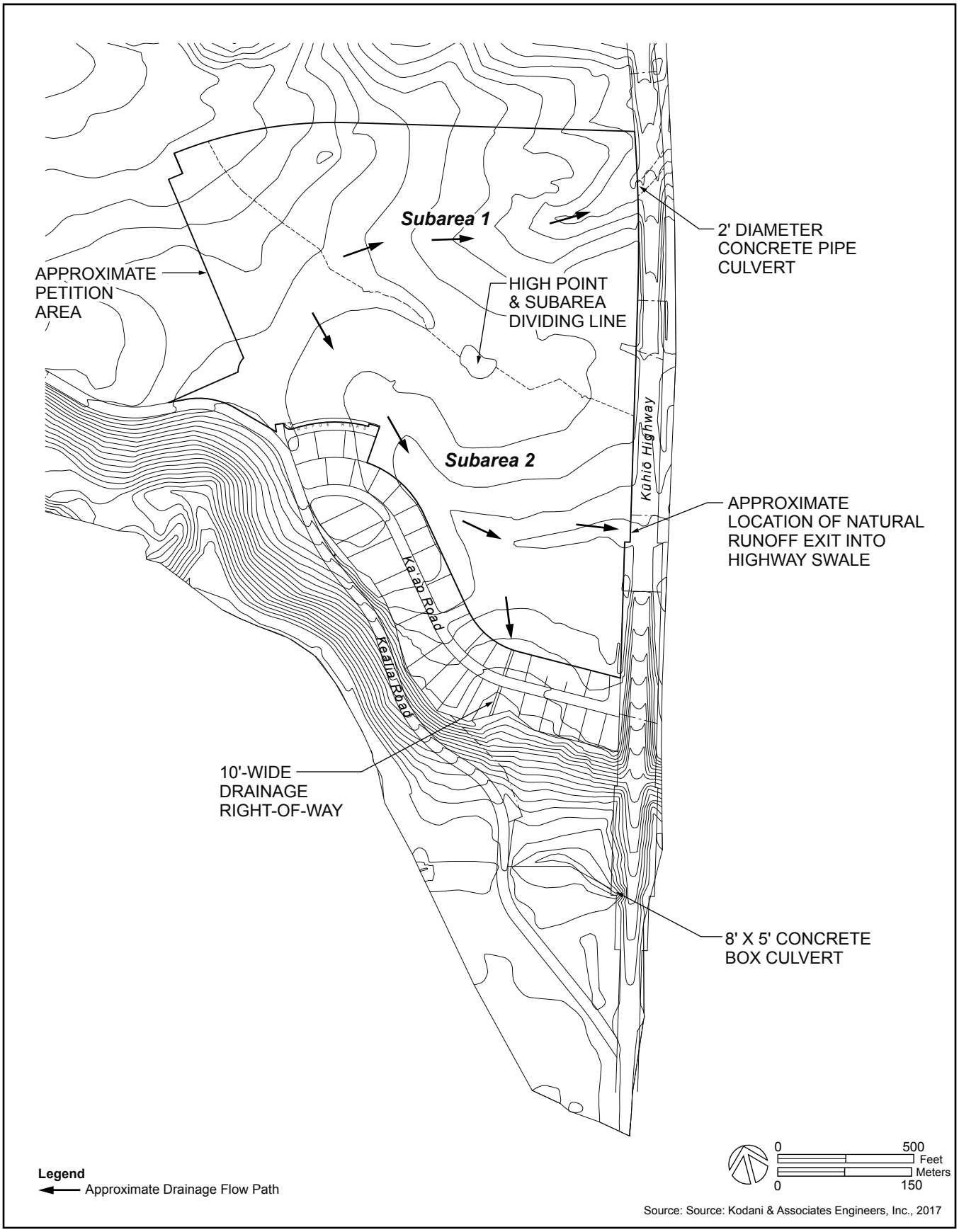
- Subarea 2 remainder outlets to a 10 foot wide Drainage Right-of-Way that connects with the Petition Area, crosses Ka‘ao Road via a 2 foot diameter concrete pipe culvert and outlets on a hillside within the large lot.

Runoff that is transmitted by Subarea 2 combines with other drainage areas and is conveyed by an existing 8 foot by 5 foot rectangular concrete drainage box culvert beyond the south end of the proposed Petition Area and within the large lot that runs under Kūhiō Highway and outlets on the Keālia Beach side of the highway. The location of the box culvert is shown in Figure 4-7.

4.10.4.2 Potential Impacts and Mitigation

Figure 4-8 shows proposed drainage patterns within the developed Petition Area. Storm water generated from each individual lot within the Petition Area will be directed to the nearest downstream street or natural drainage way that will collect the storm water and convey it to the most appropriate of two proposed detention basins on site. The detention basins are intended to moderate the storm flows and allow infiltration back into the soil. They are sized in accordance with the existing peak flows for both the 2-year and 100-year storm events. Detention Basin 2 on the southern end of the Petition Area, will also provide a multiple purpose of green space/park, and provide a buffer between the new subdivision and the existing residential area on Ka‘ao Road.

Kodani & Associates utilized the TR-55 model to estimate post-development storm water runoff from the Petition Area. According to the County’s Storm Water Runoff System Manual, storm water runoff cannot exceed the predevelopment conditions. The analysis of post-development conditions estimated a runoff flow of 13.52 CFS and 12.99 cfs for the first and second sub areas, respectively. This post-development flow for both subareas is less than that of current undeveloped conditions. Therefore, the proposed Keālia Mauka subdivision is not expected to have a negative drainage impact on the surrounding and downstream lands.



Existing Site Drainage Pattern **Figure 4-7**

Keālia Mauka Homesites

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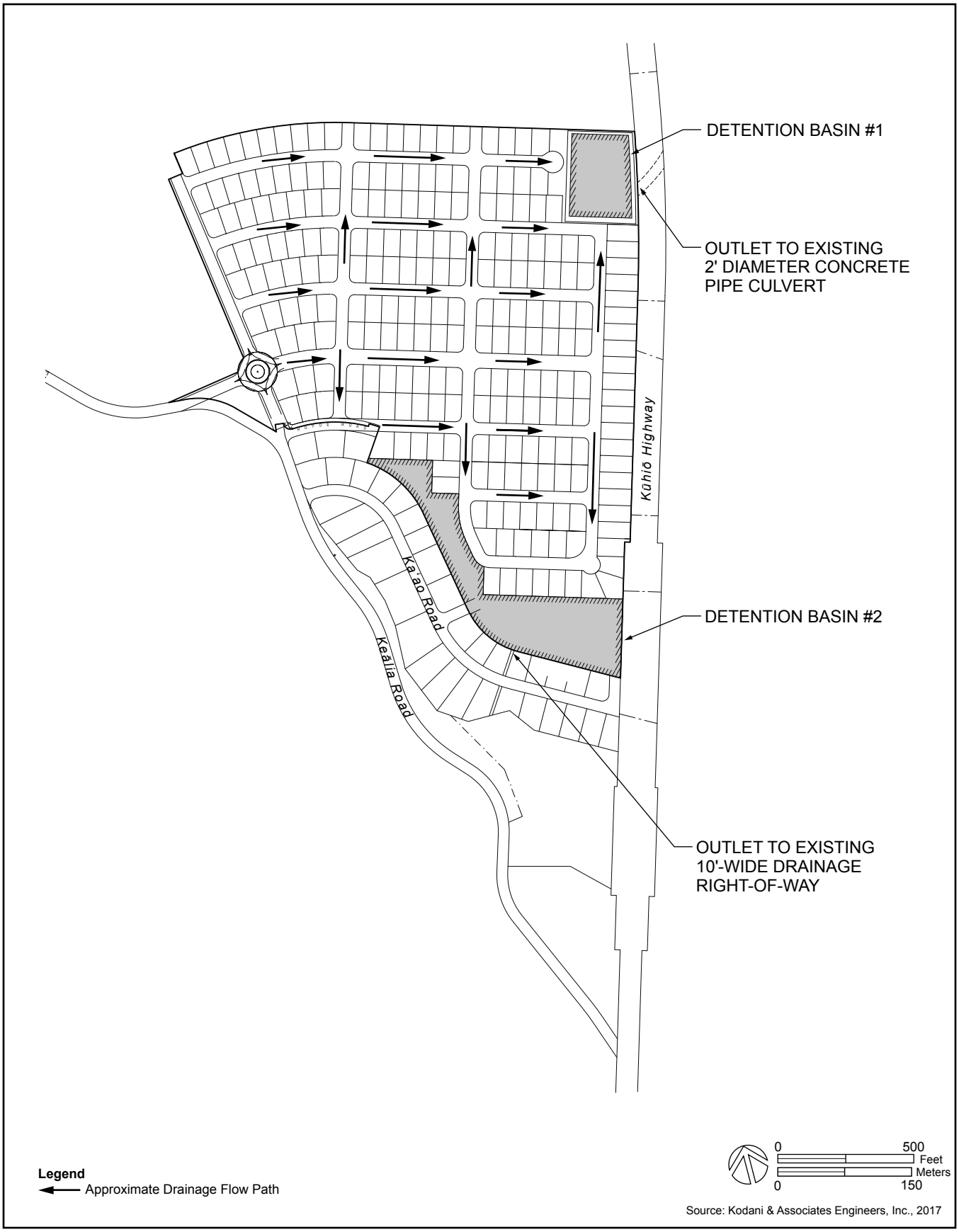


Proposed Drainage **Figure 4-8**

Keālia Mauka Homesites

Draft Environmental Impact Statement

Kealia Properties, LLC

4.10.5 Solid Waste

4.10.5.1 Existing Conditions

The County Department of Public Works (DPW) refuse collection crews operate out of three baseyards on Kauaʻi. The Kapaʻa Baseyard collects trash from Puhi to Anahola, and includes the Keālia Project Area. There is currently one sanitary landfill and four refuse transfer stations on the island. The transfer stations are at Hanapepe, Līhuʻe, Hanalei, and Kapaʻa, with the latter the closest to the Project Area. The County's single landfill, the Central Kaua'i Landfill, is located in Kekaha and services the entire island. According to the County's Integrated Solid Waste Management Plan, the landfill will need to be expanded to increase capacity. The County Department of Public Works, Solid Waste Division has indicated there are plans to expand the landfill to provide capacity until 2027 (Kodani & Associates, 2017).

Residential waste is collected via the County of Kaua'i's Residential Refuse Collection program. Adjacent residential areas along Kaʻao and Hopoe Roads are served by the County. Currently, there is no solid waste generation from the Petition Area.

The Kauaʻi County Recycling Office is a division of the DPW Solid Waste Division and oversees County recycling programs. Paper, aluminum, other metals, glass, plastic, motor oil, household hazardous waste and green waste are recycled. There are also greenwaste diversion sites located in Hanapepe, Līhuʻe and Kapaʻa.

4.10.5.2 Potential Impacts and Mitigation

The Petition Area is undeveloped and as such, there are few fixed structures that would need to be disposed as construction waste. There are remnants of current and past irrigation systems onsite, such as pipes and small concrete headwalls. Waste generated during subdivision construction will consist primarily of vegetation and debris. Soil and debris displaced from grading and clearing will be utilized as fill throughout the site as required, minimizing disposal and transit/relocation of the materials. Construction materials that are rendered un-recyclable will be disposed of in the Central Kaua'i Landfill.

The County of Kauaʻi provides Residential Refuse Collection via a Pay as You Throw (PAYT) program. Curbside refuse collection is offered on a once-per-week basis, and customers are able to choose a refuse cart size. A representative of the County of Kaua'i's Solid Waste Management Division has indicated that the County would service the proposed subdivision (Kodani & Associates, 2017).

The quantity of solid waste generated from the Proposed Action was estimated by assuming that each household will fill the 64 gallon cart each week. The project is estimated to generate approximately 8.02 tons of waste per year. This compares to the estimated islandwide generation quantity of 157,130 tons per year for the year 2013 (County of Kauaʻi, 2009) and represents an increase of 0.005% in solid waste generation on Kauaʻi. Residents will be required to comply with existing regulations and requirements. The project will not have a significant impact on solid waste management.

4.11 ROADWAYS AND TRANSPORTATION

A Traffic Impact Analysis Report (TIAR) was prepared for the proposed Keālia Mauka Homesites project by Austin, Tsutsumi & Associates, Inc. (ATA). The report is included as Appendix H. The TIAR described existing roadways and traffic conditions, anticipated future traffic conditions, and the potential traffic impacts resulting from the project. The findings are summarized below.

4.11.1 Existing Conditions

4.11.1.1 Roadway System

The following are brief descriptions of the existing roadways in the project vicinity. The locations of these roads and the TIAR study intersections are shown in Figure 4-9.

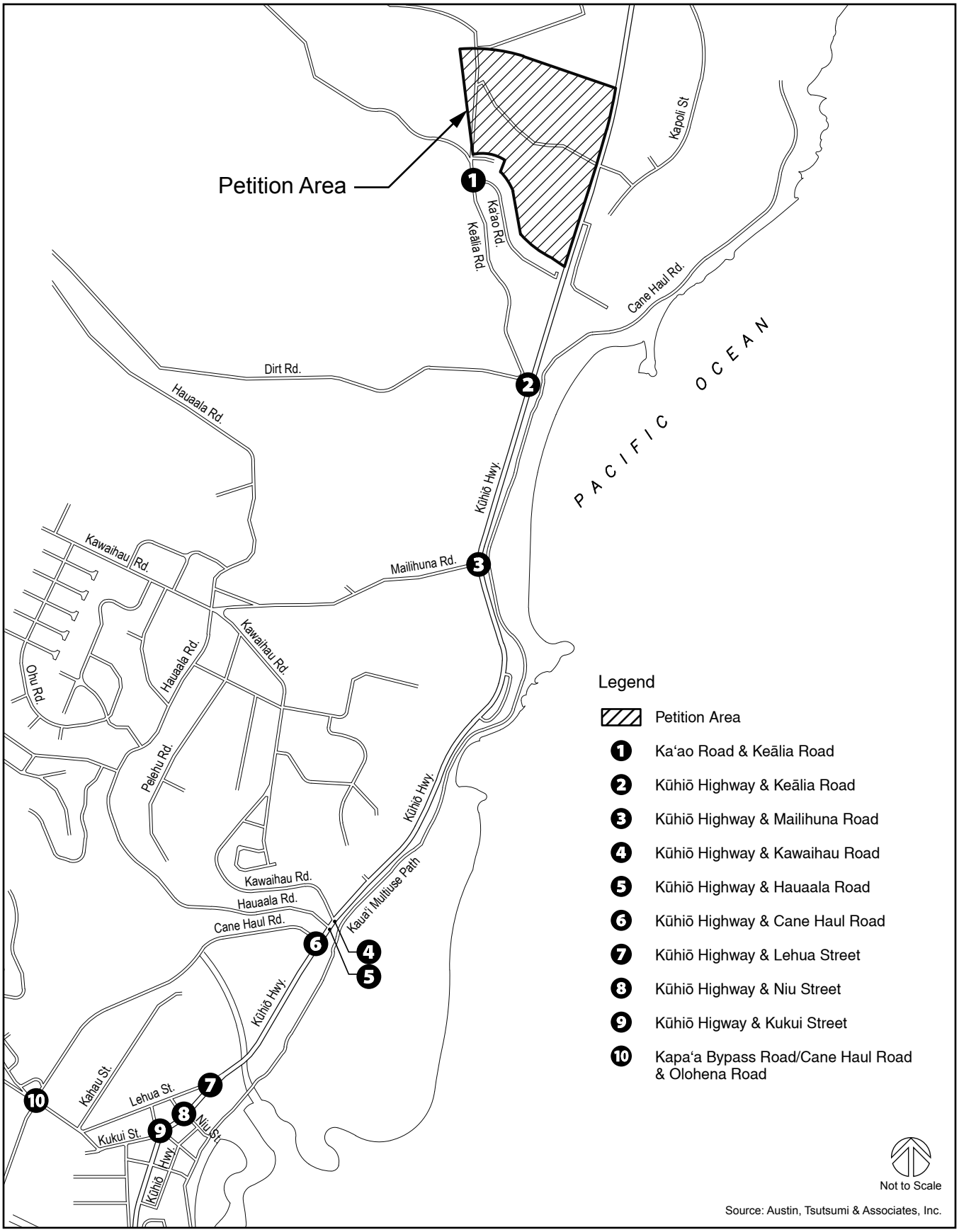
- **Kūhiō Highway** – is generally a north-south, two-way, two-lane principal arterial in the vicinity of the Petition Area. The roadway begins in Līhuʻe at its connection with Kaumualiʻi Highway and travels along the coast before terminating at Keʻe Beach in Hāʻena. Kūhiō Highway is a State roadway and is the major thoroughfare in the East Kauaʻi regions. In the vicinity of the project, Kūhiō Highway has a posted speed limit of 25 to 50 miles per hour (mph) depending on the surrounding land uses. In the immediate vicinity of the project, the highway has a speed limit of 50 mph in the northbound direction and 40 mph in the southbound direction.

- **Keālia Road** – is generally a northwest-southeast, two-way, two-lane roadway in the vicinity of the Petition Area. The roadway begins at its intersection with Kūhiō Highway in the east and extends to the northwest to its intersection with Hauaala Road. The roadway then travels to the northeast where it reconnects to Kūhiō Highway in Anahola. In the vicinity of the Project, Keālia Road has a posted speed limit of 25 mph.

- **Kaʻao Road** – is generally an east-west, two-way, two-lane roadway in the vicinity of the Petition Area. The roadway begins at its intersection with Keālia Road to the west and travels to the east to provide access to the existing residential neighborhood. In the vicinity of the Petition Area, Kaʻao Road has a posted speed limit of 15 mph.

- **Mailihuna Road** – is generally an east-west (*makai-makai*), two-way, two-lane roadway in the vicinity of the Petition Area. The roadway begins on the east end at its intersection with Kūhiō Highway, about a half mile south of the Kūhiō Highway-Keālia Road intersection. Mailihuna Road terminates on the west at its intersection with Kawaihau Road. Mailihuna Road provides access to Kapaʻa High School and residential areas. Closer to Kūhiō Highway, Mailihuna Road has a posted speed limit of 25 mph which drops to 15 mph near Kapaʻa High School.

- **Kawaihau Road** – is generally an east-west (*makai-makai*), two-way, two-lane roadway in the vicinity of the Petition Area. The roadway begins on the east end at its intersection with Kūhiō Highway, about 1.3 miles south of the Kūhiō Highway-Keālia Road intersection. Kawaihau Road terminates to the west at its intersection with Kahuna Road and Pililiamoo Road. Kawaihau Road provides access to Kapaʻa High School, Kapaʻa Elementary School and residential areas. In the vicinity of the Petition Area, Kawaihau Road has a posted speed limit of 25 mph.



Roadways and Traffic Study Intersections **Figure 4-9**

Keālia Mauka Homesites

Draft Environmental Impact Statement

Kealia Properties, LLC

- **Hauaala Road** – is generally an east-west (*makai-mauka*), two-way, two-lane roadway in the vicinity of the Petition Area. The roadway begins to the east at its intersection with Kūhiō Highway (about 1.4 miles south of the Kūhiō Highway-Keālia Road intersection) and terminates to the northwest at its intersection with Keālia Road. Hauaala Road provides access to residential areas. In the vicinity of the Petition Area, Hauaala Road has a posted speed limit of 25 mph.

- **Cane Haul Road** – is generally a north-south, one-way, one-lane roadway in the vicinity of the Petition Area. The roadway begins to the northeast at its intersection with Kūhiō Highway (about 1.4 miles south of the Kūhiō Highway-Keālia Road intersection) and terminates to the south at the roundabout on Olohena Road where it connects to the two-way Kapaʻa Bypass Road. The roadway provides travel in the southbound direction only. In the vicinity of the Petition Area, Cane Haul Road has a posted speed limit of 25 mph.

- **Kapaʻa Bypass Road** – is a three mile long bypass road providing an alternate to Kūhiō Highway for travelers passing through Kapaʻa and Waipouli. The bypass road is a north-south, two-way, two-lane roadway. The roadway begins to the north at the roundabout on Olohena Road where it connects to the one-way Cane Haul Road. The Olohena Road roundabout is approximately two miles south of the Kūhiō Highway-Keālia Road intersection. The Kapaʻa Bypass Road terminates to the south at its intersection with Kūhiō Highway in Wailua. In the vicinity of the Petition Area, it has a posted speed limit of 25 to 35 mph.

- **Olohena Road** – is generally an east-west, two-way, two-lane roadway. The roadway begins in Kapaʻa Town at Kūhiō Highway, near its connection with Kukui Street, about two miles south of the Kūhiō Highway-Keālia Road intersection. Olohena Road provides access to Kapaʻa Middle School. In the Kapaʻa Town area, Olohena Road has a posted speed limit of 25 mph.

- **Lehua Street** – is generally an east-west, two-way, two-lane roadway in Kapaʻa Town. The roadway begins to the east at its intersection with Kūhiō Highway and terminates to the west at its intersection with Olohena Road, and has a posted speed limit of 25 mph.

- **Niu Street** – is generally a northwest-southeast, two-way, two-lane roadway in Kapaʻa Town. The roadway begins to the northwest at its intersection with Lehua Street and terminates on the *makai* end at the Ke Ala Hele Makalae Multi-Use Path. There is no posted speed limit.

- **Kukui Street** – is generally an east-west, two-way, two-lane roadway in Kapaʻa Town. The roadway begins to the west at its connection with Olohena Road and terminates on the *makai* end at the Ke Ala Hele Makalae Multi-Use Path. Kukui Street has a posted speed limit of 15 mph.

4.11.1.2 Sustainable Transportation Infrastructure

Pedestrian Accessibility

Within Kapaʻa Town, Kūhiō Highway has sidewalks on both sides of the road from the Kukui Street intersection to just north of the Kūhiō Highway/Lehua Street intersection. The sidewalk continues north along the *mauka* side of Kūhiō Highway until the Kawaihau Road intersection. Beyond that,

there is no sidewalk until after the Kapaʻa Stream bridge, where the sidewalk on the *mauka* side of the highway resumes until the intersection with Keālia Road. Keālia Road, from Kūhiō Highway up to the existing Kaʻao subdivision, is a narrow two lane road without sidewalks or shoulders. There is minimal pedestrian activity along Kūhiō Highway near the Keālia Road intersection, and no pedestrian activity along Keālia Road.

The Ke Ala Hele Makalae Multi-Use Path provides a pedestrian and bicycle route as an alternative to travel along Kūhiō Highway. The multi-use coastal path begins at Lihi Park in Kapaʻa and travels north to Kuna Bay in Keālia on the *makai* side of Kūhiō Highway. The Ke Ala Hele Makalae also has a Kawaihau Road spur that provides access from the main pathway to the Mahelona Medical Center, Kapaʻa Elementary School and Kapaʻa High School.

Bicycle Accessibility

Bike Plan Hawai'i (HDOT, 2003) is the State's bicycle master plan, and outlines how the State intends to accommodate and promote bicycling. *Bike Plan Hawai'i* identifies existing and proposed bicycle routes that could potentially be implemented in the future. Kūhiō Highway is a two-lane road in the project vicinity, and is the principal north-south arterial. Bike Plan Hawaiʻi identifies Kūhiō Highway between Wailua and Keālia as a proposed "signed shared roadway," that is, a roadway that is open to both bicycle and motor vehicle travel, and that has been designated by signage as a preferred route for bicycle use. Keālia Road is also identified as a proposed signed shared roadway.

In the project vicinity, Ke Ala Hele Makalae Multi-Use Path provides pedestrian and bicycle accessibility from Kapaʻa Town through Keālia. From the proposed subdivision, it is a just over a 10 minute walk or 5 minute bike ride on a slight downhill grade to access the multi-use path. Within Kapaʻa Town, the Kawaihau Bike Path provides a 3.0 mile long shared use path from Kapaʻa Elementary School to Kapahi Park.

A total of 20 bicycle routes and upgrades are proposed for the Kawaihau region of East Kauaʻi. In the vicinity of the Petition Area, five (5) signed shared roadways and three (3) bicycle paths are proposed. Priority I projects are considered near-term, Priority II are considered mid-term, and Priority III are long-term projects. The projects involve roadway segments under both State and County jurisdiction.

- Signed Shared Road--Kūhiō Highway (Keālia to Anahola) (Priority Level II)
- Signed Shared Road--Kūhiō Highway (Wailua to Keālia) (Priority Level II)
- Signed Shared Road--Keālia Road (Koʻolau to Kūhiō Highway) (Priority Level III)
- Signed Shared Road--Mailihuna Road (Kawaihau Road to Kūhiō Highway) (Priority Level III)
- Signed Shared Road--Olohena Road/Kukui Street (Kamalu Road to Kūhiō Highway) (Priority Level III)
- Bike Path--Extension of Ke Ala Hele Makalae Multi-Use Path (Kuna Bay to Anahola) (Priority Level I)
- Bike Path--Extension of Kawaihau Bike Path (Kapaʻa Elementary School to Kūhiō Highway) (Priority Level II)
- Bike Path--Upgrade of Kawaihau Bike Path (Kapaʻa Elementary School to Kapahi Park) (Priority Level II)

Public Transit

The Kauaʻi Bus public transit system offers several routes that provide service from Kekaha to Hanalei. Routes 400 and 500 serve Līhuʻe to Hanalei, providing several stops in the project vicinity along Kūhiō Highway. There are bus stops on both sides of Kūhiō Highway near the Keālia Road intersection. These stops are a half-mile away from the proposed subdivision, and just over a ten minute walk. However, given Keālia Road's narrow width and lack of sidewalk or shoulders, it is unlikely that many residents of the existing Kaʻao Road subdivision walk between the subdivision and the bus stop.

Route 60 (Kapahi Shuttle) provides service within the Kapaʻa region, including to Mahelona Hospital, Kapaʻa High School, and Kapaʻa Middle School. This route includes several stops along Kūhiō Highway in Kapaʻa Town between the Kukui Street and Kawaihau Road, and along Kawaihau Road. Buses run every hour throughout the day. The Kapahi Shuttle does not stop near the Keālia Road intersection with Kūhiō Highway. In order to access the Kapahi Shuttle, Kaʻao subdivision residents would need to get to a Route 60 stop within Kapaʻa Town, over a mile away. On foot, this would require a half-hour walk along a section of Kūhiō Highway with no sidewalks. Unless they are dropped off in Kapaʻa Town near a Kapahi Shuttle stop, it is unlikely that many existing residents regularly utilize this bus route to get to the high or middle school.

4.11.1.3 Existing Traffic Volumes

The hourly turning movement data was collected at the following intersections, which are located in proximity to the Petition Area. The numbers correspond to the numbers shown in Figure 4-9

- [1] Kaʻao Road/Keālia Road (unsignalized)
- [2] Kūhiō Highway/Keālia Road (unsignalized)
- [3] Kūhiō Highway/Mailihuna Road (unsignalized)
- [4] Kūhiō Highway/Kawaihau Road (unsignalized)
- [5] Kūhiō Highway/Hauaala Road (unsignalized)
- [6] Kūhiō Highway/Cane Haul Road (unsignalized)
- [7] Kūhiō Highway/Lehua Street (unsignalized)
- [8] Kūhiō Highway/Niu Street (unsignalized)
- [9] Kūhiō Highway/Kukui Street (signalized)
- [10] Kapaʻa Bypass Road/Cane Haul Road/Olohena Road (roundabout)[2]

Based on the count data, it was determined that the AM peak hour of traffic occurs between 7:15 AM and 8:15 AM and the PM peak hour of traffic occurs between 3:45 PM and 4:45 PM.

[2] For intersection [10] Kapaʻa Bypass Road/Cane Haul Road/Olohena Road, turning movement data was obtained from the 2015 Kapaʻa Transportation Solutions report and calibrated to collected existing conditions data.

4.11.1.4 Existing Traffic Conditions

Regional Analysis

Kūhiō Highway serves as the main thoroughfare for regional traffic in East Kauaʻi. The highway is contra flowed on Monday through Saturday from 7:00 AM to 1:30 PM to provide two (2) southbound lanes and one (1) northbound lane from the Kapaʻa Bypass south junction to Kapule Highway to accommodate heavier southbound volumes.

During the AM and PM peak hours of traffic, volumes along Kūhiō Highway are generally balanced in both the northbound and southbound directions within the project vicinity. Although southbound traffic is generally higher during the AM peak, volume on Kūhiō Highway is reduced by the use of the Kapaʻa Bypass Road.

Within the region, queuing along southbound Kūhiō Highway was observed to occur during the PM peak hour when contraflow operations were not in place. Occasionally, queues were observed to also form along southbound Kapaʻa Bypass Road during the PM peak hour.

The proposed Keālia Mauka subdivision will be accessed from Kūhiō Highway via Keālia Road. Keālia Road also provides access to the existing residences on Kaʻao Road and Hopoe Road. The entry to the proposed subdivision will be located *mauka* of Hopoe Road.

Currently, there is an existing, unused gated access on the property, on the *mauka* side of Kūhiō Highway, north of the Keālia Road intersection. This is a former plantation era gate and has been chained since the plantation closed. This access point onto Kūhiō Highway will be eliminated. The State Department of Transportation has indicated it will not allow direct access from the Petition Area onto Kūhiō Highway.

Existing Intersection Analysis

The observations and analysis described below are based on observations at the time the TIAR was prepared. Within Kapaʻa Town, queuing was observed during both the AM and PM peak hours of traffic. Queues began near the Kūhiō Highway/Kawaihau Road intersection and extended in both the northbound and southbound directions. Queuing during the AM peak hour was mainly the result of traffic from the nearby Kapaʻa High School (Mailihuna Road) and Kapaʻa Elementary School (Kawaihau Road).

Level of service (LOS) is a term used to describe traffic operating conditions that may occur on a given travel lane or roadway when it is subjected to various traffic volumes. LOS also measures the effect of various factors on traffic such as space, speed, travel time, traffic interruptions, safety, driving comfort, convenience, and freedom to maneuver. LOS is expressed in a qualitative manner through the use of six levels ranging from “A” through “F.” LOS “A” represents free-flowing traffic and no congestion. LOS “F” reflects severe traffic congestion with stop and go conditions.

Study intersections were analyzed using the traffic analysis software Synchro. Because Synchro does not report LOS for uncontrolled movements at unsignalized intersections, LOS is not given for the through movements along Kūhiō Highway. Therefore, existing congestion along Kūhiō Highway at the study intersections is based solely on observations at the time of the traffic counts. Traffic count information for these intersections can be found in the TIAR in Appendix H.

[1] Kaʻao Road/Keālia Road. This intersection has low volumes of traffic, with 46(62) vehicles during the AM(PM) peak hour of traffic. All movements operate at LOS A with minimal delay.

[2] Kūhiō Highway/Keālia Road. The eastbound approach of this intersection operated at LOS C(C) and the westbound approach operated at LOS E(F) during the AM(PM) peak hour of traffic. Delay to the westbound approach was mainly caused by the larger percentage of vehicles making a left-turn onto Kūhiō Highway. However, the number of vehicles making the left-turn was low (≤ 26 vehicles) and adequate gaps were observed along Kūhiō Highway to complete the maneuver. The northbound and southbound left-turn movements from Kūhiō Highway onto Keālia Road operated at LOS A during both peak hours and experienced minimal delay. Although minor street movements and major street left-turn movements were able to proceed during gaps in traffic along Kūhiō Highway, the high speeds along the highway increased the difficulty of these maneuvers.

Although the posted speed limit is 40 mph in the southbound direction and 50 mph in the northbound direction, southbound vehicle speeds were observed to be higher. This is due to a hill on the northbound approach. No congestion along Kūhiō Highway near the Keālia Road intersection was observed during either peak hour.

[3] Kūhiō Highway/Mailihuna Road. The eastbound approach of this intersection operated at LOS F during both peak hours of traffic and at overcapacity conditions during the AM peak hour because of the high volume of vehicles making the left-turn onto Kūhiō Highway. Much of this traffic is associated with the elementary and high schools in the area. Vehicles had difficulty making the eastbound left-turn because of the high speeds of the vehicles on Kūhiō Highway. The northbound and left-turn from Kūhiō Highway onto Mailihuna Road operated at LOS A during both peak hours and experienced minimal delay. No congestion along Kūhiō Highway was observed at this intersection during either peak hour.

[4] Kūhiō Highway/Kawaihau Road. The eastbound approach of this intersection operated at LOS F(C) and the northbound left-turn movement operated at LOS B(B) during the AM(PM) peak hour of traffic. Because of the high volume of eastbound right-turns and northbound left-turns, the vehicles heading southbound along Kūhiō Highway often stopped to allow these vehicles to proceed, and the inter section was observed to self-regulate and operate similar to an all-way stop controlled intersection during the heaviest periods of congestion. During less congested periods, minor movements were able to use gaps in traffic to proceed. Because of the large number of turning movements at this intersection and the proximity of this intersection to the Hauaala Road intersection, Kūhiō Highway became congested in both the northbound and southbound directions.

[*5] Kūhiō Highway/Hauaala Road*. The eastbound approach of this intersection operated at LOS F(D) and the northbound left-turn movement operated at LOS B(B) during the AM(PM) peak hour of traffic. Additionally, the eastbound approach operated under overcapacity conditions during the AM peak hour. Operations at this intersection behaved similarly to the Kūhiō Highway/Kawaihau Road intersection.

[6] Kūhiō Highway/Cane Haul Road. Because Cane Haul Road is one-way and does not allow traffic to enter Kūhiō Highway, minimal delay was observed at this intersection. Many vehicles were observed to make a southbound right-turn onto Cane Haul Road in order to access the Kapaʻa Bypass Road. The majority of Kūhiō Highway congestion in the southbound direction cleared in the vicinity of this intersection. However, congestion in the northbound direction remained due to queues extending from the Kūhiō Highway/Kawaihau Road and Kūhiō Highway/Hauaala Road intersections.

[*7] Kūhiō Highway/Lehua Street*. The eastbound approach of this intersection operated at LOS F and overcapacity during both peak hours of traffic. Because Kapa'a Bypass Road terminates at the Olohena Road roundabout, vehicles heading farther north must reenter Kūhiō Highway. The majority of these vehicles use Lehua Street to make a left-turn onto Kūhiō Highway. The high volume of left-turns caused increased delay for the eastbound approach. At this intersection, congestion was observed along Kūhiō Highway in the northbound direction due to queues extending from Kawaihau Road and Hauaala Road intersections during both peak hours of traffic.

[8] Kūhiō Highway/Niu Street. The eastbound approach of this intersection operated at LOS E(C) and the westbound approach operated at LOS C(C) during the AM(PM) peak hours of traffic. At this intersection, congestion was observed along Kūhiō Highway in the northbound direction due to queues extending from the Kawaihau Road and Hauaala Road intersections.

[9] Kūhiō Highway/Kukui Street. The minor street movements operated at LOS F(D) during the AM(PM) peak hours of traffic. Delay to the minor movements was mainly caused by the long coordinated signal favoring the Kūhiō Highway through movements. All movements generally cleared in one cycle. However, during the most congested AM and PM periods, queues from the Kawaihau Road and Hauaala Road intersections caused slow moving traffic heading northbound.

[10] Kapa'a Bypass Road/Cane Haul Road/Olohena Road. Data from the Kapa'a Transportation Solutions report indicates the roundabout at this intersection generally operates smoothly during the PM peak hour of traffic, with all approaches operating at LOS C or better. However, during the AM peak hour, the eastbound approach operates at LOS E, near overcapacity conditions. The high volume of traffic is due to vehicles from residential areas and Kapa'a Middle School entering Kūhiō Highway and Kapa'a Bypass Road.

4.11.2 Potential Impacts and Mitigation

The TIAR evaluated traffic conditions in a future base year without the project, and then again with the project. The analysis below for "Base Year 2027" represents future conditions without the project. The analysis for "Future Year 2027" represents future conditions with the project.

4.11.2.1 Base Year 2027 (Future Conditions Without Project)

For the TIAR analysis, a Base Year 2027 was selected to represent the full build out and occupancy of the project. The actual construction of the infrastructure improvements and the commencement of lot sales will occur prior to 2027. However, because homes will be constructed by the individual lot purchasers, it is difficult to know when full build out will occur. Year 2027 represents a reasonable estimate for purposes of the TIAR.

The Base Year 2027 scenario represents the traffic conditions within the study area without the project. Base Year traffic projections were formulated by applying a defacto growth rate to the existing 2017 traffic count volumes, and adding trips generated by known future developments in the vicinity.

Defacto Growth Rate

Projections for Base Year 2027 traffic were based upon existing traffic counts performed by ATA for the TIAR, the State of Hawai'i Department of Transportation (HDOT)'s Kaua'i Regional Travel Demand Model (KRTDM) growth for forecast years between 2007 and 2035, and known

developments proposed in the vicinity. A 1% annual growth rate was applied to Kūhiō Highway, Cane Haul Road and Olohena Road, and a 2% annual growth rate was applied to Kukui Street.

Other Known Developments

By Year 2027, traffic in the project vicinity is expected to experience significant growth due to several residential and commercial developments proposed in the surrounding regions. The trips generated by these developments are already accounted for in the KRTDM growth forecast.

The locations of these known developments are shown in the TIAR. They are briefly described below.

- Piʻilani Mai Ke Kai – This project is located in Anahola on the *makai* side of Kūhiō Highway on land owned by the Department of Hawaiian Home Lands (DHHL). The project began in 2006 and includes 181 single-family lots. The majority of the lots have already been awarded. It is assumed by 2027, all lots will be built out. This development is already accounted for in the KRTDM growth projections.

- Kulana Subdivision – This project is located north of Olohena Road and east of Hauiki Road. This agricultural subdivision will contain 172 single family houses at full buildout. There is currently no expected completion date, however, the project is included in KRTDM forecasts.

- Hokua Place – This project is located between Olohena Road and Kapaʻa Bypass Road near Kapaʻa Middle School. The project plans to develop 100 single-family units, 700 multi-family units and 8,000 square feet of neighborhood retail. The project also proposes to construct a roadway, Road "A", through the subdivision connecting Kapaʻa Bypass Road to Olohena Road just west of Kapaʻa Middle School. Once constructed, the roadway is expected to reduce traffic volumes at the Kapaʻa Bypass Road/Cane Haul Road/Olohena Road roundabout. The Hokua Place project was previously known as Kapaʻa Highlands Phase II. A TIAR completed for Kapaʻa Highlands dated December 2013, assumes a completion year of 2020. The Kapaʻa Highlands TIAR was used to determine trips generated and rerouted in the study area.

- Coconut Plantation – This project is located along the *makai* side of Kūhiō Highway between the Courtyard by Marriott Kauai at Coconut Beach Hotel and the Mokihana Lodge. The project proposes to develop 192 resort units. There is currently no expected completion date, however, for the purposes of this TIAR, the project was assumed to be completed by 2027.

- Coconut Beach Resort – This project is located along the *makai* side of Kūhiō Highway between the Courtyard by Marriott Kauaʻi at Coconut Beach Hotel and Kauaʻi Coast Resort at the Beachboy. The project proposes to develop 330 condo units as part of a new beachfront timeshare. Completion is anticipated in 2019.

- Coco Palms – This project is located along the *mauka* side of Kūhiō Highway north of Kuamoʻo Road. The project proposes to restore the old Coco Palms hotel into a 350-room resort. These units were factored into traffic projections for 2027.

Planned Roadway Improvements

Roadway projects that are currently planned include a proposed roundabout at Kūhiō Highway and Mailihuna Road. For the purposes of the TIAR, it was assumed that the roundabout will be implemented by Base Year 2027. The existing three-legged intersection on Mailihuna Road, which currently has stop control only, would be reconfigured to improve safety by constructing a roundabout.

There are a number of other proposals to relieve congestion along Kūhiō Highway in the Wailua and Kapaʻa regions that are currently in the planning stages. They include major undertakings such as widening Kūhiō Highway from Kapaʻa Bypass Road to Kuamoʻo Road to include an additional southbound lane; widening Kūhiō Highway from Kuamoʻo Road to Kapule Highway; and extending the Kapaʻa Bypass Road from Olohena Road to Kūhiō Highway by adding a northbound lane. Other proposed improvements include closing the east leg of Kukui Street; improving the Kūhiō Highway/Niu Street intersection; and eliminating the connection from Hauaala Road to Kūhiō Highway and creating a new connection to the Kapaʻa Bypass road. These roadway improvements are not expected to be completed by Year 2027 and therefore were not included in Base Year 2027 traffic predictions.

Base Year 2027 Analysis

It is anticipated that by Base Year 2027, traffic will have increased by approximately 18%(24%) along Kūhiō Highway and by approximately 9%(14%) along Cane Haul Road/Kapaʻa Bypass Road during the AM(PM) peak hour over existing conditions. This is due to the development in the surrounding regions, though actual growth may vary based upon the approval process of the proposed developments.

Peak hour queuing along Kūhiō Highway is expected to operate similar to existing conditions. Although not expected to be completed by Year 2027, the planned widening of Kūhiō Highway from Kapaʻa Bypass Road to Kuamoʻo Road would reduce queues along Kūhiō Highway south of the study intersections. Queuing along Kūhiō Highway near Kawaihau Road is expected to remain in Base Year 2027.

Many minor street movements are expected to experience increases in delay due to the increase in traffic along Kūhiō Highway. However, the Kūhiō Highway/Mailihuna Rd intersection is expected to operate with all movements at LOS C or better due to the construction of the planned roundabout.

The following intersections are expected to continue operating at or worsen to LOS E/F during Base Year 2027 conditions.

- [2] Kūhiō Highway/Keālia Road
- [4] Kūhiō Highway/Kawaihau Road
- [5] Kūhiō Highway/Hauaala Road
- [7] Kūhiō Highway/Lehua Street
- [8] Kūhiō Highway/Niu Street
- [9] Kūhiō Highway/Kukui Street
- [10] Kapaʻa Bypass Road/Cane Haul Road/Olohena Road

Base Year 2027 With Mitigation

The TIAR notes that in order to improve Base Year 2027 traffic operations at the study intersections, the preferred mitigation would be a Kapaʻa Bypass Road extension and the relocation of the Hauaala Road connection, as described under "Planned Roadway Improvements" above. Although the Kapaʻa Bypass Road extension is currently planned by HDOT, the project is not expected to be completed by Year 2027. The TIAR describes 2027 scenarios with and without the Bypass Road Extension completed.

4.11.2.2 Future Year 2027 (Future Conditions With Project)

The Future Year 2027 scenario represents the traffic conditions in the area with the full build out of the proposed Keālia Mauka Homesites project. Access to the 235 lots will be provided via Keālia Road from Kūhiō Highway. A new four-way, one-lane roundabout will be constructed north of the Keālia Road/Hopoe Road intersection to connect Keālia Road to the subdivision. Both the southern and western approaches of the roundabout will have connections to Keālia Road.

There will be no other direct vehicle access to Kūhiō Highway from the Petition Area. An existing, unused gated access along Kūhiō Highway from the plantation era will be removed. By 2027, the 235 house lots will be sold, and homes will be constructed and occupied.

Travel Demand Estimates

In order to project the increase in vehicle trips generated by the project, the TIAR utilized trip rates and formulae from the Institute of Transportation Engineers (ITE) *Trip Generation Manual.* The standard rates selected were based on the future land use (single-family detached housing) and the number of dwelling units (235). The generated trips can be found in Table 5.2 of the TIAR. The traffic generated by the project was added to the forecast Base Year 2027 traffic volumes to estimate "Future Year 2027" traffic conditions.

At full build out, the project is estimated to generate a total of 172(231) net external trips during the AM(PM) peak hour of traffic. Traffic from the project is expected to generate growth along major roadways in the study area.

Future Year 2027 Analysis

The TIAR evaluated traffic conditions at the ten study intersections under two scenarios: 1) With the Kapaʻa Bypass Road Extension and 2) Without the Kapaʻa Bypass Road Extension. The findings are discussed below.

Future Year 2027 With Kapaʻa Bypass Road Extension. Similar to Base Year 2027 (i.e., without project), there will continue to be queuing along Kūhiō Highway south of the study intersections until the widening of the roadway is completed. A decrease in traffic queuing is expected in Kapaʻa town when the extension of the Kapaʻa Bypass Road and relocation of the Hauaala Road connection are complete.

The majority of study intersections are expected to experience increased delays compared to Base Year 2027. The following intersections are projected to either continue operating at or worsen to LOS E/F during the AM and/or PM peak hours. Traffic volume counts can be found in the TIAR,

[2] Kūhiō Highway/Keālia Road. Because Kūhiō Highway/Keālia Road is the only access point to the project from Kūhiō Highway, this intersection is expected to experience a significant increase in traffic. During both peak hours of traffic, the eastbound approach is expected to worsen to LOS F and overcapacity conditions. The westbound approach is also expected to operate at overcapacity conditions. Proposed mitigation is discussed below.

[4] Kūhiō Highway/Kawaihau Road. The eastbound approach is expected to continue operating at LOS F during the AM peak hour. However, the intersection is expected to self-regulate as in existing conditions to reduce delay to the eastbound approach. Because of a lack of feasible alternatives, no mitigation is proposed for this intersection.

[5] Kapa‘a Bypass Road/Hauaala Road. The southbound approach is expected to continue operating at LOS E during the AM peak hour. Because the approach will continue to operate under capacity as in Base Year 2027 with mitigation conditions, no mitigation is proposed for this intersection.

[6] Kūhiō Highway/Kapa‘a Bypass Road. The eastbound approach is expected to continue operating at or worsen to LOS F during both peak hours of traffic. Although the eastbound approach is expected to experience delays over Base Year 2027 conditions, the proposed refuge lane is anticipated to help minimize delays to the eastbound left-turn movement. Additionally, the approach will continue to operate under capacity, and no mitigation is proposed at this intersection during the PM peak hour. Mitigation is proposed in Section 5.4 below.

[7] Kūhiō Highway/Lehua Street. The eastbound approach is expected to continue operating at LOS E during the AM peak hour and worsen to LOS F during the PM peak hour. However, the intersection is expected to self-regulate as in existing conditions to reduce delay to the eastbound approach. All movements will continue to operate under capacity, and no mitigation is proposed at this intersection.

[8] Kūhiō Highway/Niu Street. The eastbound approach is expected to worsen to LOS F during the AM peak hour and continue operating at LOS E during the PM peak hour. As in Base Year 2027 conditions, adequate gaps in traffic are expected due the intersection’s proximity to the Kukui Street signal and the minor street movements are expected to continue operating adequately. No mitigation is proposed at this intersection.

[9] Kūhiō Highway/Kukui Street. Both minor street approaches are expected to continue operating at LOS F during the AM peak hour of traffic due to a longer green time being allotted to the Kūhiō Highway through movements. Because the minor streets will continue to operate under capacity, no mitigation is proposed for this intersection.

Future Year 2027 Without Kapa‘a Bypass Extension. Similar to Base Year 2027, queuing along Kūhiō Highway within and south of the Project area is expected to remain until congestion relief projects are completed in Kapa‘a and Wailua. In the Project area, while major through movements are expected to continue allowing other movements to proceed during congested periods to reduce major left-turn and minor movement delay, all movements are expected to experience longer delays over existing conditions.

The majority of study intersections are expected to experience increased delays compared to Base Year 2027. The following intersections are projected to either continue operating at or worsen to LOS E/F during the AM and/or PM peak hours. Traffic volume counts can be found in the TIAR.

[2] Kūhiō Highway/Keālia Road. Because Kūhiō Highway/Keālia Road is the only access point to the project from Kūhiō Highway, this intersection is expected to experience a significant increase in traffic. During both peak hours of traffic, the eastbound approach is expected to worsen to LOS F and overcapacity conditions. The westbound approach is also expected to operate at overcapacity conditions. Proposed mitigation is discussed below.

[3] Kūhiō Highway/Mailihuna Road. The eastbound approach is expected to worsen to LOS E during the AM peak hour of traffic due to anticipated reroutes of vehicles to this intersection from the congested Kawaihau Road and Hauaala Road. This intersection is expected to continue operating adequately with minimal increases in overall delay. No mitigation is proposed for this intersection.

[4] Kūhiō Highway/Kawaihau Road. The eastbound approach is expected to continue operating overcapacity at LOS F during the AM peak hour and LOS E during the PM peak hour. Similar to Base Year 2027, although a signal may be warranted at this intersection, it may create longer delays. However, the intersection is expected to self-regulate as in existing conditions to reduce delay to the eastbound approach. Additionally, a larger portion of vehicles may use Mailihuna Road to access Kūhiō Highway due to the improved conditions at that intersection with the roundabout. No mitigation is proposed for this intersection.

[5] Kūhiō Highway/Hauaala Road. The eastbound approach is expected to continue operating at LOS F during both peak hours and at overcapacity during the AM peak hour. Similar to Base Year 2027, although a signal may be warranted at this intersection, it may create longer delays. However, the intersection is expected to self-regulate as in existing conditions to reduce delay to the eastbound approach. Additionally, a larger portion of vehicles may use Mailihuna Road to access Kūhiō Highway due to the improved conditions at that intersection with the roundabout. No mitigation is proposed for this intersection.

[7] Kūhiō Highway/Lehua Street. The eastbound approach is expected to continue operating at LOS F and under capacity during both peak hours of traffic. The intersection is expected to self-regulate as in existing conditions to reduce delay to the eastbound approach. No mitigation is proposed for this intersection.

[8] Kūhiō Highway/Niu Street. The minor street approaches are expected to continue operating at or worsen to LOS E(F) during both peak hours of traffic. As in Base Year 2027 conditions, adequate gaps in traffic are expected due the intersection's proximity to the Kukui Street signal, and the minor street movements are expected to continue operating adequately. No mitigation is proposed at this intersection.

[9] Kūhiō Highway/Kukui Street. The northbound shared through/right-turn movement will continue operating at overcapacity during both peak hours of traffic with increases in delay. Additionally, both minor street approaches are expected to continue operating at LOS E or F during both peak hours of traffic. Because there is limited right of way (ROW) to improve capacity along Kūhiō Highway and the minor streets will continue to operate under capacity, no mitigation is proposed for this intersection.

Future Year 2027 With Proposed Mitigation. The TIAR evaluated two potential mitigations for the Kūhiō Highway/Keālia Road intersection. The first was to construct a roundabout. However, this option is problematic from a design standpoint due to the skew of the intersection.

The preferred mitigation is to install a traffic signal to improve operations along Keālia Road. Based on projections for Future Year 2027 and the Four-Hour Vehicular Volume signal warrant condition (Warrant 2) in the Manual on Uniform Traffic Control Devices (MUTCD) (FHWA, 2009), a signal will likely be warranted at this intersection. Although a signal would slow through progression along Kūhiō Highway when vehicles actuate the signal on Keālia Road, the signal would be designed to provide Kūhiō Highway with the majority of green time. Additionally, because the Kūhiō Highway/Keālia Road intersection is relatively isolated, queuing at the signal is not expected to affect traffic operations in the area.

As part of the installation of a traffic signal, a right turn will be provided onto Keālia Road and the existing bus stop/bay to the south of the intersection will need to be relocated. Figure 4-10 illustrates the proposed traffic mitigation at this intersection. With this mitigation, both the eastbound and westbound approaches will operate at LOS C during both peak hours of traffic. Additionally, the intersection will operate with overall LOS B during both peak hours.

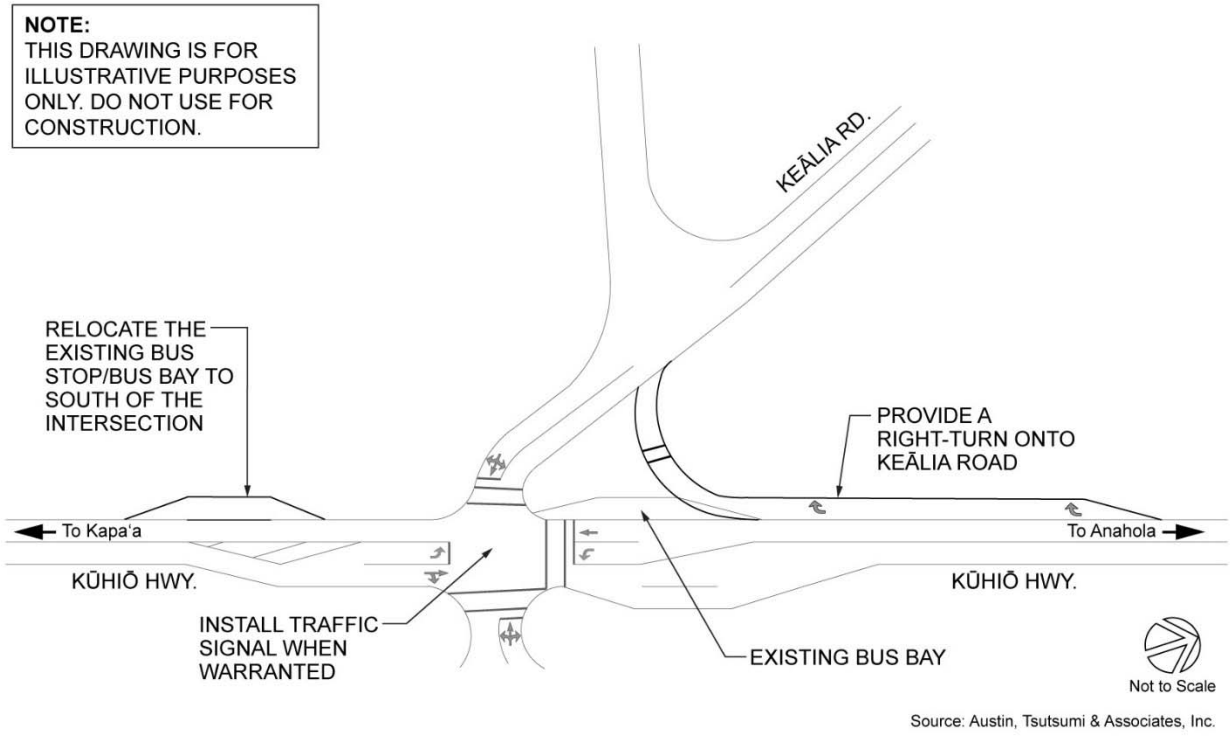


Figure 4-10. Proposed Traffic Mitigation, Kūhiō Highway and Keālia Road

Future Year 2027 Sustainable Transportation

The proposed traffic mitigation for the project will include improvements to the eastbound approach of Keālia Road, including the addition of a sidewalk. The installation of a traffic signal at the Kūhiō Highway/Keālia Road intersection will provide signalized crossings along the southbound, eastbound and westbound approaches. These will improve conditions for pedestrians. The existing bus stops at the intersection will be relocated but will continue to be available.

The County has proposals to modify bus routes to improve access from the project vicinity to Kapaʻa Middle and High Schools. The State Bike Plan has identified Kūhiō Highway near Keālia Road as a future signed shared roadway, furthering the goal of regional bicycle connectivity. Ke Ala Hele Makalae will continue provide a nearby amenity for walking, jogging, or recreational bike riding, and could also provide a transportation option into Kapaʻa.

These improvements to sustainable transportation modes will benefit future residents of Keālia Mauka. That said, the major constraint to the use of sustainable mode of transportation by residents will continue to be the poor connectivity between the subdivision and Kūhiō Highway. The narrow width of Keālia Road, lack of sidewalks or shoulders, combined with the uphill terrain and roadway curves make this segment uninviting—and potentially dangerous--for bicycling and walking. Starting from the Keālia Road and Kūhiō Highway intersection, walking, bicycling, and public transit are more attractive and realistic transportation options.

4.12 PUBLIC SERVICES

There will be an estimated 700 residents of the subdivision that will move into the Keālia region. The project impacts and any recommended mitigation for public services are discussed in the following sub sections.

4.12.1 Police Protection

4.12.1.1 Existing Conditions

The County of Kauaʻi Police Department has three stations located approximately 25 miles apart. The main station and administrative headquarters is located in Līhuʻe, and collocated with the County Civil Defense and County Prosecuting Attorney's office. District stations are located at Waimea in West Kauaʻi and Hanalei on the north shore. A small substation is located in Kapaʻa adjacent to Kapaʻa Beach Park.

The Project Area is under the jurisdiction of the Hanalei District, which extends north from Olohena Road in Kapaʻa and covers the entire northern end of the island. The Hanalei District covers the communities of Kapaʻa, Keālia, Anahola, Kīlauea, Princeville, Hanalei, Wainiha and Hāʻena. The district substation is located on Kūhiō Highway just north of the Princeville Shopping Center. The Hanalei District is comprised of three squads of officers, responsible for staffing three "beats" with 24 hour coverage, 7 days a week. When fully staffed, personnel include one Lieutenant (District Commander), three sergeants, 21 police officers, and a senior clerk.

4.12.1.2 Potential Impacts and Mitigation

The increased number of residents associated with the project is not likely to have a significant impact on the overall need for police services. The majority of future residents (approximately 658

of 700) are expected to be existing Kauaʻi residents, so the project will not result in a large net increase in population. The proposed traffic improvements (signal) will mitigate the impact of increased traffic at the Kūhiō Highway and Keālia Road intersection.

4.12.2 Fire Protection

4.12.2.1 Existing Conditions

The Kauaʻi County Fire Department has eight fire stations islandwide: Hanalei (Princeville), Kaiakea, Kapaʻa, Līhuʻe, Koloa, Kalaheo, Hanapēpē and Waimea. The station nearest the Petition Area is Station 8, Kaiakea Station located in Kapaʻa. The county has a unified, island-wide system of fire protection and rescue services. Satellite stations typically have two to three personnel per station and provide quick response to medical emergencies. The Kaiakea Station is staffed with three to five fire fighters. Firefighting apparatus include one engine (pumper), one truck, and one hazmat vehicle (personal communication with Kalani Abreu, Kaiakea Station, March 6, 2018).

4.12.2.2 Potential Impacts and Mitigation

The project proposes 235 additional homes which will need fire protection from the Kaiakea Station in Kapaʻa. Because most of the 700 subdivision residents are expected to be current Kauaʻi residents, there will not be a significant net population increase to the island. The Proposed Action should not have a significant impact on fire protection resources or service. The subdivision roads will be designed to accommodate fire vehicle access and equipment, and the water system will be designed to provide adequate firefighting and storage capacity. No additional mitigation is required.

4.12.3 Medical Services and Facilities

4.12.3.1 Existing Conditions

The Mahelona Medical Center is Kauaʻi's eastside critical access hospital. The facilities are part of the Kauaʻi region of Hawaiʻi Health Systems Corporation, headquartered at a sister facility, West Kauaʻi Medical Center in Waimea. Services include 24 hour emergency services, imaging (digital x-ray), rehabilitation therapies (occupational, physical, and recreational), skilled nursing, intermediate, long term and acute care. The medical center has approximately 145 employees.

The medical facilities include the Samuel Mahelona Memorial Hospital, which was founded in 1917. The medical campus also includes the East Kauaʻi Clinic, and Hoʻola Lahui Hawaiʻi (Federally Qualified Health Clinic), Kauaʻi Police Athletic League, and state and hospital housing.

4.12.3.2 Potential Impacts and Mitigation

The addition of 235 new housing units will not have an impact on the Mahelona Medical Center or other medical services on the island. The majority of the prospective homeowners are already Kauaʻi residents, and there will be only a negligible increase in demand for medical services, if at all. No mitigation measures are required.

4.12.4 Schools

4.12.4.1 Existing Conditions

Public schools serving the Keālia area include Kapaʻa Elementary School, Kapaʻa Middle School and Kapaʻa High School, as well as the Kanuikapono Public Charter School in Anahola, which serves Grades K-12. According to the State of Hawaiʻi Department of Education (DOE), Kapaʻa Elementary School currently has capacity for approximately 29 additional students. However, excess capacity is expected to be eliminated over the next five years. Kapa'a Intermediate School has classroom capacity for roughly 125 additional students, which is expected to remain the same for the next five years. Kapaʻa High School is over capacity by 100 students. The over-capacity condition will continue over the next five years (correspondence from DOE dated December 22, 2017, see Chapter 9).

Independent (private) schools in the area include the Anahola campus of Kamehameha Schools Preschool. There are also several private pre-schools located in Kapaʻa.

4.12.4.2 Potential Impacts and Mitigation

Public school enrollment generated by the Proposed Action was estimated using student generation rates provided by the DOE Office of School Facilities and Support Services. The student generation rates (SGR) for elementary, middle, and high school students were calculated using the Kealaula Subdivision in Eleʻele as a comparable. This subdivision targets a similar sales demographic and has lot sizes similar to the Proposed Action.

Level	Student Generation Rate (SGR)	Hsg Units	# Students
Elementary	0.2241	235	53
Middle	0.0345	235	11
High School	0.1552	235	37
Total			101

The SGR are subject to the following disclaimers:

1. That the SGR is based on student addresses currently in the HIDOE system and may not be accurate due to inaccurate student addresses (i.e. data entry errors);
2. That Pre-K and Charter school students are excluded from the SGR calculations;
3. That it is assumed that the information regarding street names, addresses, and number of built units are accurate; and
4. That the project is not at mature build out as the subdivision has 61 lots with 58 housing units built.

Utilizing these SGR, the proposed 235 residential lots may generate a total of 101 school-aged children. This includes 53 elementary school age children (235 x 0.2241= 53 students); 11 middle school age students (235 x 0.345= 11 students); and 37 high school age students (235 x 0.1552= 37 students). These projections represent the anticipated number of students at full subdivision build out, which could occur over the next 10 years. The proposed lot sizes do not allow Additional

Dwelling Units (ADU) per the County's zoning ordinance, so no more than one single-family home would be built on each lot.

Because the Keālia Mauka residential lots are targeted to local residents, most of these 101 students are already attending Kauaʻi public schools, although not necessarily in the Kapaʻa schools complex. The economic and market study estimates that over 80 percent of the prospective buyers will be existing Kauaʻi residents. The remaining 20 percent of would be non-resident second/vacation home buyers (CBRE, 2017). Using this assumption, 20 percent of the total 235 lots, or 47 lots could be purchased by an off-island buyer. Applying the DOE standard multipliers to these 47 households, the potential new students to the Kauaʻi island school system is estimated to be eleven elementary school aged children (47x 0.2241=11 students); two intermediate school students (47 x 0.345=2 students); and eight high school students (47 x 0.1552=8). This results in a total of 21 students who are "new" to the Kauaʻi school system. In reality, many of the off-island purchasers will be empty nesters without school aged children. Those with school-aged children may also choose to send their children to Kauaʻi's private, rather than public schools.

In summary, a worst case estimate of 21 new students to the Kauaʻi public schools over a ten year build out period will not have a significant adverse impact.

4.12.5 Parks and Recreational Facilities

4.12.5.1 Existing Conditions

There are 15 parks within the County of Kauaʻi's Kawaihau Planning District, which includes the Keālia Petition Area. These County parks encompass 211 acres of land and include athletic fields, playgrounds, beach parks, and playing courts. Keālia Beach Park, located across Kūhiō Highway from the Petition Area, is 66 acres in size and is serviced by County lifeguards, with portable toilets only. The County's multi-use path, Ke Ala Hele Makalae, extends from Lydgate Park in Kapaʻa to Ahihi Point, and is proposed to continue northward to Anahola. This 6.2 mile multi-use path runs along the coastline and provides a major recreation resource for walking, jogging and bicycling.

The Keālia coastline is used for a number of recreational activities, despite the lack of County facilities. Keālia Beach is a long strip of sandy beach located on the *makai* side of the highway providing scenic views of the coastline. Strip parking occurs along gravel and dirt areas of this beach park from Kapaʻa Stream up to the northern end of the park. The southern section of this beach is commonly used for surfing and fishing. The only public facilities present are a temporary lifeguard stand and a few picnic tables. At the northern end of this beach is an unpaved parking area. This portion of the beach is used for swimming, picnicking, surfing and fishing.

4.12.5.2 Potential Impacts and Mitigation

The Proposed Action will not adversely impact County parks and other public recreation facilities in the area. The majority of subdivision residents are already Kauaʻi residents, so the increased demand on public recreational facilities will be minimal.