
Chapter 20101

Kōloa Aquifer System Area

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20101 KŌLOA AQUIFER SYSTEM AREA

20101-1 SYSTEM AREA PROFILE

20101-1.1 General

The Kōloa [20101] Aquifer System Area (ASYA) is roughly bound on the east by the Hā‘upu Mountain Range, Knudsen Gap, and Mount Kāhili, on the west by the Wahiawa Gulch, and on the south by the Pacific Ocean. The Kōloa ASYA lies almost entirely within the South Kaua‘i Planning District and includes the communities of Po‘ipū, Kukui‘ula, Kōloa, ‘Ōmao, Lāwa‘i, and Kalāheo. The Kōloa ASYA also includes the community of ‘Ele‘ele.

The South Kaua‘i Community Plan, adopted in July 2015, does not provide quantitative target numbers for the future development within the planning area. It does, however, describe the desired qualitative goals and objectives for the area that were developed with input from the community.

As described in the South Kaua‘i Community Plan (Section 2.1 Vision Statements), “South Kaua‘i is comprised of distinct rural communities, each embracing its own rich cultural, natural, and historic heritage”.

- Kōloa: Is to be maintained as a thriving commercial and residential community while preserving its existing rural feel and historic old sugar plantation charm.
- Po‘ipū: Is to be a world-class, sustainable resort destination servicing both residents and visitors to the island. The area is to be well-connected and accessible to everyone and is to be developed responsibly with clean, healthy beaches and ocean environments, welcoming parks, and preserved heritage resources.
- Kalāheo: Is to remain a residential community with neighborhood scaled commercial center and supported by small businesses.
- ‘Ōmao: Is to be maintained as a small rural residential community.
- Lāwa‘i: Is to remain a rural crossroads with limited commercial areas centered on the Post Office and Old Cannery.

The South Kaua‘i Community Plan (§2.2 Guiding Principles) also identified a set of nine guiding principles under which the plan’s vision is to be implemented. Key principles with regards to the development and management of water resources include:

- Watershed Management: Recognition that water resource services and nature are interrelated
- Hazard and Climate Risk Management: Prepare for potential impacts of natural hazards and climate changes
- Sustainable Resorts and Tourism: This is tied into the development of the Po‘ipū Resort area as a sustainable visitor destination

- Diversity of Housing Types: Support workforce housing development within and around town cores
- Public Infrastructure and Facilities: Prioritize (development and improvements) to meet basic needs and support economic development

Average annual rainfall ranges from 35 inches per year along the coast to 160 inches in the mountains. The sustainable yield is 29 mgd.

20101-1.2 Economy and Population

20101-1.2.1 Economy

Poʻipū is currently the most popular visitor destination on the island and has the highest concentration of visitor accommodation units on the island and is anticipated to remain so into the future. In 2014, The Hawaiʻi Tourism Authority estimated that approximately 36 percent of the visitor units in inventory on Kauaʻi were located in the Poʻipū-Kukuiʻula area.

The largest industries in the various town areas located within the Kōloa ASYA are as follows:

- Kōloa: Accommodation and food service, retail trade, and administration, support, waste management services.
- Poʻipū : Accommodation and food service, public administration, and healthcare and social assistance
- Kalāheo: Accommodation and food service, retail trade, and educational services
- ʻŌmao: Retail trade, accommodation and food service, and healthcare and social assistance
- Lāwaʻi: Accommodation and food service, educational services, and retail trade
- ʻEleʻele: Port Allen is an active harbor and industrial hub

20101-1.2.2 Population

The population contributing to the water demand within the Kōloa ASYA is almost completely from the South Kauaʻi Planning District. Historical population data, as summarized in **Table 20101-1**, shows that, over the past 20 years, this area has experienced growth in the order of 10 to almost 15 percent per decade.

Population projections for the Kōloa ASYA are summarized through the year 2035 in **Table 20101-2a**. For planning purposes, a range of values (low, medium and high estimates) is provided. As shown in **Table 20101-2b**, it is estimated that the area will continue to experience growth rates between 10 and 15 percent per decade.

Table 20101-1: Historical Population – Kōloa ASYA

	Year		
	1990	2000	2010
Population	10,918	12,032	13,825
Percent Change		10.2	14.9

Data Source: Socioeconomic Analysis and Forecasts (2014) Technical Report.
Data redistributed and evaluated for Kōloa ASYA.

Table 20101-2a: Population Projection – Kōloa ASYA

Growth Rate	Population by Year								
	2015	2016	2017	2018	2019	2020	2025	2030	2035
A – Low	14,655	14,813	14,972	15,132	15,293	15,454	16,278	17,127	18,002
B – Med.	14,799	15,005	15,212	15,421	15,632	15,845	16,939	18,083	19,275
C – High	14,823	15,037	15,253	15,470	15,690	15,912	17,051	18,248	19,496

Data Source: Socioeconomic Analysis and Forecasts (2014) Technical Report. Data redistributed and evaluated for Kōloa ASYA.

Table 20101-2b: Population Projection – Percent Change – Kōloa ASYA

Growth Rate	2015-2025 % Change	2025-2035 % Change
A – Low	11.1	10.6
B – Medium	14.5	13.8
C – High	15.0	14.3

20101-1.3 Land Use

20101-1.3.1 2000 Kaua‘i General Plan

The 2000 Kaua‘i County General Plan Land Use Designation Map for the Kōloa ASYA is shown on **Figure 20101-1**. The estimated land use allocation acreage for each land use designation within the system area is listed in **Table 20101-3**.

Table 20101-3: General Plan Estimated Land Use Allocation Acreage – Kōloa ASYA

General Plan Land Use Designation	Acreage	Percent of Total
Agricultural	15,368	47.2
Military	0	0.0
Open	12,365	37.9
Park	277	0.9
Residential Community	3,843	11.8
Resort	596	1.8
Transportation	9	0.0
Urban Center	124	0.4
DHHL	0	0.0
TOTAL	32,582	100.0

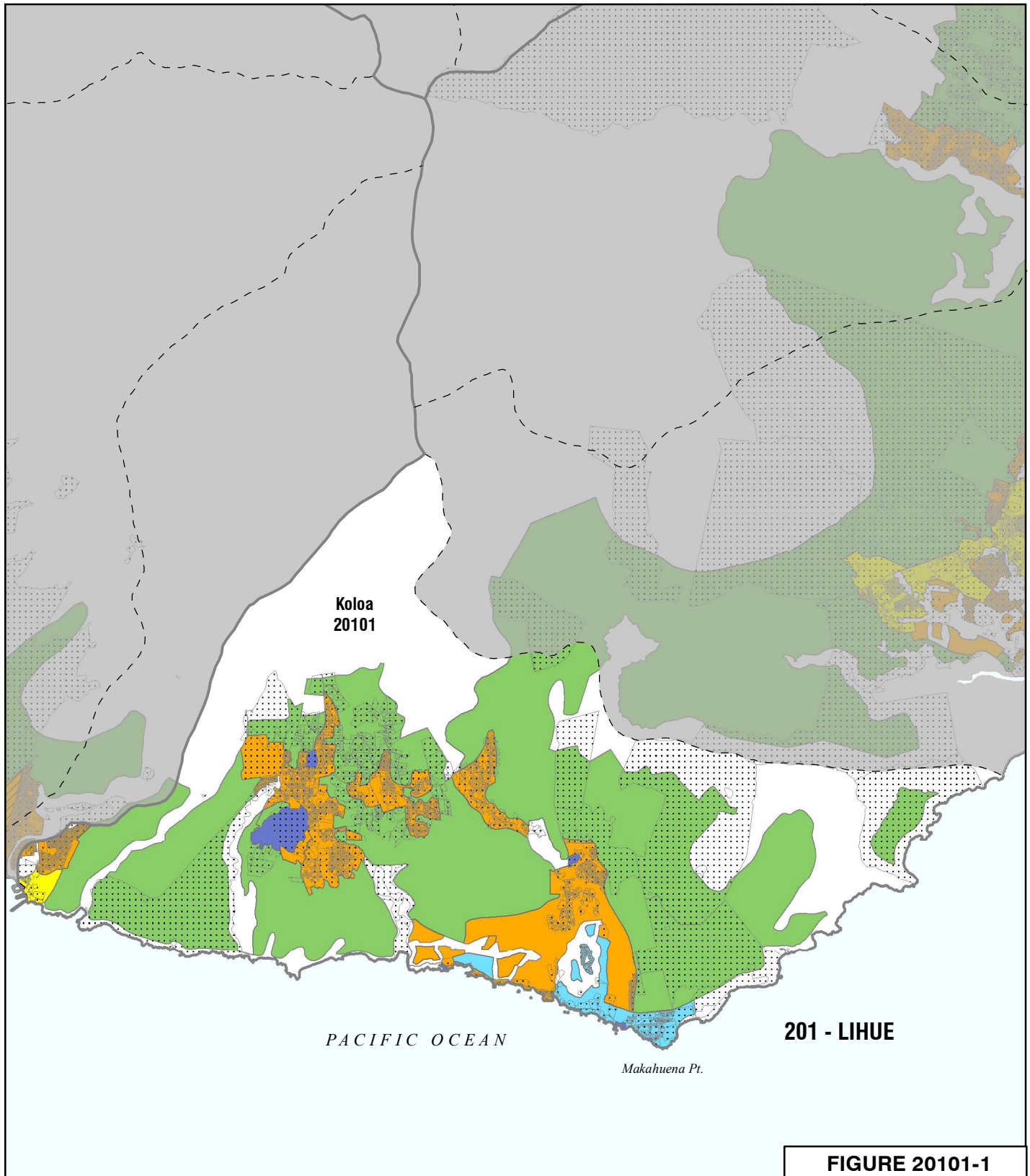
20101-1.3.2 Kauaʻi Zoning

Kauaʻi County Zoning Map for the Kōloa ASYA shown on **Figure 20101-2**. The estimated land use allocation acreage for each zoning district within the system area is listed in **Table 20101-4**.

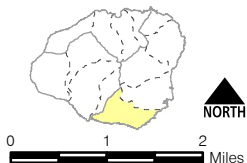
Table 20101-4: County Zoning Estimated District Allocation Acreage – Kōloa ASYA

Zoning District	Acreage	Percent of Total
Agriculture	15,193	46.3
Commercial – General	53	0.2
Commercial - Neighborhood	64	0.2
Conservation	8,136	24.8
Industrial – General	53	0.2
Industrial - Limited	32	0.1
Open	6,252	19.0
Residential	2,644	8.0
Resort	123	0.4
Project Development	12	0.0
Special Planning Area	0	0.0
Special Treatment	0	0.0
No Zoning	251	0.8
DHHL	0	0.0
TOTAL	32,813	100.0

Estimated water demand for the Kōloa ASYA will be based on the number of dwelling units allowed in residential and resort districts varies by the type of residential or resort district. The average number of dwelling units allowed in residential districts in the Kōloa ASYA is 5.40 dwelling units per acre. The average number of dwelling units allowed in resort districts in the Kōloa ASYA is 13.72 dwelling units per acre.



INDEX MAP - Island of Kaua'i



LEGEND:

- Aquifer Sector Areas
- - - Aquifer System Areas
- ▨ Hawaiian Home Lands
- ⋯ Developed Properties

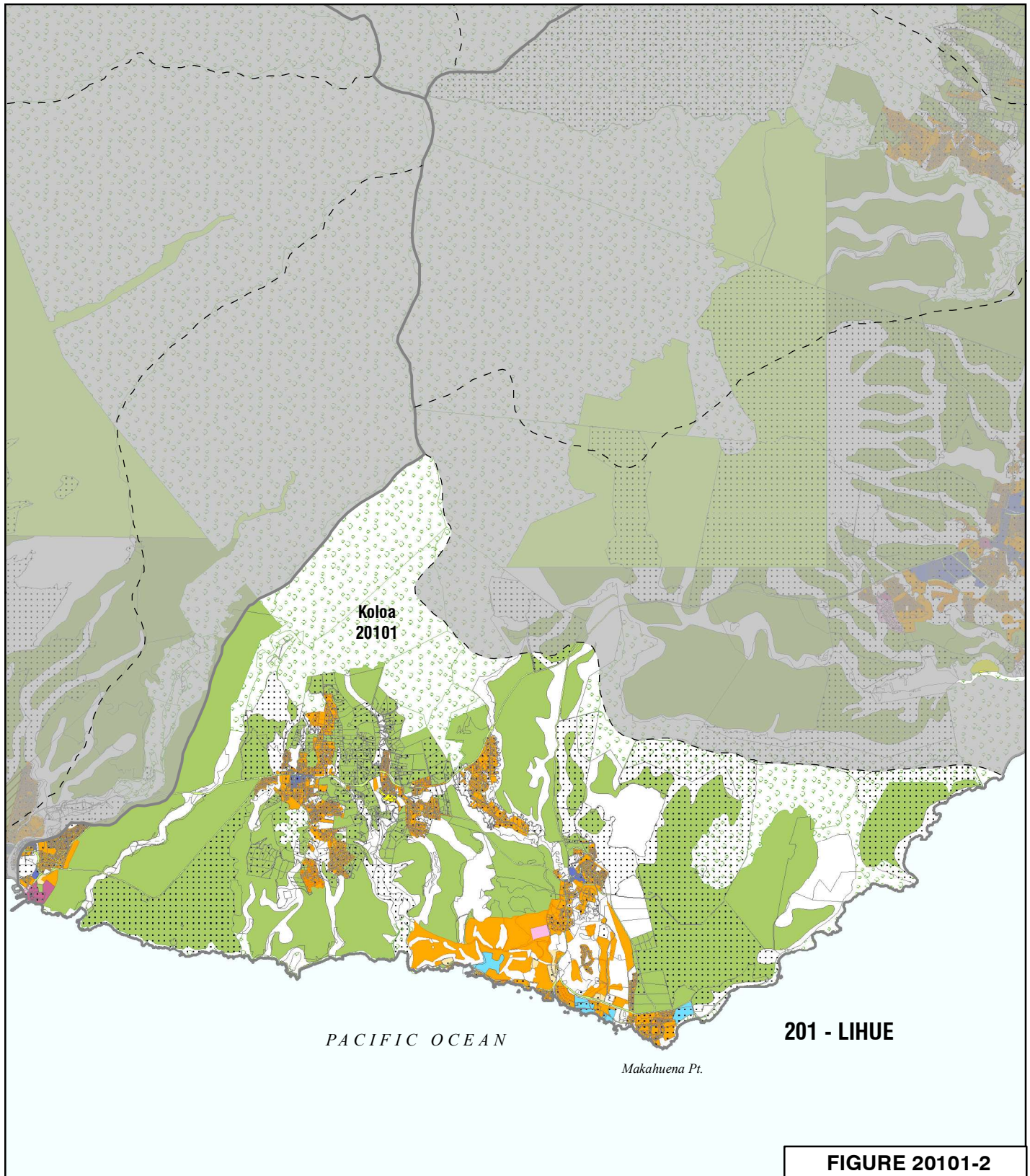
Land Use Allocation Guide

- | | |
|--|--|
| Agricultural | Residential Community |
| Open | Resort |
| Park | Transportation |
| Military | Urban Center |

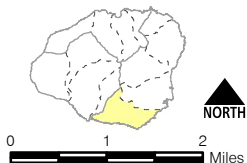
FIGURE 20101-1

**GENERAL PLAN
LAND USE MAP**

Aquifer Sector: LIHUE - 201
Aquifer System:
KOLOA - 20101



INDEX MAP - Island of Kaua'i



LEGEND:

- Aquifer Sector Areas
- - - Aquifer System Areas
- ▨ Hawaiian Home Lands
- ▤ Developed Properties

Zoning Designations:

- Agriculture
- Commercial - General
- Commercial - Neighborhood
- Conservation
- Industrial - General

- Industrial - Limited
- No Zoning
- Open
- Residential
- Resort
- Special District

FIGURE 20101-2

COUNTY ZONING

Aquifer Sector: LIHUE - 201
 Aquifer System:
 KOLOA - 20101

20101-2 EXISTING WATER RESOURCES

20101-2.1 Ground Water

The Kōloa ASYA has a sustainable yield of 29 mgd. According to the 2014 CWRM database, there are 35 production wells in the system, 5 agriculture, 12 municipal, 3 domestic, 5 industrial, 9 irrigation, and 1 well with a user type of “other”. There are also 10 drilled wells drilled and categorized as “unused”. Refer to **Appendix A** for the 2014 database. **Figure 20101-3** shows the well locations.

20101-2.2 Surface Water

There are four streams classified as perennial within the Kōloa ASYA, all of which are considered continuous. The continuous streams are Kīpū Kai Stream, Waikomo Stream, Lāwaʻi Stream, and Wahiawa Stream. The USGS has one active surface water gage in the system area. The gage is located on Lāwaʻi Stream.

There are 21 non-potable reservoirs located within the Kōloa ASYA. The largest of these reservoirs are the Waitā and the Alexander Reservoirs. The Waitā Reservoir, located near Kōloa Town, along with other non-potable reservoirs in the area are fed by surface waters from perennial streams and diverted through man-made ditches. The non-potable water from these reservoirs, supplemented by approximately 0.47 mgd of recycled treated wastewater¹, are used for irrigation of landscaped areas and golf courses within the Kōloa ASYA. The Alexander Reservoir was created by damming the Wahiawa Stream above Kalāheo. The Alexander Reservoir provides hydroelectric power and irrigation water to Kauaʻi Coffee plantation.

In accordance with the Code, the CWRM must establish and administer instream flow standards (IFS) on a stream-by-stream basis as necessary to protect public interests. IFS is defined as “a quantity or flow of water or depth of water which is required to be present at a specific location in a stream system at certain specified times of the year to protect fishery, wildlife, recreational, aesthetic, scenic, and other beneficial instream uses.” Considerably more research and study need to be completed to accumulate the data and perspective necessary to conduct a thorough and meaningful assessment of IFS. Until permanent IFS are established, interim IFS have been adopted. The interim IFS are defined as the amount of water flowing in each stream at the time the administrative rules governing them were adopted in 1988 and 1989. In order to assess surface water sustainability, this KWUDP assumes that no additional diversions will be allowed from any stream without amendment of the interim IFS.

The CWRM database lists 44 stream diversions in Kōloa ASYA, see **Table 20101-5** for listing and **Figure 20101-4** for locations. This accounts for about 15 percent of the 292 declared stream diversions on the island. The declared stream diversions are listed in **Appendix B**. The total declared flow for the Kōloa ASYA is 9.93 mgd. In addition, some existing irrigation systems have the capability to transfer surface water to adjacent ASYAs. 11.26 mgd of declared flow from

¹ Estimated recycled water in 2013. Reference: 2015 South Kauaʻi Community Plan

diversions in the Hanapēpē ASYA appear to be associated with irrigation lines that have service area in the Kōloa ASYA.

Table 20101-5: Kōloa ASYA Stream Diversions

Unit Code	Unit Name	Area (sq. mi.)	Demand ² (mgd)	No. of Diversions	No. of Gages	Active Gages	Interim IFS
2048	Māhā‘ulepū	13.43	0.000	6	0	0/0	HAR §13-169-45
2049	Waikomo	9.12	1.000	11	0	0/0	HAR §13-169-45
2050	Aepo	2.58	0.000	5	0	0/0	HAR §13-169-45
2051	Lāwa‘i	9.73	1.739	11	2	0/0	HAR §13-169-45
2052	Kalāheo	6.56	0.000	9	0	0/0	HAR §13-169-45
2053	Wahiawa	7.34	7.175	1	0	0/0	HAR §13-169-45

Reference: 2019 WRPP

The Alexander Reservoir provides water to the Kaua‘i Coffee Irrigation System. This system is owned by McBryde Sugar Company and operated/maintained by Kaua‘i Coffee Company, both wholly owned subsidiaries of Alexander & Baldwin, LLC. The irrigation system was originally constructed to irrigate sugarcane fields in Hanapēpē through ‘Ele‘ele, Kalāheo, Lāwa‘i, and into Kōloa. The system includes:

- Alexander Dam Ditch
- Pump 3 Ditch

The Waitā Reservoir is the largest fresh water body in the State. The reservoir is fed from the Waiahi-Ku‘ia Aqueduct, Waiahi-‘Ili‘ili‘ula Ditch, and Kōloa-Wilcox Ditch. This system was formerly owned by Kōloa Plantation and was developed to irrigate the leeward coastal plains in and around Kōloa, Po‘ipū, and Lāwa‘i. Little is known about the overall current condition of the system; however, the upstream portion of the existing system may have been partially abandoned. The downstream portion of the system still provides irrigation water to the Kōloa and Po‘ipū areas. The Lāwa‘i portion of the system is reportedly in good condition and being maintained.

20101-2.3 Water Conservation

Water conservation measures for this ASYA are as described in **Section 1.5.7** of this report. There are no ASYA specific special conservation measures in place at this time.

20101-2.4 Rainwater Catchment

Rainwater catchment is a viable resource for areas that are not served by ground water or surface water. **Figure 20101-5** shows the possible catchment areas, or parcels with a building value greater than \$20,000 and assumed to be developed but without a ground water or surface water source.

² 1989 Declared Surface Water Use

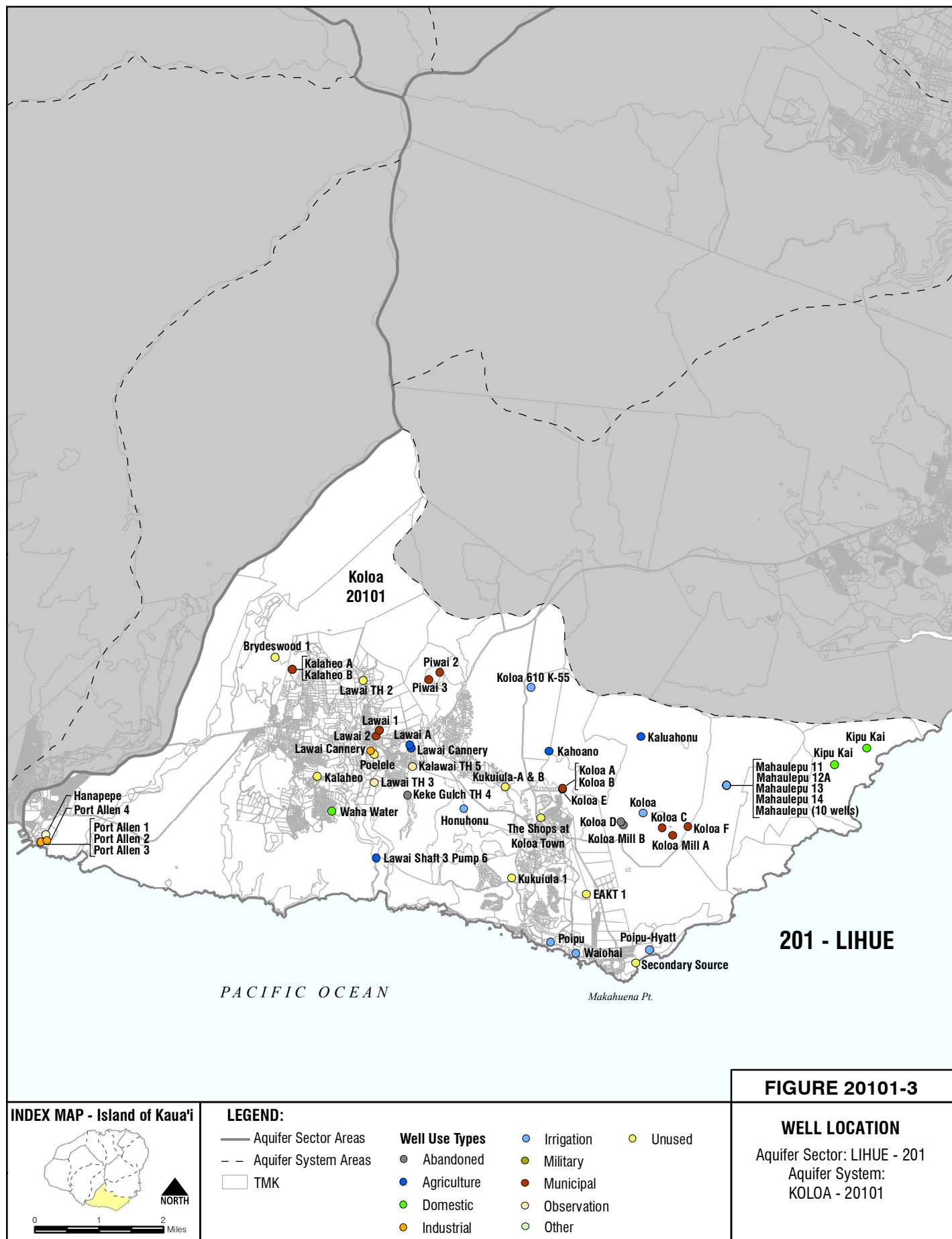
20101-2.5 Recycled Water

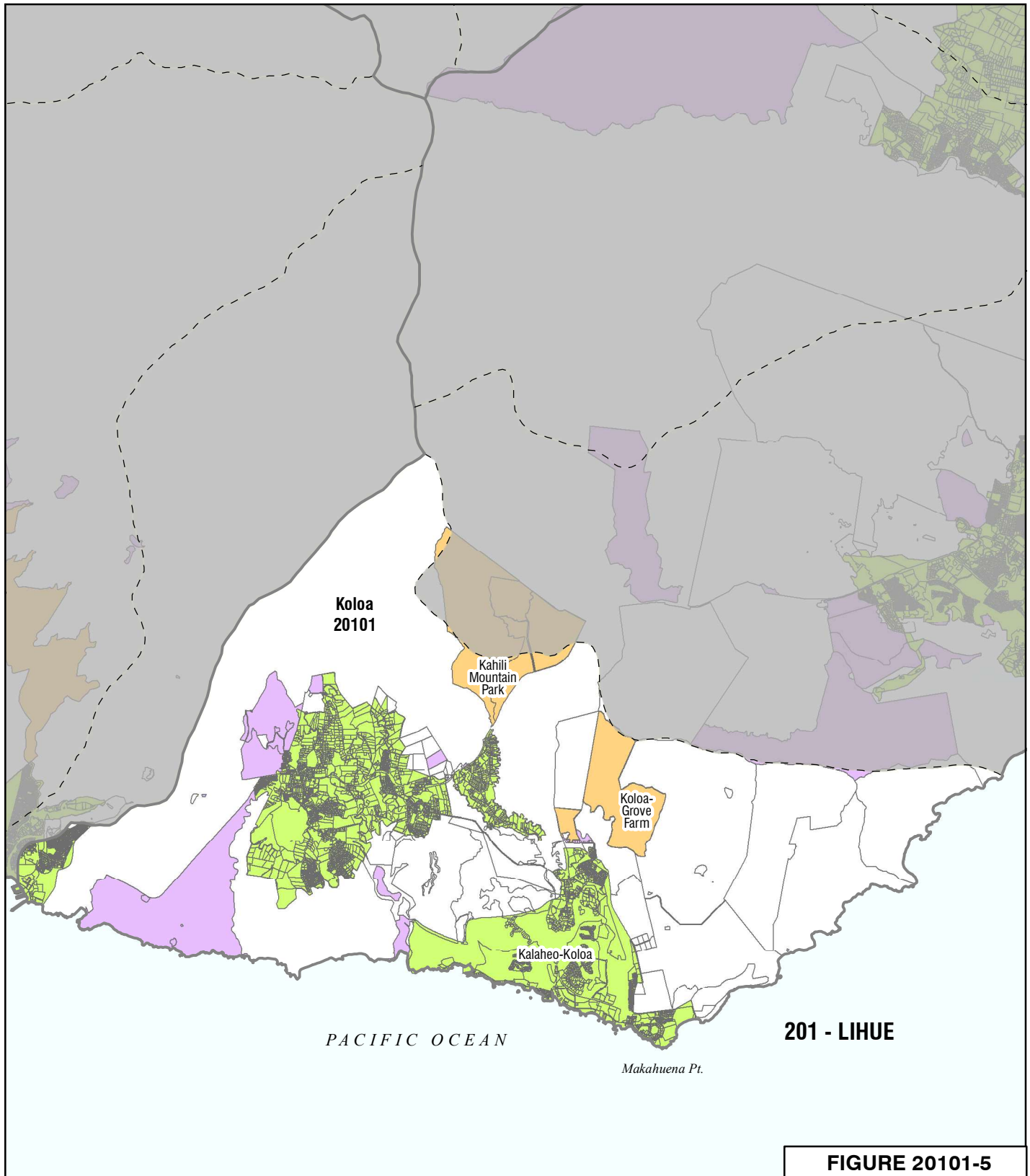
There are 2 wastewater reclamation facilities in the Kōloa ASYA. **Table 20101-6** lists the wastewater facilities, recycled water classification, facility treatment capacity, current reuse amount, facility type, and current application. **Figure 20101-6** shows the facility locations.

Table 20101-6: Wastewater Reclamation Facilities – Kōloa ASYA

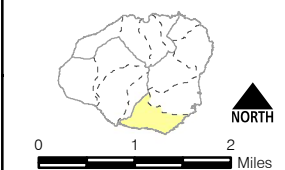
WWRF/ WWTP	Recycled Water Classification	Design Capacity (mgd)	Quantity Produced (mgd)	Current Reuse Amount (mgd)	Owner	Irrigation Application
Grand Hyatt WWRF	R-2	0.25	N/R	0.11	Private	Po‘ipū Bay Resort Golf Course
Po‘ipū WRF	R-1	0.8	N/R	0.30	Private	Kiahuna Golf Course, Kōloa Landing (landscape irrigation)

N/R: Not reported





INDEX MAP - Island of Kaua'i



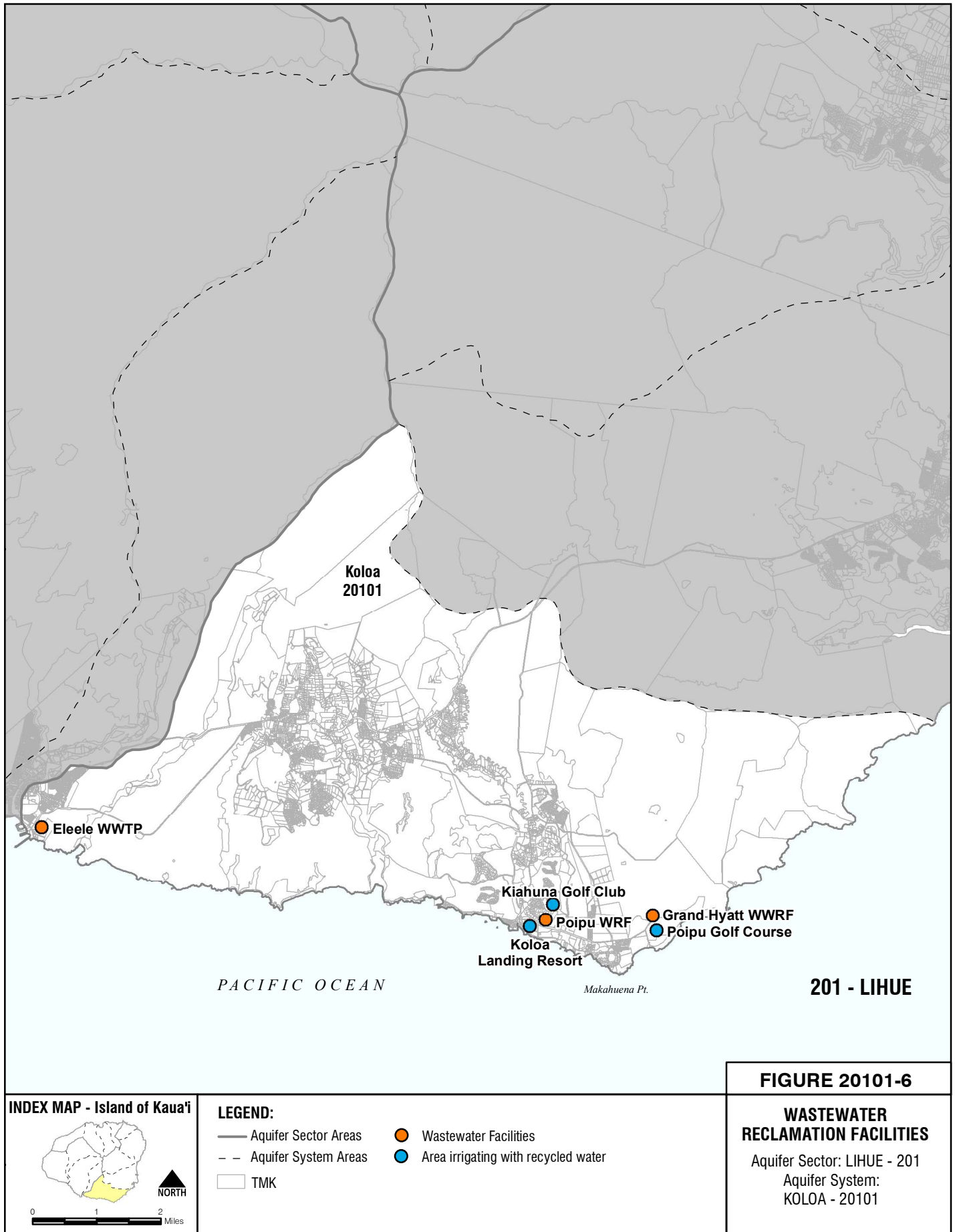
LEGEND:

- | | |
|--------------------------|---|
| — Aquifer Sector Areas | Light Green Box: DOW Service Area |
| - - Aquifer System Areas | Orange Box: Private Water System |
| | Light Blue Box: State Water System |
| | Yellow Box: Federal Water System |
| | Purple Box: Possible Catchment Area (Building Value > \$20,000) |

FIGURE 20101-5

WATER SYSTEM & SERVICE AREA

Aquifer Sector: LIHUE - 201
 Aquifer System:
 KOLOA - 20101



20101-3 EXISTING WATER USE

20101-3.1 General

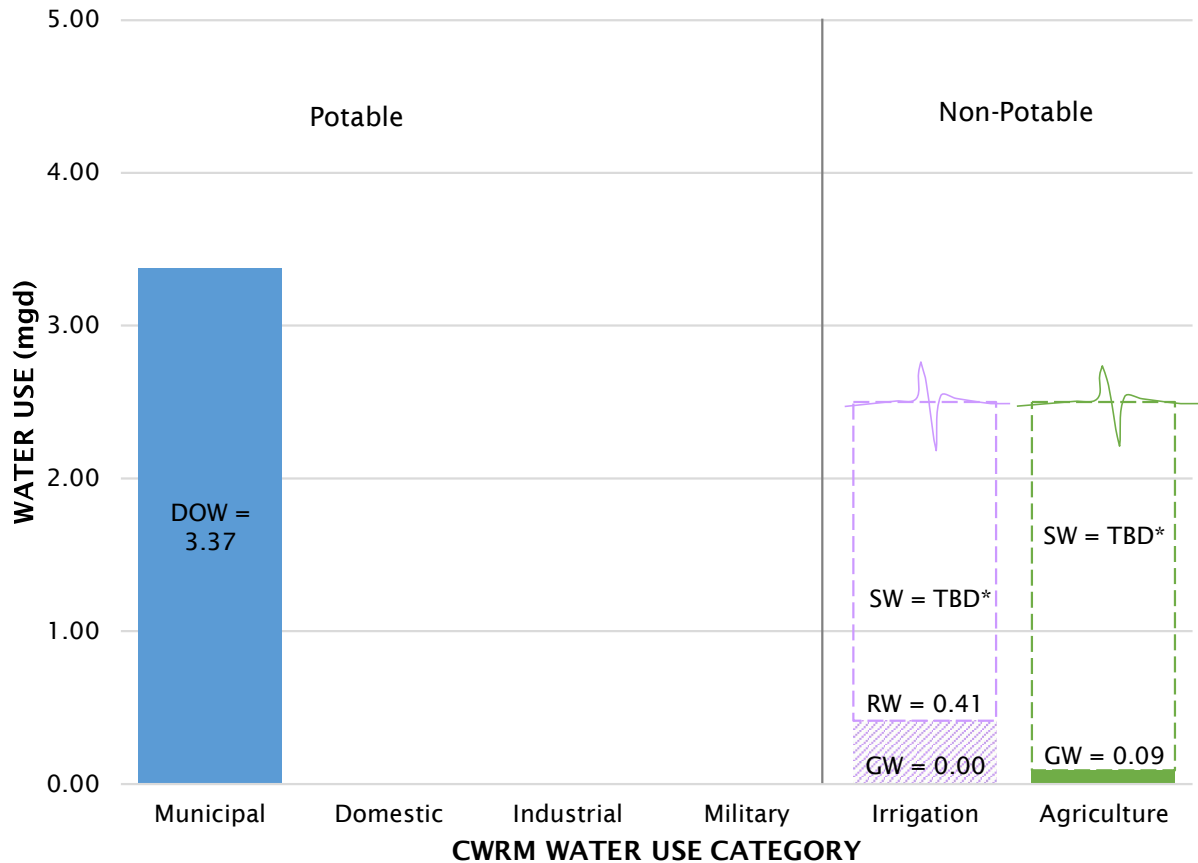
The following section presents the total estimated average water use within the Kōloa ASYA. The total estimated average water use was based on data from CWRM (well pumpage) and DOH (Sanitary Surveys for Public Water Systems and estimated recycled water usage) for the year of 2014. Well classification changes since 2014 are noted in the following sub-sections. **Table 20101-7** and **Figure 20101-7** summarizes water use by CWRM water use categories.

Table 20101-7: Existing Water Use by Category – Kōloa ASYA

CWRM Category	Ground Water (mgd)	Other Sources (mgd)	Total (mgd)	Percent of Total
Domestic	0.00		0.00	0.0
Industrial	0.00		0.00	0.0
Irrigation	0.004	0.41 ¹	0.41	10.6
Agriculture	0.09	TBD ²	0.09	2.3
Military			0.00	0.0
Municipal				
DOW System	3.37		3.37	87.1
Private-Public WS	0.00		0.00	0.0
TOTAL	3.46	0.41	3.87	100.0

¹ Recycled Water

² Surface Water – TBD from AWUDP

Figure 20101-7: Existing Water Use by Category – Kōloa ASYA

*Values to be determined by other components of the Hawai'i Water Plan

20101-3.2 Domestic Use

There are three wells classified as “Domestic” in the CWRM database. One is owned by Twin Pines Farm and two are owned by J. Waterhouse. All three wells have not reported pumpage.

20101-3.3 Industrial Use

There are five wells classified as “Industrial” in the CWRM database, with four further classified as INDEL - geothermal or thermoelectric cooling industrial. The four INDEL wells are owned by Citizens Utilities Co. and the fifth industrial well is owned by McBryde Sugar Company. All five wells have not reported pumpage. The well owned by McBryde Sugar Company has been removed from the CWRM well database as of 2017.

There are two hydropower plants in the Kōloa ASYA: the Kalāheo Hydropower plant and the Green Energy Hydropower plant.

The Kalāheo Hydropower plant was built in 1928 by McBryde Sugar Company when the Alexander Dam and Reservoir were built. This was the second hydropower plant for McBryde Sugar Company.

(the first hydropower plant was the Wainiha Power Plant, and will be discussed in **Section 20203** of this report). The Kalāheo Hydropower Plant has the capacity to generate 1 megawatt of power from the Wahiawa Stream diverted into the Alexander Dam. The electricity generated from this facility powers the Kauaʻi Coffee factory, visitor center, and offices in Numila. Excess energy is sold to the Kauaʻi Island Utility Cooperative (KIUC).

The Green Energy Hydropower plant was built in 2010 by Green Energy Hydro, LLC, Hawaiian Mahogany, Inc., and Pacific Hydro. This plant provides power to 75 nearby homes and the Hawaiian Mahogany mill. A 40 MG reservoir located approximately one mile north of Kōloa Town provides water to this facility. Excess energy is sold to the KIUC.

20101-3.4 Irrigation Use

Water for irrigation use is divided into ground water, recycled water, and surface water.

20101-3.4.1 Ground Water

There are nine wells classified as “Irrigation” in the CWRM database. Under the nine listed “Irrigation” wells, three wells are further classified as IRRHOT (hotel irrigation) and one well further classified as IRROTH (“other” irrigation).

Five of the “Irrigation” wells are owned by McBryde Sugar Co., Ltd with none reporting pumpage. Based on information from the 2017 CWRM Well Database, all five of the McBryde-owned wells have either been re-classified under a different owner or has changed ownership (but is still listed under the “irrigation” well use classification). Three of these wells are now owned by Hawaiʻi Dairy Farm, LLC and are listed under the well use classification of AGRLI (Livestock, Processing, and Pasture Agriculture). The remaining two wells are now owned by Grove Farm Company and Poʻipū Ranch.

The three IRRHOT wells are owned by Hyatt Regency, Kiahuna Plantation, and Marriott Ownership Resorts, Inc. The well owned by Hyatt Regency has a reported pumpage of 0.004 mgd. The other two other IRRHOT wells do not have any reported pumpage. The IRROTH well is owned by Honuhonu Ranch and does not have any reported pumpage.

20101-3.4.2 Recycled Water

There are two golf courses in the Kōloa ASYA that are irrigated with recycled water. The Poʻipū Bay Resort Golf Course receives R-2 water from the Grand Hyatt WWRF and the Kiahuna Golf Club receives R-1 water from the Poʻipū WRF. The Poʻipū WRF also provides landscape irrigation to the Kōloa Landing Resort.

20101-3.4.3 Surface Water

Information on surface water use for irrigation is to be determined by the AWUDP. However, due to where parks and other landscaped areas are typically located within communities, it is assumed that it is unlikely that surface water will be used to irrigate these areas.

20101-3.5 Agricultural Use

Agricultural use has been divided into ground water, recycled water, and surface water.

20101-3.5.1 Ground Water

There are five wells classified as “Agriculture” in the CWRM database, with three wells further classified as AGRCP (crops and processing agriculture) and one well further classified as AGRON (ornamental and nursery plant agriculture). Two of the wells are owned by McBryde Sugar Co., Ltd. One is classified as “agriculture,” and one well classified as AGRCP. Neither well has reported pumpage. The remaining two AGRCP wells are owned by Grove Farm Company, Inc., and has no reported pumpage. The AGRON classified well is owned by National Tropical Botanical Garden with reported pumpage of 0.09 mgd.

As mentioned in the **Section 20101-3.4.1**, three of the McBryde Sugar Co. wells that were formerly classified as “Irrigation” are now under the ownership of Hawai‘i Dairy Farm, LLC is now listed under the classification of AGRLI. These wells have not reported any pumpage.

20101-3.5.2 Recycled Water

There are no agriculture demands served by recycled water in the Kōloa ASYA.

20101-3.5.3 Surface Water

Information on surface water use for agriculture is to be determined by the AWUDP.

The Kaua‘i Coffee Irrigation System currently delivers surface water to agricultural lands in the Kōloa ASYA. The long term average water delivery of the irrigation system was estimated at approximately 27 mgd. The service area of the irrigation system includes approximately 3,773 acres of Important Agricultural Lands (IAL), owned by Alexander & Baldwin, LLC. The majority of the area designated as IAL is used for coffee cultivation, and a smaller portion of the area designated as IAL is used for seed corn cultivation, pasture, and other crops (rice, taro).³

The Waiāhi-Ku‘ia Aqueduct and the Kōloa-Wilcox Ditch System serve agricultural lands in the Kōloa ASYA. The service area of the system includes approximately 1,553 acres of IAL, owned by Māhā‘ulepū Farm, LLC. The current water use for the IAL is approximately 2.4 mgd for the cultivation of taro, seed corn, forage crops as well as for cattle ranching⁴.

20101-3.6 Military Use

There is no military use in the Kōloa ASYA.

³ DR08-37 Alexander and Baldwin, Inc., Findings of Fact, Conclusions of Law, Decision and Order, dated March 2009

⁴ DR11-43 Māhā‘ulepū Farm, LLC, Findings of Fact, Conclusion of Law, Decision and Order, dated May 2011

20101-3.7 Municipal Use

There are 12 wells in the CWRM database classified as “Municipal” (MUNCO – Municipal County). Municipal can be subcategorized into the other water use categories: Domestic, Industrial, Agricultural, Military, and Municipal.

20101-3.7.1 County Water Systems

Kalāheo-Kōloa Water System

The DOW has one major water system that within the Kōloa ASYA: the Kalāheo-Kōloa Water System is DOH Public Water System (PWS) No. 434. This DOW system includes 4,799 service connections to 15,108 people. This system was created after the 2009 merger of the former Kalāheo Water System (PWS 434), Kōloa-Po‘ipū Water System (PWS 408), and Lāwa‘i-‘Ōmao Water System (PWS 409). All three systems were already inter-connected.

The Kalāheo-Kōloa Water System provides service to the towns of Kalāheo, Kōloa, Po‘ipū, Lāwa‘i, and ‘Ōmao. Water for this water system is supplied by 12 wells (one of which is currently inactive). **Table 20101-8** lists the water sources, well number, pumping capacity, pressure zone, and pumpage amount.

Table 20101-8: DOW Kalāheo-Kōloa Water System Water Sources

WELL NAME	WELL NUMBER	PUMPING CAPACITY (gpm)	PRESSURE ZONE (ft)	PUMPAGE (mgd)
Kōloa Well 16-A	2-5427-001	600	366	0.57
Kōloa Well 16-B	2-5427-002	560	366	0.00
Kōloa Well E	2-5427-003	700	366	0.47
Kōloa Well C	2-5426-004	1200	245	0.34
Kōloa Well D	2-5426-005	1200	245	0.51
Kōloa Well F	2-5425-015	1200	245	0.32
Kalāheo Deepwell A	2-5631-001	1000	1112	0.04
Kalāheo Deepwell B	2-5631-002	1000	1112	0.41
Lāwa‘i Well 1	2-5530-003	425	677	0.09
Lāwa‘i Well 2	2-5530-004	550	677	0.12
Piwai Well 2	2-5629-001	1050	677	0.36
Piwai Well 3	2-5629-002	1050	677	0.14

Within the Kalāheo-Kōloa Water System, there are eight primary pressure zones (at elevations 245 feet, 366 feet, 677 feet, 825 feet, 886 feet, 1112 feet, 1222 feet, and 1290 feet) and 14 storage tanks.

The Hanapēpē-‘Ele‘ele Water System (PWS 404) crosses over from the Hanapēpē AYSA into the Kōloa ASYA. It is noted however, that based on the configuration of this system, the majority of

the Hanapēpē-‘Ele‘ele Water system supplies areas within the Hanapēpē ASYA. As such, the Hanapēpē-‘Ele‘ele Water system will therefore be discussed under the Hanapēpē ASYA in **Section 20304** of this report.

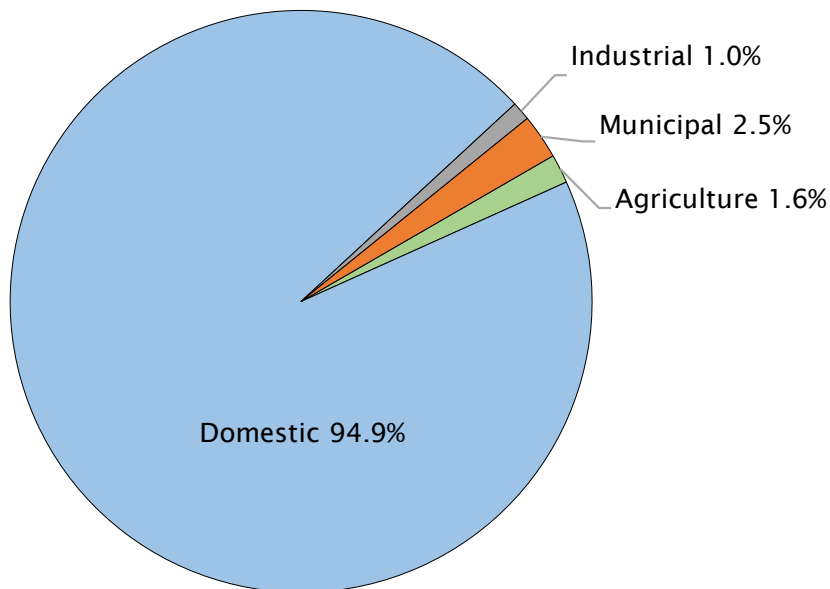
DOW Water Use by Category

DOW water use has been subcategorized to the extent possible based on available meter data and summarized in **Table 20101-9** and is also shown graphically in **Figure 20101-8**.

Table 20101-9: DOW Existing Water Use by Category – Kōloa ASYA

CWRM Water Use Category	DOW Metered Water Use (mgd)	Percent of Total
Agricultural	0.053	1.6
Domestic	3.105	94.9
Industrial	0.034	1.0
Military	0.000	0.0
Municipal	0.082	2.5
Total	3.273	100.0

Figure 20101-8: DOW Existing Water Use by Category – Kōloa ASYA



20101-3.7.2 State Water Systems

There are no DOH regulated State water systems located within the Kōloa ASYA.

20101-3.7.3 Federal Water Systems

There are no DOH regulated Federal water systems located within the Kōloa ASYA.

20101-3.7.4 Private-Public Water Systems

The Knudsen Trust's Kōloa Water System (PWS 421) is the only DOH regulated privately owned public water system located within the Kōloa ASYA. This Knudsen Trust water system includes 21 service connections which provides 0.02 mgd of water to 40 people. The sole water source feeding this system is from Kāhili Tunnel No. 1. When water is diverted into the Kāhili Mountain Park tank, flow into the Kōloa system stops entirely.

20101-3.7.5 Per Capita Use

The per capita existing water use consumption based on domestic DOW metered water use and private-public water system use is presented in **Table 20101-10**. The per capita use in the Kōloa ASYA is approximately 20.2% higher than the overall County of Kaua'i per capita use.

Table 20101-10: Per Capita Use – Kōloa ASYA

	DOW Metered Water Use – Domestic (mgd)	Private-Public Water System (mgd)	90% of 2015 Population	Per Capita Use (gpd)
Kōloa ASYA	3.105	0	13,319	233
County of Kaua'i	9.360	2.951	63,462	194

20101-3.8 Existing Water Use by Resource

20101-3.8.1 Ground Water

Table 20101-11 summarizes the current production, sustainable yield (SY), and percentage of SY for the current production. Current production is represented by the 2014 average yield calculated from the actual pumping data.

Table 20101-11: Pumpage – Kōloa ASYA

Pumpage (mgd)	SY (mgd)	Pumpage Portion of SY
3.46	29	11.9%

Based on available information from the CWRM database, the current ground water use is 11.9 percent of the sustainable yield.

20101-3.8.2 Surface Water

Information on surface water use for agriculture is to be determined by the AWUDP. However, some limited information is available in the AWUDP dated 2003 (revised 2004) and in IAL designation documents.

According to the AWUDP dated 2003 (revised 2004) and an IAL designation document, the Kauaʻi Coffee Irrigation System delivers approximately 27 mgd to agricultural lands, including approximately 3,773 acres of IAL. The Waiahi-Kuʻia Aqueduct and the Kōloa-Wilcox Ditch System also serve agricultural lands in the Kōloa ASYA. The service area of the system includes approximately 1,553 acres of IAL, owned by Māhāʻulepū Farm, LLC, and current water use for the IAL is approximately 2.4 mgd.

20101-3.8.3 Water Conservation

Water conservation, including water loss management, may reduce water use. See **Section 20101-2.3** for discussion of existing conservation efforts.

20101-3.8.4 Rainwater Catchment

Developed parcels that are not supplied by ground water or surface water are assumed to be supplied by rainwater catchment.

20101-3.8.5 Recycled Water

Recycled water from the two wastewater treatment facilities are used for golf course and landscape irrigation. Refer to **Table 20101-6** presented earlier for recycled water summary.

20101-4 FUTURE WATER USE

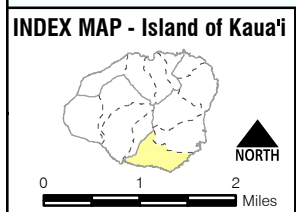
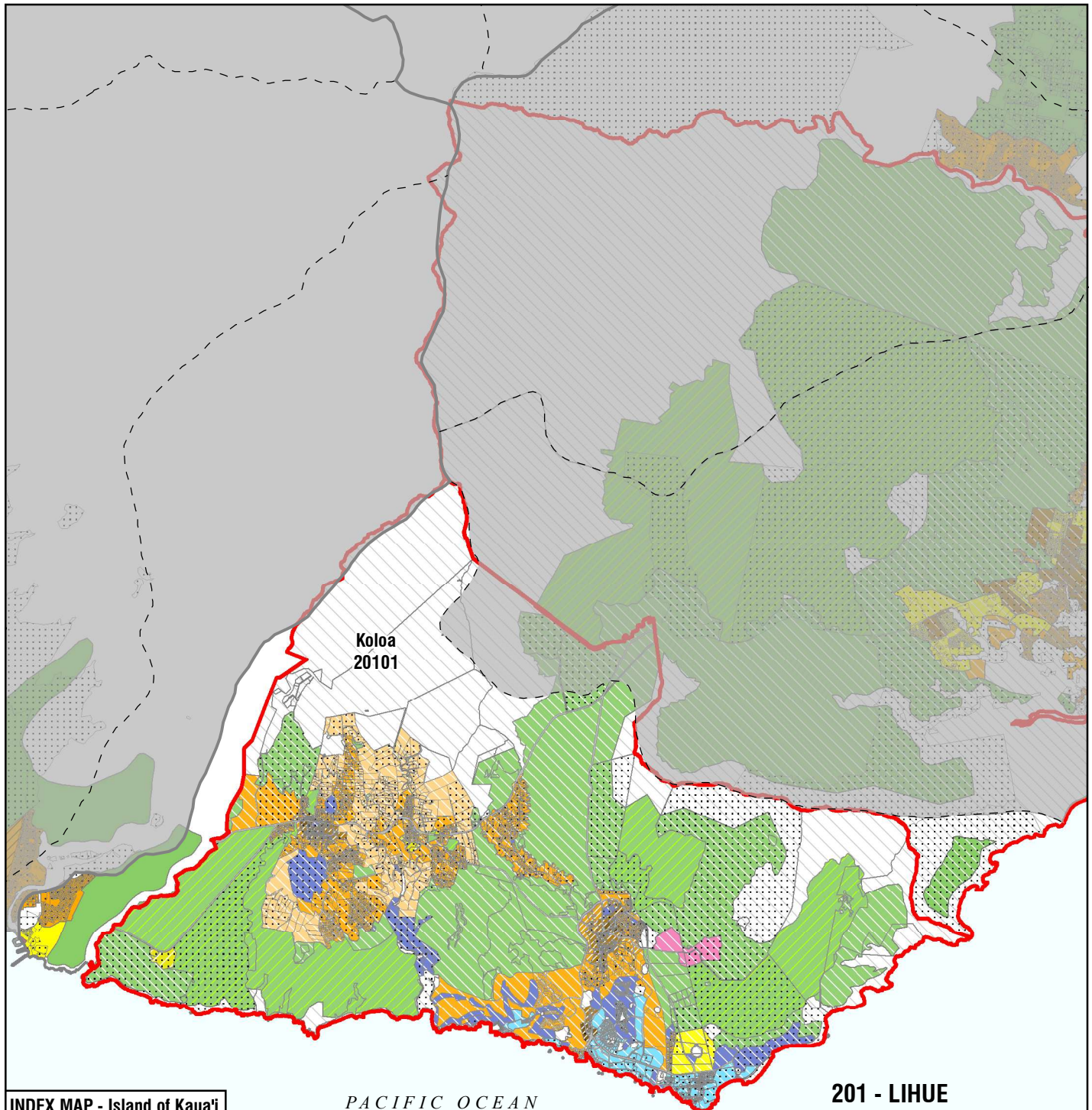
20101-4.1 Full Build-Out Water Demand Projections

The full build-out water demand projections based on the General Plan and County Zoning for the Kōloa ASYA is listed in **Table 20101-12a** and **20101-13**, respectively. Each land use class is associated with the most appropriate CWRM water use category.

Table 20101-12a: General Plan Full Build-Out Water Demand Projection – Kōloa ASYA

General Plan Category	CWRM Category	Water Demand (mgd)
Agriculture	Agriculture/Domestic	1.42
Open	Domestic	0.14
Military	Military	0.00
Park	Irrigation	1.11
Residential	Domestic/Municipal	10.37
Resort	Domestic/Irrigation/Municipal	5.72
Transportation	Municipal	0.00
Urban Center	Domestic/Industrial/Municipal	0.62
DHHL	Domestic	0.00
TOTAL		19.37

The General Plan was further refined by replacing the portion of the General Plan that coincides with the South Kauaʻi Community Plan and its associated demand with the South Kauaʻi Community Plan and its associated demand as shown in **Figure 20101-9**. **Table 20101-12b** is the full build-out water demand projection based on the South Kauaʻi Community Plan.



LEGEND: — Aquifer Sector Areas - - Aquifer System Areas — Community Plan Boundaries Hawaiian Home Lands Developed Properties				FIGURE 20101-9 GENERAL PLAN REFINED BY COMMUNITY PLAN Aquifer Sector: LIHUE - 201 Aquifer System: KOLOA - 20101			
Land Use Allocation Guide Agricultural Open Residential Community Transportation Urban Center		Community Plan Agricultural (IAL) Agricultural (Other) Homestead Large Village Natural Industrial		Neighborhood Center Neighborhood General Neighborhood Edge Parks and Recreation Residential Resort Small Village			

Table 20101-12b: South Kauaʻi Community Plan Full Build-Out Water Demand Projection – Kōloa ASYA

Community Plan Category	CWRM Category	Water Demand (mgd)
Agricultural (Others)	Agriculture/Domestic	0.00
Industrial	Industrial	0.64
Neighborhood Center	Municipal/Residential	0.21
Neighborhood General	Municipal	0.55
Neighborhood Edge	Domestic	0.30
Small Village	Municipal	0.19
Large Village	Municipal/Residential	0.52
Open	Domestic	0.00
Military	Military	0.00
Parks & Recreation	Irrigation	4.07
Residential	Domestic/Municipal	8.42
Resort	Domestic/Irrigation/Municipal	1.76
DHHL	Irrigation/Municipal	0.00
TOTAL		16.66

The full build-out water demand projection for the General Plan refined by the South Kauaʻi Community Plan is 19.32 mgd. See calculation below:

(1) General Plan full build-out water demand projection = 19.37 mgd	
(2) Portion of General Plan full build-out water demand projection that coincides with the South Kauaʻi Community Plan = 16.71 mgd	
(3) South Kauaʻi Community Plan full build-out water demand projection = 16.66 mgd	
Refined General Plan full build-out water demand projection = (1) – (2) + (3)	
= 19.37 – 16.71 + 16.66	
= 19.32 mgd	

Estimated full build-out projected water demands for the Kōloa ASYA are summarized by zoning class in **Table 20101-13**.

Table 20101-13: Zoning Full Build-Out Water Demand Projection – Kōloa ASYA

Zoning Class	CWRM Category	Water Demand (mgd)
Agriculture	Agriculture/Domestic	1.42
Commercial	Municipal	0.59
Industrial	Industrial/Municipal	0.34
Open	Domestic	0.14
Project Development	Domestic/Municipal	0.01
Residential	Domestic/Municipal	6.74
Resort	Domestic/Irrigation/Municipal	1.18
DHHL	Domestic	0.00
TOTAL		10.42

20101-4.1.1 Refined Land Use Based Water Projection

State Water Projects Plan

Table 20101-14 lists future State water projects reported in the 2021 SWPP update. The total projected demand to the year 2034 for these 3 State water projects within the Kōloa ASYA is 0.071 mgd, 0.063 mgd using potable and 0.008 mgd non-potable using potable sources.

Table 20101-14: Future State Water Projects – Kōloa ASYA

Project Name	State of Hawai'i Department	Primary Use	Water Development Strategy	2034 Demand (mgd)
Kōloa Elementary School New 6 Classroom	DOE	Potable	REMAIN	0.0036
		Non-potable using Potable	REMAIN	0.0075
Kōloa II Elementary School	DOE	Potable	REMAIN	0.0600
TOTAL REMAIN				0.0710
TOTAL KŌLOA ASYA SWPP 2034 DEMAND				0.0710

As mentioned in **Section 2.2.2.5.1**, State water projects with the water development strategy of REMAIN are located within the service areas of County water systems which need to be coordinated with the respective County water departments. All 3 of the State water projects within the Kōloa ASYA were assigned the REMAIN water development strategy and results in a total 2034 demand of 0.0710 mgd. This accounts for 0.24 percent of the 29 mgd sustainable yield.

State Department of Hawaiian Home Lands

There are no DHHL tracts located within the Kōloa ASYA.

Agricultural Water Use and Development Plan

The AWUDP dated 2003 (revised 2004) was limited in scope. More recent, comprehensive information on agricultural lands is available in the County of Kauaʻi Important Agricultural Lands Study.

In 2019, a public review draft of the AWUDP was released and it is anticipated that the next phase of the AWUDP will provide agricultural water demand projections in greater detail and will supersede information in the KWUDP when it becomes available.

County of Kauaʻi Important Agricultural Lands Study

10,264 acres of agricultural lands within the Kōloa ASYA received a score of 28 or better in the County of Kauaʻi Important Agricultural Lands (IAL) Study. Lands that receive a score of 28 or better were determined to have met all eight IAL criteria to some degree. Only a subset of lands with a score of 28 or better is expected to be designated as IAL. **Table 20101-15** compares these lands that received a score of 28 or better to the declared surface water use from diversions and to the diversified water use rate of 3,400 gallons per acre per day (gpad) estimated in the 2004 AWUDP.

Table 20101-15: Irrigation of Agricultural Lands

(1) Declared Surface Water Use from Diversions (mgd)	21.19
(2) Agricultural Lands with a Score $\geq$ 28 (Acres)	10,264
- How many acres can be sustained by (1) at a water rate of 3,400 gpad? (Acres)	6,232
- What percent of (2) can be sustained with a water rate of 3,400 gpad?	61%
- If all of (2) were to be irrigated, what is the water unit rate? (gpad)	2,065

Over 5,400 acres of agricultural lands have been designated as IAL in the Kōloa ASYA.

20101-4.1.2 Water Use Unit Rates

Water use unit rates are based on the *Water System Standards* (WSS), as discussed in Chapter 2.

The General Plan provides only broad density guidelines for residential and resort designations. For these designations, under the assumption that most residents would like their communities, including the development density, to remain similar in the future, the average number of dwelling units as allowed by zoning was used as the density (i.e., 5.40 dwelling units per acre for residential designation and 13.72 dwelling units per acre for resort designation).

20101-4.2 Water Demand Projections to the Year 2035

The following section presents water demand projections to the year 2035 for the Kōloa ASYA. The projected low, medium, and high growth rates are listed in **Table 20101-16** and are graphed in

Figure 20101-10. Potable (domestic, industrial, municipal, and military water uses) and non-potable (irrigation) water demands are also differentiated. As mentioned in Chapter 2, agriculture and irrigation water demands are not included in the population and growth rate projections.

Table 20101-16: Water Demand Projections – Kōloa ASYA

Water Use Category	Water Demand by Year (mgd)								
	2015	2016	2017	2018	2019	2020	2025	2030	2035
GROWTH RATE C (HIGH)									
TOTAL	3.78	3.84	3.90	3.96	4.02	4.08	4.37	4.67	4.99
Potable	3.37	3.42	3.47	3.52	3.57	3.62	3.88	4.15	4.43
Non-Potable	0.41	0.42	0.43	0.44	0.45	0.46	0.49	0.52	0.56
GROWTH RATE B (MEDIUM)									
TOTAL	3.78	3.84	3.90	3.96	4.02	4.08	4.36	4.65	4.95
Potable	3.37	3.42	3.47	3.52	3.57	3.62	3.87	4.13	4.40
Non-Potable	0.41	0.42	0.43	0.44	0.45	0.46	0.49	0.52	0.55
GROWTH RATE A (LOW)									
TOTAL	3.78	3.82	3.86	3.90	3.94	3.98	4.19	4.41	4.63
Potable	3.37	3.41	3.45	3.49	3.53	3.57	3.76	3.96	4.16
Non-Potable	0.41	0.41	0.41	0.41	0.41	0.41	0.43	0.45	0.47

Figure 20101-10: Water Demand Projection Summary – Kōloa ASYA

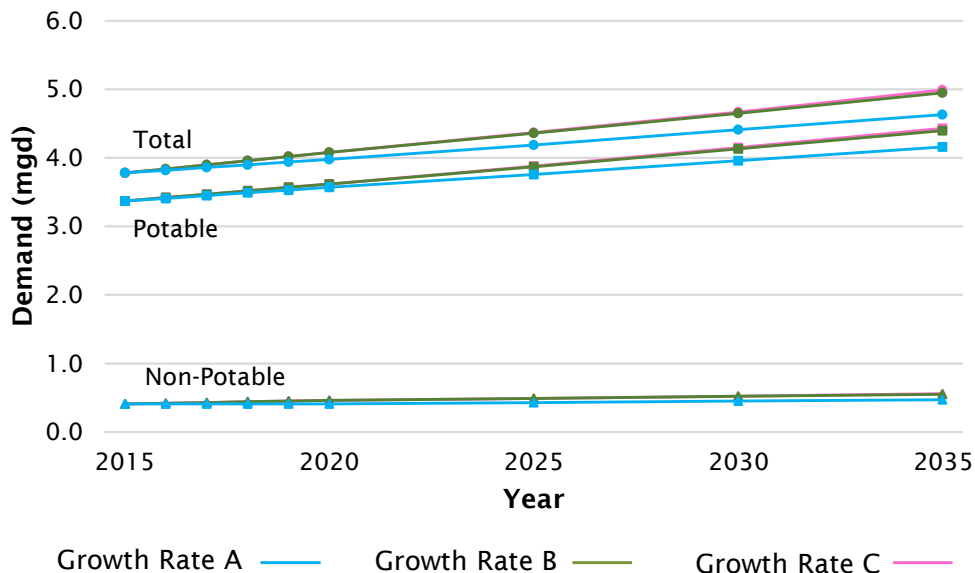


Figure 20101-11 shows the breakdown of water demand projections for a medium growth rate by CWRM categories through the year 2035. **Table 20101-17** summarizes this figure.

Figure 20101-11: Medium Growth Rate B Water Demand Projection by Category – Kōloa ASYA

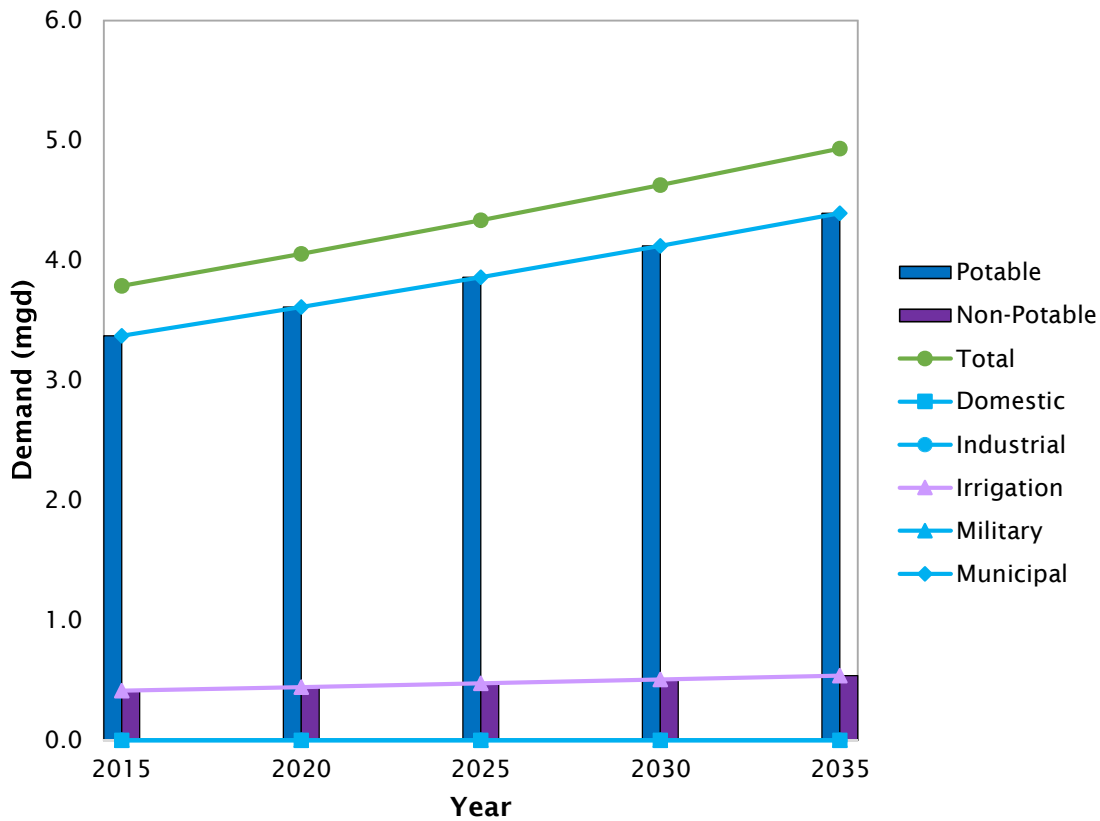


Table 20101-17: Medium Growth Rate B Water Demand Projection by Category – Kōloa ASYA

Water Use Category	Water Use by Year (mgd)								
	2015	2016	2017	2018	2019	2020	2025	2030	2035
Total	3.78	3.84	3.90	3.96	4.02	4.08	4.36	4.65	4.95
Potable	3.37	3.42	3.47	3.52	3.57	3.62	3.87	4.13	4.40
Non-Potable	0.41	0.42	0.43	0.44	0.45	0.46	0.49	0.52	0.55
Domestic	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Industrial	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Irrigation	0.41	0.42	0.43	0.44	0.45	0.46	0.49	0.52	0.55
Military	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Municipal	3.39	3.44	3.49	3.54	3.59	3.64	3.89	4.15	4.42
DOW	3.37	3.42	3.47	3.52	3.57	3.63	3.87	4.13	4.40

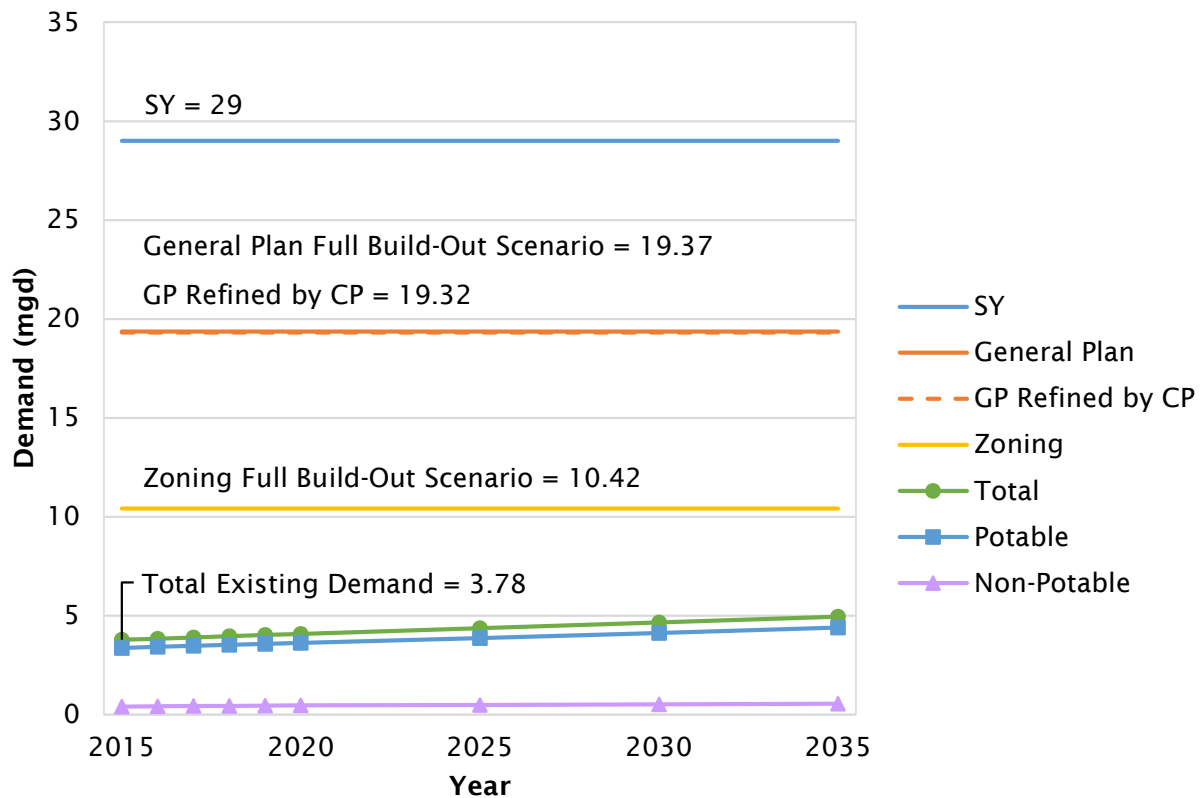
20101-4.3 Summary

Figure 20101-12 illustrates the magnitude of the sustainable yield, both General Plan and Zoning full build-out (FBO) water use projections, and water use projection through the year 2035 focusing on Medium Growth Rate B. **Table 20101-18** summarizes the General Plan (GP), Zoning, and 20-year water demand projection scenarios for the Kōloa ASYA. The sustainable yield is presented to draw comparisons. All demands are in mgd.

Table 20101-18: Summary of Demand Projections

SY (mgd)	FBO (mgd)		Medium Growth Rate Demand by Year (mgd)								
	GP	Zoning	2015	2016	2017	2018	2019	2020	2025	2030	2035
29	19.37	10.42	3.78	3.84	3.90	3.96	4.02	4.08	4.36	4.65	4.95

Figure 20101-12: Medium Growth Rate B Water Demand Projections and Full Build-Out – Kōloa ASYA



Note: Total existing demand includes municipal, domestic, industrial, military, and irrigation water uses. It does not include agriculture water use. For future agricultural water use analysis, please see Section 20101-4.1.1 County of Kaua'i Important Agricultural Lands Study.

20101-5 RESOURCE AND FACILITY RECOMMENDATIONS

20101-5.1 Water Source Adequacy

20101-5.1.1 Full Build-Out

Development to the highest extent allowed by the General Plan and County Zoning within the Kōloa ASYA is sustainable, with General Plan and County Zoning full build-out water demands requiring 67 and 36 percent of the 29 mgd sustainable yield, respectively. Full build-out water demand based on the General Plan refined by the South Kauaʻi Community Plan is 67 percent of the sustainable yield.

20101-5.1.2 Twenty-Year Projection

The 2035 water demand projection for the Kōloa ASYA is sustainable, requiring only 17 percent of the 29 mgd sustainable yield.

20101-5.2 Source Development Requirements

20101-5.2.1 Supply-Side Management

Supply-side management, including conventional water resource measures, water conservation, and alternative water resource measures, were evaluated to meet projected water demands.

Conventional Water Resource Measures

Ground Water

The Kōloa ASYA contains basal, perched, and high level ground water resources. Most reported pumpage is from the perched zone.

The 2035 water demand projection for the Kōloa ASYA is only 17 percent of the 29 mgd sustainable yield. This indicates that theoretically, more water could be pumped from the aquifer without impairing the utility or quality of the water resource if wells are optimally placed and the proper due diligence with regard to traditional and customary rights and impacts has been completed. However, it is noted that sustainable yield does not consider the feasibility of developing the ground water resources, and that the safe yield of an individual production well may be limited by localized ground water behavior near the well as a result of pumpage. Water supply reliability and quality, feasibility, environmental and cultural impacts, and water rights shall be considered as projects and programs develop. More detailed and site-specific evaluation of these impacts shall be required and accomplished through the environmental review process (HRS Chapter 343) for source development projects and programs utilizing public funding, and CWRM could consider requiring compliance with the environmental review process for private source development projects and programs also. **Section 1.5.3.1** provides additional information regarding the protection of traditional and customary rights.

The DOW's Kalāheo-Kōloa Water System serves the towns of Kalāheo, Kōloa, Po'ipū, Lāwā'i, and 'Ōmao. The DOW's Water Plan 2020 identified water supply projects to meet the growing demand of its service areas. For DOW's Kalāheo - Kōloa Water System, a couple of well projects were proposed and completed. The completed wells are included in **Table 20101-7**. As demand continues to grow, DOW proposes the addition of three new wells: 'Ōmao Well, Kōloa Well G, and Kalāheo Well #3.

The DOW's Water Plan 2020 also identified potential storage and distribution system upgrades. Several new tanks are proposed, including a new Po'ipū tank for the 245-foot pressure zone and a new Kukuiolono tank at the 886-foot pressure zone. There are many proposed water main projects, including replacing mains in Kalāheo town and replacing older and undersized mains in Lāwā'i-'Ōmao.

Surface Water

The Kōloa ASYA has 44 declared diversions. Until permanent instream flow standards are established, interim instream flow standards have been adopted. According to Section 13-169-46, Hawai'i Administrative Rules, "Interim Instream Flow Standard for all streams on Hawai'i, as adopted by the commission on water resource management on June 15, 1988, shall be that amount of water flowing in each stream on the effective date of this standard, and as that flow may naturally vary throughout the year and from year to year without further amounts of water being diverted offstream through new or expanded diversions, and under the stream conditions existing on the effective date of the standard, except as may be modified [by the commission]." Therefore, for the purposes of assessing surface water availability, it is assumed that no additional diversions will be allowed without amendment of the interim IFS.

The existing declared diversions have the potential to meet additional demands. However, a challenge with developing surface water is transmission of these resources from source to location of need. Farmers generally grow what is feasible for the area; therefore, it is anticipated that agricultural water use will follow the availability of irrigation water. Increase in the availability of surface water would likely promote additional usage and could thereby minimize ground water being used for irrigation.

There are several existing irrigation systems in the Kōloa ASYA, including the Kaua'i Coffee Irrigation System, Waiahi-Ku'ia Aqueduct, Waiahi-'Ili'ili'ula Ditch, and Kōloa-Wilcox Ditch. Due to the cessation of sugarcane cultivation, many of these irrigation systems may not be functioning as efficiently as they once were. The Agricultural Water Use and Development Plan (AWUDP) should include an inventory of large irrigation systems and provide information on their rehabilitation and maintenance needs. The AWUDP should also include a more detailed assessment of agricultural water demand projections that will supersede information in the KWUDP when it becomes available.

Water Transfer

Some existing irrigation systems have the capability to transfer surface water to adjacent ASYAs. The AWUDP should study irrigation system services areas and provide information on irrigation systems' water transfer.

Water can also be transferred between ASYAs through public water systems. The DOW's Hanapēpē-ʻEleʻele Water System services areas in the Makaweli, Hanapēpē, and Kōloa ASYAs. Currently, the water sources for this system are two wells located in the Hanapēpē ASYA and one well located in the Makaweli ASYA. Water must be transferred to ʻEleʻele via booster pump stations.

Water Conservation

The per capita use in the Kōloa ASYA is approximately 20.2% higher than the overall County of Kauaʻi per capita use. There are no ASYA-specific conservation measures in place at this time; however, there are general water conservation programs that are described in **Section 1.5.7**. Water conservation, including water loss management, can increase the amount of water available and help to ensure the long-term viability of water resources.

Alternative Water Resource Measures

Rainwater Catchment

Rainwater can be utilized as a water resource in several ways.

Rainwater can be harvested in rainwater catchment systems which can be utilized to supply domestic potable water needs. These systems are viable in areas that receive abundant rainfall and are a suitable source of potable water for individual domestic users in areas outside the limits of municipal water systems. Generally, these are remote areas and are not expected to expand significantly because most development is anticipated to be concentrated within existing urban areas. Therefore, use of rainwater catchment systems is not anticipated to increase significantly.

Rainwater can also be used to supplement or satisfy agricultural non-potable water needs through ambient rainfall.

See the Storm Water Reuse section below to see how rainwater as storm water runoff can be reclaimed and reused.

Storm Water Reuse

Rainfall can turn into storm water runoff. Storm water runoff from impervious surfaces in urban areas can be significant. This water could be captured, treated, and used as a source of non-potable water (e.g., irrigation), integrated with recycled water, or even as potable and/or non-potable ground water recharge. However, due to the lack of storm water reuse standards, the high initial infrastructure costs, and the treatment requirements, storm water reclamation and reuse on a small or large scale may not be feasible and requires further assessment as noted in the Water Resource Protection Plan. The U.S. Department of the Interior, Bureau of Reclamation published An Appraisal of Stormwater Reclamation and Reuse Opportunities in Hawaiʻi (Storm Water Report) in 2008 but did not identify any storm water reclamation and reuse opportunities in the Kōloa ASYA.

Recycled Water

Recycled water is a valuable resource; an increase in its use may lower the dependence on potable sources. There are two wastewater reclamation facilities (WWRFs) in the Kōloa ASYA. Po'ipū WRF produces R-1 water, and Grand Hyatt WWRF produces R-2 water. Comparing the current reuse amount to the design capacity of each facility, it appears that there is recycled water available to meet additional demands, see **Table 20101-19** below. However, the actual additional recycled water use will depend on several factors, including the quantity of wastewater generated (which may be significantly less than the design capacity), the demand for recycled water, and the number of viable users within close proximity to the facility.

Table 20101-19: Wastewater Reclamation Facilities Available Capacity – Kōloa ASYA

WWRF/ WWTP	Recycled Water Classification	Design Capacity (mgd)	Quantity Produced (mgd)	Current Reuse Amount (mgd)	Available Capacity (mgd)
Grand Hyatt WWRF	R-2	0.25	N/R	0.11	0.14
Po'ipū WRF	R-1	0.8	N/R	0.30	0.50

N/R: Not Reported

Desalination

Desalination of brackish ground water is a potential alternative; however, due to its high capital and operational costs, it likely would not be considered when other potable water sources are readily available.

20101-5.2.2 Demand-Side Management

Development Density Control

The full build-out demand for the Kōloa ASYA based on County Zoning is 10.42 mgd, which is 36 percent of the sustainable yield. This indicates that there are adequate water resources to sustain the level of development that is allowed by law. In the Kōloa ASYA, the average number of dwelling units allowed by County Zoning is 5.40 dwelling units per acre in residential districts and 13.72 dwelling units per acre in resort districts.

The full build-out demand for the Kōloa ASYA based on the General Plan is 19.37 mgd, which is 67 percent of sustainable yield. The full build-out demand based on the General Plan refined by the South Kaua'i Community Plan is 19.32 mgd, which is also 67 percent of sustainable yield. Although it is highly unlikely that full build-out will occur within the time frame of these plans, these full build-out demands are sustainable; there are adequate water resources to sustain the long-range land use vision for this area. Therefore, development density control may not be necessary. However, the County Planning Department could consider development density control for areas where there is the flexibility to do so, such as areas that are not yet zoned as residential or resort, and promote sustainable development. Further, it is noted that these full build-out scenarios are unlikely to occur since it assumes all land is developed to the maximum extent.

20101-5.3 Recommended Alternatives

To optimize appropriate use of water resources, the quality of the water source should be matched to the quality of water required. The highest quality of water shall be reserved for the most valuable end use. Potable water is considered the highest quality water, and the sustenance of life is the most valuable end use. Recycled water, brackish water, untreated surface water, and other lower quality water sources should be used for landscaping and agriculture when available, thereby reserving potable water for human consumption. If there is a practical alternative water source available, that alternative source should be used in lieu of ground water or surface water. With this in mind, the following recommendations are made for the Kōloa ASYA:

Alternative Water Resources

Alternative water sources, such as recycled water generated from wastewater reclamation facilities, should be used where available to reduce demands on both ground and surface water resources and to conserve water resources as a whole. Recycled water is available from the Po'ipū WRF and Grand Hyatt WWRF; however, as discussed previously, successfully increasing use of recycled water is dependent on several factors, including the number of viable users within close proximity to the facilities.

Conservation

Water resources are a finite resource that should be managed and used wisely. It should be conserved and not wasted. Implementation of conservation measures should continue to be encouraged.

Ground Water

Meeting future demands at a reasonable cost is a planning objective, and conventional sources, such as ground water, are typically the most cost-effective means for meeting projected water demands. Projected potable water needs are within the sustainable yield for this area. Therefore, ground water resources could continue to be used and developed to meet potable water needs now and into the future. However, as noted above, development of conventional water resource measures can have challenges, and water supply reliability and quality, feasibility, environmental and cultural impacts, and water rights shall be considered as projects and programs develop.

Development of ground water resources is the primary strategy to serve future potable demands in the Kōloa ASYA.

Surface Water

Surface water, where available, should be used to meet non-potable demands if alternative water resources are not available. To achieve this, it will be critical to maintain and improve existing irrigation systems. Making surface waters more readily available to meet non-potable water demands has the potential to minimize future dependence on the use of ground water. It is therefore recommended that the AWUDP provide information on the rehabilitation and maintenance needs of large irrigation systems.

Demand-Side Management

Full build-out demand based on the General Plan and the South Kauaʻi Community Plan is 67 percent of sustainable yield. At this projection, implementation of development density control by the County Planning Department is not needed since it is highly unlikely that full build-out will occur within the time frame of these plans.

Although the projection is sustainable, the County Planning Department should exercise caution and consider potential impacts on available water resources when considering any future zoning modifications. Modifications that may result in increased development density within the area will increase demands on water resources.