
Chapter 20105

Kīlauea Aquifer System Area

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20105 KĪLAUEA AQUIFER SYSTEM AREA

20105-1 SYSTEM AREA PROFILE

20105-1.1 General

The Kīlauea [20105] Aquifer System Area (ASYA) is roughly bound by the Pacific Ocean along the north, the ridge above the Moloaʻa and Puʻu Ka Ele Streams along the south and up to the peak of Mount Namahana, and along the ridge above Pōhakuhonu, Kahiliholo, and Kīlauea Streams on the west. The ASYA includes most of Kīlauea town.

Average annual rainfall ranges from 50 inches per year along the coast to 130 inches in the mountains. The sustainable yield for the Kīlauea ASYA is 10 mgd.

20105-1.2 Economy and Population

20105-1.2.1 Economy

The Kīlauea ASYA is primarily a rural residential community and is surrounded by agriculturally zoned lands. Land use within the Kīlauea ASYA is largely designated as Agriculture. Agricultural activities include orchards and farms specializing in the production of organic produce. Local retail and/or commercial areas are mainly centered in the area located near the intersection of Kūhiō Highway and Kīlauea Road.

20105-1.2.2 Population

The population within the Kīlauea ASYA is concentrated in closer proximity to the shoreline area below (north) of Kūhiō Highway. Historical population data for the Kīlauea ASYA is summarized in **Table 20105-1**. Population projections through the year 2035 are summarized in **Table 20105-2a**. As shown in **Table 20105-2b**, it is estimated that the area will continue to experience growth rates between 1 and 7 percent per decade.

Table 20105-1: Historical Population – Kīlauea ASYA

	Year		
	1990	2000	2010
Population	1,953	2,183	2,642
Percent Change		11.8	21.0

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

Table 20105-2a: Population Projection by Year – Kīlauea ASYA

Growth Rate	Population by Year								
	2015	2016	2017	2018	2019	2020	2025	2030	2035
A – Low	2,664	2,667	2,670	2,674	2,677	2,681	2,702	2,727	2,757
B – Med.	2,682	2,693	2,703	2,714	2,725	2,737	2,799	2,870	2,952
C – High	2,685	2,697	2,709	2,721	2,733	2,746	2,816	2,894	2,986

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

Table 20105-2b: Population Projection – Percent Change – Kīlauea ASYA

Growth Rate	2015-2025 % Change	2025-2035 % Change
A – Low	1.4	2.8
B – Medium	4.4	7.9
C – High	4.9	6.0

20105-1.3 Land Use

20105-1.3.1 2000 Kaua‘i General Plan

The 2000 Kaua‘i County General Plan Land Use Designation Map for the Kīlauea ASYA is shown on **Figure 20105-1**. The estimated land use allocation acreage for each land use designation within the system area is listed in **Table 20105-3**.

Table 20105-3: General Plan Estimated Land Use Allocation Acreage – Kīlauea ASYA

General Plan Land Use Designation	Acreage	Percent of Total
Agricultural	6,476	52.5
Military	0	0.0
Open	5,717	46.3
Park	0	0.0
Residential Community	148	1.2
Resort	0	0.0
Transportation	0	0.0
Urban Center	0	0.0
DHHL	0	0.0
TOTAL	12,341	100.0

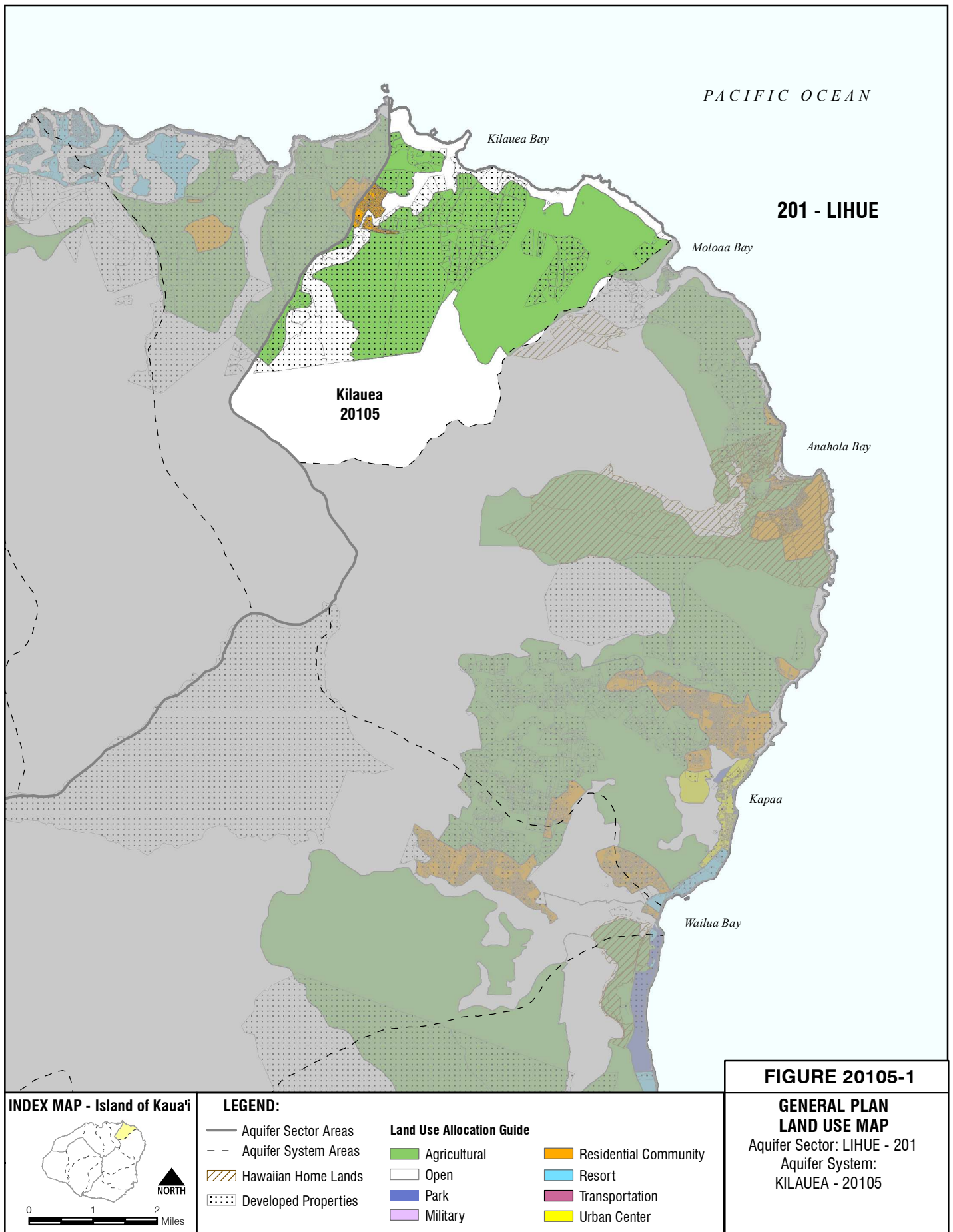
20105-1.3.2 Kaua‘i Zoning

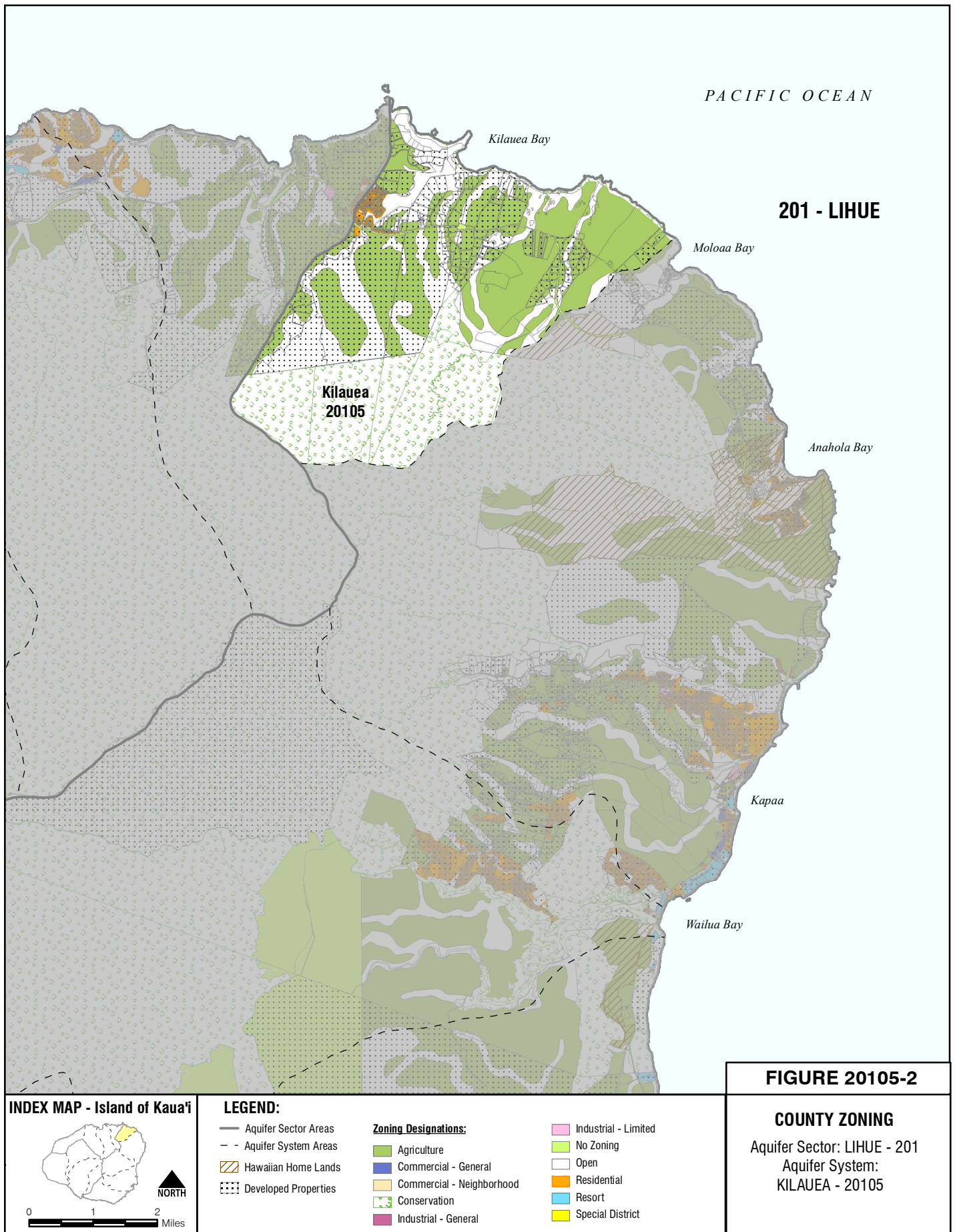
Kaua‘i County Zoning Map for the Kīlauea ASYA is shown on **Figure 20105-2**. The estimated land use allocation acreage for each zoning district within the system area is listed in **Table 20105-4**.

Table 20105-4: County Zoning Estimated District Allocation Acreage – Kīlauea ASYA

Zoning District	Acreage	Percent of Total
Agriculture	5,066	40.4
Commercial – General	0	0.0
Commercial - Neighborhood	3	0.0
Conservation	4,147	33.1
Industrial – General	0	0.0
Industrial - Limited	0	0.0
Open	3,164	25.3
Residential	115	0.9
Resort	0	0.0
Project Development	0	0.0
Special Planning Area	0	0.0
Special Treatment	0	0.0
No Zoning	32	0.3
DHHL	0	0.0
TOTAL	12,527	100.0

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 Kīlauea ASYA is 5.42 dwelling units per acre.





20105-2 EXISTING WATER RESOURCES

20105-2.1 Ground Water

The Kīlauea ASYA has a sustainable yield of 10 mgd. According to the 2014 CWRM database, there are 43 production wells in the system, 10 agriculture, 2 municipal, 28 domestic, and 3 irrigation wells. There are also 12 wells drilled and categorized as “unused”. Refer to **Appendix A** for this database. **Figure 20105-3** shows the well locations.

20105-2.2 Surface Water

There are 6 streams classified as perennial in the Kīlauea ASYA, of which 3 are considered continuous and 3 are considered intermittent. Kīlauea Stream, Kulihaile Stream, and Pīla‘a Stream are classified as continuous streams. E. Waiakalua Stream, W. Waipakē Stream, and E. Waipakē Stream are classified as intermittent streams. The USGS has 1 active surface water gage in the system area. The gage is located on Hālaulani Stream, which was previously listed in **Table 1-19**.

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.

There are 17 declared stream diversions in the CWRM database shown on **Figure 20105-4**, which accounts for 6 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 Kīlauea ASYA is 0.32 mgd.

Ka Loko and Pu‘u Ka Ele Ditches, Stone Dam, and Kalihiwai Irrigation Subsystems were formerly owned by Kīlauea Sugar Company and used to irrigate sugarcane fields. The irrigation systems no longer function as a network and are now considered standalone subsystems.

- The Ka Loko Irrigation Ditch Subsystem is owned by the Mary N. Lucas Trust, Pflueger Partners, and Circensa. The subsystem is active but may need rehabilitation. It diverts water from the Pu‘u Ka Ele Stream and Kalua‘a Stream.
- The Pu‘u Ka Ele Irrigation Ditch Subsystem is owned by Jurassic Kāhili Ranch and is inactive. The 2019 draft AWUDP update recommends that this subsystem not be rehabilitated since it is not in use and some portions are demolished.

- The Stone Dam Irrigation Subsystem is managed by Bridgewater Irrigation. The subsystem is currently active and diverts water from the Pōhakuono and Hālaulani Streams. This subsystem also provides backup water to the Kalihiwai Irrigation subsystem.
- The Kalihiwai Irrigation subsystem is managed by Porter Irrigation System. The subsystem is currently active, in relatively good condition, and diverts water from the Pōhakuono Stream. This subsystem is primarily located in and serving the Kalihiwai ASYA.

20105-2.3 Water Conservation

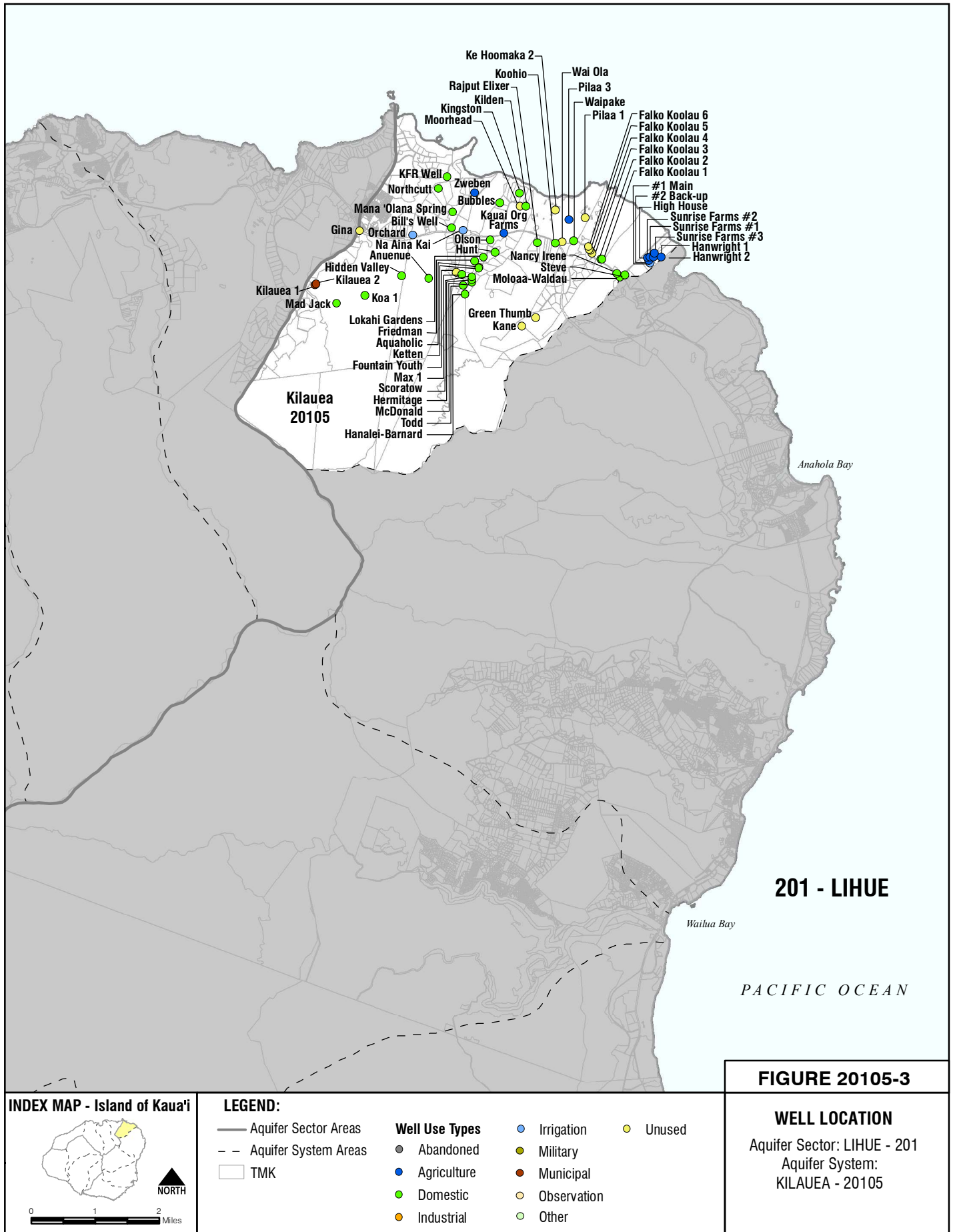
Water conservation increases the amount of water available and helps to ensure the long-term viability of water resources. Water conservation measures for this ASYA are as described in **Section 1.5.7** of this report. There are no ASYA specific special conservation measures in place at this time.

20105-2.4 Rainwater Catchment

Rainwater catchment is a viable resource for areas that are not served by ground water or surface water. **Figure 20105-5** 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.

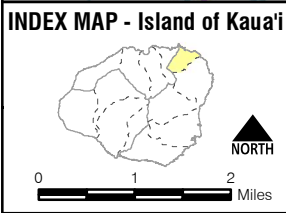
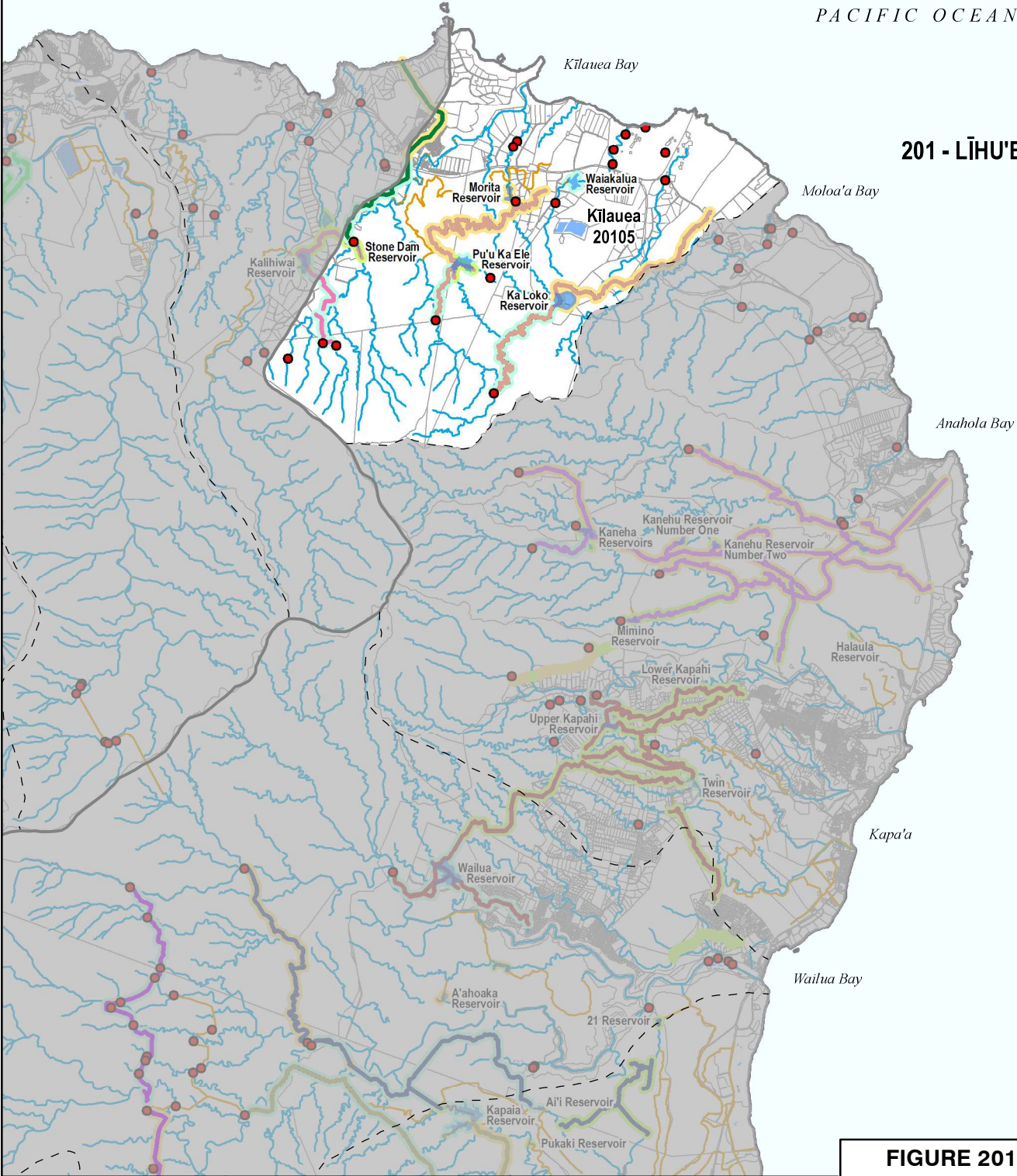
20105-2.5 Recycled Water

There are no wastewater reclamation facilities in the Kīlauea ASYA.



PACIFIC OCEAN

201 - LĪHU'E



LEGEND:

- Aquifer Sector Areas
- - - Aquifer System Areas
- Perennial Streams
- Irrigation Systems
- Diversions
- Reservoirs, Ponds
- TMK

Irrigation Systems

- Ka Loko and Pu'u Ka 'Ele Ditches
- Stone Dam Irrigation Subsystem
- Kallihwai Irrigation Subsystem Ditch

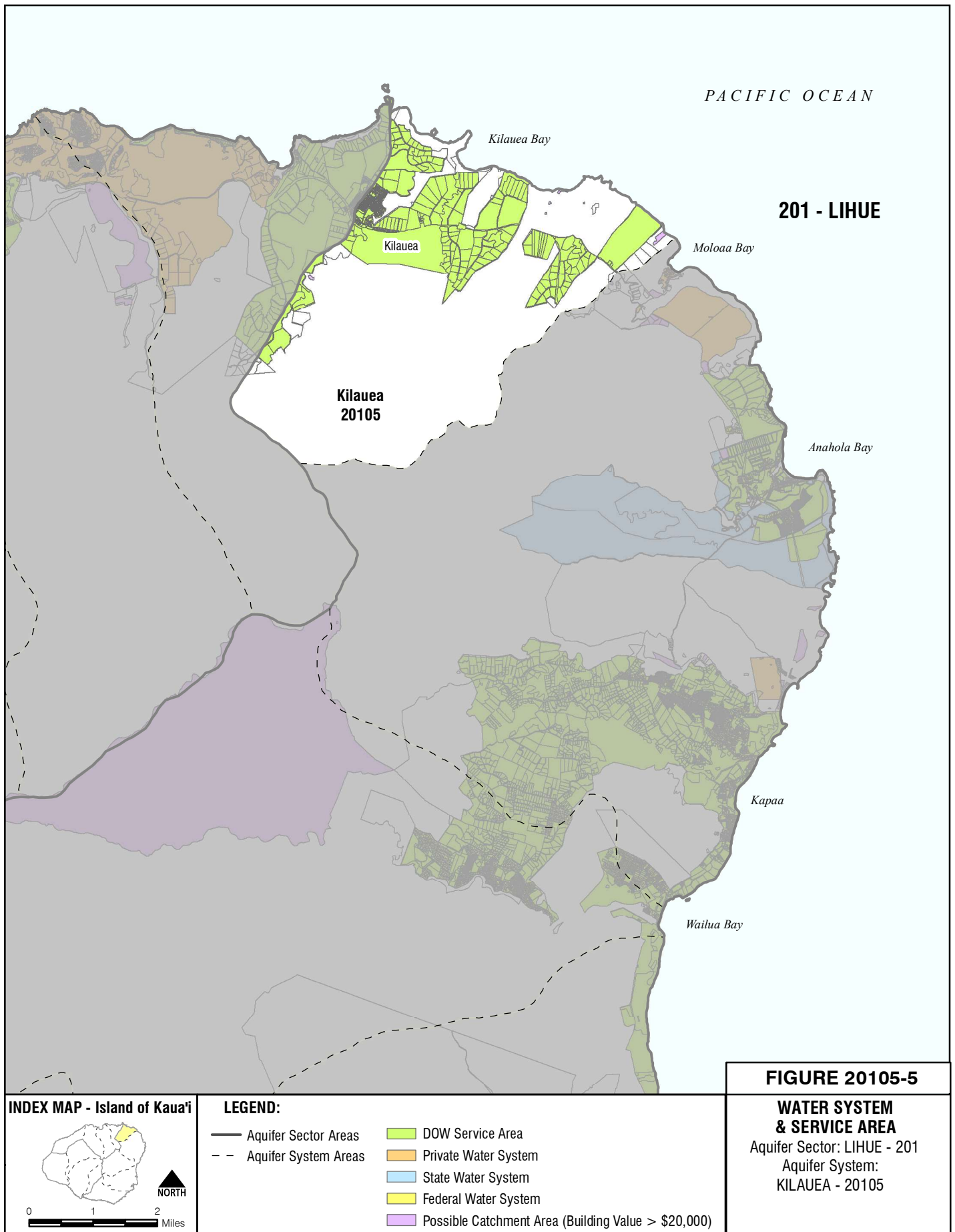
Status

- Active
- Inactive
- Unknown
- Abandoned

FIGURE 20105-4

STREAMS & DIVERSIONS

Aquifer Sector: LĪHU'E - 201
Aquifer System:
KĪLAUEA - 20105



20105-3 EXISTING WATER USE

20105-3.1 General

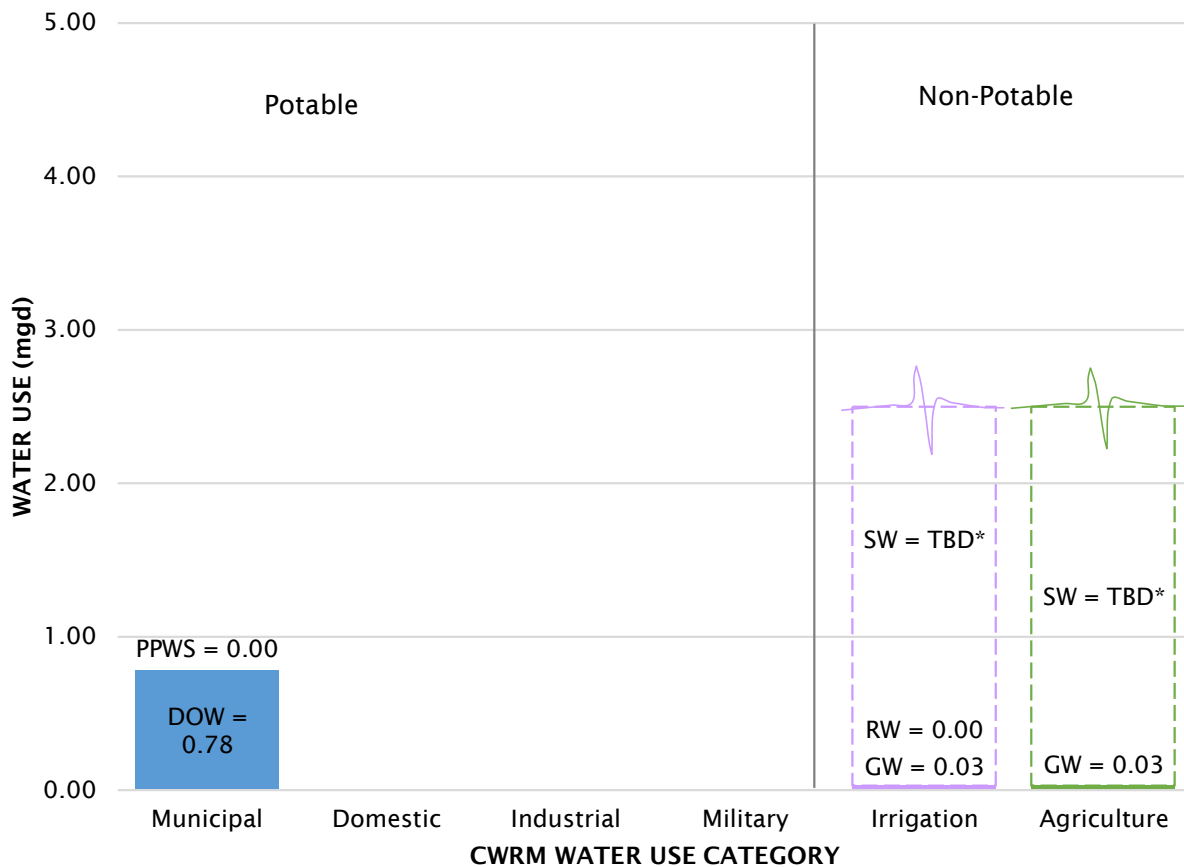
The following section presents the total estimated average water use within the Kīlauea ASYA. The total estimated average water use was based on data from CWRM (well pumpage) and DOH (Sanitary Surveys for Public Water Systems and estimated recycled water usage) for the year of 2014. Well classification changes since 2014 are noted in the sub-sections below. **Table 20105-5** and **Figure 20105-6** summarize the water use in accordance with CWRM categories.

Table 20105-5: Existing Water Use by Category – Kīlauea ASYA

CWRM Category	Ground Water (mgd)	Other Sources (mgd)	Total (mgd)	Percent of Total
Domestic	0.00	TBD ¹	0.00	0.0
Industrial			0.00	0.0
Irrigation	0.03		0.03	3.6
Agriculture	0.03		0.03	3.6
Military			0.00	0.0
Municipal				
DOW System	0.78		0.78	92.8
Private-Public WS			0.00	0.0
TOTAL	0.84		0.84	100.0

¹ Surface Water – TBD from AWUDP

Figure 20105-6: Existing Water Use by Category – Kīlauea ASYA



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

20105-3.2 Domestic Use

There are 28 wells classified as “Domestic” in the 2014 CWRM database; however, none have reported pumpage.

Three additional “Domestic” wells were added to the 2017 CWRM database and two “domestic” wells were re-classified to “Agriculture,” increasing the “domestic” well total to 29 wells. One well was previously classified as “unused” in the 2014 CWRM database.

20105-3.3 Industrial Use

There is no industrial water use in the Kīlauea ASYA.

20105-3.4 Irrigation Use

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

20105-3.4.1 Ground Water

There are three wells classified as “Irrigation” in the CWRM database with total reported pumpage of 0.03 mgd. One is further classified as IRRLA – landscape irrigation, and one is further classified as IRROTH – other irrigation. The IRRLA and IRROTH wells are owned by Na Aina Kai Botanical Gardens and Mauna Ota LLC, respectively.

One additional IRRLA well was added to the CWRM database as of 2017.

20105-3.4.2 Recycled Water

There is no recycled water use in the Kīlauea ASYA.

20105-3.4.3 Surface Water

Information on surface water use for irrigation is to be determined by the AWUDP. However, typically, due to the location of parks and other landscaped areas within communities, it is assumed that it is unlikely for landscaping to be irrigated with surface water.

20105-3.5 Agricultural Use

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

20105-3.5.1 Ground Water

There are ten wells classified as “Agriculture” in the CWRM database, with nine wells further classified as AGRCP - crops and processing and the other well further classified as AGRON – ornamental and nursery plants. Sunrise Organic Farms owns five of the AGRCP wells to irrigate their organic noni crop and has reported pumpage of 0.02 mgd. Kauaʻi Organic Farms owns one AGRCP well to irrigate their turmeric, ginger, and galangal crops and has reported pumpage of 0.01 mgd. Three of the AGRCP wells are owned by private landowners with no reported pumpage. The AGRON well is owned by Na ʻAina Kai Botanical Gardens with no reported pumpage.

Three additional wells were added to the 2017 CWRM database. As previously mentioned, two wells that were previously categorized as “domestic” were re-classified as “agriculture.” These two wells changed ownership from Falco Partners, LLC to Kahuʻaina Holdings, LLC. The third well added to the database is owned by a private landowner.

20105-3.5.2 Recycled Water

There is no recycled water use in the Kīlauea ASYA.

20105-3.5.3 Surface Water

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

20105-3.6 Military Use

There is no military water use in the Kīlauea ASYA.

20105-3.7 Municipal Use

There are 2 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.

20105-3.7.1 County Water Systems

Kīlauea Water System

The DOW has one major water system that serves the Kīlauea ASYA. The Kīlauea water system is DOH Public Water System (PWS) No. 407 and services areas in both the Kīlauea ASYA and Kalihiwai ASYA. The system spans from the Waipakē Subdivision in east Kīlauea to the Kalihiwai River. Besides the residential community of Kīlauea Town, the majority of the service area consists of agricultural subdivisions that consist of a mixture of agricultural and residential uses. Water for this system is supplied by 2 wells. **Table 20105-6** lists the water sources, well number, pumping capacity, pressure zone, and pumpage amount.

Table 20105-6: DOW Kīlauea Water System Water Sources

WELL NAME	WELL NUMBER	PUMPING CAPACITY (gpm)	PRESSURE ZONE (ft)	PUMPAGE (mgd)
Kīlauea Well No. 1	2-1125-001	700	466, 566, 637	0.22
Kīlauea Well No. 2	2-1125-002	700	466, 566, 637	0.56

There are 3 primary pressure zones (466, 566, and 637 feet) and 5 storage tanks in the Kīlauea Water System. The water sources are located at a lower elevation and are pumped to storage tanks at the higher pressure zones.

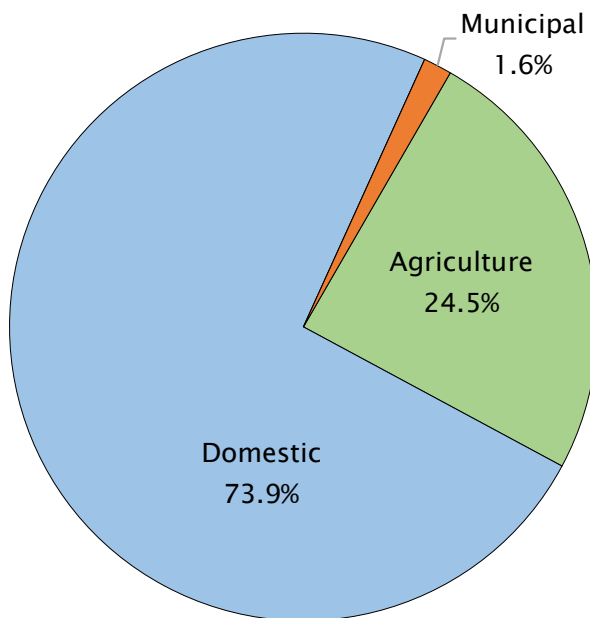
DOW Water Use by Category

DOW water use is subcategorized in **Table 20105-7** to the extent possible based on available meter data and is depicted in **Figure 20105-7**.

Table 20105-7: DOW Existing Water Use by Category – Kīlauea ASYA

CWRM Water Use Category	DOW Metered Water Use (mgd)	Percent of Total
Agricultural	0.090	24.5
Domestic	0.273	73.9
Industrial	0.000	0.0
Military	0.000	0.0
Municipal	0.006	1.6
Total	0.369	100.0

Figure 20105-7: DOW Existing Water Use by Category – Kīlauea ASYA



20105-3.7.2 State Water Systems

There are no State water systems in the Kīlauea ASYA regulated by the DOH.

20105-3.7.3 Federal Water Systems

There are no Federal water systems in the Kīlauea ASYA regulated by the DOH.

20105-3.7.4 Private-Public Water Systems

There are no private-public water systems in the Kīlauea ASYA regulated by the DOH.

20105-3.7.5 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 20105-8**. The per capita use in the Kīlauea ASYA is approximately 41.7% lower than the overall County of Kauaʻi per capita use.

Table 20105-8: Per Capita Use – Kīlauea ASYA

	DOW Metered Water Use – Domestic (mgd)	Private-Public Water System (mgd)	90% of 2015 Population	Per Capita Use (gpd)
Kīlauea ASYA	0.273	0	2,414	113
County of Kauaʻi	9.360	2.951	63,462	194

20105-3.8 Existing Water Use by Resource

20105-3.8.1 Ground Water

Table 20105-9 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 20105-9: Pumpage – Kīlauea ASYA

Pumpage (mgd)	SY (mgd)	Pumpage Portion of SY
0.84	10	8.4%

Based on available information from the CWRM database, the current ground water use is 8.4 percent of the sustainable yield.

20105-3.8.2 Surface Water

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

20105-3.8.3 Water Conservation

Water conservation, including water loss management, may reduce water use. See **Section 20105-2.3** for existing conservation efforts.

20105-3.8.4 Rainwater Catchment

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

20105-3.8.5 Recycled Water

There is no recycled water use in the Kīlauea ASYA.

20105-4 FUTURE WATER USE

20105-4.1 Full Build-Out Water Demand Projections

The full build-out water demand projections based on the General Plan and County Zoning for the Kīlauea ASYA is listed in **Table 20105-10** and **Table 20105-11**, respectively. Each land use class is associated with the most appropriate CWRM water use category.

Table 20105-10: General Plan Full Build-Out Water Demand Projection – Kīlauea ASYA

General Plan Category	CWRM Category	Water Demand (mgd)
Agriculture	Agriculture/Domestic	0.81
Open	Domestic	0.02
Military	Military	0.00
Park	Irrigation	0.00
Residential	Domestic/Municipal	0.40
Resort	Domestic/Irrigation/Municipal	0.00
Transportation	Municipal	0.00
Urban Center	Domestic/Industrial/Municipal	0.00
DHHL	Domestic	0.00
TOTAL		1.23

Table 20105-11: Zoning Full Build-Out Water Demand Projection – Kīlauea ASYA

Zoning Class	CWRM Category	Water Demand (mgd)
Agriculture	Agriculture/Domestic	0.81
Commercial	Municipal	0.02
Industrial	Industrial/Municipal	0.00
Open	Domestic	0.02
Residential	Domestic/Municipal	0.31
Resort	Domestic/Irrigation/Municipal	0.00
DHHL	Domestic	0.00
TOTAL		1.16

20105-4.1.1 Refined Land Use Based Water Projection

State Water Projects Plan

Table 20105-12 lists future State water projects reported in the 2021 SWPP update. The total projected demand to the year 2034 for these two State water projects within the Kīlauea ASYA is 0.001 mgd, both using potable sources.

Table 20105-12: Future State Water Projects – Kīlauea ASYA

Project Name	State of Hawai'i Department	Primary Use	Water Development Strategy	2034 Demand (mgd)
Kīlauea Elementary School New Administration	DOE	Potable	REMAIN	0.0003
Kōloa II Elementary School	DOE	Potable	REMAIN	0.0005
TOTAL REMAIN				0.0008
TOTAL KĪLAUEA ASYA SWPP 2034 DEMAND				0.0008

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. Both of the State projects within the Kīlauea ASYA were assigned the REMAIN water development strategy and results in a total 2034 demand of 0.0008 mgd. This accounts for 0.01 percent of the 10 mgd sustainable yield for the Kīlauea ASYA.

State Department of Hawaiian Home Lands

There are no DHHL tracts in the Kīlauea 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 Kaua'i Important Agricultural Lands (IAL) 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 Kaua'i Important Agricultural Lands Study

1,737 acres of agricultural lands within the Kīlauea ASYA received a score of 28 or better in the County of Kaua'i 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 IALs. **Table 20105-13** 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 20105-13: Irrigation of Agricultural Lands

(1) Declared Surface Water Use from Diversions (mgd)	0.32
(2) Agricultural Lands with a Score ≥ 28 (Acres)	1,737
- How many acres can be sustained by (1) at a water rate of 3,400 gpad? (Acres)	94
- What percent of (2) can be sustained with a water rate of 3,400 gpad?	5%
- If all of (2) were to be irrigated, what is the water unit rate? (gpac)	184

20105-4.1.2 Water Use 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., 5.42 dwelling units per acre for residential designation).

20105-4.2 Water Demand Projections to the Year 2035

The following section presents water demand projections to the year 2035 for the Kīlauea ASYA. The projected low, medium, and high growth rates are listed in **Table 20105-14** and are graphed in **Figure 20105-8**. Potable (domestic, industrial, municipal, and military water uses) and non-potable (irrigation) water demands are also differentiated.

Table 20105-14: Water Demand Projection – Kīlauea ASYA

Water Use Category	Water Demand by Year (mgd)								
	2015	2016	2017	2018	2019	2020	2025	2030	2035
GROWTH RATE C (HIGH)									
TOTAL	0.81	0.82	0.82	0.82	0.83	0.83	0.85	0.88	0.90
Potable	0.78	0.79	0.79	0.79	0.80	0.80	0.82	0.84	0.87
Non-Potable	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
GROWTH RATE B (MEDIUM)									
TOTAL	0.81	0.82	0.82	0.82	0.83	0.83	0.85	0.87	0.89
Potable	0.78	0.79	0.79	0.80	0.80	0.80	0.82	0.84	0.86
Non-Potable	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
GROWTH RATE A (LOW)									
TOTAL	0.81	0.81	0.81	0.82	0.82	0.82	0.82	0.83	0.84
Potable	0.78	0.78	0.78	0.79	0.79	0.79	0.79	0.80	0.81
Non-Potable	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03

Figure 20105-8: Water Demand Projection Summary – Kīlauea ASYA

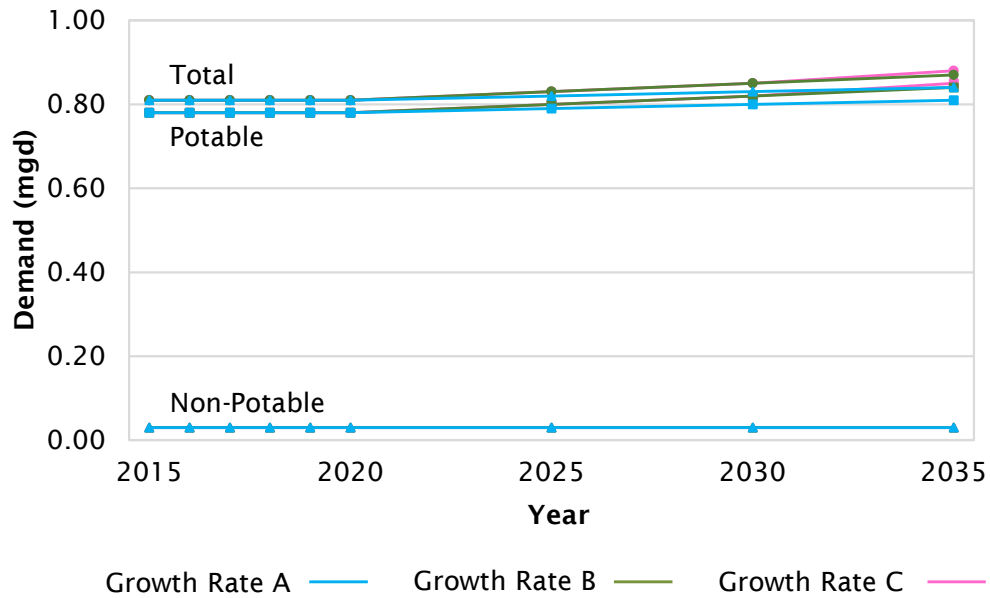


Figure 20105-9 shows the breakdown of water demand projections for a medium growth rate by CWRM categories through the year 2035. Table 20105-15 summarizes this figure.

Figure 20105-9: Medium Growth Rate B Water Demand Projection by Category – Kīlauea ASYA

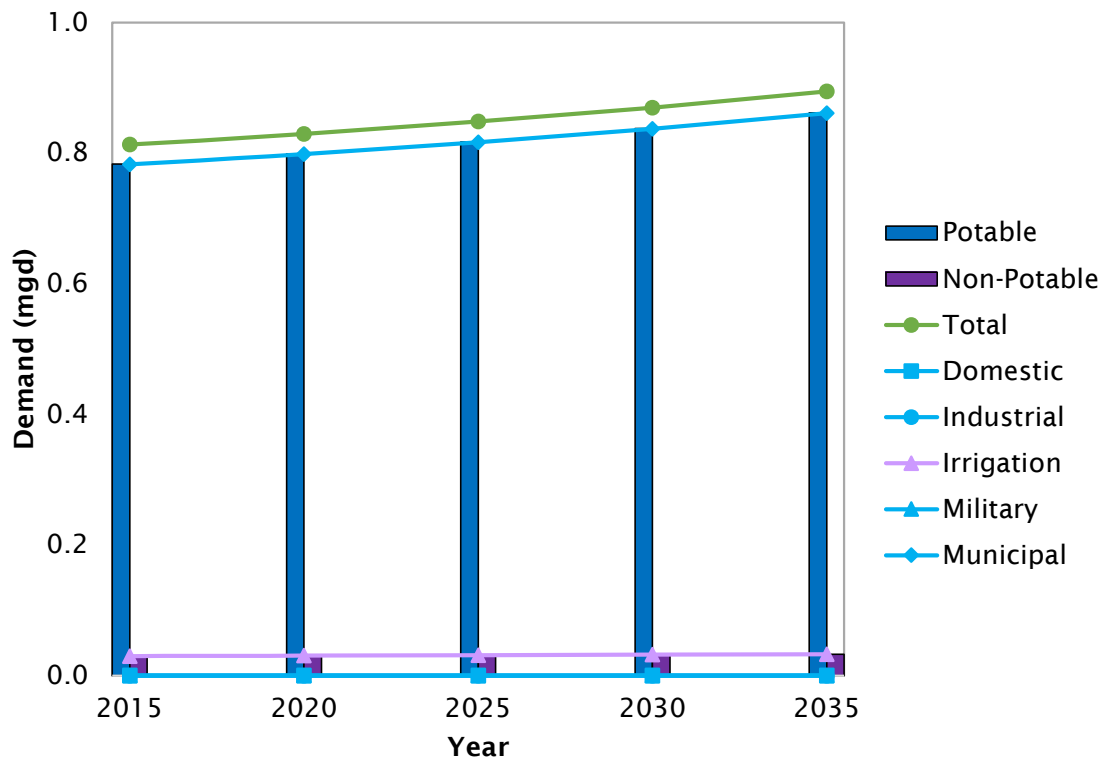


Table 20105-15: Medium Growth Rate B Water Demand Projection by Category – Kīlauea ASYA

Water Use Category	Water Use by Year (mgd)								
	2015	2016	2017	2018	2019	2020	2025	2030	2035
Total	0.81	0.82	0.82	0.82	0.83	0.83	0.85	0.87	0.89
Potable	0.78	0.79	0.79	0.80	0.80	0.80	0.82	0.84	0.86
Non-Potable	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
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	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Military	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Municipal	0.78	0.79	0.79	0.80	0.80	0.80	0.82	0.84	0.86
DOW	0.78	0.79	0.79	0.80	0.80	0.80	0.82	0.84	0.86

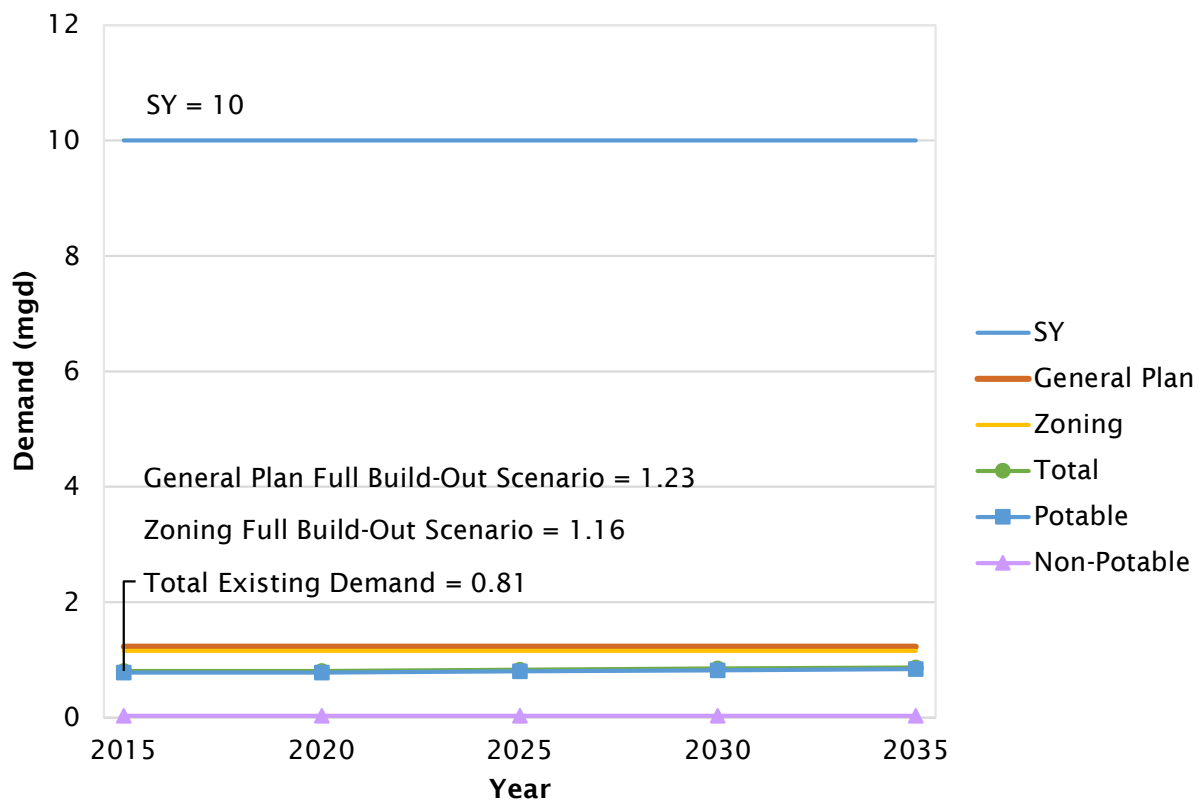
20105-4.3 Summary

Figure 20105-10 illustrates the magnitude of the sustainable yield, both General Plan and Zoning full build-out water use projections, and water use projection through the year 2035 focusing on Medium Growth Rate B. **Table 20105-16** summarizes the General Plan, Zoning, and 20-year water demand projection scenarios for the Kīlauea ASYA. The sustainable yield is presented to draw comparisons. All demands are in mgd.

Table 20105-16: 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
10	1.23	1.16	0.81	0.82	0.82	0.82	0.83	0.83	0.85	0.87	0.89

Figure 20105-10: Medium Growth Rate B Water Demand Projections and Full Build-Out – Kīlauea 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 20105-4.1.1 County of Kaua'i Important Agricultural Lands Study.

20105-5 RESOURCE AND FACILITY RECOMMENDATIONS

20105-5.1 Water Source Adequacy

20105-5.1.1 Full Build-Out

Development to the highest extent allowed by the General Plan and County Zoning within the Kīlauea ASYA is sustainable, with General Plan and County Zoning full build-out water demands both requiring 12 percent of the 10 mgd sustainable yield.

20105-5.1.2 Twenty-Year Projection

The 2035 water demand projection for the Kīlauea ASYA is sustainable and is only 8 percent of the 10 mgd sustainable yield.

20105-5.2 Source Development Requirements

20105-5.2.1 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 Kīlauea ASYA contains basal, perched, and high level ground water. Most reported pumpage is from the basal, followed by perched zone and then high level.

The 2035 water demand projection for the Kīlauea ASYA is only 8 percent of the 10 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 Kīlauea water system is the only public water system in the Kīlauea ASYA. The DOW's Water Plan 2020 identified projects to meet future demands of its service areas. For the Kīlauea water system, one new well (Kīlauea Well No. 4) is proposed.

The DOW's Water Plan 2020 also identified potential storage and distribution system upgrades. Proposed improvements include construction of a new tank in the 466' pressure zone and replacement of several water mains.

It is noted that most of the irrigation water for agriculture in the Kīlauea ASYA comes from ground water. There are approximately 100 agriculture water meters in Kīlauea water system, and they account for a significant portion of DOW's water sales in the area. There are also ten wells classified as agriculture and three wells classified as irrigation in the Kīlauea ASYA. Generally, the quality of the water source should be matched to the quality of the water needed, and it is typically recommended that ground water sources be primarily used as potable drinking water for human consumption. However, until other water sources become more available and economically feasible, ground water will likely remain the primary source for agriculture.

Surface Water

The Kīlauea ASYA has 17 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. As mentioned above, most of the irrigation water for agriculture in the Kīlauea ASYA currently comes from ground water.

There are a few existing irrigation systems in the Kīlauea ASYA, including the Ka Loko and Pu'u Ka Ele Ditches, and the Stone Dam and Kalihiwai irrigation subsystems. These irrigation systems may not be functioning as efficiently as they once were, and several reservoirs in the area have been decommissioned. 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 shall 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 Kīlauea water system services areas in the Kīlauea ASYA and Kalihiwai ASYA. The sources for the water system, including the proposed well, are in the Kīlauea ASYA, while its service area is in both the Kīlauea ASYA and Kalihiwai ASYA.

Water Conservation

The per capita use in the Kīlauea ASYA is approximately 41.7% lower 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 Kīlauea ASYA.

Recycled Water

Recycled water is a valuable resource; an increase in its use may lower the dependence on potable sources. However, there are no wastewater reclamation facilities (WWRFs) in the Kīlauea ASYA.

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.

20105-5.2.2 Demand-Side Management

Development Density Control

The full build-out demand for the Kīlauea ASYA based on County Zoning is 1.16 mgd which is 12 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 Kīlauea ASYA, the average number of dwelling units allowed by County Zoning is 5.42 dwelling units per acre in residential districts.

The full build-out demand for the Kīlauea ASYA based on the General Plan is 1.23 mgd which is 12 percent of sustainable yield. Although it is unlikely that full build-out will occur within the time frame of the General Plan, the full build-out demand is 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 the full build-out scenario is unlikely to occur since it assumes all land is developed to the maximum extent.

20105-5.3 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 Kīlauea ASYA:

Alternative Water Resources

Use of alternative water sources can reduce demands on both ground and surface water resources and conserve water resources as a whole. However, aside from rainwater, there are no available alternative water sources in the area. Alternative water sources are unlikely to be developed when other water resources are readily available.

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 Kīlauea ASYA.

It is noted that ground water is a significant source of water for non-potable agriculture needs in the Kīlauea ASYA. Existing use of ground water for agriculture is sustainable. Also, since the projections of potable water demand are low under full build-out conditions, increased use of ground water for agriculture can be accommodated within the sustainable yield. However, it is noted that the sustainable yield of the Kīlauea ASYA is only 10 mgd and is the lowest on Kauaʻi. Because of this, caution should be exercised before committing to large quantities of ground water use for agriculture. Further, as discussed previously, it is typically recommended that ground water sources be primarily used as potable drinking water for human consumption, and therefore, it is encouraged that other sources of water be explored to meet future agricultural water needs.

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. As mentioned previously, agriculture in the area is currently dependent 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 is 12 percent of sustainable yield. At this projection, implementation of development density control by the County Planning Department is not needed. Although the projection is sustainable, the County Planning Department will need to 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.