
Chapter 20203

Wainiha Aquifer System Area

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20203 WAINIHA AQUIFER SYSTEM AREA

20203-1 SYSTEM AREA PROFILE

20203-1.1 General

The Wainiha [20203] Aquifer System Area (ASYA) is roughly bound on the north by the Pacific ocean from about Hā'ena Point on the west to Makahoa Point on the east, from Makahoa Point proceeding along the east ridge above the Lumaha'i River to the peak of Wai'ale'ale along the east boundary, from Wai'ale'ale through the 'Alakai Swamp on the south, and proceeding back down to the ocean along the western ridge above Wainiha River along the western boundary.

Average annual rainfall ranges from 100 inches per year along the coast to 380 inches in the mountains. The sustainable yield is 24 mgd.

20203-1.2 Economy and Population

20203-1.2.1 Economy

The Wainiha ASYA, particularly in proximity to the shoreline, can be generally characterized as a rural residential area. A majority of lands located mauka (south) of Kūhiō Highway remains undeveloped.

Only a small percentage of lands within the Wainiha ASYA, primarily near the shoreline area, are currently in use for agriculture (grazing lands or cultivated land).

20203-1.2.2 Population

Most of the population within the Wainiha ASYA is concentrated along the areas close to the shoreline, north of Kūhiō Highway, in the Wainiha area. Historical population data for this ASYA is summarized in **Table 20203-1**. Population projections through the year 2035 are summarized in **Table 20203-2a**. As shown in **Table 20203-2b**, it is estimated that the area will continue to experience growth rates between 1 and 6 percent per decade.

Table 20203-1: Historical Population - Wainiha ASYA

	Year		
	1990	2000	2010
Population	602	673	815
Percent Change		11.70	21.15

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

Table 20203-2a: Population Projection – Wainiha ASYA

Growth Rate	Population by Year								
	2015	2016	2017	2018	2019	2020	2025	2030	2035
A – Low	822	823	824	825	826	827	833	841	850
B – Med.	827	830	834	837	840	844	863	885	910
C – High	828	832	835	839	843	847	868	892	920

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

Table 20203-2b: Population Projection – Percent Change – Wainiha ASYA

Growth Rate	2015-2025 % Change	2025-2035 % Change
A – Low	1.3	2.0
B – Medium	4.3	5.4
C – High	4.8	6.0

20203-1.3 Land Use

20203-1.3.1 2000 Kaua‘i General Plan

The 2000 Kaua‘i County General Plan Land Use Designation Map for the Wainiha ASYA is shown on **Figure 20203-1**. The estimated land use allocation acreage for each land use designation within the system area is listed in **Table 20203-3**.

Table 20203-3: General Plan Estimated Land Use Allocation Acreage – Wainiha ASYA

General Plan Land Use Designation	Acreage	Percent of Total
Agricultural	0	0.0
Military	0	0.0
Open	24,667	99.1
Park	59	0.2
Residential Community	174	0.7
Resort	0	0.0
Transportation	0	0.0
Urban Center	0	0.0
DHHL	0	0.0
TOTAL	24,900	100.0

20203-1.3.2 Kaua‘i Zoning

Kaua‘i County Zoning Map for the Wainiha ASYA is shown on **Figure 20203-2**. The estimated land use allocation acreage for each zoning district within the system area is listed in **Table 20203-4**.

Table 20203-4: County Zoning Estimated District Allocation Acreage – Wainiha ASYA

Zoning District	Acreage	% of Total
Agriculture	835	3.3
Commercial – General	0	0.0
Commercial - Neighborhood	0	0.0
Conservation	24,003	94.5
Industrial – General	0	0.0
Industrial - Limited	0	0.0
Open	351	1.4
Residential	149	0.6
Resort	3	0.0
Project Development	0	0.0
Special Planning Area	0	0.0
Special Treatment	0	0.0
No Zoning	58	0.2
DHHL	0	0.0
TOTAL	25,399	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 Wainiha ASYA is 2.49 dwelling units per acre. The average number of dwelling units allowed in resort districts in the Wainiha ASYA is 8.00 dwelling units per acre.

PACIFIC OCEAN

202 - HANA LEI

Hanakapi'ai
Beach

Hanalei
Bay

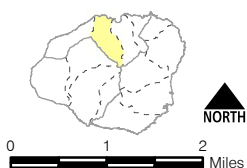
Wainiha
20203

FIGURE 20203-1

GENERAL PLAN LAND USE MAP

Aquifer Sector: HANA LEI - 202
Aquifer System:
WAINIHA - 20203

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 |

20203-2 EXISTING WATER RESOURCES

20203-2.1 Ground Water

The Wainiha ASYA has a sustainable yield of 24 mgd. According to the 2014 CWRM database, there are 4 production wells in the system, 3 municipal and 1 domestic well. Refer to **Appendix A** for this database. **Figure 20203-3** shows the well locations.

20203-2.2 Surface Water

There are 4 streams classified as perennial in the Wainiha ASYA, all of which are considered continuous. The perennial streams are Limahuli Stream, Mānoa Stream, Wainiha River, and Lumaha'i River. The USGS has 1 active surface water gage in the system area. The gage is located on Wainiha River near Hanalei, 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 37 declared stream diversions in the CWRM database shown on **Figure 20203-4**, which accounts for 13 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 Wainiha ASYA is 0.65 mgd.

20203-2.3 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.

20203-2.4 Rainwater Catchment

Rainwater catchment is a viable resource for areas that are not served by ground water or surface water. **Figure 20203-5** 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.

20203-2.5 Recycled Water

There are no wastewater reclamation facilities in the Wainiha ASYA.

PACIFIC OCEAN

202 - HANAIEI

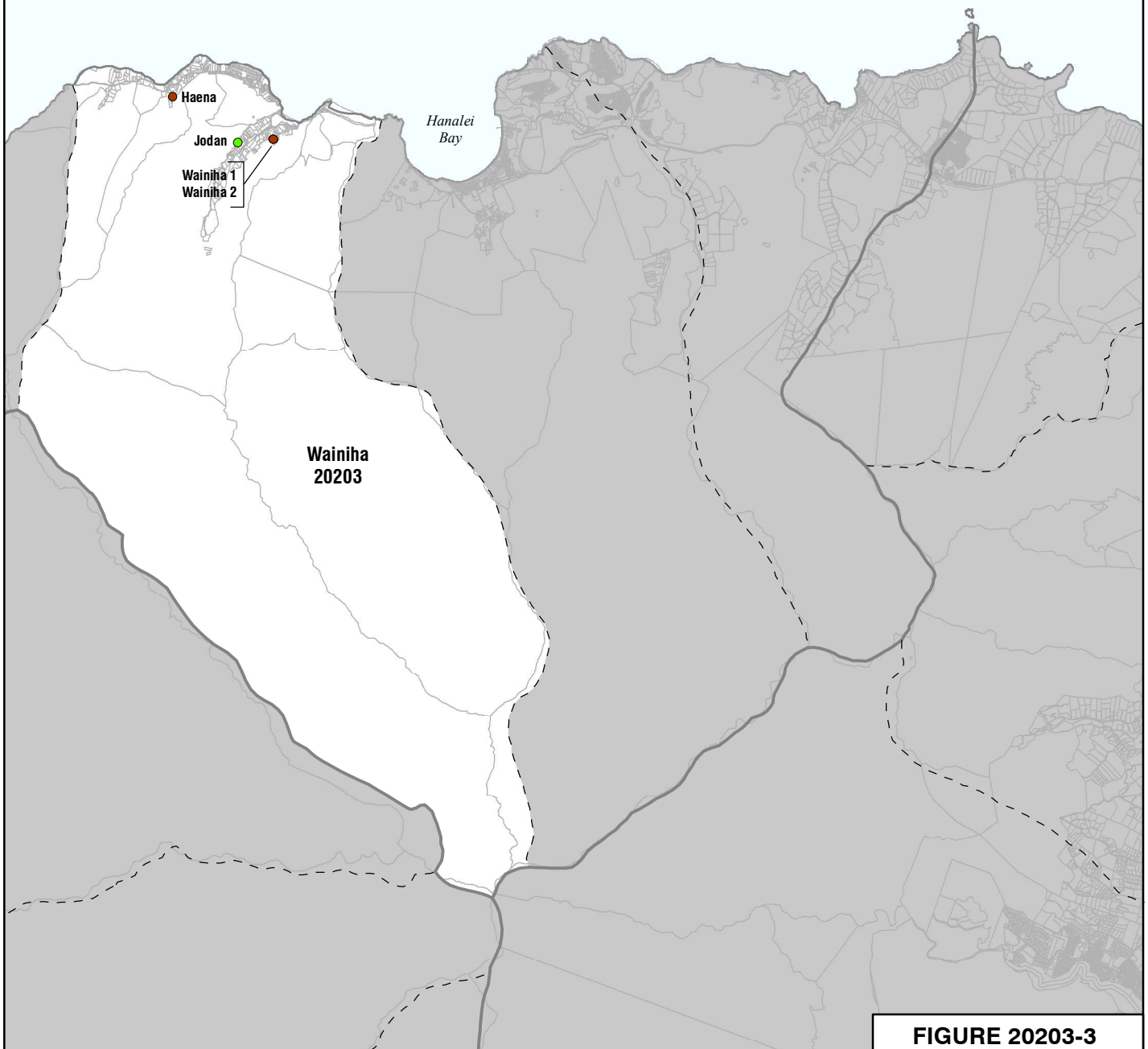
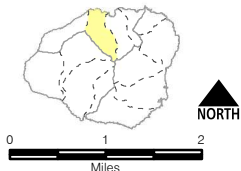


FIGURE 20203-3

INDEX MAP - Island of Kaua'i



LEGEND:

- Aquifer Sector Areas
- - - Aquifer System Areas
- TMK

Well Use Types

- Abandoned
- Agriculture
- Domestic
- Industrial

- Irrigation
- Military
- Municipal
- Observation
- Other

- Unused

WELL LOCATION

Aquifer Sector: HANAIEI - 202
Aquifer System:
WAINIHA - 20203

202 - HANA LEI

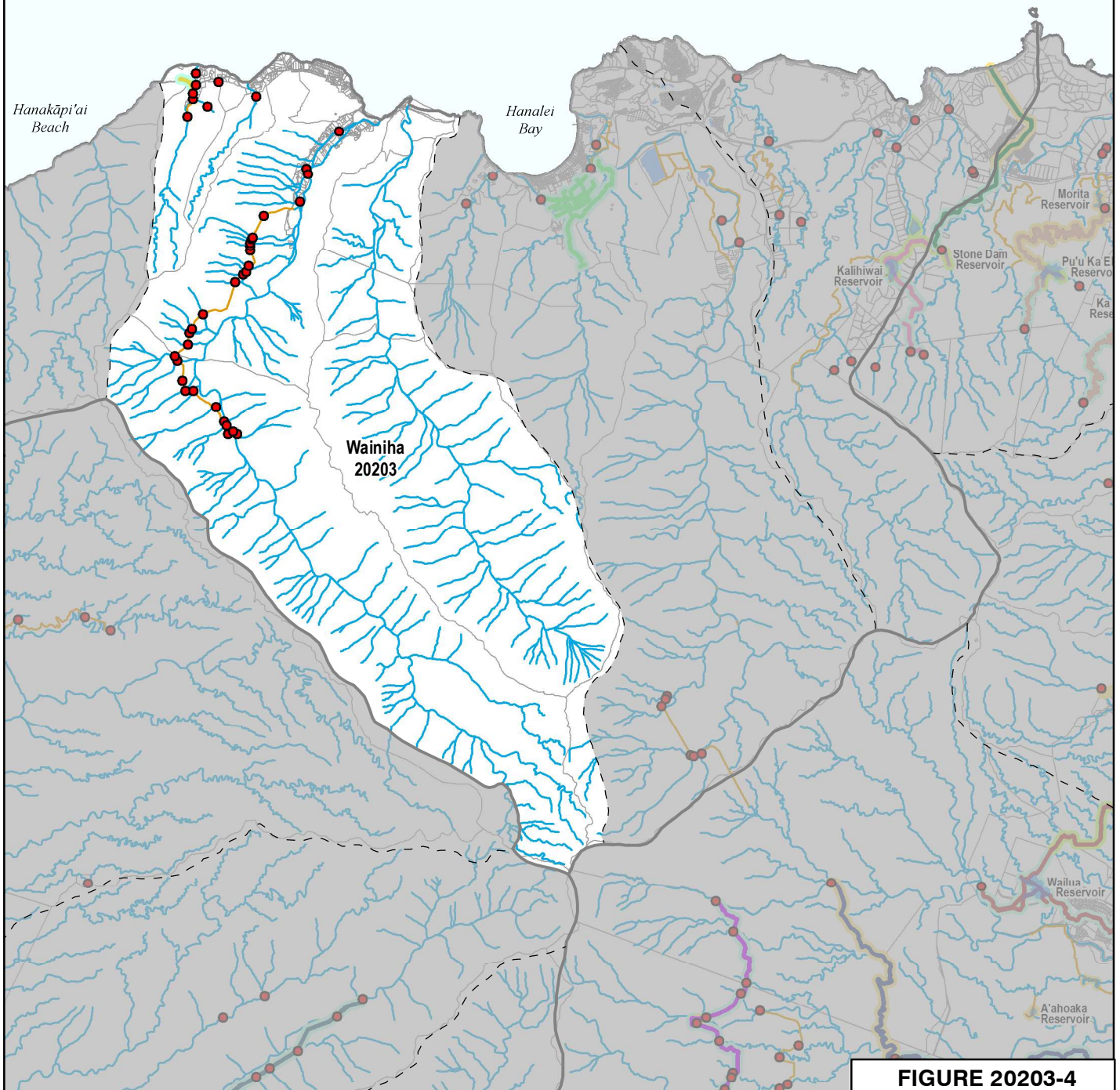
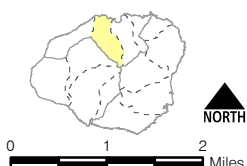


FIGURE 20203-4

STREAMS & DIVERSIONS

Aquifer Sector: HANA LEI - 202
Aquifer System:
WAINIHA - 20203

INDEX MAP - Island of Kaua'i



LEGEND:

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

Irrigation Systems

- Hā'ena State Park

Status

- Active
- Inactive
- Unknown
- Abandoned

PACIFIC OCEAN

202 - HANA LEI

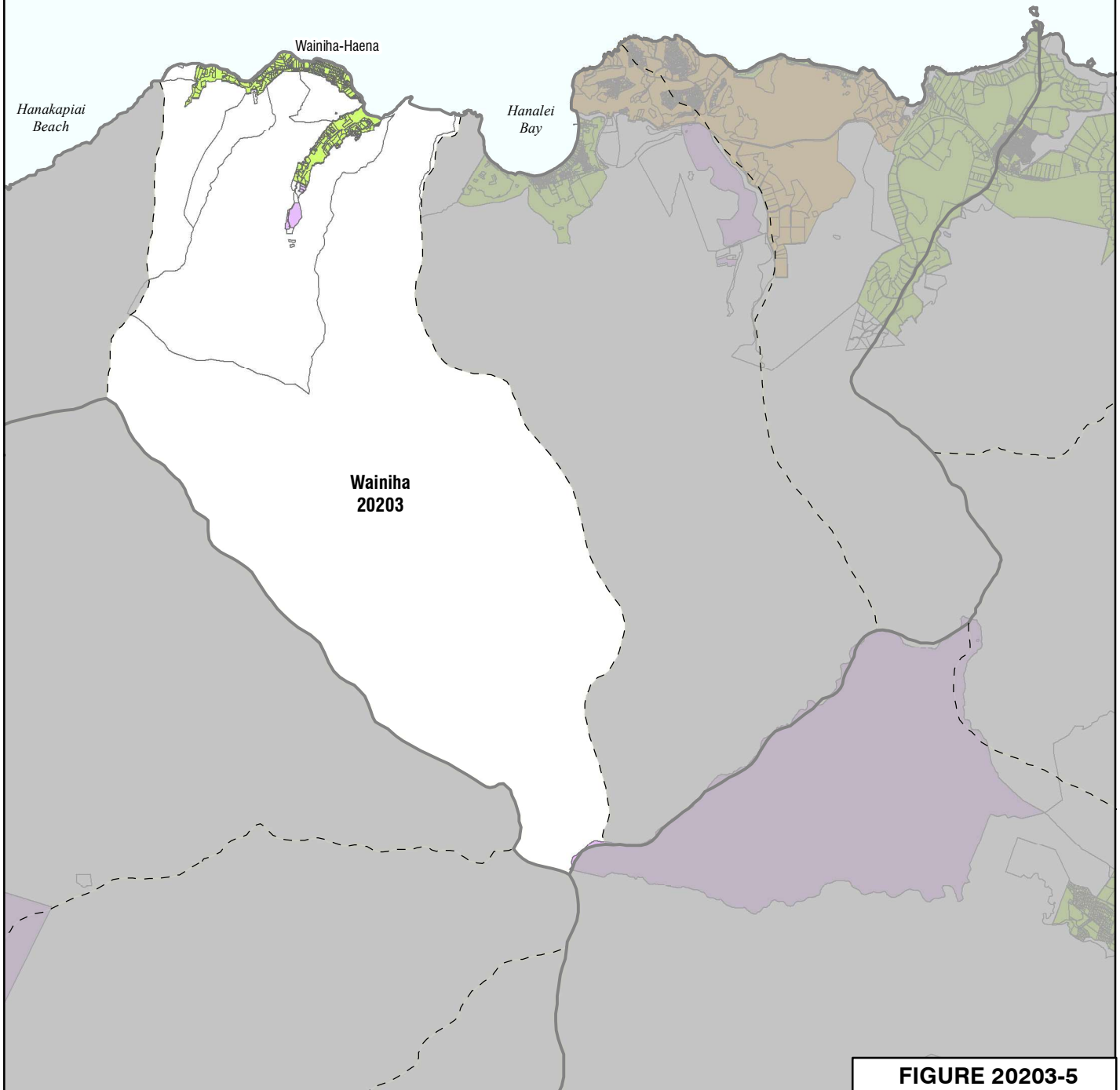
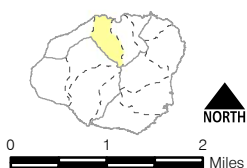


FIGURE 20203-5

WATER SYSTEM & SERVICE AREA

Aquifer Sector: HANA LEI - 202
Aquifer System:
WAINIHA - 20203

INDEX MAP - Island of Kaua'i



LEGEND:

- Aquifer Sector Areas
- - Aquifer System Areas
- DOW Service Area
- Private Water System
- State Water System
- Federal Water System
- Possible Catchment Area (Building Value > \$20,000)

20203-3 EXISTING WATER USE

20203-3.1 General

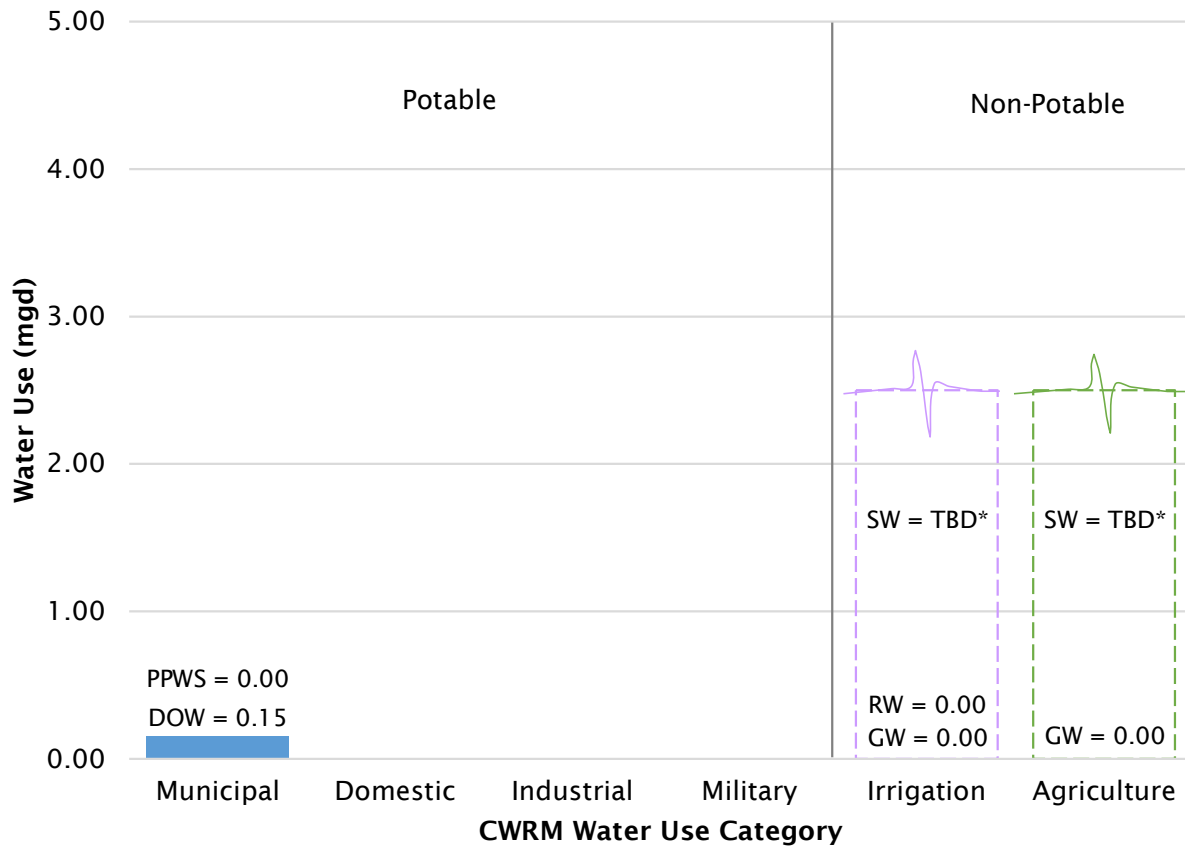
The following section presents the total estimated average water use within the Wainiha ASYA. The total estimated average water use was based on data from CWRM (well pumpage) and DOH (Sanitary Surveys for Public Water Systems and estimated recycled water usage) for the year of 2014. Well classification changes since 2014 are noted in the sub-sections below. **Table 20203-5** and **Figure 20203-6** summarize the water use in accordance with CWRM categories.

Table 20203-5: Existing Water Use by Category – Wainiha 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			0.00	0.0
Agriculture			0.00	0.0
Military			0.00	0.0
Municipal				
DOW System	0.15		0.15	100.0
Private-Public WS			0.00	0.0
TOTAL	0.15		0.15	100.0

¹ Surface Water – TBD from AWUDP

Figure 20203-6: Existing Water Use by Category – Wainiha ASYA



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

20203-3.2 Domestic Use

There is 1 well classified as “Domestic” in the 2014 CWRM database; however, it has not reported pumpage.

One additional “Domestic” well was added to the 2017 CWRM database, increasing the “Domestic” well total to 2 wells. This well was drilled in 2016 to serve a private landowner.

20203-3.3 Industrial Use

There are no wells classified as “Industrial” in the Wainiha ASYA.

The Wainiha Hydropower plant was built by McBryde Sugar Company in 1906 and produces 3.7 MW of power. McBryde’s plantation in Hanapēpē did not have access to sufficient surface water to irrigate its sugarcane fields so it developed ground water sources and storage reservoirs. In order to economically pump the water from the wells to the storage reservoirs and sugarcane fields, the Wainiha Hydropower plant was built, utilizing the Wainiha River. Together with Kalāheo Hydropower plant (discussed in **Section 20101**), the electricity generated powers the Kaua’i Coffee factory, visitor center, and offices in Numila. The hydropower plant is now owned and operated by

Kaua'i Coffee Company, Inc. Excess electricity is sold to the Kaua'i Island Utility Cooperative (KIUC).

20203-3.4 Irrigation Use

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

20203-3.4.1 Ground Water

There is no irrigation water use in the Wainiha ASYA.

20203-3.4.2 Recycled Water

There is no recycled water use in the Wainiha ASYA.

20203-3.4.3 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.

20203-3.5 Agricultural Use

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

20203-3.5.1 Ground Water

There are no wells classified as "Agriculture" in the Wainiha ASYA.

20203-3.5.2 Recycled Water

There is no recycled water use in the Wainiha ASYA.

20203-3.5.3 Surface Water

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

20203-3.6 Military Use

There is no military water use in the Wainiha ASYA.

20203-3.7 Municipal Use

There are 3 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.

20203-3.7.1 County Water Systems

Hā'ena-Wainiha Water System

The DOW has one major water system that serves the Wainiha ASYA. The Hā'ena-Wainiha water system is DOH Public Water System (PWS) No. 415 and spans the Wainiha ASYA. This water system serves 1,180 people in Wainiha Valley and the Hā'ena community through 357 service connections. Water for this system is supplied by 3 wells. **Table 20203-6** lists the water sources, well number, pumping capacity, pressure zone, and pumpage amount.

Table 20203-6: DOW Hā'ena-Wainiha Water System Water Sources

WELL NAME	WELL NUMBER	PUMPING CAPACITY (gpm)	PRESSURE ZONE (ft)	PUMPAGE (mgd)
Wainiha Well #1	2-1232-001	25	224	0.01
Wainiha Well #2	2-1232-002	250	144	0.08
Hā'ena Well	2-1333-001	150	144	0.06

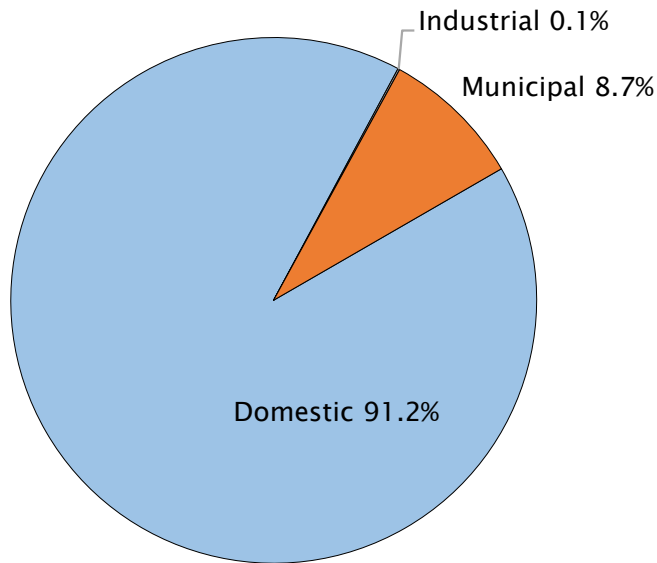
There are 2 primary pressure zones (144 feet, 224 feet) and 2 storage tanks in the Hā'ena-Wainiha water system.

DOW Water Use by Category

DOW water use is subcategorized in **Table 20203-7** to the extent possible based on available meter data and is depicted in **Figure 20203-7**.

Table 20203-7: DOW Existing Water Use by Category – Wainiha ASYA

CWRM Water Use Category	DOW Metered Water Use (mgd)	Percent of Total
Agricultural	0.0000	0.0
Domestic	0.1360	91.2
Industrial	0.0002	0.1
Military	0.0000	0.0
Municipal	0.0130	8.7
Total	0.1492	100.0

Figure 20203-7: DOW Existing Water Use by Category – Wainiha ASYA

20203-3.7.2 State Water Systems

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

20203-3.7.3 Federal Water Systems

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

20203-3.7.4 Private-Public Water Systems

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

20203-3.7.5 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 20203-8**. The per capita use in the Wainiha ASYA is approximately 5.1% lower than the overall County of Kaua'i per capita use.

Table 20203-8: Per Capita Use – Wainiha ASYA

	DOW Metered Water Use – Domestic (mgd)	Private-Public Water System (mgd)	90% of 2015 Population	Per Capita Use (gpd)
Wainiha ASYA	0.136	0	744	184
County of Kaua'i	9.360	2.951	63,462	194

20203-3.8 Existing Water Use by Resource

20203-3.8.1 Ground Water

Table 20203-9 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 20203-9: Pumpage – Wainiha ASYA

Pumpage (mgd)	SY (mgd)	Pumpage Portion of SY
0.15	24	0.6%

Based on available information from the CWRM database, the current ground water use is 0.6 percent of the sustainable yield.

20203-3.8.2 Surface Water

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

20203-3.8.3 Water Conservation

Water conservation, including water loss management, may reduce water use. See **Section 20203-2.3** for discussion of existing conservation efforts.

20203-3.8.4 Rainwater Catchment

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

20203-3.8.5 Recycled Water

There is no recycled water use in the Wainiha ASYA.

20203-4 FUTURE WATER USE

20203-4.1 Full Build-Out Water Demand Projections

The full build-out water demand projections based on the General Plan and County Zoning for the Wainiha ASYA is listed in **Table 20203-10** and **20203-11**, respectively. Each land use class is associated with the most appropriate CWRM water use category.

Table 20203-10: General Plan Full Build-Out Water Demand Projection – Wainiha ASYA

General Plan Category	CWRM Category	Water Demand (mgd)
Agriculture	Agriculture/Domestic	0.08
Open	Domestic	0.01
Military	Military	0.00
Park	Irrigation	0.23
Residential	Domestic/Municipal	0.22
Resort	Domestic/Irrigation/Municipal	0.00
Transportation	Municipal	0.00
Urban Center	Domestic/Industrial/Municipal	0.00
DHHL	Domestic	0.00
TOTAL		0.54

Table 20203-11: Zoning Full Build-Out Water Demand Projection – Wainiha ASYA

Zoning Class	CWRM Category	Water Demand (mgd)
Agriculture	Agriculture/Domestic	0.08
Commercial	Municipal	0.00
Industrial	Industrial/Municipal	0.00
Open	Domestic	0.01
Residential	Domestic/Municipal	0.18
Resort	Domestic/Irrigation/Municipal	0.02
DHHL	Domestic	0.00
TOTAL		0.29

20203-4.1.1 Refined Land Use Based Water Projection

State Water Projects Plan

There are no future State water projects through the year 2034 within the Wainiha ASYA according to the 2021 SWPP Update.

State Department of Hawaiian Home Lands

There are no DHHL tracts in the Wainiha 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

57 acres of agricultural lands within the Wainiha 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 20203-12** 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 (gpac) estimated in the 2004 AWUDP.

Table 20203-12: Irrigation of Agricultural Lands

(1) Declared Surface Water Use from Diversions (mgd)	0.65
(2) Agricultural Lands with a Score $\geq$ 28 (Acres)	57
- How many acres can be sustained by (1) at a water rate of 3,400 gpac? (Acres)	191
- What percent of (2) can be sustained with a water rate of 3,400 gpac?	338%
- If all of (2) were to be irrigated, what is the water unit rate? (gpac)	11,490

20203-4.1.2 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., 2.49 dwelling units per acre for residential designation and 8.00 dwelling units per acre for resort designation).

20203-4.2 Water Demand Projections to the Year 2035

The following section presents water demand projections to the year 2035 for the Wainiha ASYA. The projected low, medium, and high growth rates are listed in **Table 20203-13** and are graphed in **Figure 20203-8**. Potable (domestic, industrial, municipal, and military water uses) and non-potable (irrigation) water demands are also differentiated.

Table 20203-13: Water Demand Projection – Wainiha ASYA

Water Use Category	Water Demand by Year (mgd)								
	2015	2016	2017	2018	2019	2020	2025	2030	2035
GROWTH RATE C (HIGH)									
TOTAL	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.16	0.17
Potable	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.16	0.17
Non-Potable	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GROWTH RATE B (MEDIUM)									
TOTAL	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.16	0.16
Potable	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.16	0.16
Non-Potable	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GROWTH RATE A (LOW)									
TOTAL	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Potable	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Non-Potable	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure 20203-8: Water Demand Projection Summary – Wainiha ASYA

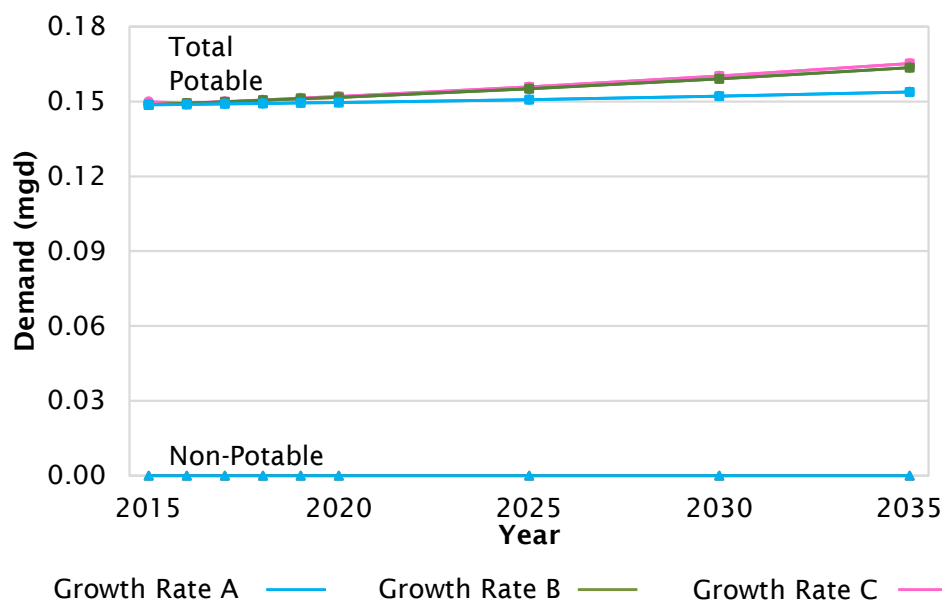


Figure 20203-9 shows the breakdown of water demand projections for a medium growth rate by CWRM categories through the year 2035. Table 20203-14 summarizes this figure.

Figure 20203-9: Medium Growth Rate B Water Demand Projection by Category – Wainiha ASYA

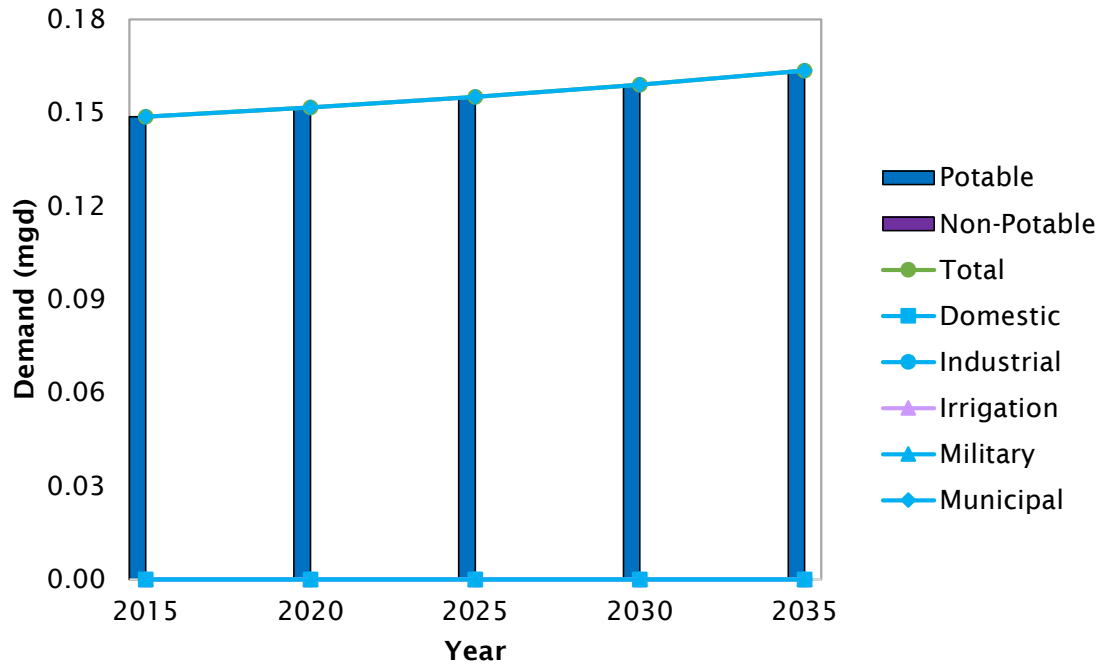


Table 20203-14: Medium Growth Rate B Water Demand Projection by Category – Wainiha ASYA

Water Use Category	Water Use by Year (mgd)								
	2015	2016	2017	2018	2019	2020	2025	2030	2035
Total	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.16	0.16
Potable	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.16	0.16
Non-Potable	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Military	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Municipal	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.16	0.16
DOW	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.16	0.16

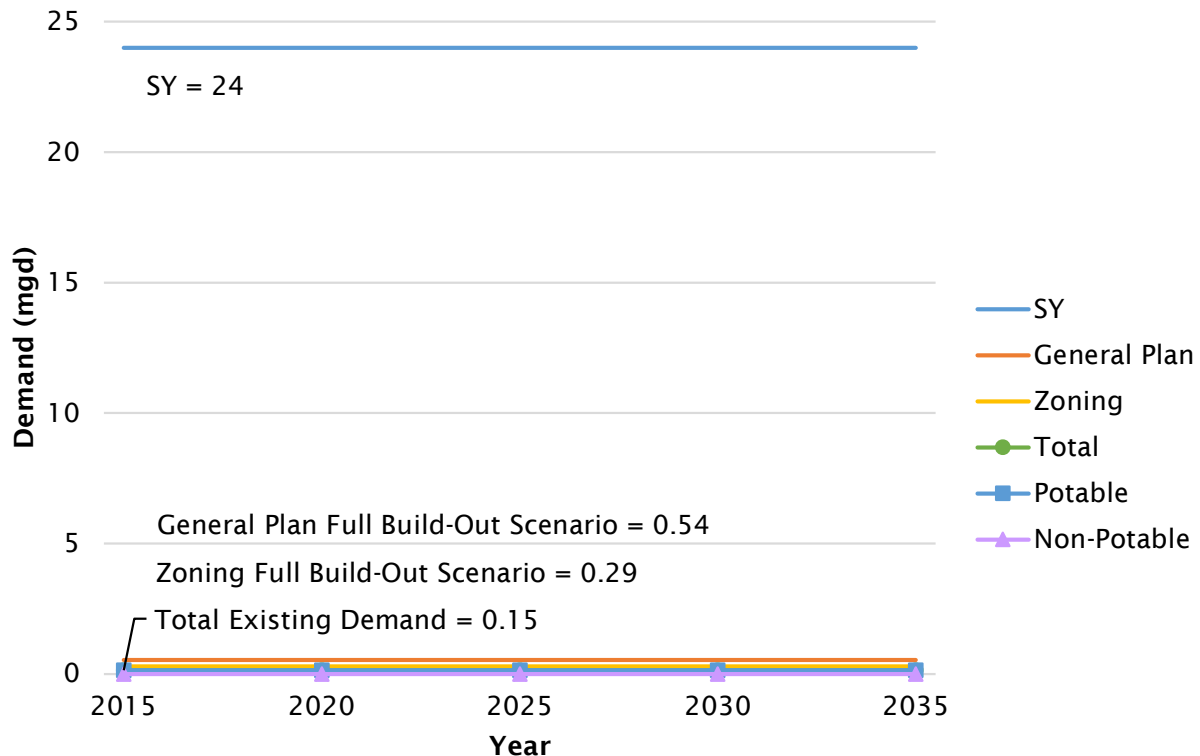
20203-4.3 Summary

Figure 20203-10 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 20203-15** summarizes the General Plan, Zoning, and 20-year water demand projection scenarios for the Wainiha ASYA. The sustainable yield is presented to draw comparisons. All demands are in mgd.

Table 20203-15: 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
24	0.54	0.29	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.16	0.16

Figure 20203-10: Medium Growth Rate B Water Demand Projections and Full Build-Out – Wainiha 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 20203-4.1.1 County of Kaua'i Important Agricultural Lands Study.

20203-5 RESOURCE AND FACILITY RECOMMENDATIONS

20203-5.1 Water Source Adequacy

20203-5.1.1 Full Build-Out

Development to the highest extent allowed by the General Plan and County Zoning within the Wainiha ASYA is sustainable, with General Plan and County Zoning full build-out water demands requiring 2 and 1 percent of the 24 mgd sustainable yield, respectively.

20203-5.1.2 Twenty-Year Projection

The 2035 water demand projection for the Wainiha ASYA is sustainable and is only 0.6 percent of the 24 mgd sustainable yield.

20203-5.2 Source Development Requirements

20203-5.2.1 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 Wainiha ASYA contains basal and high level ground water. All reported pumpage is from the basal zone.

The 2035 water demand projection for the Wainiha ASYA is only 0.6 percent of the 24 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 Hā'ena-Wainiha water system is the only public water system in the Wainiha ASYA. The DOW's Water Plan 2020 identified projects to meet future demands of its service areas. For the Hā'ena-Wainiha water system, one new well (Wainiha 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 and replacement mainlines along Wainiha Powerhouse Road and along Kūhiō Highway in west Hā'ena.

Surface Water

The Wainiha ASYA has 37 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 off-stream 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 a couple of small existing irrigation lines in the Wainiha ASYA, as shown on **Figure 20203-4**, but there are no major irrigation systems.

Water Transfer

There is no apparent existing infrastructure to transfer water into or out of the Wainiha ASYA. It is unlikely that constructing infrastructure to transfer water into or out of the Wainiha ASYA will be necessary to meet the projected demands of the Wainiha ASYA or the adjacent ASYAs.

Water Conservation

The per capita use in the Wainiha ASYA is approximately 5.1% lower than the overall County of Kaua'i 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 Hawai'i (Storm Water Report) in 2008 but did not identify any storm water reclamation and reuse opportunities in the Wainiha 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 Wainiha 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 available.

20203-5.2.2 Demand-Side Management

Development Density Control

The full build-out demand for the Wainiha ASYA based on County Zoning is 0.29 mgd which is 1 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 Wainiha ASYA, the average number of dwelling units allowed by County Zoning is 2.49 dwelling units per acre in residential districts and 8.00 dwelling units per acre in resort districts.

The full build-out demand for the Wainiha ASYA based on the General Plan is 0.54 mgd which is 2 percent of sustainable yield. 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.

20203-5.3 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 Wainiha 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 Wainiha 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 or large irrigation systems.

Demand-Side Management

Full build-out demand based on the General Plan is 2 percent of sustainable yield. At this projection, implementation of development density control by the County Planning Department is not needed in this area. 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.