
Chapter 20202

Hanalei Aquifer System Area

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20202 HANALEI AQUIFER SYSTEM AREA

20202-1 SYSTEM AREA PROFILE

20202-1.1 General

The Hanalei [20202] Aquifer System Area (ASYA) is roughly bound on the north by Hanalei Bay, along the east ridge of the Hanalei River to the peak of Keāhūa, from Keāhūa to the peak of Wai‘ale‘ale along the southeast, and from the peak of Wai‘ale‘ale back to Hanalei Bay along the east ridge above the Lumaha‘i River. The Hanalei ASYA includes Hanalei town and a portion of Princeville.

Average annual rainfall ranges from about 80 inches per year along the coast to 340 inches in the mountains. The sustainable yield is 35 mgd.

20202-1.2 Economy and Population

20202-1.2.1 Economy

The Hanalei ASYA is generally residential but also includes commercial and resort areas in areas typically located along the north side of Kūhiō Highway. The Hanalei ASYA also includes the island’s largest agricultural areas for the raising of taro crops.

The largest industries in Hanalei are accommodation and food service, retail trade, and educational services. The largest industries in Princeville are accommodation and food service; art, entertainment, recreation; and real estate, rental and leasing.

20202-1.2.2 Population

Most of the population within the Hanalei ASYA is concentrated along the areas close to the shoreline, north of Kūhiō Highway, in Hanalei Town and in Princeville. Historical population data for this ASYA is summarized in **Table 20202-1**. Population projections through the year 2035 are summarized in **Table 20202-2a**. As shown in **Table 20202-2b**, it is estimated that the area will continue to experience growth rates between 1 and 6 percent per decade.

Table 20202-1: Historical Population – Hanalei ASYA

	Year		
	1990	2000	2010
Population	978	1,092	1,323
Percent Change		11.7	21.2

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

Table 20202-2a: Population Projection – Hanalei ASYA

Growth Rate	Population by Year								
	2015	2016	2017	2018	2019	2020	2025	2030	2035
A – Low	1,334	1,335	1,337	1,338	1,340	1,342	1,352	1,365	1,379
B – Med.	1,343	1,348	1,353	1,359	1,364	1,370	1,401	1,436	1,477
C – High	1,344	1,350	1,356	1,362	1,368	1,375	1,409	1,448	1,494

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

Table 20202-2b: Population Projection – Percent Change – Hanalei 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

20202-1.3 Land Use

20202-1.3.1 2000 Kaua‘i General Plan

The 2000 Kaua‘i County General Plan Land Use Designation Map for the Hanalei ASYA is shown on **Figure 20202-1**. The estimated land use allocation acreage for each land use designation within the system area is listed in **Table 20202-3**.

Table 20202-3: General Plan Estimated Land Use Allocation Acreage – Hanalei ASYA

General Plan Land Use Designation	Acreage	Percent of Total
Agricultural	723	3.5
Military	0	0.0
Open	19,427	94.5
Park	4	0.0
Residential Community	131	0.6
Resort	276	1.4
Transportation	0	0.0
Urban Center	0	0.0
DHHL	0	0.0
TOTAL	20,561	100.0

20202-1.3.2 Kaua‘i Zoning

Kaua‘i County Zoning Map for the Hanalei ASYA is shown on **Figure 20202-2**. The estimated land use allocation acreage for each zoning district within the system area is listed in **Table 20202-4**.

Table 20202-4: County Zoning Estimated District Allocation Acreage - Hanalei ASYA

Zoning District	Acreage	Percent of Total
Agriculture	1,143	5.4
Commercial - General	26	0.1
Commercial - Neighborhood	9	0.0
Conservation	18,439	87.0
Industrial - General	0	0.0
Industrial - Limited	0	0.0
Open	1,283	6.0
Residential	237	1.1
Resort	68	0.3
Project Development	0	0.0
Special Planning Area	0	0.0
Special Treatment	0	0.0
No Zoning	22	0.1
DHHL	0	0.0
TOTAL	21,227	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 Hanalei ASYA is 5.92 dwelling units per acre. The average number of dwelling units allowed in resort districts in the Hanalei ASYA is 12.37 dwelling units per acre.

PACIFIC OCEAN

202 - HANALEI

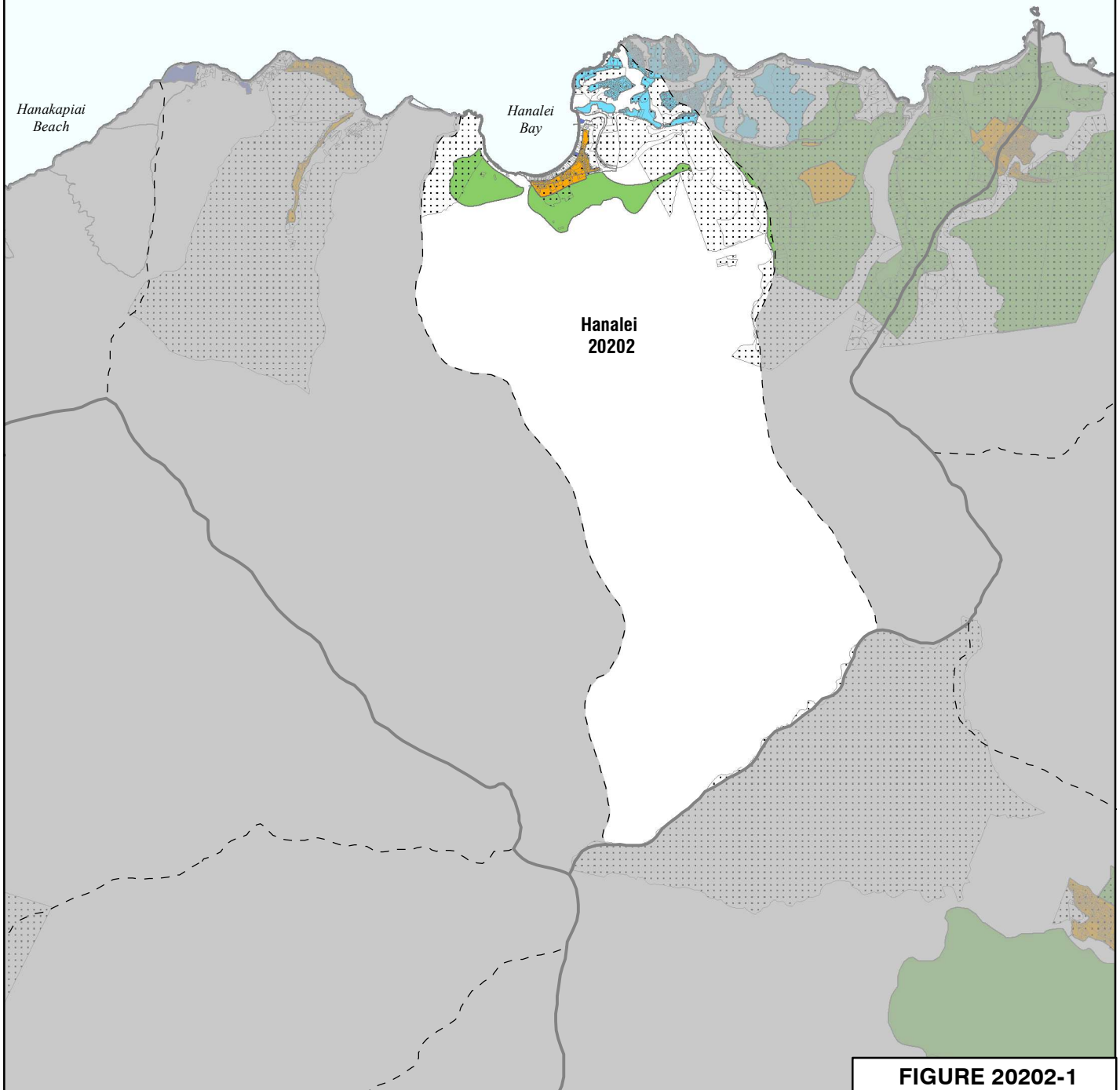
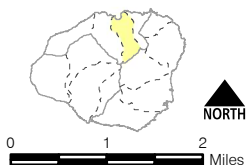


FIGURE 20202-1

INDEX MAP - Island of Kaua'i



LEGEND:

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

Land Use Allocation Guide

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

GENERAL PLAN LAND USE MAP

Aquifer Sector: HANALEI - 202
Aquifer System:
HANALEI - 20202

202 - HANALEI

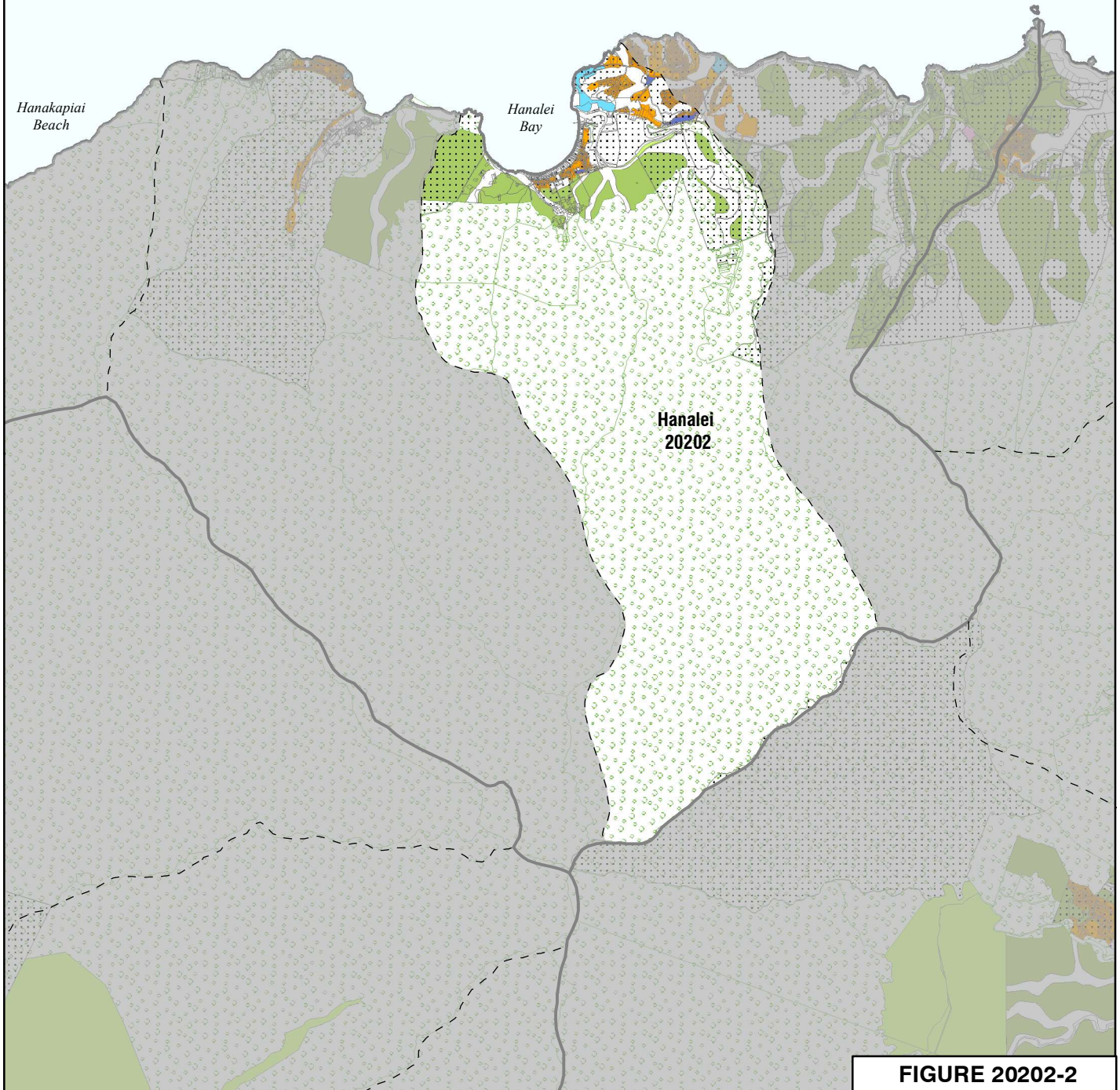
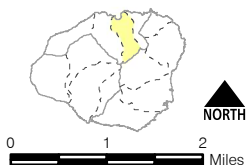


FIGURE 20202-2

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

COUNTY ZONING

Aquifer Sector: HANALEI - 202
 Aquifer System:
 HANALEI - 20202

20202-2 EXISTING WATER RESOURCES

20202-2.1 Ground Water

The Hanalei ASYA has a sustainable yield of 35 mgd. According to the 2014 CWRM database, there are 5 production wells in the system, 2 municipal (1 DOW, 1 non-DOW) and 3 domestic. There are also 2 wells drilled and categorized as “unused”. Refer to **Appendix A** for this database. **Figure 20202-3** shows the well locations.

20202-2.2 Surface Water

There are 4 streams classified as perennial in the Hanalei ASYA, all of which 4 are considered continuous. The continuous streams are Waikoko Stream, Waipā Stream, Wai’oli Stream, and Hanalei River. The USGS has 2 active surface water gages in the system area. Both gages are located on Hanalei River, 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 13 declared stream diversions in the CWRM database shown on **Figure 20202-4**, which accounts for 4 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 Hanalei ASYA is 0.57 mgd. 0.03 mgd is declared surface water use from 1989 and the IIFS for Lumaha’i River was amended in 2016 to include the remaining 0.54 mgd.

20202-2.3 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.

20202-2.4 Rainwater Catchment

Rainwater catchment is a viable resource for areas that are not served by ground water or surface water. **Figure 20202-5** 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.

20202-2.5 Recycled Water

There is 1 wastewater reclamation facility in the Hanalei ASYA. **Table 20202-5** lists the wastewater facility, reclaimed water classification, facility treatment capacity, current reuse amount, facility type, and current application. **Figure 20202-6** shows the facility location.

Table 20202-5: Wastewater Reclamation Facilities – Hanalei ASYA

WWRF/ WWTP	Recycled Water Classification	Design Capacity (mgd)	Quantity Produced (mgd)	Current Reuse Amount (mgd)	Owner	Irrigation Application
Princeville WWRF	R-2	1.5	0.6	0.53	Private	Princeville Makai Golf Course

PACIFIC OCEAN

202 - HANAIEI

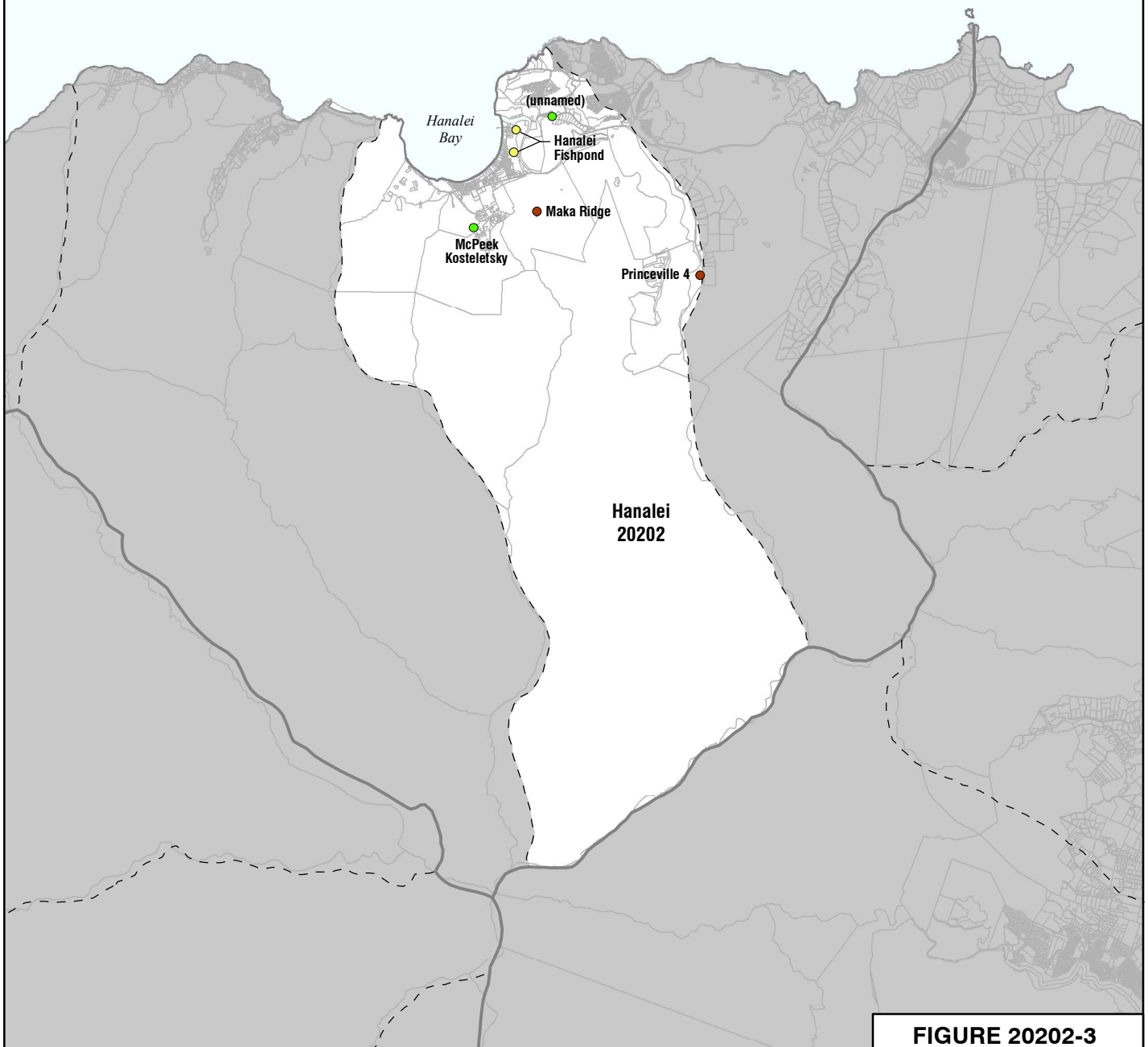
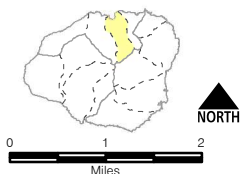


FIGURE 20202-3

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:
HANAIEI - 20202

202 - HANALEI

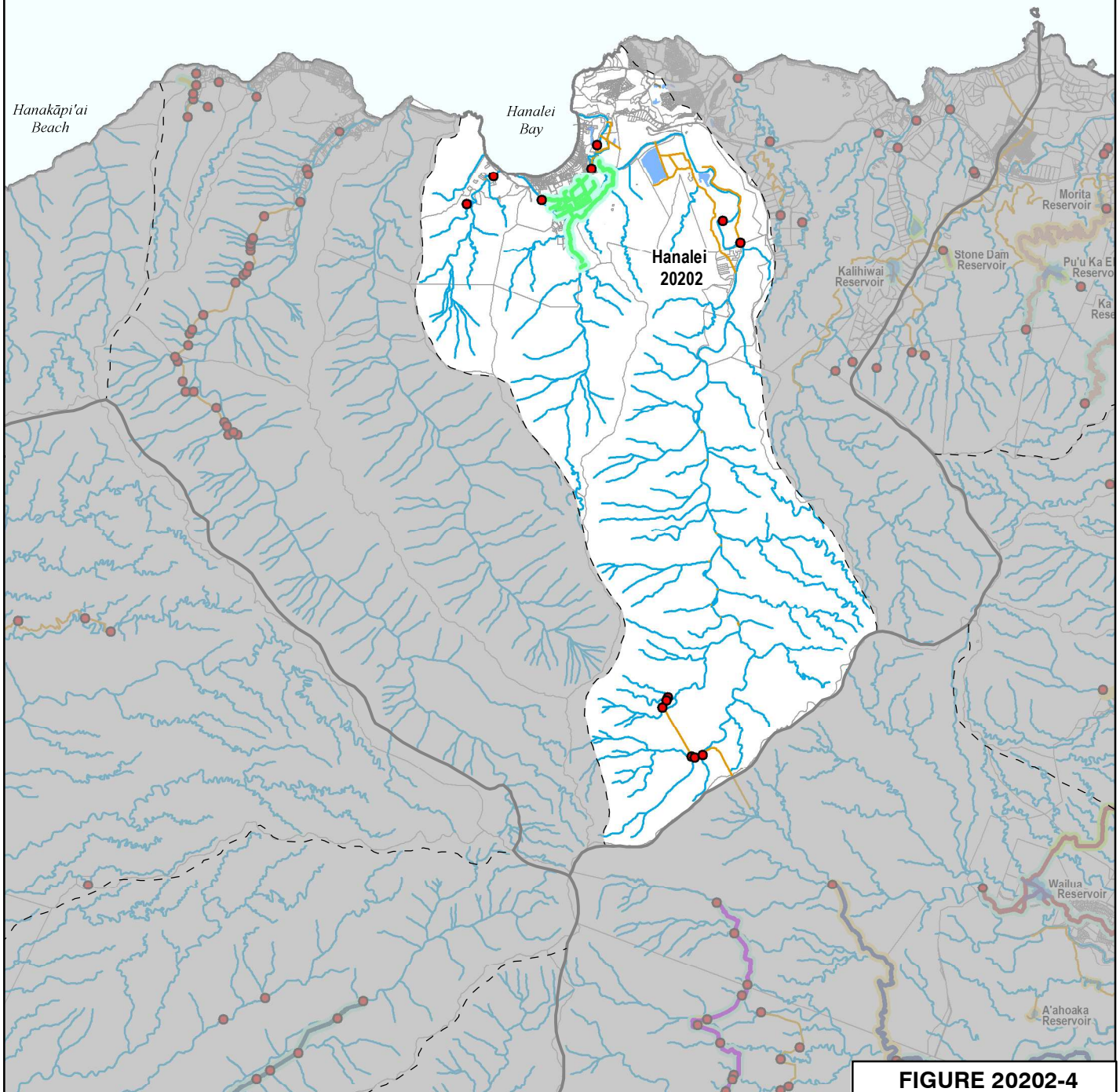
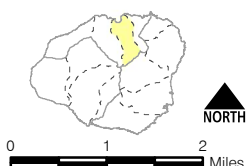


FIGURE 20202-4

STREAMS & DIVERSIONS

Aquifer Sector: HANALEI - 202
Aquifer System:
HANALEI - 20202

INDEX MAP - Island of Kaua'i



LEGEND:

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

Irrigation Systems

- East Wai'oli Ditch

Status

- Active
- Inactive
- Unknown
- Abandoned

PACIFIC OCEAN

202 - HANALEI

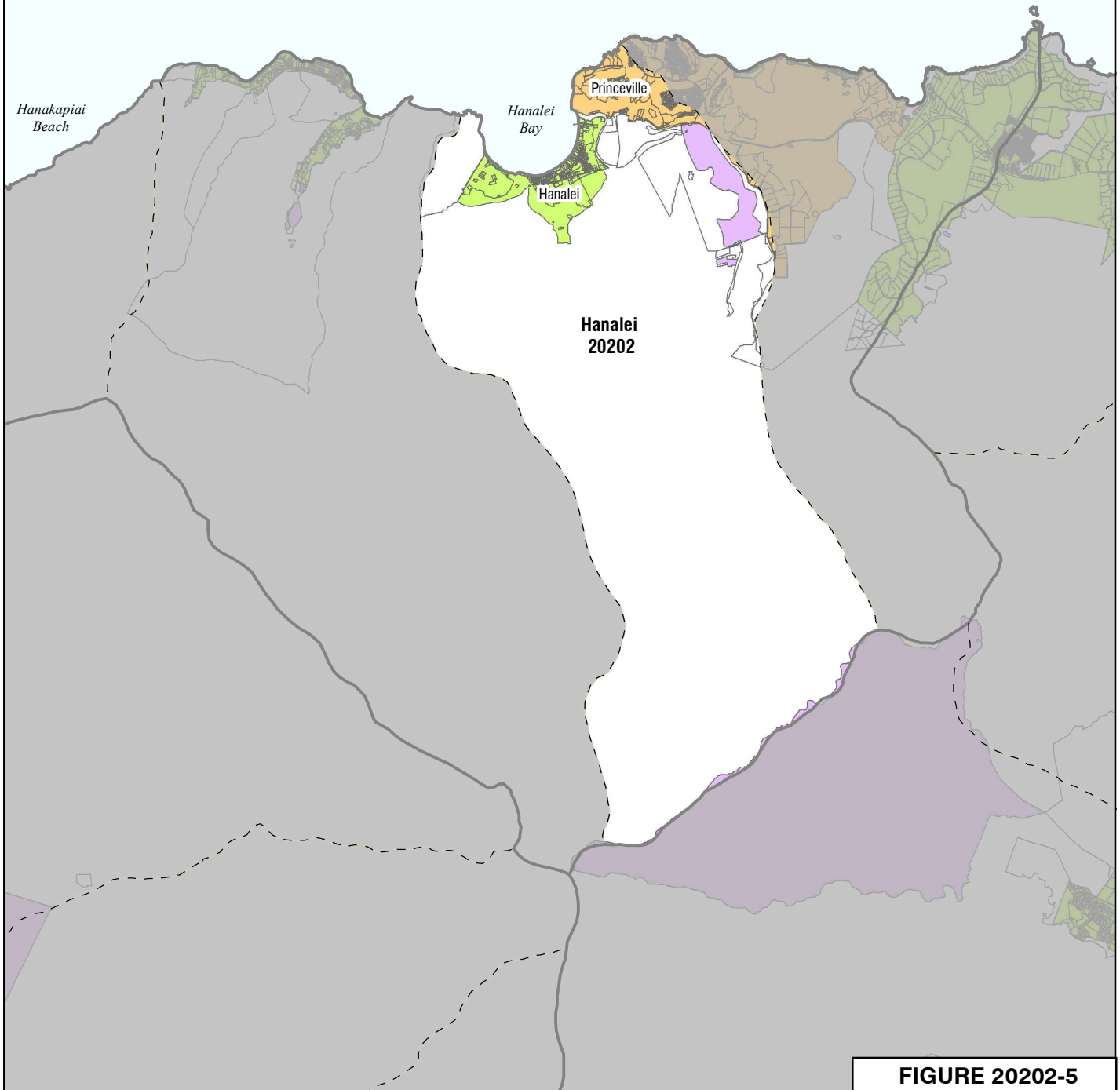
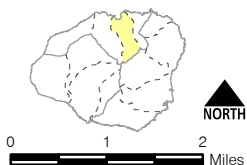


FIGURE 20202-5

WATER SYSTEM & SERVICE AREA

Aquifer Sector: HANALEI - 202
Aquifer System:
HANALEI - 20202

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)

202 - HANAIEI

PACIFIC OCEAN

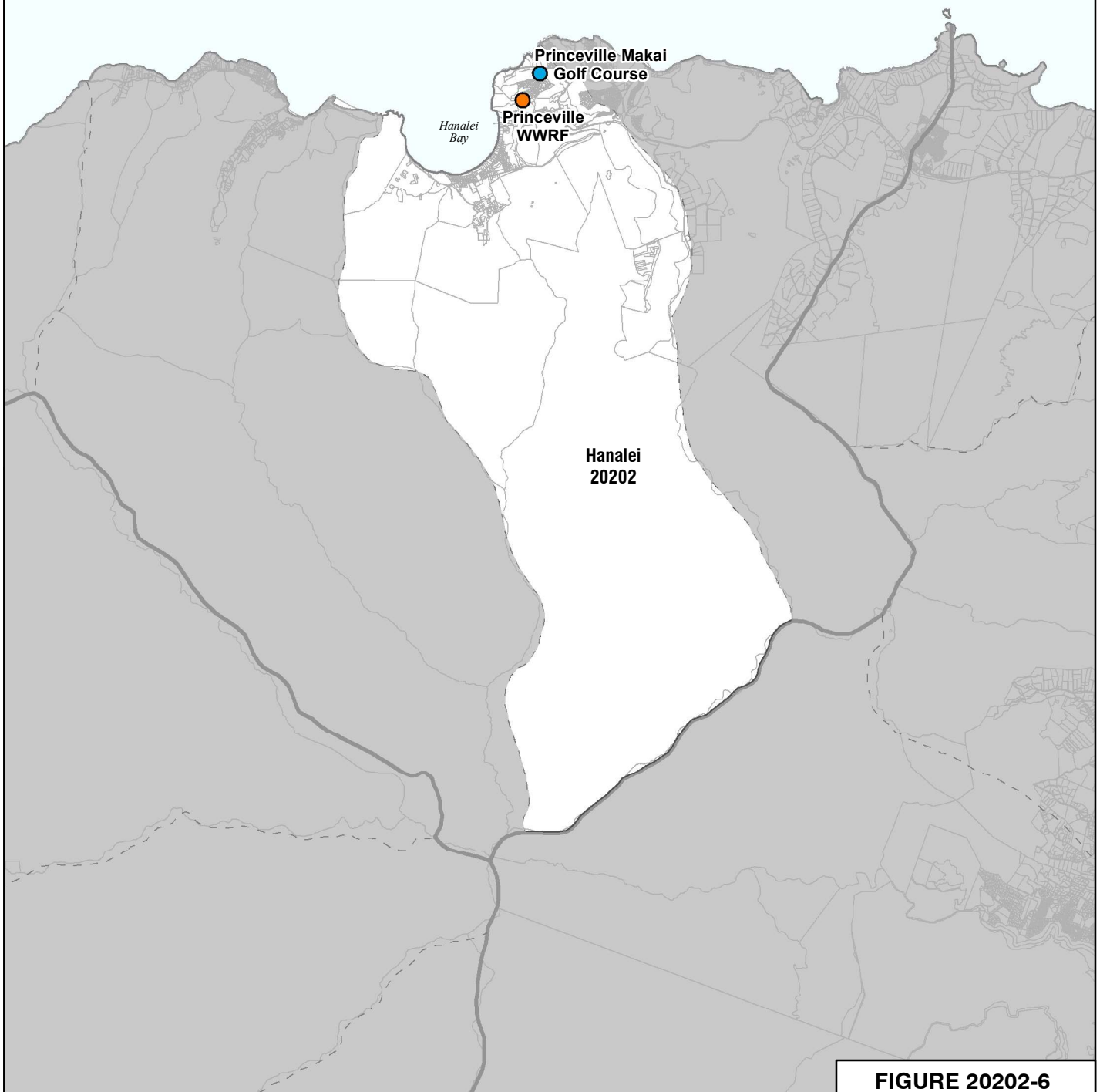
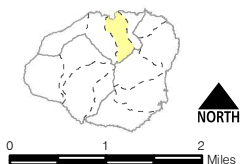


FIGURE 20202-6

INDEX MAP - Island of Kaua'i



LEGEND:

- Aquifer Sector Areas
- - - Aquifer System Areas
- TMK
- Wastewater Facilities
- Area irrigating with recycled water

WASTEWATER RECLAMATION FACILITIES

Aquifer Sector: HANAIEI - 202
 Aquifer System:
 HANAIEI - 20202

20202-3 EXISTING WATER USE

20202-3.1 General

The following section presents the total estimated average water use within the Hanalei ASYA. The total estimated average water use was based on data from CWRM (well pumpage) and DOH (Sanitary Surveys for Private-Public Water Systems and estimated reclaimed water usage) for the year of 2014. **Table 20202-6** and **Figure 20202-7** summarize the water use in accordance with CWRM categories.

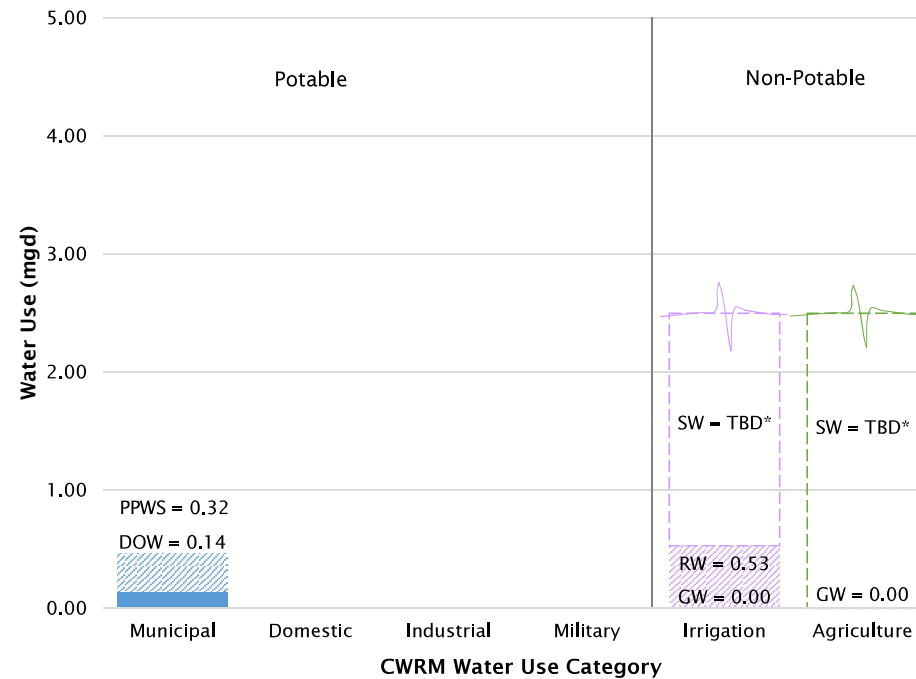
Table 20202-6: Existing Water Use by Category – Hanalei ASYA

CWRM Category	Ground Water (mgd)	Other Sources (mgd)	Total (mgd)	Percent of Total
Domestic	0.00		0.00	0.0
Industrial			0.00	0.0
Irrigation		0.53 ¹	0.53	53.6
Agriculture		TBD ²	0.00	0.0
Military			0.00	0.0
Municipal				
DOW System	0.14		0.14	14.1
Private-Public WS	0.32		0.32	32.3
TOTAL	0.46	0.53	0.99	100.0

¹ Recycled Water

² Surface Water – TBD from AWUDP

Figure 20202-7: Existing Water Use by Category – Hanalei ASYA



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

20202-3.2 Domestic Use

There are 3 wells classified as “Domestic” in the 2014 CWRM database, all owned by private landowners. None of the three wells have reported pumpage.

20202-3.3 Industrial Use

There is no industrial water use in the Hanalei ASYA.

20202-3.4 Irrigation Use

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

20202-3.4.1 Ground Water

There are no wells classified as “Irrigation” in the Hanalei ASYA.

20202-3.4.2 Recycled Water

The Princeville Makai Golf Course, located in the Kalihiwai ASYA and Hanalei ASYA, receives R-2 water from the Princeville WWRF. A blend of the R-2 water and captured rainwater has been used to irrigate the golf course since 1971.

20202-3.4.3 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.

20202-3.5 Agricultural Use

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

20202-3.5.1 Ground Water

There are no wells classified as “Agriculture” in the Hanalei ASYA.

20202-3.5.2 Recycled Water

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

20202-3.5.3 Surface Water

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

There are approximately 366 acres of lo‘i in Hanalei utilizing surface water.

There are 190 acres of IAL in the Hanalei ASYA owned by Kamehameha Schools for taro cultivation, diversified agriculture, and pasture¹. The IAL is divided into two areas by a mountain ridge. The Lumaha‘i area is to the west of the mountain ridge and the Waipā area is to the east of the mountain range. The areas consist of approximately 66 and 124 acres, respectively. Approximately 0.54 mgd is diverted from the Lumaha‘i River to serve the Lumaha‘i area². The Waipā area is served from the Waipā Stream, Kiwa‘a Spring, and the DOW Hanalei water system; the capacity and estimated use from each source has not been quantified.

20202-3.6 Military Use

There is no military use in the Hanalei ASYA.

¹ DR13-50 Trustees of the Estate of Bernice Pauahi Bishop dba Kamehameha Schools, Findings of Fact, Conclusions of Law, and Decision and Order, dated January 2014

² Stream Diversion Works Permit (SDWP.3936.2)

20202-3.7 Municipal Use

There is 1 well in the CWRM database classified as “Municipal” (MUNCO – Municipal County) and 1 well classified as MUNPR (Municipal-Private). County Municipal can be subcategorized into the other water use categories: Domestic, Industrial, Agricultural, Military, and Municipal.

20202-3.7.1 County Water Systems

Hanalei Water System

The DOW has one major water system that serves the Hanalei ASYA. The Hanalei water system is DOH Public Water System (PWS) No. 403 that serves 988 people through 349 service connections. The community water system serves residences and small-town businesses. Water for this system is supplied by 1 well. **Table 20202-7** lists the water source, well number, pumping capacity, pressure zone, and pumpage amount.

Table 20202-7: DOW Hanalei Water System Water Source

WELL NAME	WELL NUMBER	PUMPING CAPACITY (gpm)	PRESSURE ZONE (ft)	PUMPAGE (mgd)
Maka Ridge Well	2-1229-003	350	225	0.14

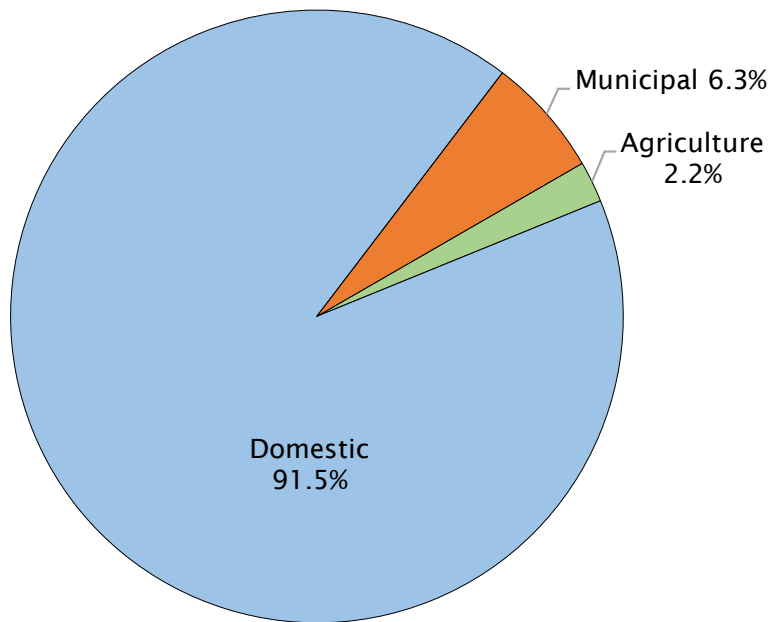
There is 1 primary pressure zone (225') and 1 storage tank in the Hanalei water system. Water can also be obtained from the Princeville (PWS 428) water system.

DOW Water Use by Category

DOW water use is subcategorized in **Table 20202-8** to the extent possible based on available meter data and is depicted in **Figure 20202-8**.

Table 20202-8: DOW Existing Water Use by Category – Hanalei ASYA

CWRM Water Use Category	DOW Metered Water Use (mgd)	Percent of Total
Agricultural	0.003	2.2
Domestic	0.143	91.5
Industrial	0.000	0.0
Military	0.000	0.0
Municipal	0.010	6.3
Total	0.156	100.0

Figure 20202-8: DOW Existing Water Use by Category – Hanalei ASYA

20202-3.7.2 State Water Systems

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

20202-3.7.3 Federal Water Systems

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

20202-3.7.4 Private-Public Water Systems

The Princeville (PWS 428) is the only private-public water system in the Hanalei ASYA regulated by the DOH. The majority of the service area for this water system lies within the Kalihiwai ASYA and therefore is discussed in **Section 20201**.

20202-3.7.5 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 20202-9**. The per capita use in the Hanalei ASYA is approximately 97.9% higher than the overall County of Kauaʻi per capita use largely due to the high PPWS use in the Princeville resort area.

Table 20202-9: Per Capita Use – Hanalei ASYA

	DOW Metered Water Use – Domestic (mgd)	Private-Public Water System (mgd)	90% of 2015 Population	Per Capita Use (gpd)
Hanalei ASYA	0.143	0.321	1,209	384
County of Kauaʻi	9.360	2.951	63,462	194

20202-3.8 Existing Water Use by Resource

20202-3.8.1 Ground Water

Table 20202-10 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 20202-10: Pumpage – Hanalei ASYA

Pumpage (mgd)	SY (mgd)	Pumpage Portion of SY
0.46	35	1.3%

Based on available information from the CWRM database, the current ground water use is 1.3 percent of the sustainable yield.

20202-3.8.2 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.

As previously mentioned, there are loʻi in Hanalei that use surface water and 0.54 mgd of surface water is diverted from the Lumahaʻi River to serve approximately 66 acres of IAL. The remaining 124 acres of IAL owned by Kamehameha Schools is served from the Waipā Stream, Kiwaʻa Spring, and DOW Hanalei water system, and existing surface water use is unknown.

20202-3.8.3 Water Conservation

Water conservation, including water loss management, may reduce water use. See Section 20202-2.3 for existing conservation efforts.

20202-3.8.4 Rainwater Catchment

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

20202-3.8.5 Recycled Water

Recycled wastewater from the wastewater reclamation facility is used for golf course irrigation. Refer to **Table 20202-5** presented earlier.

20202-4 FUTURE WATER USE

20202-4.1 Full Build-Out Water Demand Projections

The full build-out water demand projections based on the General Plan and County Zoning for the Hanalei ASYA is listed in **Tables 20202-11** and **20202-12**, respectively. Each land use class is associated with the most appropriate CWRM water use category.

Table 20202-11: General Plan Full Build-Out Water Demand Projection – Hanalei ASYA

General Plan Category	CWRM Category	Water Demand (mgd)
Agriculture	Agriculture/Domestic	0.17
Open	Domestic	0.07
Military	Military	0.00
Park	Irrigation	0.02
Residential	Domestic/Municipal	0.39
Resort	Domestic/Irrigation/Municipal	2.39
Transportation	Municipal	0.00
Urban Center	Domestic/Industrial/Municipal	0.00
DHHL	Domestic	0.00
TOTAL		3.04

Table 20202-12: Zoning Full Build-Out Water Demand Projection – Hanalei ASYA

Zoning Class	CWRM Category	Water Demand (mgd)
Agriculture	Agriculture/Domestic	0.17
Commercial	Municipal	0.17
Industrial	Industrial/Municipal	0.00
Open	Domestic	0.07
Residential	Domestic/Municipal	0.63
Resort	Domestic/Irrigation/Municipal	0.59
DHHL	Domestic	0.00
TOTAL		1.63

20202-4.1.1 Refined Land Use Based Water Projection

State Water Projects Plan

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

State Department of Hawaiian Home Lands

There are no DHHL tracts in the Hanalei 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

494 acres of agricultural lands within the Hanalei 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 20202-13** 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 20202-13: Irrigation of Agricultural Lands

(1) Declared Surface Water Use from Diversions (mgd)	0.57
(2) Agricultural Lands with a Score $\geq$ 28 (Acres)	494
- How many acres can be sustained by (1) at a water rate of 3,400 gpad? (Acres)	167
- What percent of (2) can be sustained with a water rate of 3,400 gpad?	34%
- If all of (2) were to be irrigated, what is the water unit rate? (gpad)	1,153

A total of 190 acres of agricultural lands have been designated as IAL in the Hanalei ASYA thus far.

20202-4.1.2 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., 5.92 dwelling units per acre for residential designation and 12.37 dwelling units per acre for resort designation).

20202-4.2 Water Demand Projections to the Year 2035

The following section presents water demand projections to the year 2035 for the Hanalei ASYA. The projected low, medium, and high growth rates are listed in **Table 20202-14** and are graphed in **Figure 20202-9**. Potable (domestic, industrial, municipal, and military water uses) and non-potable (irrigation) water demands are also differentiated.

Table 20202-14: Water Demand Projection – Hanalei ASYA

Water Use Category	Water Demand by Year (mgd)								
	2015	2016	2017	2018	2019	2020	2025	2030	2035
GROWTH RATE C (HIGH)									
TOTAL	0.99	1.00	1.00	1.01	1.01	1.01	1.04	1.07	1.10
Potable	0.46	0.46	0.47	0.47	0.47	0.47	0.48	0.50	0.51
Non-Potable	0.53	0.53	0.53	0.54	0.54	0.54	0.56	0.57	0.59
GROWTH RATE B (MEDIUM)									
TOTAL	0.99	1.00	1.00	1.00	1.01	1.01	1.03	1.06	1.09
Potable	0.46	0.46	0.47	0.47	0.47	0.47	0.48	0.49	0.51
Non-Potable	0.53	0.53	0.53	0.54	0.54	0.54	0.55	0.57	0.58
GROWTH RATE A (LOW)									
TOTAL	0.99	0.99	0.99	1.00	1.00	1.00	1.01	1.01	1.03
Potable	0.46	0.46	0.46	0.46	0.46	0.46	0.47	0.47	0.48
Non-Potable	0.53	0.53	0.53	0.53	0.53	0.53	0.54	0.54	0.55

Figure 20202-9: Water Demand Projection Summary – Hanalei ASYA

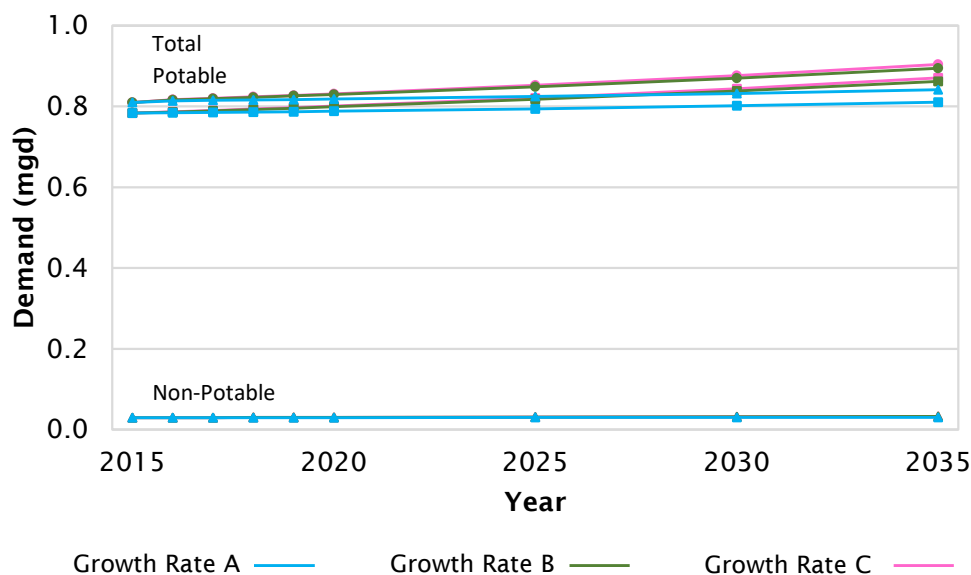


Figure 20202-10 shows the breakdown of water demand projections for a medium growth rate by CWRM categories through the year 2035. **Table 20202-15** summarizes this figure.

Figure 20202-10: Medium Growth Rate B Water Demand Projection by Category – Hanalei ASYA

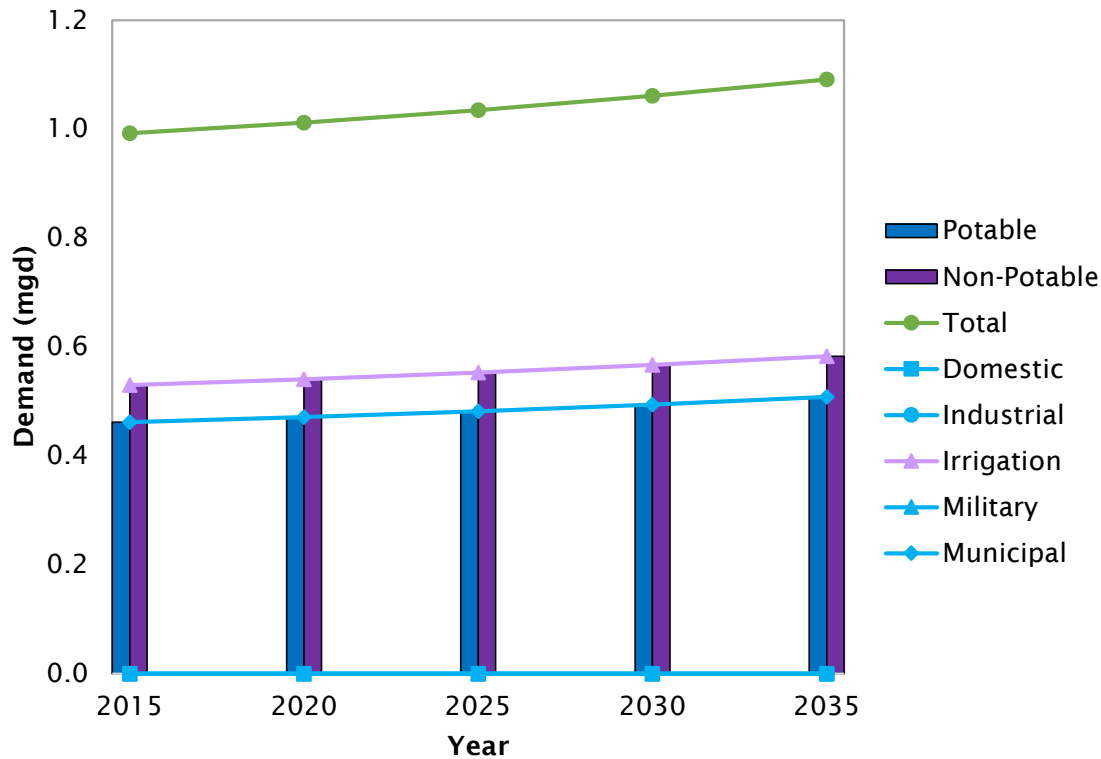


Table 20202-15: Medium Growth Rate B Water Demand Projection by Category – Hanalei ASYA

Water Use Category	Water Use by Year (mgd)								
	2015	2016	2017	2018	2019	2020	2025	2030	2035
Total	0.99	1.00	1.00	1.00	1.01	1.01	1.03	1.06	1.09
Potable	0.46	0.46	0.47	0.47	0.47	0.47	0.48	0.49	0.51
Non-Potable	0.53	0.53	0.53	0.54	0.54	0.54	0.55	0.57	0.58
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	0.53	0.53	0.53	0.54	0.54	0.54	0.55	0.57	0.58
Military	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Municipal	0.46	0.46	0.47	0.47	0.47	0.47	0.48	0.49	0.51
DOW	0.14	0.14	0.14	0.14	0.14	0.14	0.15	0.15	0.16

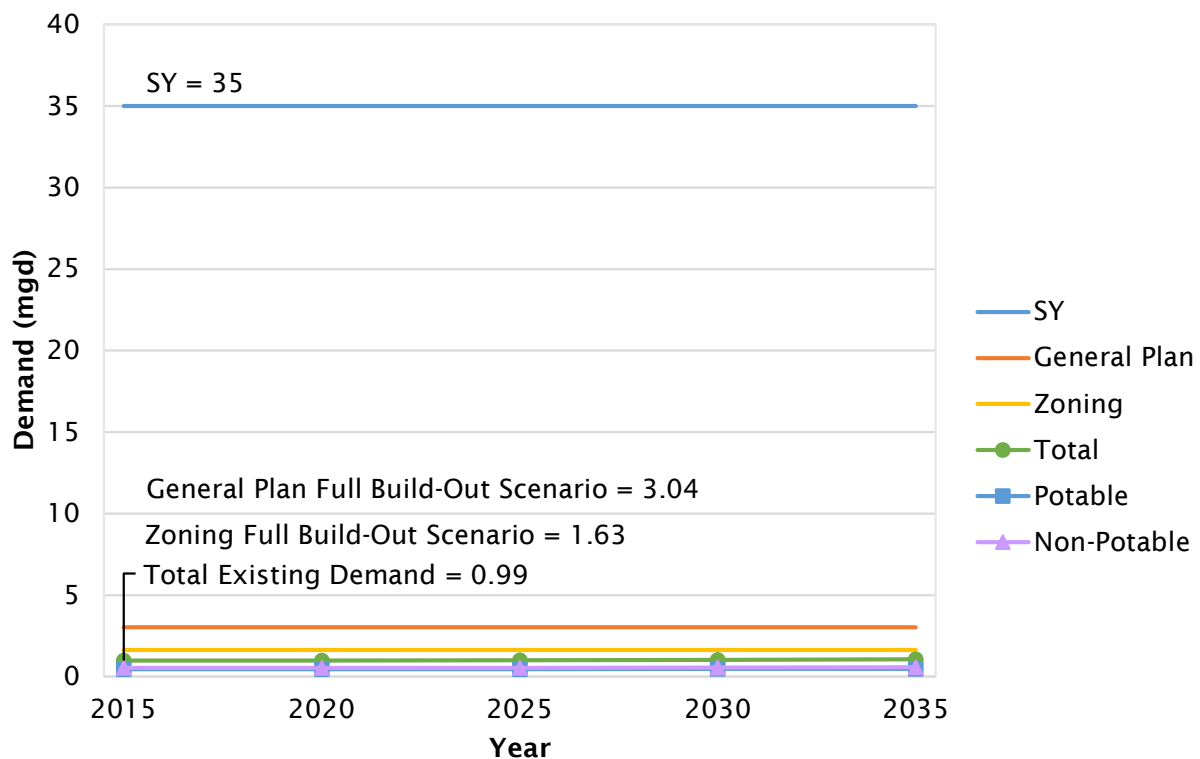
20202-4.3 Summary

Figure 20202-11 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 20202-16** summarizes the General Plan, Zoning, and 20-year water demand projection scenarios for the Hanalei ASYA. The sustainable yield is presented to draw comparisons. All demands are in mgd.

Table 20202-16: 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
35	3.04	1.63	0.99	1.00	1.00	1.00	1.01	1.01	1.03	1.06	1.09

Figure 20202-11: Medium Growth Rate B Water Demand Projections and Full Build-Out – Hanalei 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 20202-4.1.1 County of Kaua'i Important Agricultural Lands Study.

20202-5 RESOURCE AND FACILITY RECOMMENDATIONS

20202-5.1 Water Source Adequacy

20202-5.1.1 Full Build-Out

Development to the highest extent allowed by the General Plan and County Zoning within the Hanalei ASYA is sustainable, with General Plan and County Zoning full build-out water demands requiring 9 and 5 percent of the 35 mgd sustainable yield, respectively.

20202-5.1.2 Twenty-Year Projection

The 2035 water demand projection for the Hanalei ASYA is sustainable and is only 3 percent of the 35 mgd sustainable yield.

20202-5.2 Source Development Requirements

20202-5.2.1 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 Hanalei ASYA contains basal, perched, and high level ground water. Most reported pumpage is from the basal zone, followed by from the perched zone. There are no wells located at the high level.

The 2035 water demand projection for the Hanalei ASYA is only 3 percent of the 35 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.

There are two public water systems in the Hanalei ASYA: Princeville Water System and DOW's Hanalei ASYA.

The Princeville Water System serves the Princeville, Kalihiwai, and ‘Anini Vista communities and is owned and operated by the Princeville Utilities Company, Inc. Its service area and ground water sources are located in the Hanalei ASYA and Kalihiwai ASYA. Further development of ground water sources to meet projected demands should be viable.

DOW’s Hanalei Water System serves the lowland bay area of Hanalei. The DOW’s Water Plan 2020 identified projects to meet demands of its service areas. For the Hanalei Water System, one new well (Hanalei Well) 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 of several water mains along Weke, Anae, and Malolo Roads.

Surface Water

The Hanalei ASYA has 13 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 a couple of small existing irrigation lines in the Hanalei ASYA, as shown on **Figure 20202-4**; however, there are no major irrigation systems.

Water Transfer

It may be possible to transfer surface water between ASYAs by utilizing existing irrigation systems. Water can also be transferred between ASYAs through the existing Princeville water system which services areas in the Kalihiwai ASYA and Hanalei ASYA. Two of the Princeville water system wells are in the Kalihiwai ASYA, and one well is located in the Hanalei ASYA.

Water Conservation

The per capita use in the Hanalei ASYA is approximately 97.9% higher than the overall County of Kaua‘i per capita use largely due to the high PPWS use in the Princeville resort area. 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 Hanalei ASYA.

Recycled Water

Recycled water is a valuable resource; an increase in its use may lower the dependence on potable sources. The Princeville Wastewater Reclamation Facility (WWRF) is the only WWRF in the Hanalei ASYA, and it produces R-2 water. Comparing the current reuse amount to the design capacity of the facility, it appears that there is recycled water available to meet additional demands, see **Table 20202-17** below. However, the actual additional recycled water use is dependent 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 20202-17: Wastewater Reclamation Facilities Available Capacity – Hanalei ASYA

WWRF/ WWTP	Reclaimed Water Classification	Design Capacity (mgd)	Quantity Produced (mgd)	Current Reuse Amount (mgd)	Available Capacity (mgd)
Princeville WWRF	R-2	1.5	0.6	0.53	0.97

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.

20202-5.2.2 Demand-Side Management**Development Density Control**

The full build-out demand for the Hanalei ASYA based on County Zoning is 1.63 mgd which is 5 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 Hanalei ASYA, the average number of dwelling units allowed by County Zoning is 5.92 dwelling units per acre in residential districts and 12.37 dwelling units per acre in resort districts.

The full build-out demand for the Hanalei ASYA based on the General Plan is 3.04 mgd which is 9 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.

20202-5.3 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 Hanalei 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 Princeville WWRF; however, as discussed previously, successfully increasing the 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 Hanalei 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. 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 9 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.