



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

SCHEDULE

**INVESTIGATION AND SITE VISITS
KEAUHOU, KONA, HAWAII
COMMISSION ON WATER RESOURCE MANAGEMENT**

DATE: October 9, 2014
TIME: 8:00 am – 5:00 pm
PLACE: Various Sites within the Keauhou Aquifer System,
Kailua-Kona

The Commission on Water Resource Management (“Commission”) will conduct a field investigation and site visit pursuant to the Commission’s investigatory authority and responsibilities under the Hawai’i Water Code, Haw. Rev. Stat. §174C-43 and §92-6, as part of the Commission’s process to evaluate the Keauhou Aquifer in Kailua-Kona, Hawaii.

An opportunity for public testimony will be provided at a later date.

This investigation and site visit is for the purpose of scientific investigation and study. This is not a public meeting. *No public testimony will be taken at this time. A meeting to take public testimony will be scheduled at a later date.*

Although the investigation is not a public meeting, there are portions of the site visit which the public may observe, provided that the location is safe and there is no interference with activities on the ground.

The October 9, 2014 site visit times and locations are outlined below. All times are tentative. Any member of the public who attends will be responsible for his / her own transportation.

SITE # 1

Aimakapa Fishpond 8:00 am

Directions: From airport, drive south on Queen Ka'ahumanu Hwy to Honokohau Harbor. Park at makai end of the Harbor and walk along path following signs for Aimakapa Fishpond (See Exhibit 1)

Investigation and Site Visit Schedule
Keauhou, Kona, Hawaii
Commission on Water Resource Management
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Experience the National Park and fishpond that the National Park Service (“NPS”) petition seeks to protect. Measure the salinity of the water in the fishpond. Reggie and Elizabeth Lee to discuss knowledge about NPS ponds.

SITE # 2

Kamakana Well 9:15 am

Directions: Drive back out to Queen Ka'ahumanu Hwy, cross the road to Kealakehe Pkwy, drive to end, then right onto Keanalehu Dr to Kamakana well (See Exhibit 2)

See one of the two deep wells that tapped artesian fresh water below seawater 1,050 feet below sea level. The other well, CWRM's Keopu Deep Monitor Well (“DMW”), is 1.8 miles to the southeast from this well.

SITE # 3

CANCELLED

~~Artesian spring near King Kamehameha's Heiau — 9:45 am~~

~~Directions: Drive back out to Ane Keohokalole Hwy and turn left. Turn right onto Palani Rd, turn left onto Kuakini St, turn right onto Likana Lane into Kona Seaside's overflow parking lot. Walk down to “The Wall”~~

~~To see fresh water boil at seawall. Show major discharge point of groundwater and possible groundwater flow paths. Look mauka to see CWRM Keopu DMW and Hawaii Department of Water Supply (“HDWS”) Keopu Deep Well (Site # 6)~~

SITE # 4

Kahaluu Shaft 10:30 am

Directions: Exit parking lot onto Kuakini Hwy, then south to merge onto Queen Ka'ahumanu Hwy. Continue south to Kamehameha III Road turn off and turn right. Turn left into Kahaluu Shaft (See Exhibit 3)

See Kona's largest water supply facility, hear about its assets and liabilities and future plans for Kona water supply. HDWS to discuss shaft details within their North Kona Water System and Capital Improvement Projects (“CIP”). CWRM Kahaluu DMW located directly downgradient.

SITE # 5

State Kainaliu High-Level Observation Well 11:15 am

Directions: Back out to Kamehameha III Road, turn right and drive up to intersection. Turn right onto Queen Ka'ahumanu Hwy and continue south to State Kainaliu well. Left turn into University of Hawaii Ag facility (look for Aloha Theatre on right as landmark)

Obtain sense of geographic size of the Keauhou Aquifer System Area ("ASA"). This well is the southernmost high-level well in the Keauhou ASA. The water level at the well is measured quarterly.

[Eat lunch at Harold H. Hagashihara County Park in Honalo]

SITE # 6

HDWS Keopu Deep Well 1:00 pm

Directions: Drive north on Queen Ka'ahumanu to Mamalahoa Hwy. Bear right. Drive 6.5 miles north on Mamalahoa Hwy, observing HDWS tanks and facilities, and noting that this road is the approximate boundary between the basal and high level aquifers. Turn right into HDWS Keopu Deep Well (See Exhibit 3)

See panorama of the Keauhou ASA from upper level well and hear more about HDWS's distribution system, needs, and CIP. Point out nearby CWRM Komo Deep Monitor Well, measured quarterly (last measurement of head = 37 feet above mean sea level ("amsl")). Perched water exists.

SITE # 7

Kaloko Irrigation 1 Well 1:40 pm

Directions: Drive north on Mamalahoa to Hina Lani. Turn left and drive down to Kaloko Irrigation 1 well (plenty of shoulder to stop on south side of road, between 8th and 9th light standard, makai of large water tank)

View site of proposed CWRM deep monitor well where it is anticipated that artesian freshwater exists beneath seawater possibly 1,000 feet below sea level. This site is immediately up gradient from the National Park and will monitor the aquifer that is adjacent to the brackish lens that supports the National Park's aquatic systems. Current head is about 2 feet amsl.

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SITE # 8

West Hawaii Civic Center 2:00 pm – 5:00 pm

74-5044 Ane Keohokalole Highway, Kailua-Kona, HI 96740
(Council Chambers, Building A)

Presentations about the hydrology, biology, and authorized planned use of water for the Keauhou Aquifer System Area.

2:00 - 2:40 pm. Hydrology: Tom Nance, Don Thomas and John Richards

3:00 - 3:40 pm. Biology: Richard Brock and Troy Sakihara

4:00 - 4:40 pm. Authorized Planned Use of Water: County Planning HDWS, Fukunaga & Associates, Inc.

SCHEDULE FOR DECEMBER, 2014

On December 10, 2014, the Commission has tentatively scheduled a *public meeting* at the West Hawaii Civic Center to decide (pursuant to Haw. Rev. Stat. §174C-41) whether to continue the process. *Public testimony will be taken at the December 10, 2014 meeting.*

If the Commission decides to continue the process on December 10, 2014, then a *public hearing* will be scheduled (pursuant to Haw. Rev. Stat. §174C-42) in the Keauhou area some time in early 2015. *Public testimony will be taken.*

After the public hearing is closed, the Commission will schedule *another public meeting* to make a final decision on the petition to designate (pursuant to Haw. Rev. Stat. §174C-46).

For further information, please contact the Commission on Water Resource Management.

Commission on Water Resource Management
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Please use the following link to the CWRM website to access the exhibits.
<http://dlnr.hawaii.gov/cwrp/newsevents/meetings/>

Route Map Oct. 9, 2014



Data SOEST/UHM

Image © 2014 TerraMetrics
© 2014 Google

Google earth

“The majority of sites are clustered about the Ka-loko and ‘Aimakapā fishponds and shoreline, which indicates that these areas were the vital centers of activity in the prehistoric life of the Ka-loko, Hono-kō-hau settlement.”



‘Aimakapā Fishpond is a 15-acre *loko i‘a*. NPS PHOTO

‘Aimakapā Fishpond

In historic times ‘Aimakapā Fishpond was used to raise fish for the *ali‘i*.

- Groundwater discharge to ‘Aimakapā wetland provides important foraging and breeding habitat for native waterbirds

and migratory waterfowl, including the endangered Hawaiian coot and the endangered Hawaiian stilt.

- ‘Aimakapā Fishpond is listed as a Core Wetland by the U.S. Fish & Wildlife Service in their Recovery Plan for Hawaiian Waterbirds.



The ‘*alae ke‘oke‘o* or Hawaiian coot and the *ae‘o* or Hawaiian stilt. NPS PHOTO



Removal of non-native vegetation in ‘Aimakapā wetlands. NPS PHOTO



Kealakehe Pkwy

Kii Pohaku

Ala Kahakai

Site 1 Aimakapa Fishpond

Ala Mauka-Make

19

Queen Kaahumanu Hwy

Honokohau St

Kings Trail access path

Ala Hui'e Hui'e

Figure 5. Salinity and Temperature Profile through the Water Column of the Kamakana Monitor Well on April 3, 2010 Prior to Encountering Fresh Water at Depth

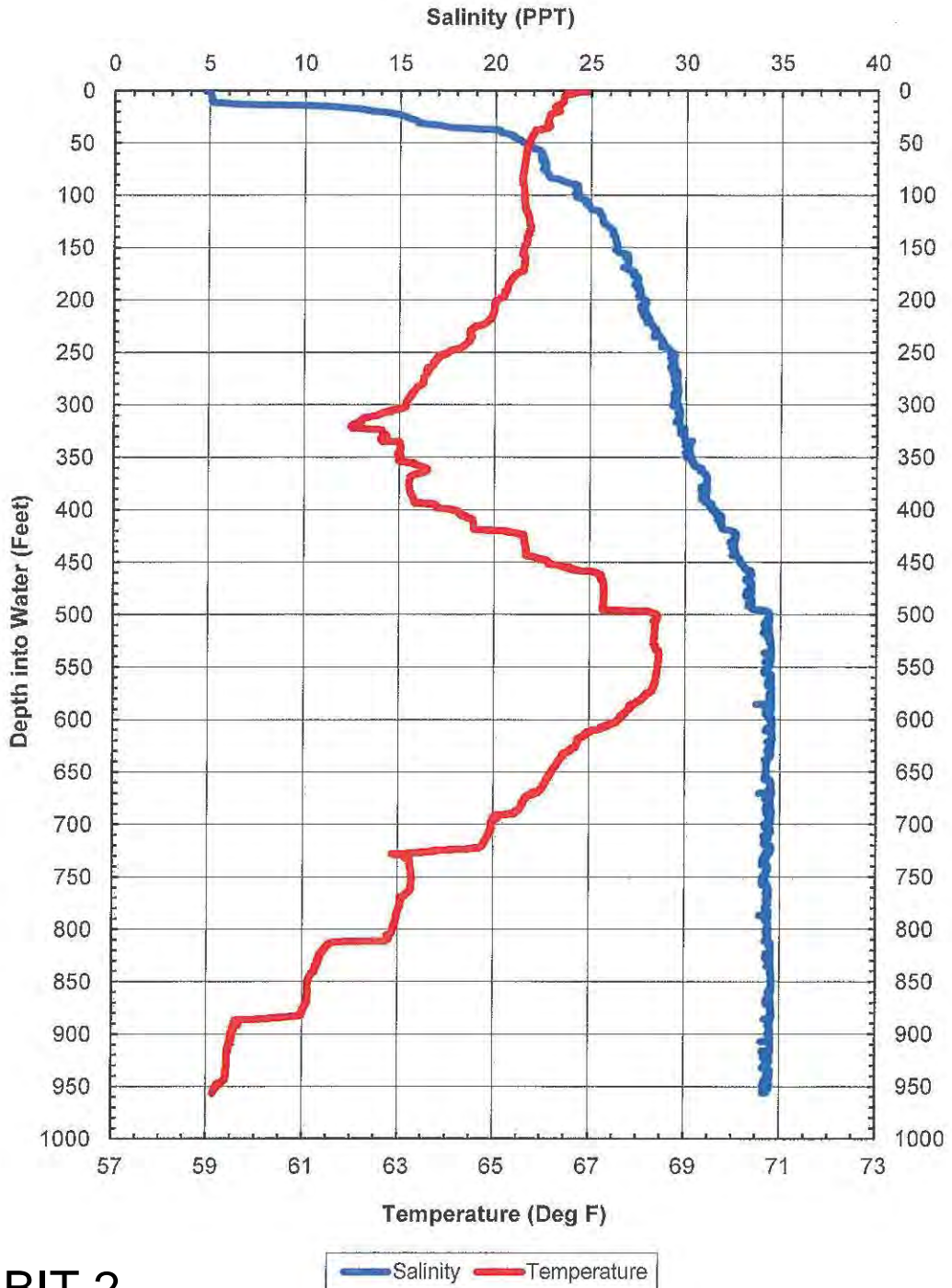
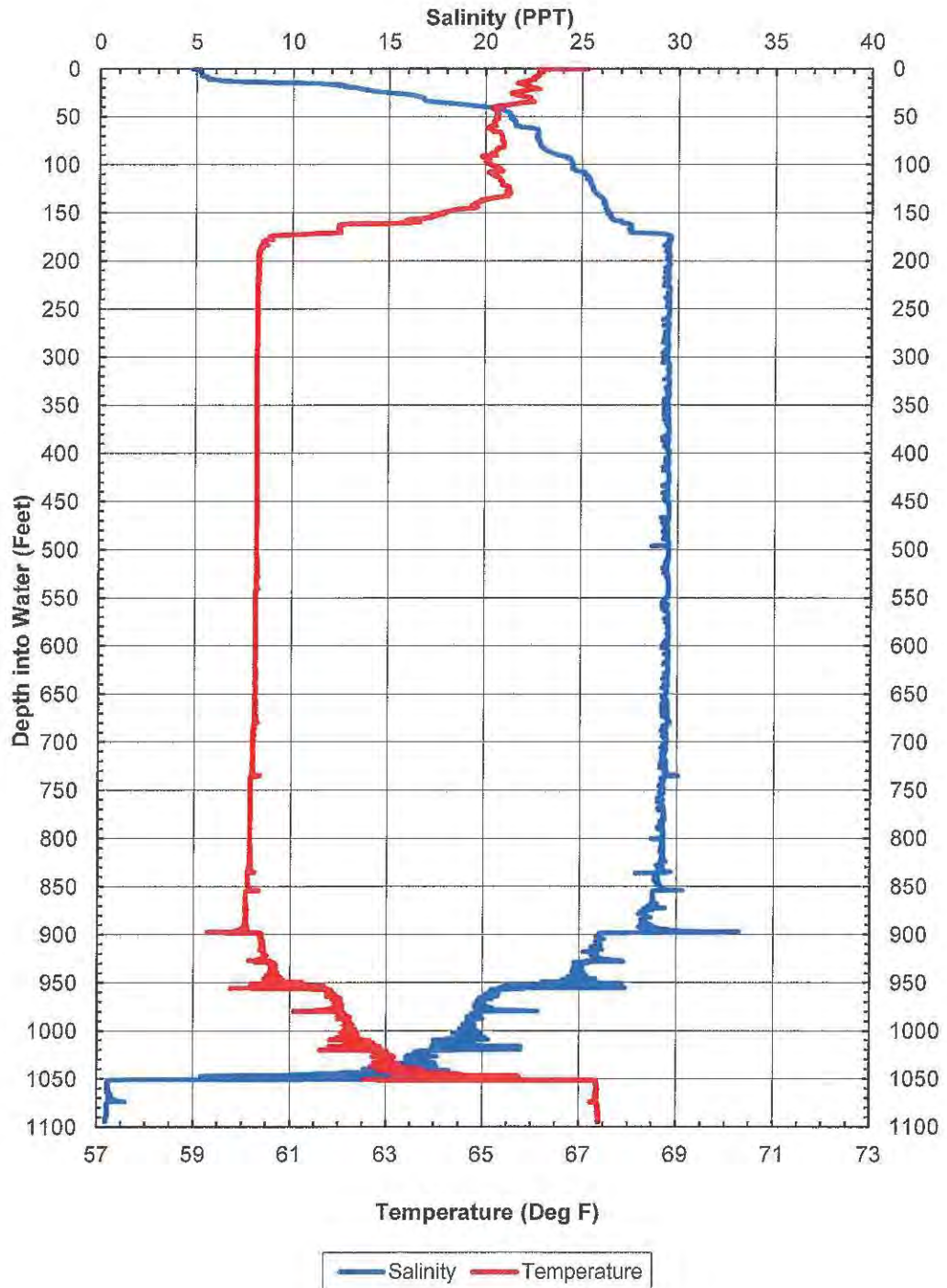


EXHIBIT 2

Figure 6. Profile through the Water Column of the Kamakana Monitor Well on May 12, 2010 After Encountering Fresh Water at Depth



Department of Water Supply, County of Hawai'i

The Department of Water Supply (DWS) is a semi-autonomous department of the County of Hawai'i whose primary function is to provide an adequate and continuous supply of safe drinking water in a financially responsible manner, comply with all relevant standards and regulations and to assist in the development of water systems in areas not currently served. DWS was established in 1949 to oversee management of the County of Hawai'i's public water supply which currently consists of a customer base of over 41,000 water accounts serving approximately 110,000 of the island's population.

DWS has a staff of 163 employees operating from several locations around the island. In addition to the main office at the Waiākea Office Plaza on Kekūanaō'a Street and the Operations Center on Leilani Street in Hilo, the Department maintains district offices and base yards in Waimea, Kona, and Ka'ū.

Description of water systems (See Figure 1)

The DWS operates and maintains 23 separate water systems, consisting of: 74 water sources (63 wells, 1 shaft, 8 springs & 2 surface), 198 tanks, 79 booster pump stations, 257 pressure reducing stations, and approximately 1,010 miles of pipelines.

Description of North Kona water system (See Figure 2)

The DWS North Kona Water System consists of 12 water sources, 57 tanks and nearly 200 miles of pipelines. Of the 12 water sources, 11 are deepwells and 1 is an inclined shaft. Six of the deepwells tap the high level aquifer and the remaining 6 sources tap the basal aquifer.

The 12 sources currently pump an average of approximately 11 million gallons per day (12 month average through June 2014) serving approximately 10,300 water accounts.

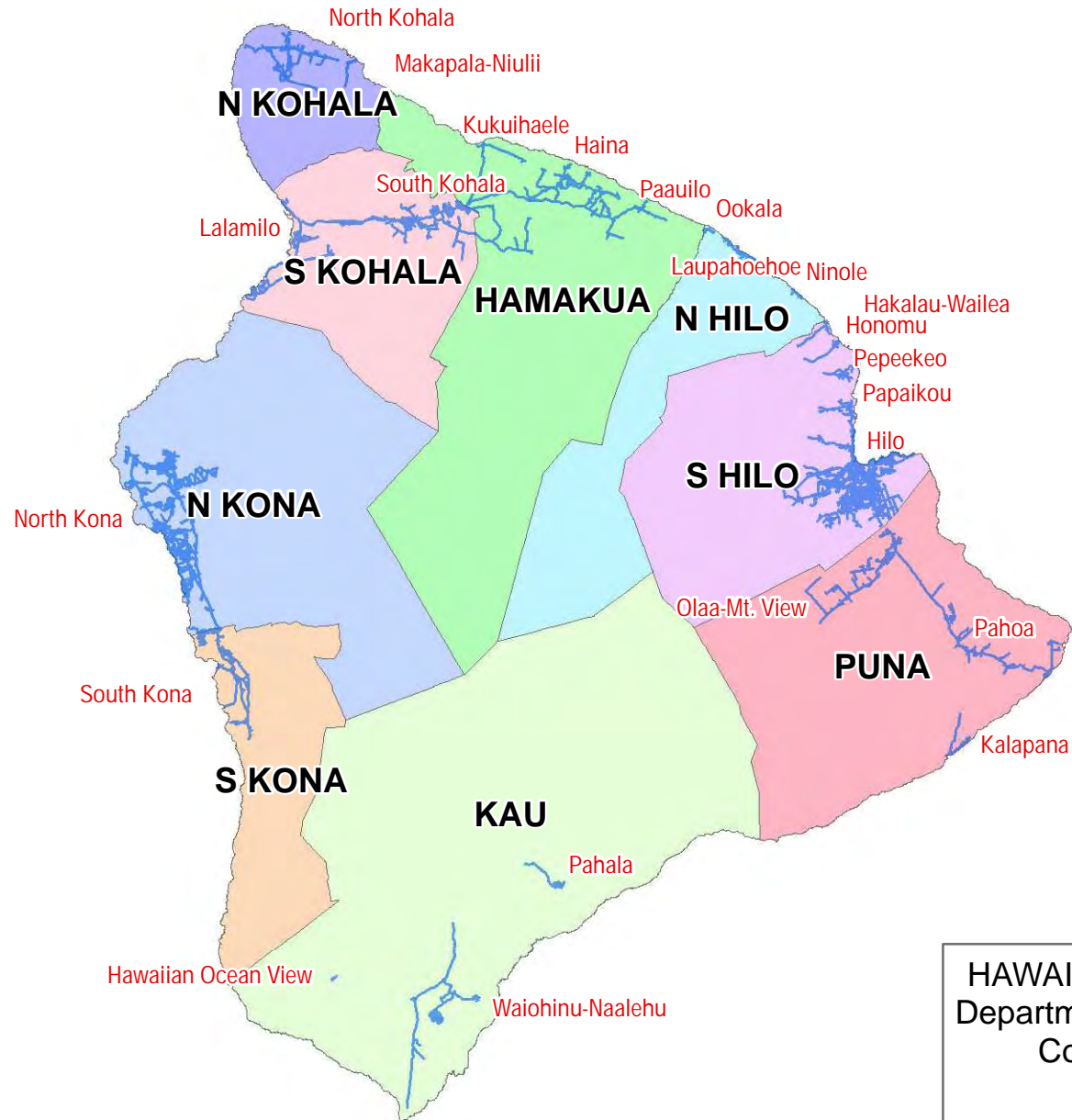
The distribution system generally extends from Keāhole Airport to the north to the Keauhou resort area to the south on the makai side and the Pu'ukala area to the north to the Honalo area (Teshima's restaurant) to the south on the mauka side. The vertical extent of the service area covers an elevation from sea level to approximately 5,000' elevation at its highest point.

North Kona Capital Improvement Projects

There are numerous projects, recently completed, under construction and planned in the area to reduce the pumping from basal sources, primarily the Kahalu'u Shaft, and thereby improving the water quality in the region for the long term.

Completed projects:

Pālani Road Transmission Waterline (Māmalahoa Highway to 595' Reservoir): This project included 2 storage tanks and approximately 12,700 feet of transmission waterline. Its primary purpose is to provide a major mauka-makai corridor from the high-level sources to Kailua-Kona. When completed in 2012, immediate improvements to the water quality for portions of Kailua-Kona area resulted. Cost: \$11.5M



HAWAII WATER SYSTEM
Department of Water Supply
County of Hawaii
[Figure 1]

September 30, 2014

1 inch = 15 miles



**KIHOLO
AQUIFER SYSTEM AREA**

Kalaoa A

Hualalai

Honokohau

Keahuolu (QLT)

Keopu

Waiaha

Holualoa (Basal)

Kahaluu A-D (Basal)

Kahaluu Shaft (Basal)

**KEAUHOU
AQUIFER SYSTEM AREA**

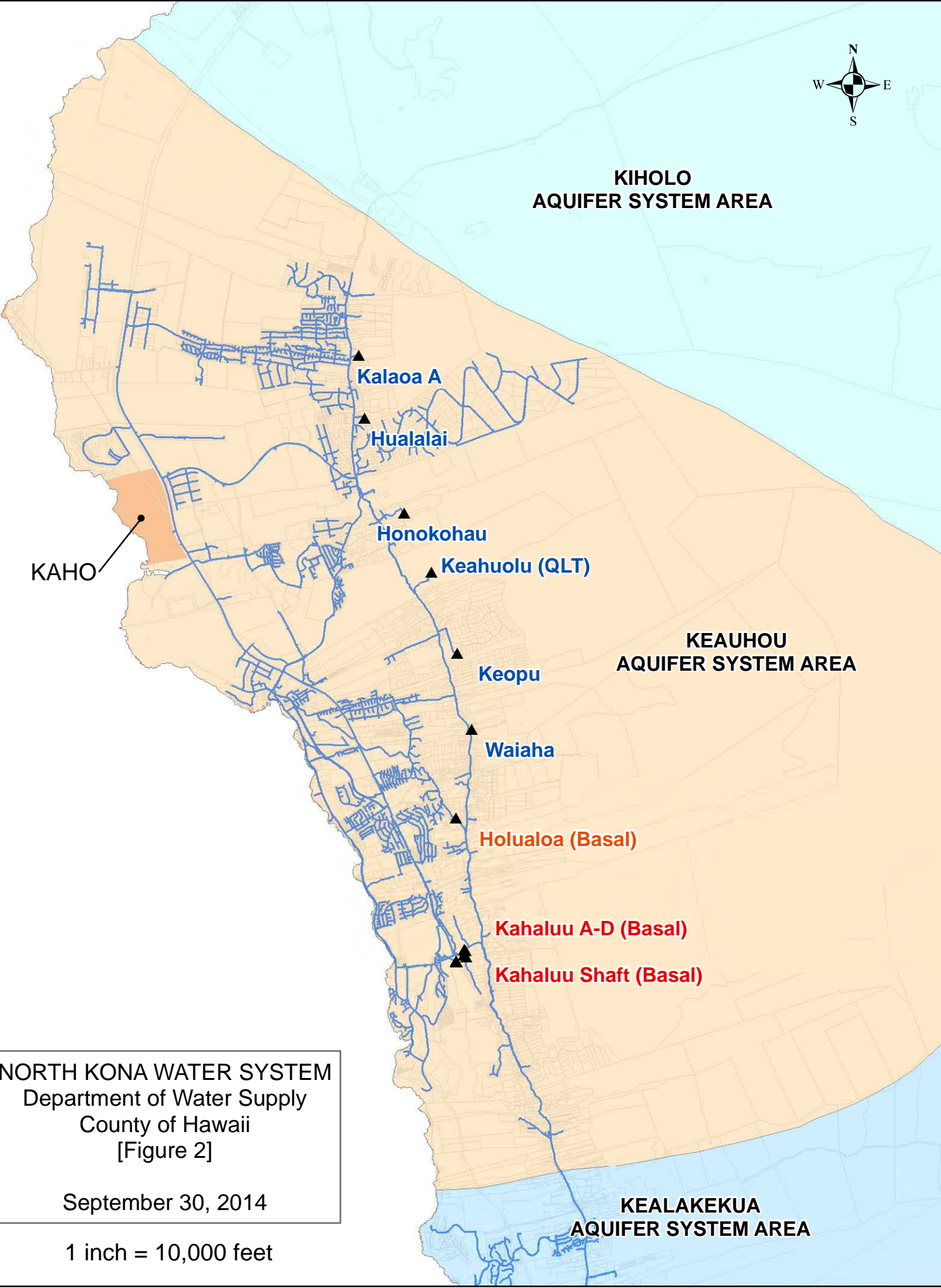
**KEALAKEKUA
AQUIFER SYSTEM AREA**

KAHO

NORTH KONA WATER SYSTEM
Department of Water Supply
County of Hawaii
[Figure 2]

September 30, 2014

1 inch = 10,000 feet



Keōpū-Pu‘uhonua Production Well and 1.0-MG Reservoir: This 695 gpm well and reservoir project, completed in December 2009, provides an additional high-level water source for the area. Cost: \$5.4M

Wai‘aha Production Well and Supporting Facilities and 2.0-MG Reservoir: This 1,400 gpm well also taps the high-level water source and was completed in 2006. Cost: \$4.9M

Māmalahoa Highway Waterline Improvements Phases 1 and 2: This project, completed in 2009, consists of 7,100 feet of 16-inch transmission waterline. The purpose of the project was improved transmission capacity between high-level sources along the Māmalahoa Highway, and working in conjunction with the Pālani transmission project to transport the high quality water makai. Cost: \$2.3M

Under construction:

Wai‘aha Water System Improvements: The Department is participating in this private-public partnership by oversizing the water system improvements, which include two 1.0 MG storage tanks and 8,800 feet of transmission pipeline that will serve as an additional major mauka-makai corridor to bring the high quality water from the high-level sources to Kailua-Kona. Estimated DWS Share: \$3.0M

Future projects:

Hinalani Street 1.0 MG Reservoir and Transmission Waterline: This tank and transmission waterline project will provide an additional route to bring the high-level water makai to the Queen Ka‘ahumanu Highway. Estimated Cost: \$4.0M

Kalaoa 1.0 MG Reservoir and Transmission Waterline: This tank and transmission waterline project will allow for more efficient use of the existing Kalaoa Well by adding storage to the existing 0.3 MG reservoir. Estimated Cost: \$3.0M

North Kona Well, Phase 1: The development of this well by DWS will add a high-level source to the system and will primarily serve as a back-up when existing sources are under repair. Estimated Cost: \$1.3M

Queen Ka‘ahumanu Highway Widening, Phase 2: This project will install approximately 5 miles of 16-inch waterline from Kealakehe Parkway to Keāhole Airport which will significantly improve transmission capacity. Estimated Cost: \$3.2M

Wai‘aha Transmission Waterline Improvements (Māmalahoa Hwy): This transmission waterline will enhance the Department’s ability to utilize the existing Wai‘aha Well and expand the service area. This will also reduce the dependency on the Hōlualoa Well (basal source). Estimated Cost: \$1.5M

DWS site visits

Kahalu‘u Shaft: This project was constructed in the 1970’s by then State of Hawai‘i, Department of Water and Land Development (DOWALD), and subsequently dedicated to the DWS. It is an inclined shaft which descends from ground elevation 590’ approximately 1,100 feet to sea level. At the bottom is a concrete floored pump gallery designed to pump water from the basal lens provided by 2 skimming tunnels. There are currently three 1,400 gpm pumps installed.



View looking down



Pump gallery

Keōpū-Pu‘uhonua Well and Reservoir: The exploratory well was drilled and cased in 1992 by Haseko Hawaii Inc. and subsequently tested for potable suitability in 1993 at 738 gpm. The original developer, however, never outfitted the well and the subsequent owner, Keopuolani Estates Associates, dedicated the well and site to DWS in 2000. The well (elevation 1675’ msl, static water level approx. 47’ above sea level), reservoir and transmission line was then completed by DWS in 2009.



1.0 MG storage tank



Well pad, column pipe to be installed,
& control building

Reported Pumpage

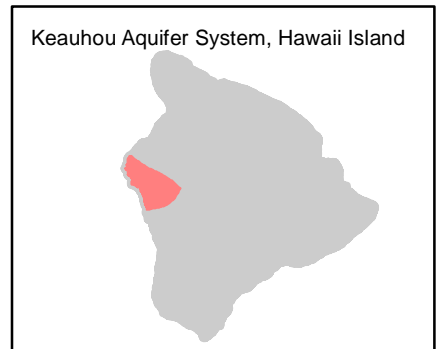
KEAUHOU AQUIFER SYSTEM
Sustainable Yield: 38 MGD
Total Pumpage: 14.5 MGD

High-level Aquifer Pumpage: 5.50 MGD
Basal Aquifer Pumpage: 9.06 MGD

KEAUHOU

EXHIBIT 3

- Basal Aquifer Wells
- High-level Aquifer Wells
- - - Basal/High-Level Aquifer Boundary
- ▭ Keauhou Aquifer System
- ▭ Aquifer System



Pumpage collected as 12-month moving average (mgd) from CWRM database on 09/01/2014.

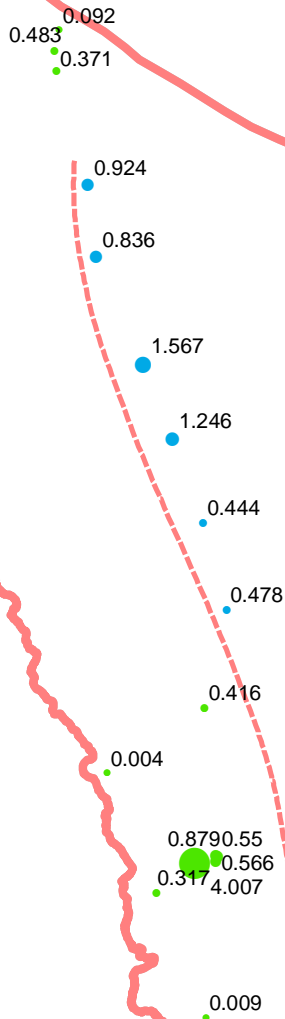
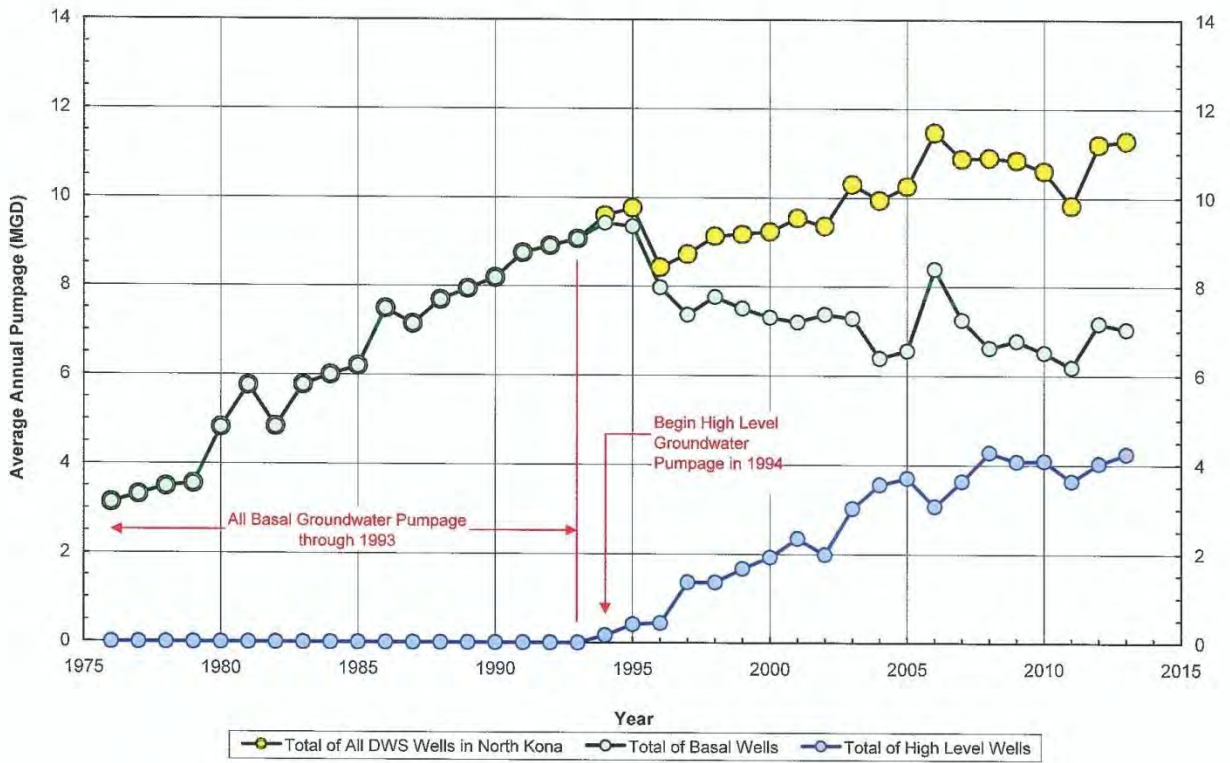


Figure 3. Pumpage of DWS Wells in North Kona from 1976 through 2013





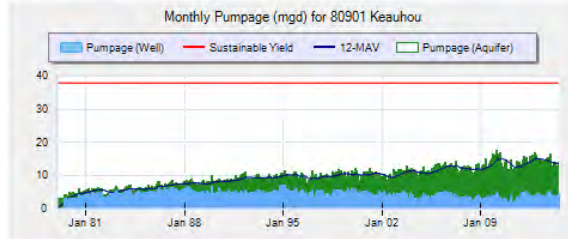
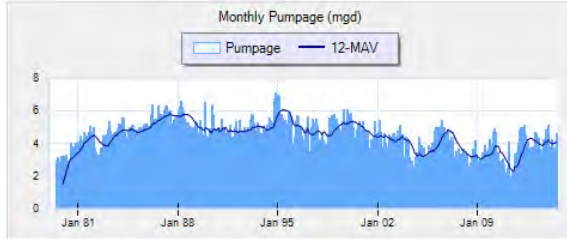
Well Index - 8-3557-005 Kahaluu Shaft

Search Add New

Well Index | **Water Use Report (427)** | Well Application (0) | WUP (0) | Violation (0) | Registration (1) | Images (0) | Files (0)

Interval: -All- Show Graph

Aquifer Type: Alluvial Basal Caprock Dike Perched



[View Final Output Detail](#) | [View Pumpage Selected](#)

[View Final Output Detail](#) | [View Pumpage Selected](#)

Water Use Report

1 2 3 4 5 6 7 8 9 10 ...

WUR #	Water Use Reporter	Start Date	End Date	Mg	Gallons	Mgd	Chloride (mg/L) (Chlorides)	Date (Chlorides)	Conductivity (µS/cm) (Conductivity)	Date (Conductivity)	Temperature (°C or °F)	Non-Pumping Date (Water Level (ft. above msl) (Water Level))	Time (Water Level)
97020	Clyde Young (Department of Water Supply Hawaii - Hilo, HDWS)	07/01/2014	07/31/2014	143.057	143,057,000	4.615	330	07/07/2014			69.8	4	
97019	Clyde Young (Department of Water Supply Hawaii - Hilo, HDWS)	06/01/2014	06/30/2014	113.958	113,958,000	3.799	330				69.8	4	
96878	Clyde Young (Department of Water Supply Hawaii - Hilo, HDWS)	05/01/2014	05/31/2014	115.839	115,839,000	3.737	330				69.8	4	
96877	Clyde Young (Department of Water Supply Hawaii - Hilo, HDWS)	04/01/2014	04/30/2014	105.120	105,120,000	3.504	330				69.8	4	
96876	Clyde Young (Department of Water Supply Hawaii - Hilo, HDWS)	03/01/2014	03/31/2014	131.318	131,318,000	4.236	330				69.8	4	
96875	Clyde Young (Department of Water Supply Hawaii - Hilo, HDWS)	02/01/2014	02/28/2014	106.089	106,089,000	3.789	340	02/14/2014			69.8	4	

Table 1

Pumpage by DWS Basal and High Level Wells

Well		Average Annual Pumpage (MGD)		
State No.	Name	1990	1994	2013
Basal Wells				
3557-05	Kahaluu Shaft	4.737	5.614	4.234
3557-01	Kahaluu A	0.807	0.777	0.686
3557-02	Kahaluu B	0.992	1.050	0.514
3557-03	Kahaluu C	0.491	0.713	0.747
3557-04	Kahaluu D	0.672	0.952	0.330
3657-01	Holualoa	0.491	0.324	0.000
Total for Basal Wells		8.190	9.430	7.040
High Level Wells				
4358-01	Kalaoa	--	0.168	0.889
4057-01	QLT	--	--	1.299
4158-02	Honokohau	--	--	1.648
4258-03	Hualalai	--	--	0.000
3857-04	Waiaha	--	--	0.529
3957-01	Keopu	--	--	0.415
Total for High Level		0.000	0.168	4.251

Note: All pumpage data provided by DWS.