WATEREUSE ASSOCIATION

Sustainable Solutions for a Thirsty Planet®

Retrofit of the Pukalani WWTP Water Reuse in Paradise

May 17, 2013

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Project Location

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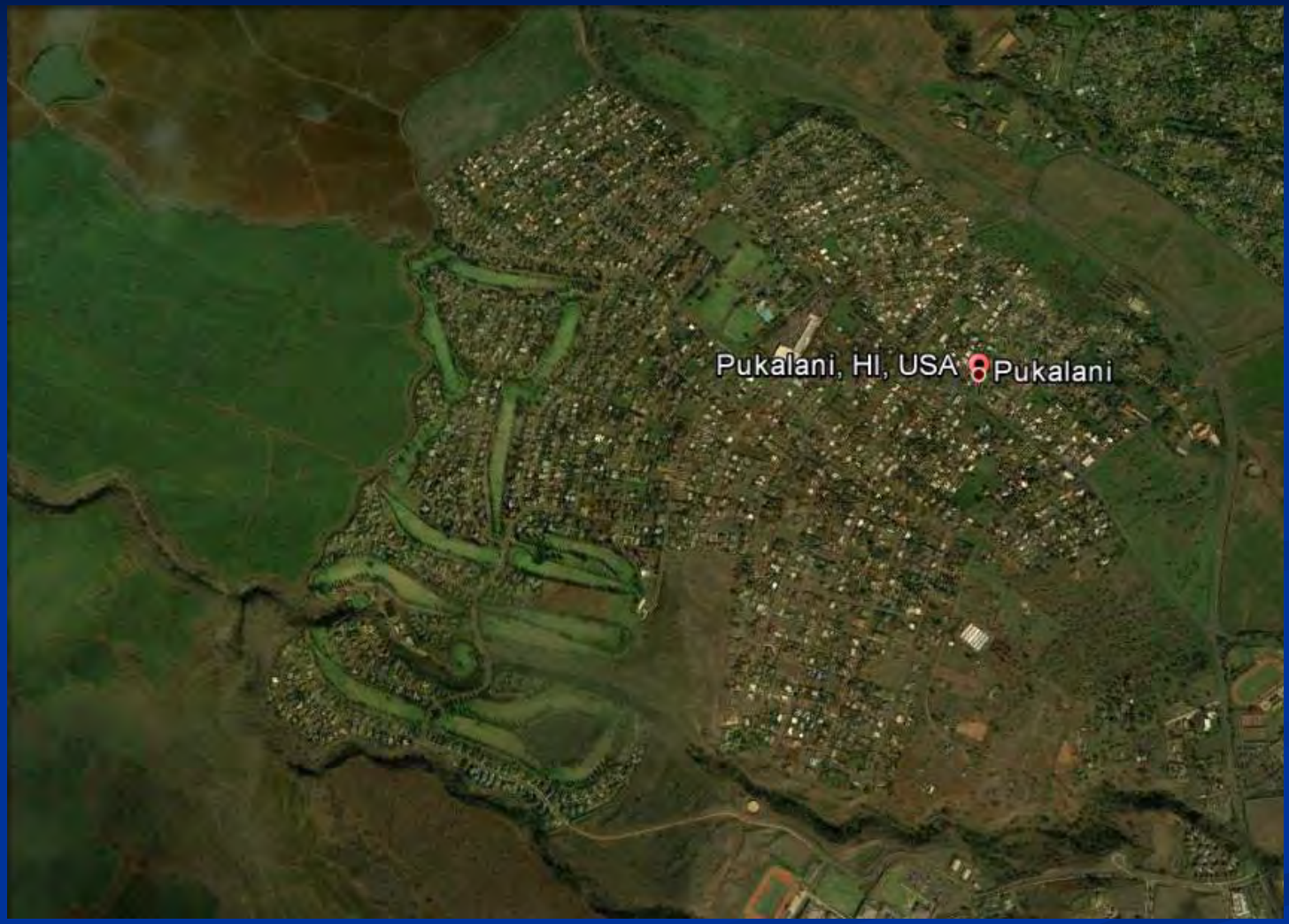

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Project Location

- Central Maui
- Pukalani – “hole in the sky”
- Variable Rainfall (15-80 in/year)

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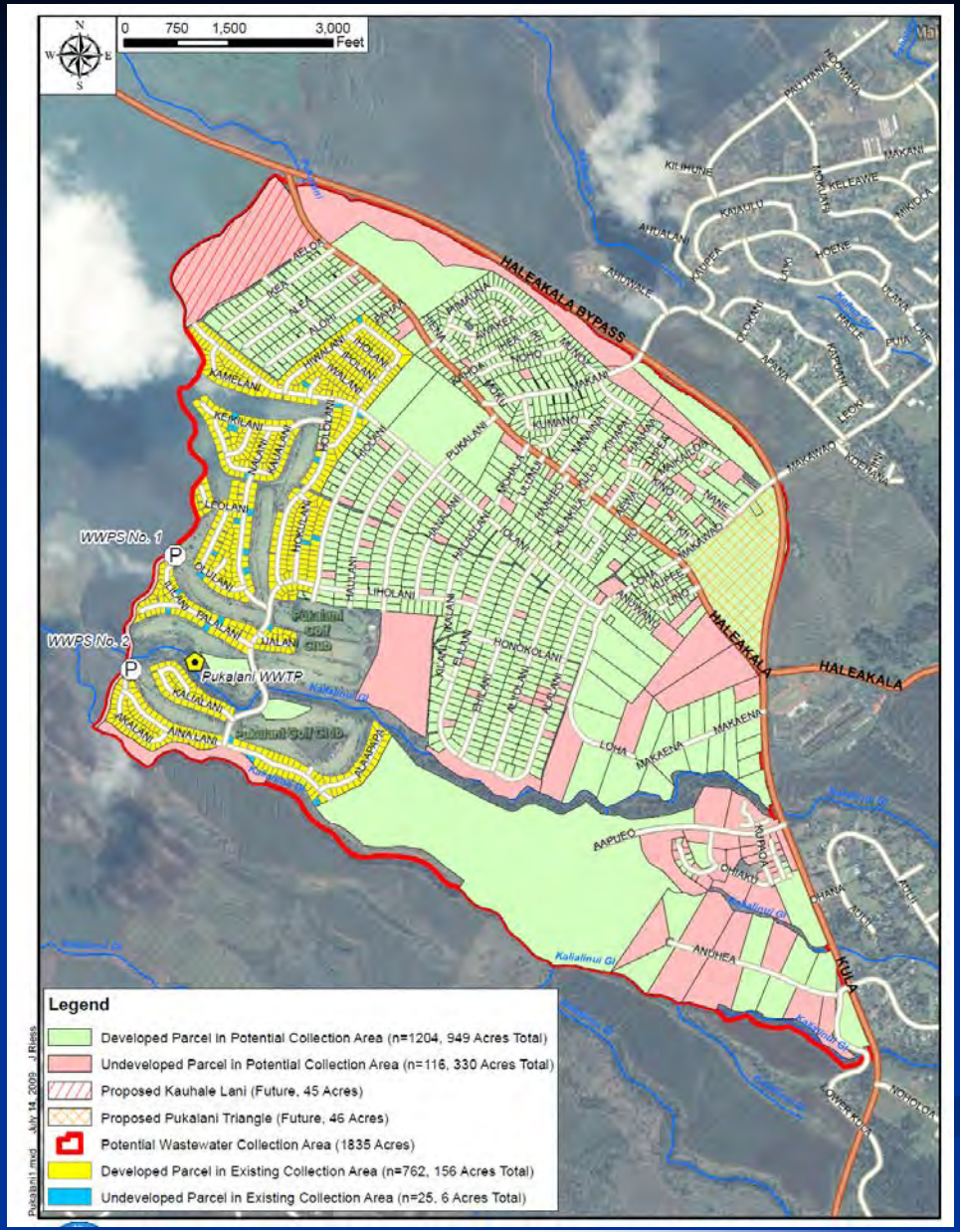
Service Area

- 787 Connections
  - 200,000 gpd
- Possible expansion to double existing size (400,000 gpd)



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Reuse Area

- Pukalani Golf Course
- 160 Acres
- 105 in/year ET
- 25-90 in/year of irrigation demand
- 330 to 1200 AF/year of irrigation demand

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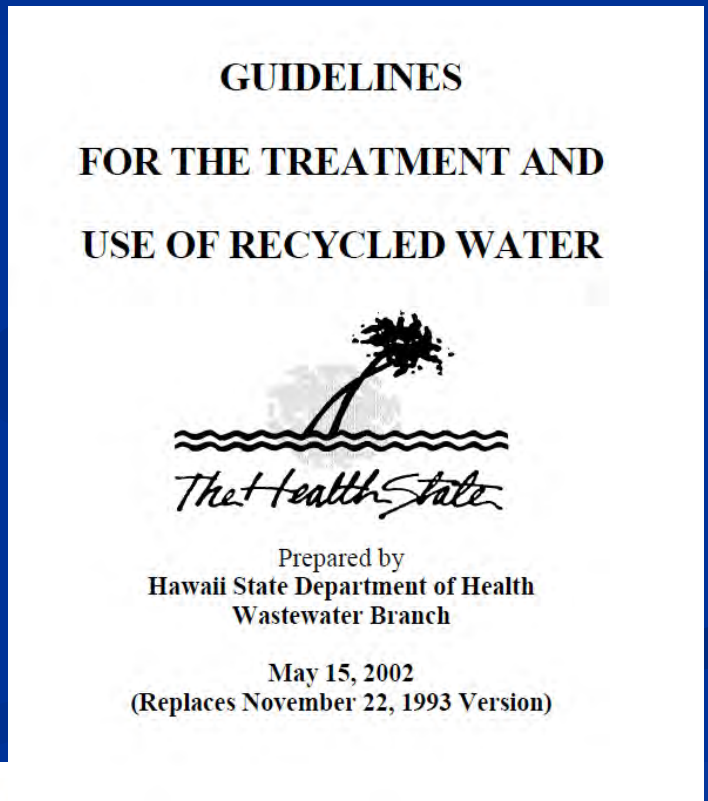
Regulatory Reference

- HDOH "Guidelines for the Treatment and Use of Recycled Water" = CA Title 22 Water Recycling Criteria
- HDOH R-1 water =
  Disinfected Tertiary
  Recycled Water
- HDOH R-2 water =
  Disinfected Secondary-23
  Recycled Water


GUIDELINES

FOR THE TREATMENT AND

USE OF RECYCLED WATER

The Health State

Prepared by
Hawaii State Department of Health
Wastewater Branch

May 15, 2002
(Replaces November 22, 1993 Version)

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The Problem?

- Existing Pukalani WWTP Produced R-2 water
  - No filtration
  - Ineffective disinfection
- Provided supplemental irrigation water to 180-acre Pukalani Golf Course
- In violation of HDOH Guidelines
  - R-2 water can only be applied to golf courses subsurface (it was being sprinklered)
  - Access was not controlled and overspray into yards and on the public was quite possible
  - R-2 water, even if allowed in sprinkler systems isnot allowed within 500 feet of residences or parks.

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The Challenge

- Aging infrastructure
  - 30 year old Oxigest
  - Salt corrosion
- No redundancy
- At capacity
- Very little space

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Space Challenge

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Existing Facility

- R-2 (Secondary-23) facility

Treatment Process	Performance
Bar Rack	Removal of Large Screenings
Oxigest Package WWTP	Secondary Treatment (Aeration/Clarification)
Storage Reservoir (2-MG)	Chlorine Contact, Storage on Non-Irrigation Days

New Facility

R-1 (Tertiary-2.2) facility

Treatment Process	Performance
1 mm fine screens	Removal of Large Screenings
Flow Equalization	Shave Daily Peaks
Anaerobic /Aerobic Bioreactor	Secondary Treatment
Membrane Filtration	0.2-0.4 micron Kubota flat plate Effluent turbidity <0.2 NTU 95% of the time
UV disinfection	80 mJ/cm^2 dose, 65% min UVT
Storage Reservoir (2-MG)	Storage on Non-Irrigation Days

Fine Screens

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Equalization

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Bioreactor

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Membranes

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Mechanical Room

UV Reactors

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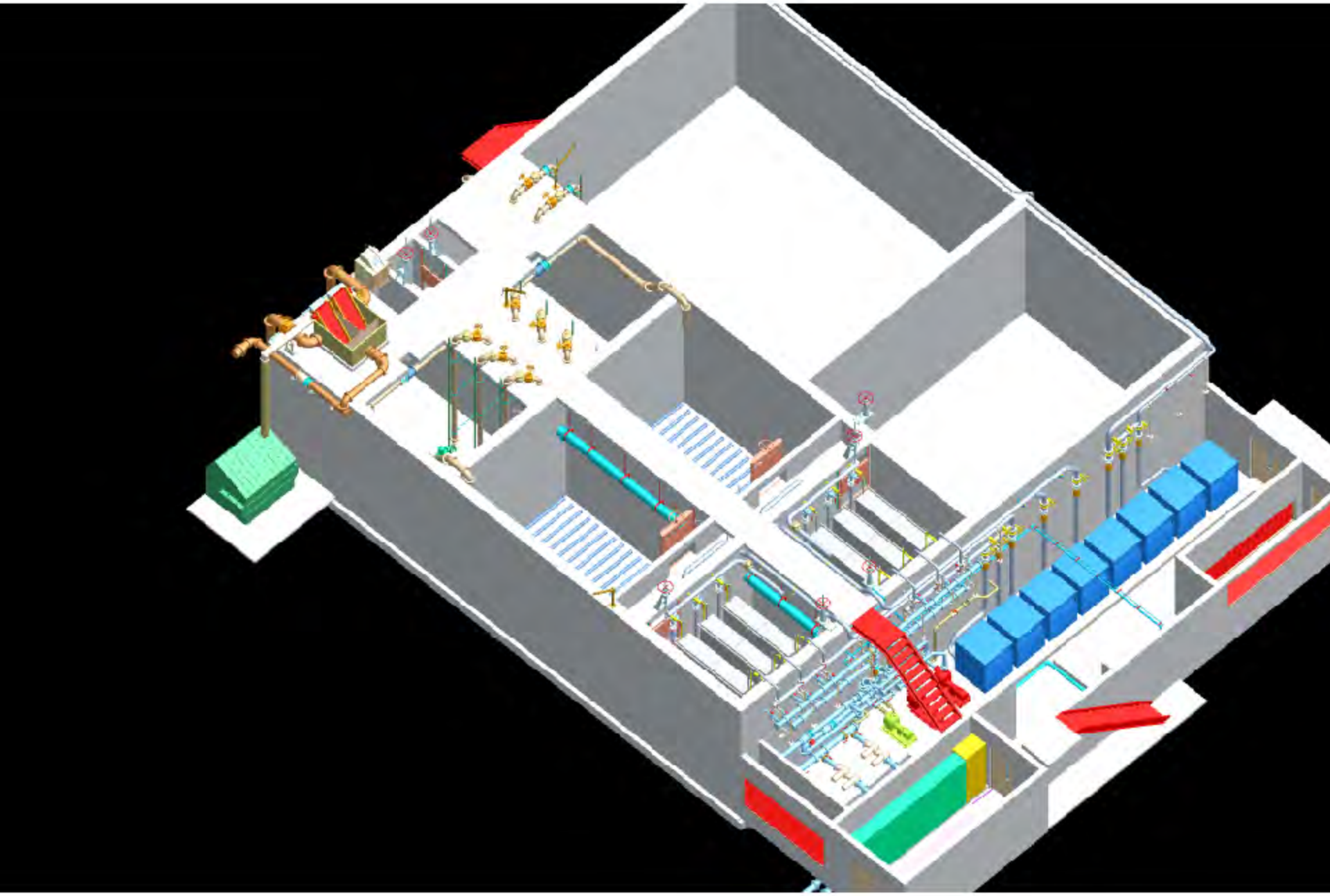

Out with the Old

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Cost?

- $7M for 200,000 gpd ($35/gpd)
- Expansion to 400,000 gpd possible for <$1M (total of approximately $20/gpd)

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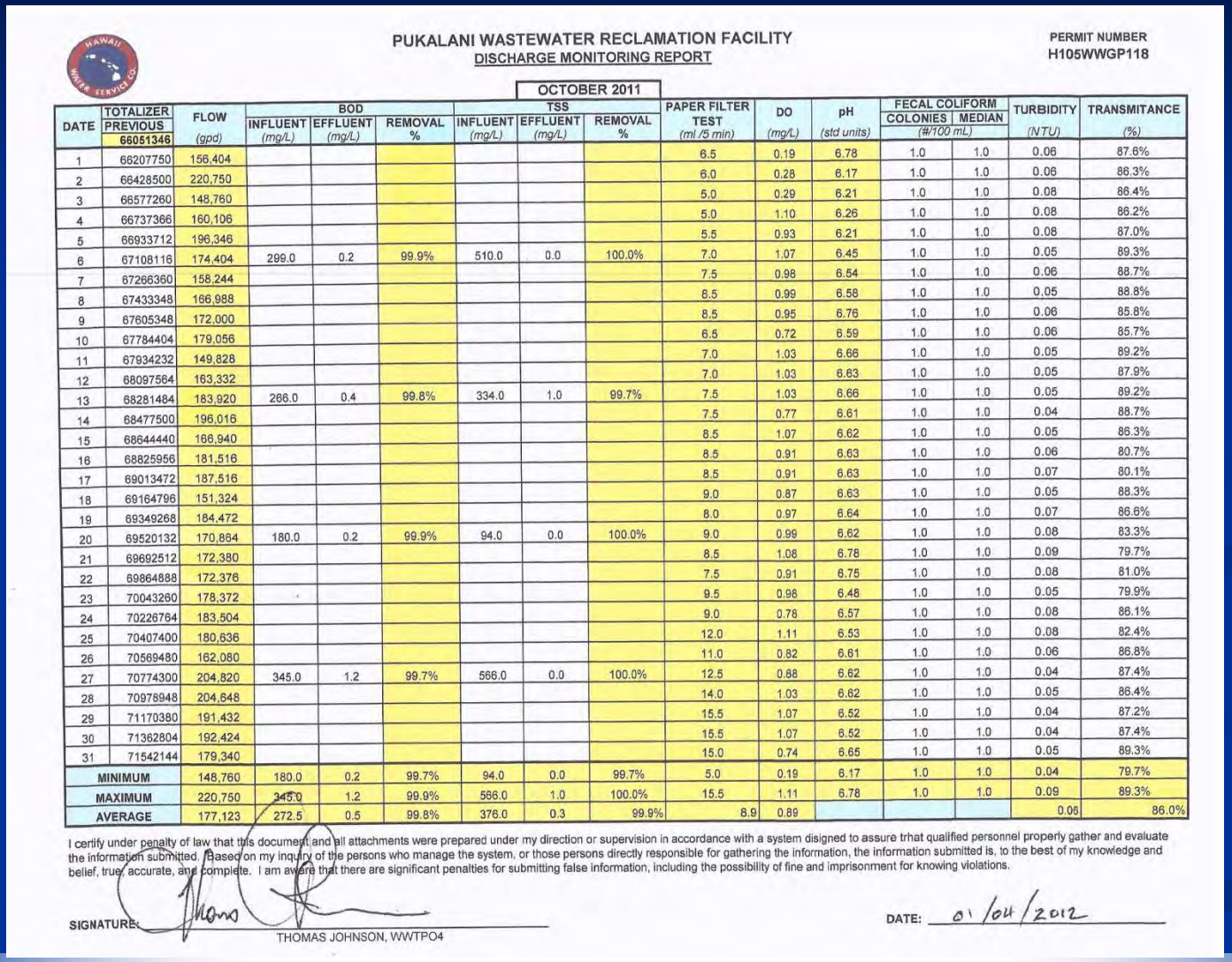
Performance is Good



PUKALANI WASTEWATER RECLAMATION FACILITY
DISCHARGE MONITORING REPORT

PERMIT NUMBER
H105WWGP118

OCTOBER 2011

DATE	TOTALIZER PREVIOUS 66051346	FLOW (gpd)	BOD INFLUENT (mg/L)	BOD EFFLUENT (mg/L)	BOD REMOVAL %	TSS INFLUENT (mg/L)	TSS EFFLUENT (mg/L)	TSS REMOVAL %	PAPER FILTER TEST (ml /5 min)	DO (mg/L)	pH (std units)	FECAL COLIFORM COLONIES (#/100 mL)	FECAL COLIFORM MEDIAN (#/100 mL)	TURBIDITY (NTU)	TRANSMITANCE (%)
1	66207750	156,404							6.5	0.19	6.78	1.0	1.0	0.06	87.6%
2	66428500	220,750							6.0	0.28	6.17	1.0	1.0	0.06	86.3%
3	66577260	148,760							5.0	0.29	6.21	1.0	1.0	0.08	86.4%
4	66737366	160,106							5.0	1.10	6.26	1.0	1.0	0.08	86.2%
5	66933712	196,346							5.5	0.93	6.21	1.0	1.0	0.08	87.0%
6	67108116	174,404	299.0	0.2	99.9%	510.0	0.0	100.0%	7.0	1.07	6.45	1.0	1.0	0.05	89.3%
7	67266360	158,244							7.5	0.98	6.54	1.0	1.0	0.06	88.7%
8	67433348	166,988							8.5	0.99	6.58	1.0	1.0	0.05	88.8%
9	67605348	172,000							8.5	0.95	6.76	1.0	1.0	0.06	85.8%
10	67784404	179,056							6.5	0.72	6.59	1.0	1.0	0.06	85.7%
11	67934232	149,828							7.0	1.03	6.66	1.0	1.0	0.05	89.2%
12	68097564	163,332							7.0	1.03	6.63	1.0	1.0	0.05	87.9%
13	68281484	183,920	266.0	0.4	99.8%	334.0	1.0	99.7%	7.5	1.03	6.66	1.0	1.0	0.05	89.2%
14	68477500	196,016							7.5	0.77	6.61	1.0	1.0	0.04	88.7%
15	68644440	166,940							8.5	1.07	6.62	1.0	1.0	0.05	86.3%
16	68825956	181,516							8.5	0.91	6.63	1.0	1.0	0.06	80.7%
17	69013472	187,516							8.5	0.91	6.63	1.0	1.0	0.07	80.1%
18	69164796	151,324							9.0	0.87	6.63	1.0	1.0	0.05	88.3%
19	69349268	184,472							8.0	0.97	6.64	1.0	1.0	0.07	86.6%
20	69520132	170,864	180.0	0.2	99.9%	94.0	0.0	100.0%	9.0	0.99	6.62	1.0	1.0	0.08	83.3%
21	69692512	172,380							8.5	1.08	6.78	1.0	1.0	0.09	79.7%
22	69864888	172,376							7.5	0.91	6.75	1.0	1.0	0.08	81.0%
23	70043260	178,372							9.5	0.98	6.48	1.0	1.0	0.05	79.9%
24	70226764	183,504							9.0	0.78	6.57	1.0	1.0	0.08	86.1%
25	70407400	180,636							12.0	1.11	6.53	1.0	1.0	0.08	82.4%
26	70569480	162,080							11.0	0.82	6.61	1.0	1.0	0.06	86.8%
27	70774300	204,820	345.0	1.2	99.7%	566.0	0.0	100.0%	12.5	0.88	6.62	1.0	1.0	0.04	87.4%
28	70978948	204,648							14.0	1.03	6.62	1.0	1.0	0.05	86.4%
29	71170380	191,432							15.5	1.07	6.52	1.0	1.0	0.04	87.2%
30	71362804	192,424							15.5	1.07	6.52	1.0	1.0	0.04	87.4%
31	71542144	179,340							15.0	0.74	6.65	1.0	1.0	0.05	89.3%
MINIMUM		148,760	180.0	0.2	99.7%	94.0	0.0	99.7%	5.0	0.19	6.17	1.0	1.0	0.04	79.7%
MAXIMUM		220,750	345.0	1.2	99.9%	566.0	1.0	100.0%	15.5	1.11	6.78	1.0	1.0	0.09	89.3%
AVERAGE		177,123	272.5	0.5	99.8%	376.0	0.3	99.9%	8.9	0.89				0.06	86.0%

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system disigned to assure trhat qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

SIGNATURE: _____
THOMAS JOHNSON, WWTPO4

DATE: 01/04/2012

Performance is Good

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Project Success

Location: Pukalani, HI
Owner: Hawaii Water Service Co.
Designer: Water Works Eng., LLC
Contractor: Bodell Construction Co.
Cost: $10.1 million
Size: 160 gpm

Pukalani Wastewater Reclamation Facility Upgrade Project

Located on the island of Maui in Pukalani, Hawaii, the Pukalani Wastewater Reclamation Facility underwent an upgrade in 2009, but the multimillion dollar construction project was not without its challenges.

The Hawaii Water Service Co. had a number of goals. The first was to replace an existing 33-year-old steel tank carousel facility with a new membrane facility, for golf course irrigation, while maximizing the limited available space. The company also hoped to rehabilitate two facility lift station structures and install new variable frequency drive pumps in the main lift station.

To achieve these goals, construction had to take place in a constrained area between the old facility and the operations building. Furthermore, there were no drawings of the original facility available, so builders had no way of knowing the location of electrical duct banks and aeration piping in the space.

Contractors from Bodell Construction Co. performed several geotechnical borings and discovered an underground electrical duct bank and hard blue lava in the building space. The electrical work had to be rerouted and the lava had to be removed without disturbing area residents with noise and vibrations.

In the end, the project was a success. During Phase 1, completed in June 2011, all process basins, screening, pumps and blowers were constructed to accommodate an initial flow of 160 gal per minute (gpm). Equalization and sludge holding basins also were built to accommodate a final flow of 320 gpm, which can be achieved with the installation of six additional membrane cassettes. The height of the basin walls was increased by 4 ft, and two future permeate headers were added to accommodate a second phase.

"We are extremely proud that we were able to utilize technology and a design that has a smaller footprint, is less costly to maintain and produces water that can be used without restriction, which frees up precious potable water supplies," said Jim Smith, general manager of the Hawaii Water Service Co. "That's a win-win for Hawaii Water, our customers and the environment."

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Questions

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