

Approve Order to Honolulu Board of Water Supply
To Bulkhead Ha'ikū Tunnel (Well No. 2450-001) at the
10-foot thick Dike 1,200 feet from the Portal Entrance
And Reduce Their Withdrawal to 0.3 mgd
He'eia Hydrologic Unit, Ko'olaupoko O'ahu

Ayron Strauch, Hydrologist
Stream Protection and Management Branch

June 15, 2021
Item B-2

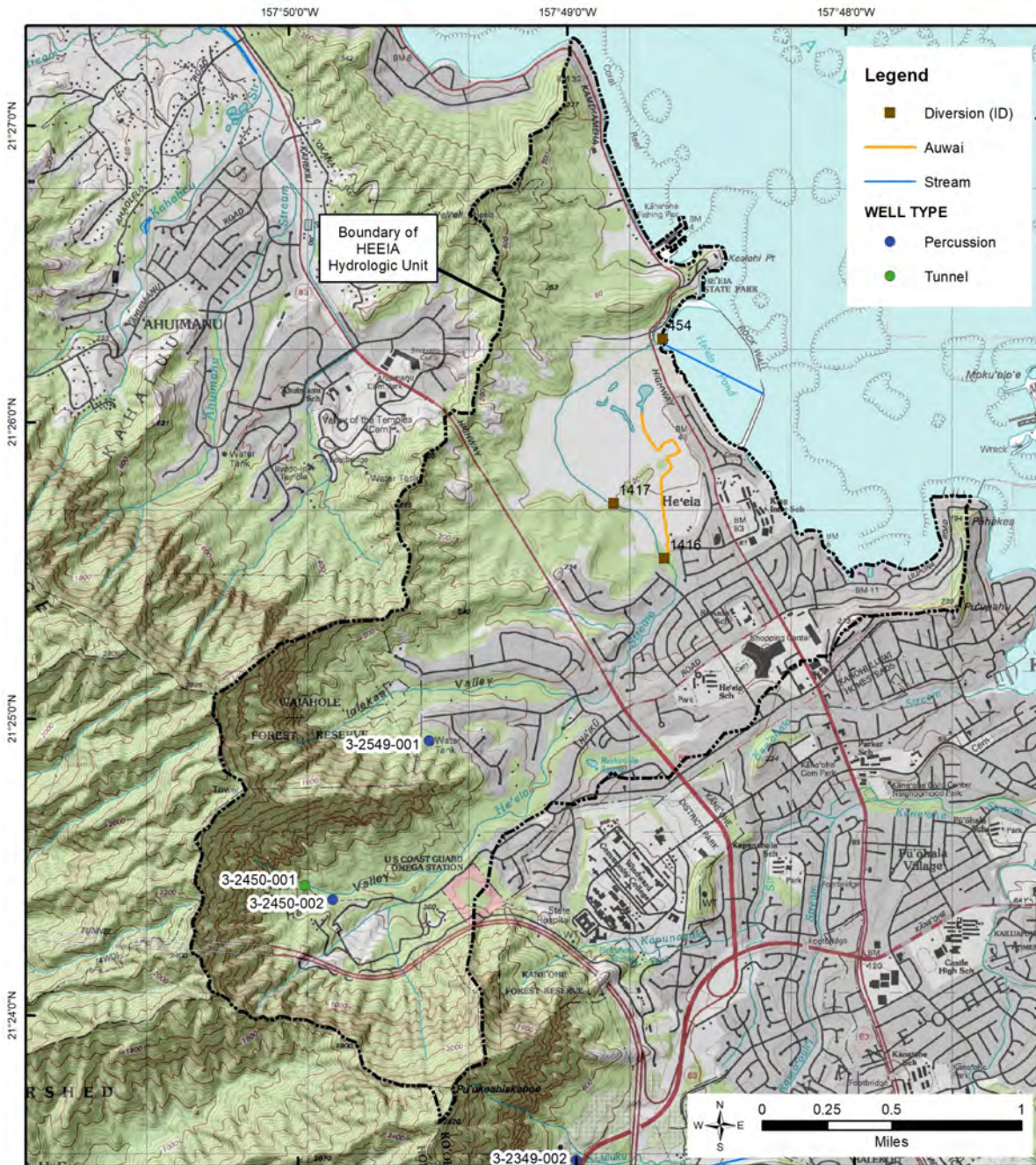
COMMISSION ON WATER RESOURCE MANAGEMENT

Ke Kahuwai Pono

"The trustee who oversees the rightful sharing of water."



Location



He'eia ahupua'a
Ko'olau Poko, Oahu

Restoration of Biocultural Landscape and Educational Opportunities

Kāko'o 'Ōiwi



Hui o Koolaupoko



Paepae o He'eia



Papahana Kuaola



Substantial instream uses
that are not protected by the
existing streamflow



John Hook



Ticket to Ride

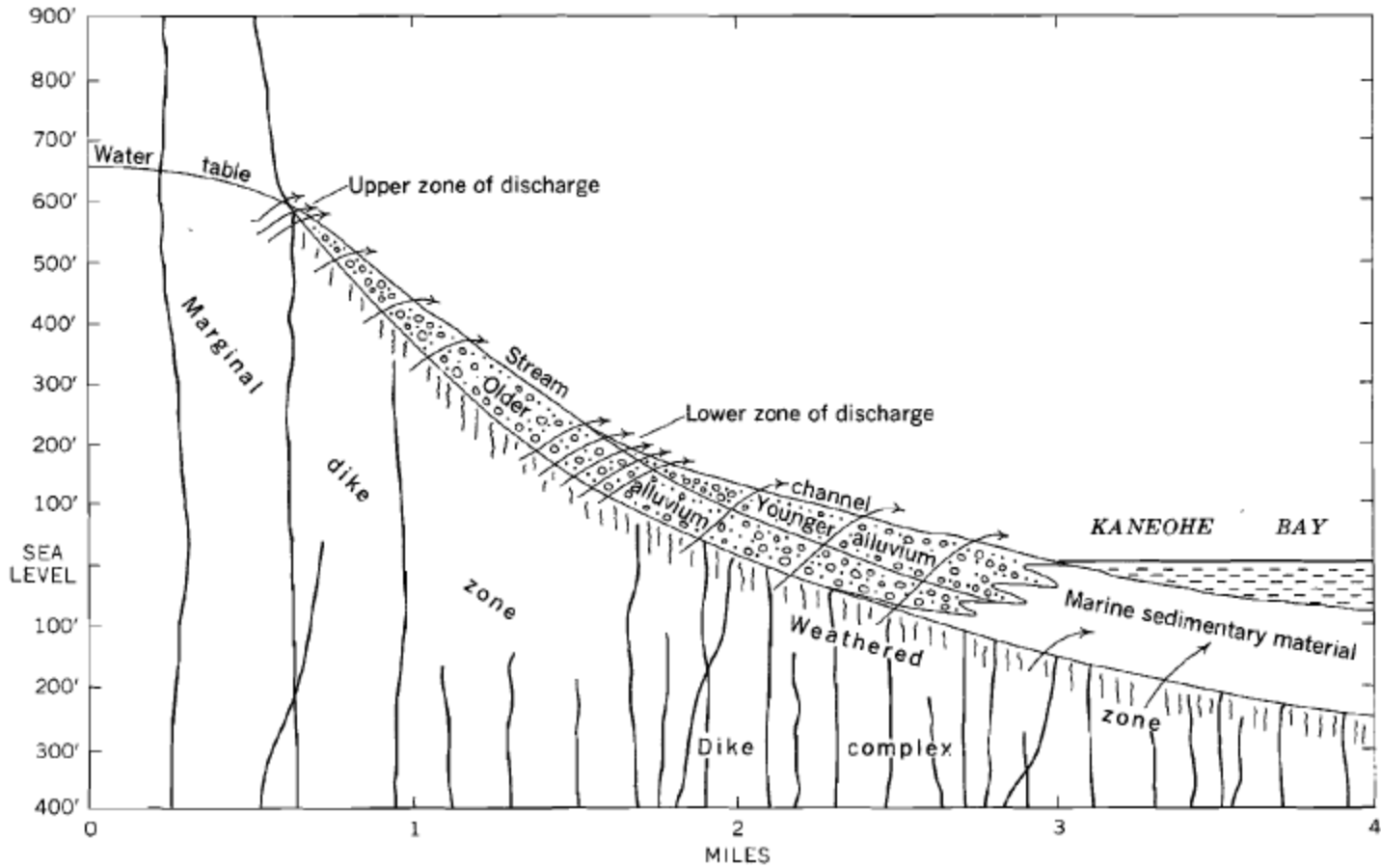


FIGURE 35.—Typical stream channel in Kaneohe area, showing positions of discharge zones.

Consequences for Streamflow in He'eia

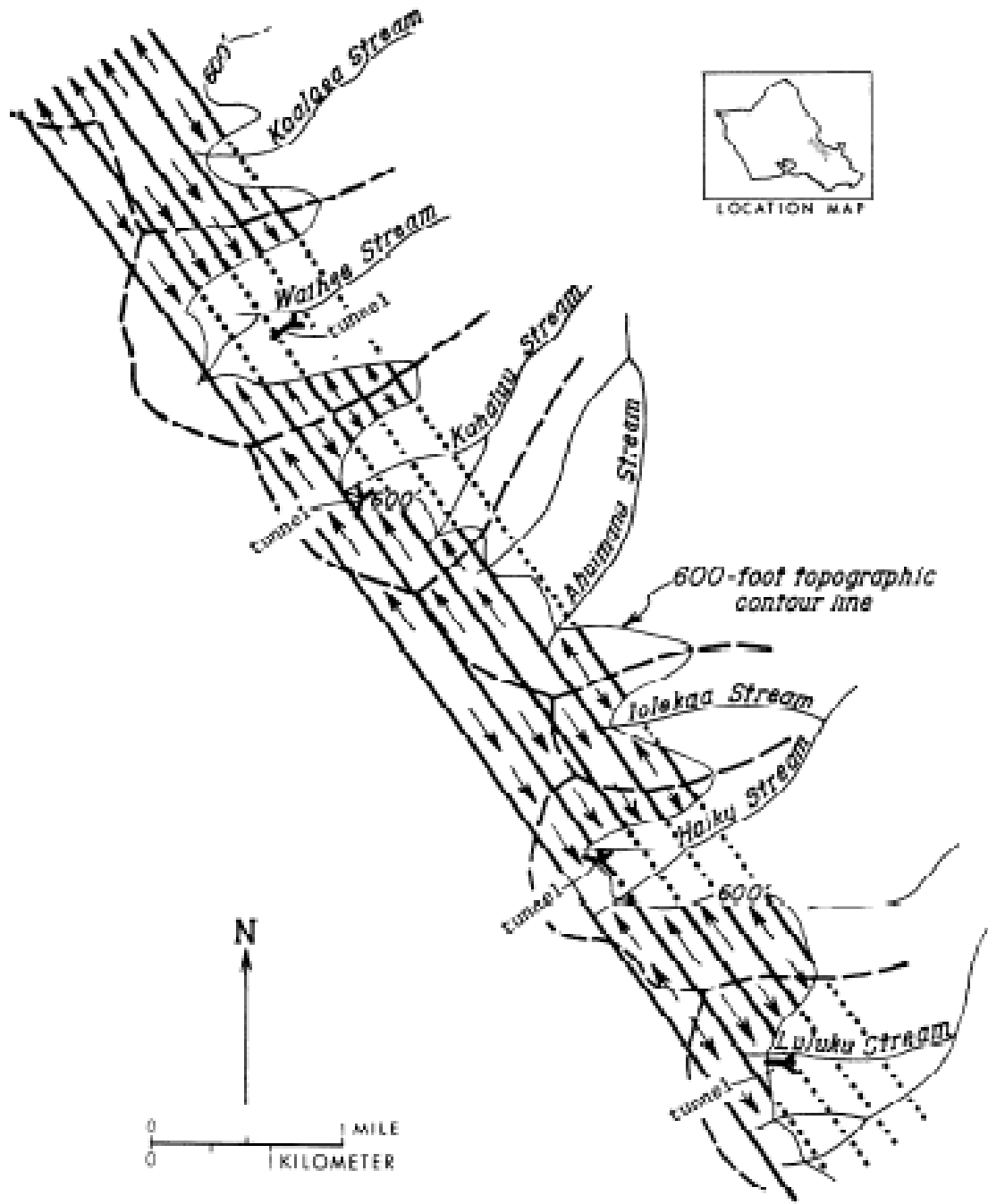
before and after Ha'ikū Tunnel Construction

time period	median baseflow	mean daily flow
1911-1940	3.28 (2.11)	4.5 (2.94)
1941-present	1.57 (1.02)	2.6 (1.68)
1989-2019	1.48 (0.96)	2.4 (1.58)



Tunnel construction and groundwater withdrawal reduced groundwater discharge to the stream by 50%; pre-tunnel average baseflow was about 2.0 mgd

Hirashima (USGS 1971,WSP 1999-M)



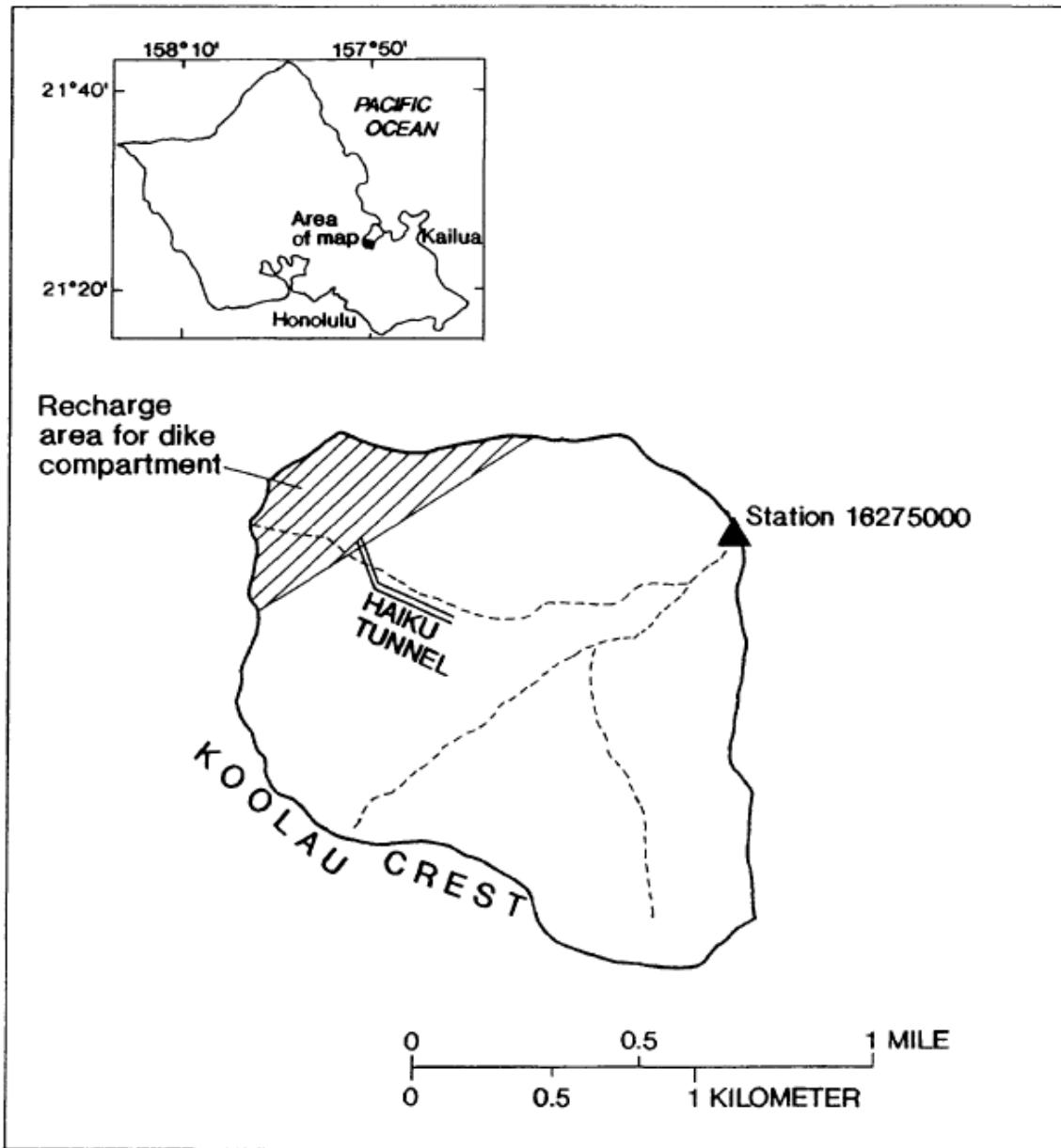


Figure 16. Partial recharge area, in Haiku Valley, for dike compartment from which the Haiku water tunnel draws its water. Actual recharge area of dike compartment extends beyond the surface drainage divide.

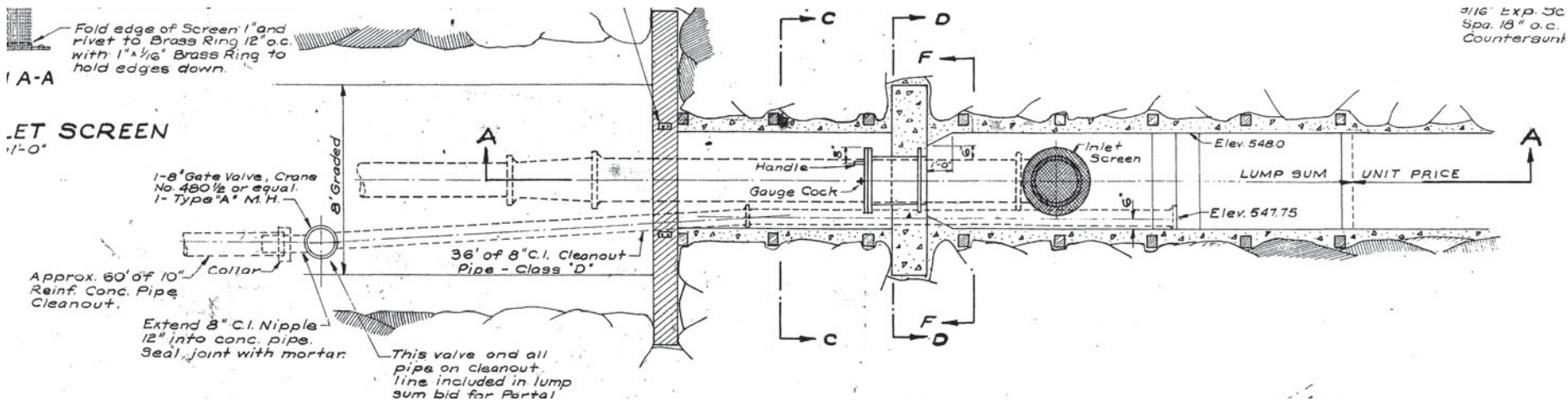
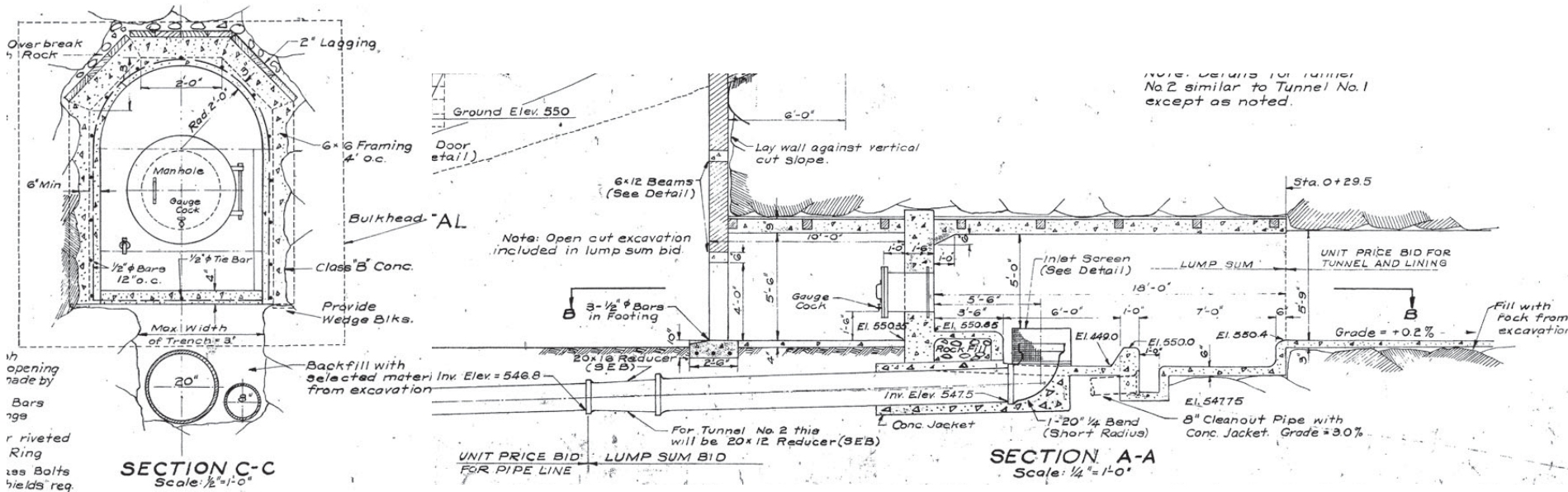
Ha'ikū Tunnel (Well No. 2450-001)



BWS Waihe'e Tunnel bulkhead



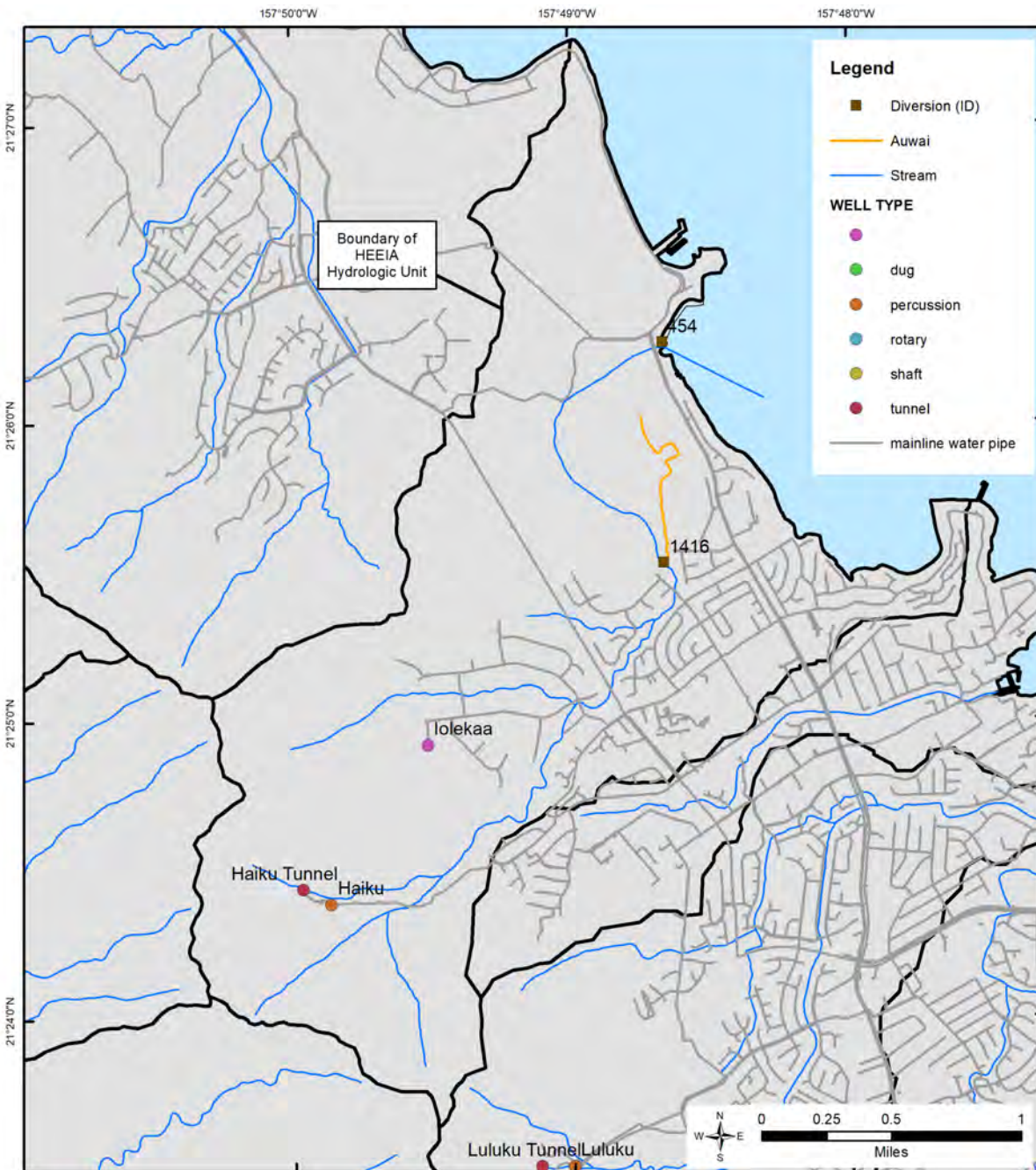
BWS Existing Ha'ikū Tunnel bulkhead at 600 feet



USGS Concluded:

- Significant reduction in ground-water storage by tunnel construction
- Single bulkheads in Ha'ikū, Lulukū and Kahalu'u were not constructed at dikes that originally stored the most water; hence they are only partly effective in restoration of storage
- Dikes that control the most water can best be determined at the time of tunneling
- Bulkheads are most effective in marginal dike zones, where single dikes generally control large quantities of stored water
- Regulation of storage with bulkheads serves two purposes:
 1. restoration periods can be coordinated with periods of minimum water demand
 2. when storage is at a maximum, tunnel flow can be increased during maximum demand

Honolulu BWS Ko'olaupoko Aquifer System



Windward - Luluku 500 Operations

Mar21



Drop is the balance of fixed source input and variable system demand + 11% water loss. Will fluctuate with weather.

Maunawili PRV (To Windward 272)

0.89 MGD (Drop)

March 2021 Avg Pumpage data listed
 March system demand 1.7 mgd – 0.89 mgd = 0.81 mgd includes nonrevenue water

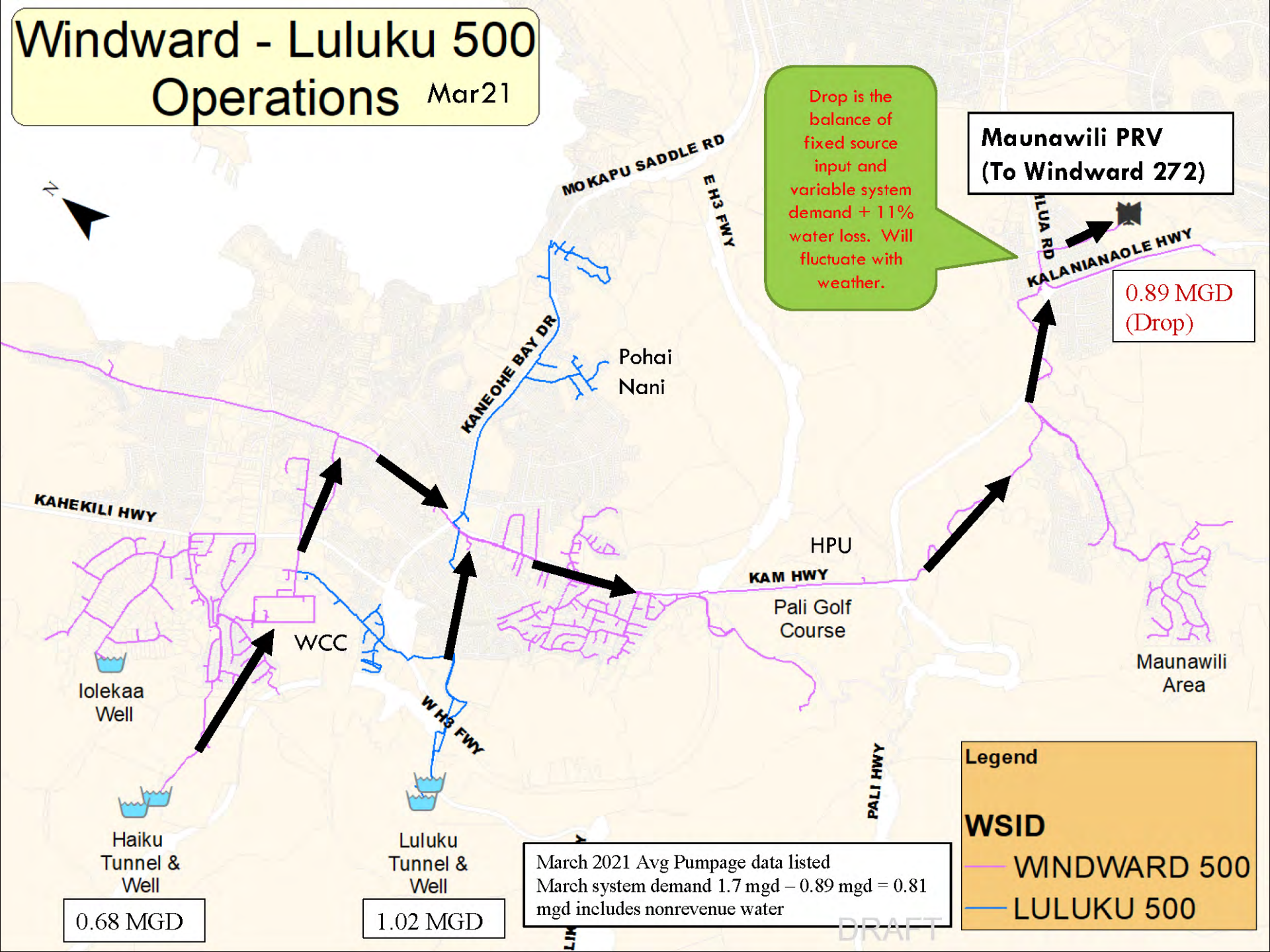
0.68 MGD

1.02 MGD

Legend

WSID

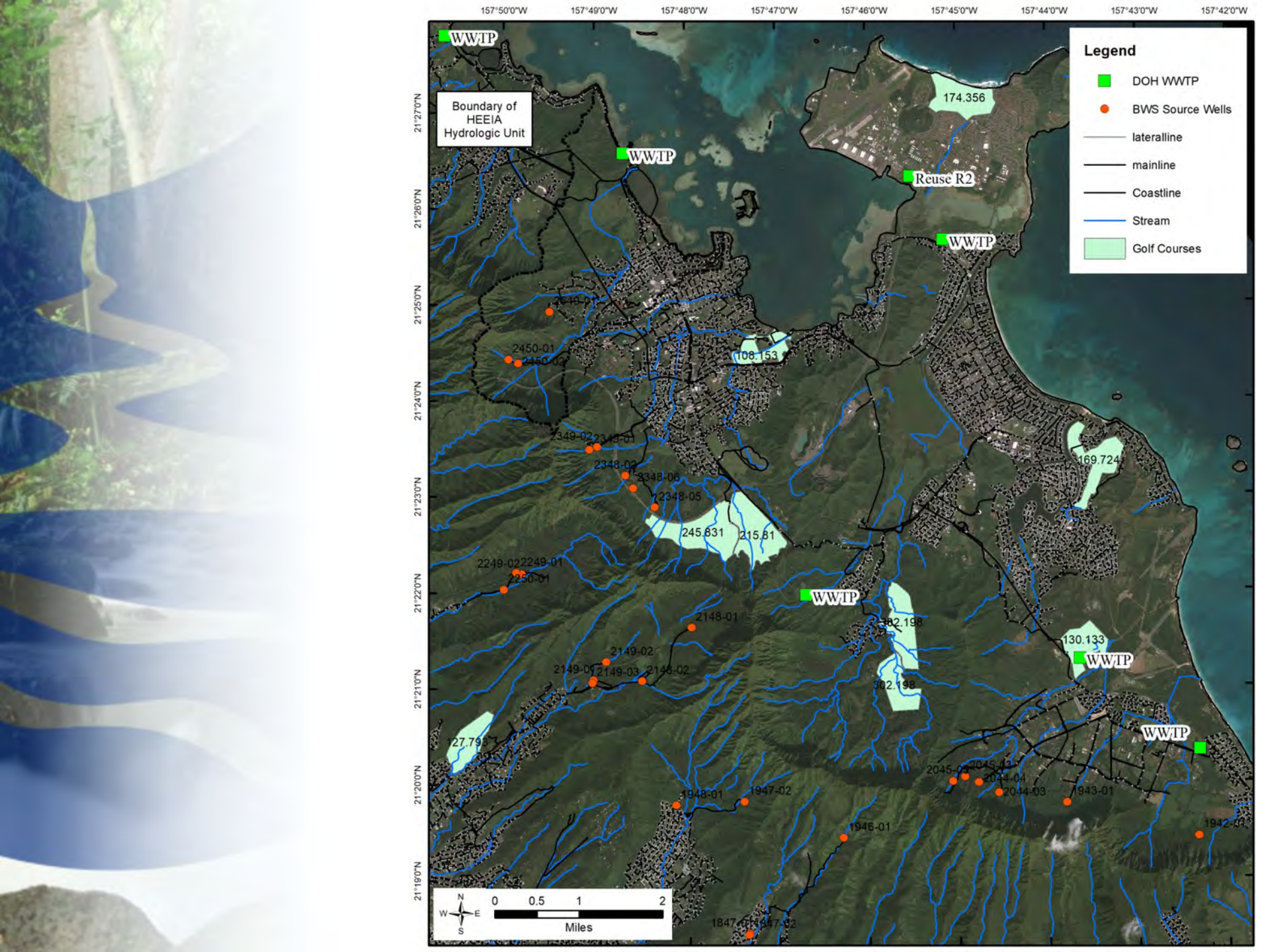
- WINDWARD 500
- LULUKU 500



DRAFT

Honolulu BWS Ko'olau Poko District: Largest metered customers:

HBWS Customer		Average daily consumption (mgd)	HBWS Customer		Average daily consumption (mgd)
1	Kāne'ōhe Marine Corps Base (golf course/irrigation)	1.698	6	Hawaii State Hospital	0.070
2	Mid Pacific Country Club	0.128	7	Hawaiian Memorial Park Cemetery	0.052
3	Kailua Regional WWTP	0.128	8	Pali Golf Course	0.044
4	Sea Life Park	0.104	9	Blue Stone Apartment Complex, Kailua	0.045
5	Olomana Golf Links	0.064	10	Pu'u Ali'i Community Association, Kāne'ōhe	0.047



BWS withdrawal from Ha'ikū Tunnel:

- Mean tunnel withdrawal of 1.019 mgd (maximum 2.064 mgd)
 - 500-foot system mean daily demand is 0.95 mgd (maximum 1.3 mgd)
 - Kamakau Charter School potable and emergency water supply for fire protection
 - Portion of potable water needs for Ha'ikū community of approximately
- BWS Ko'olau Poko district system has a system loss rate of approximately 16% (in most recent Watershed Management Plan)
- In April 2021, BWS dropped 0.8 mgd from 500-foot system to 272-foot system



Recommendation

1. Commence feasibility and preliminary engineering of bulkhead at the 10-foot thick dike 1,200 feet from the tunnel portal; with a two-year deadline to return to the Commission
2. Provide the daily amount withdrawn from each groundwater source (Ha'ikū Tunnel, Ha'ikū well, Ioleka'a well) at monthly intervals to the Commission and interested parties identified by staff
3. Reduce withdrawal from Ha'ikū Tunnel from the average of 1.06 mgd to 0.3 mgd as an interim measure

If bulkhead is not financially or practically feasible, Commission staff will revisit the establishment of an instream flow standard, a permanent reduction in the water use permit, or both.