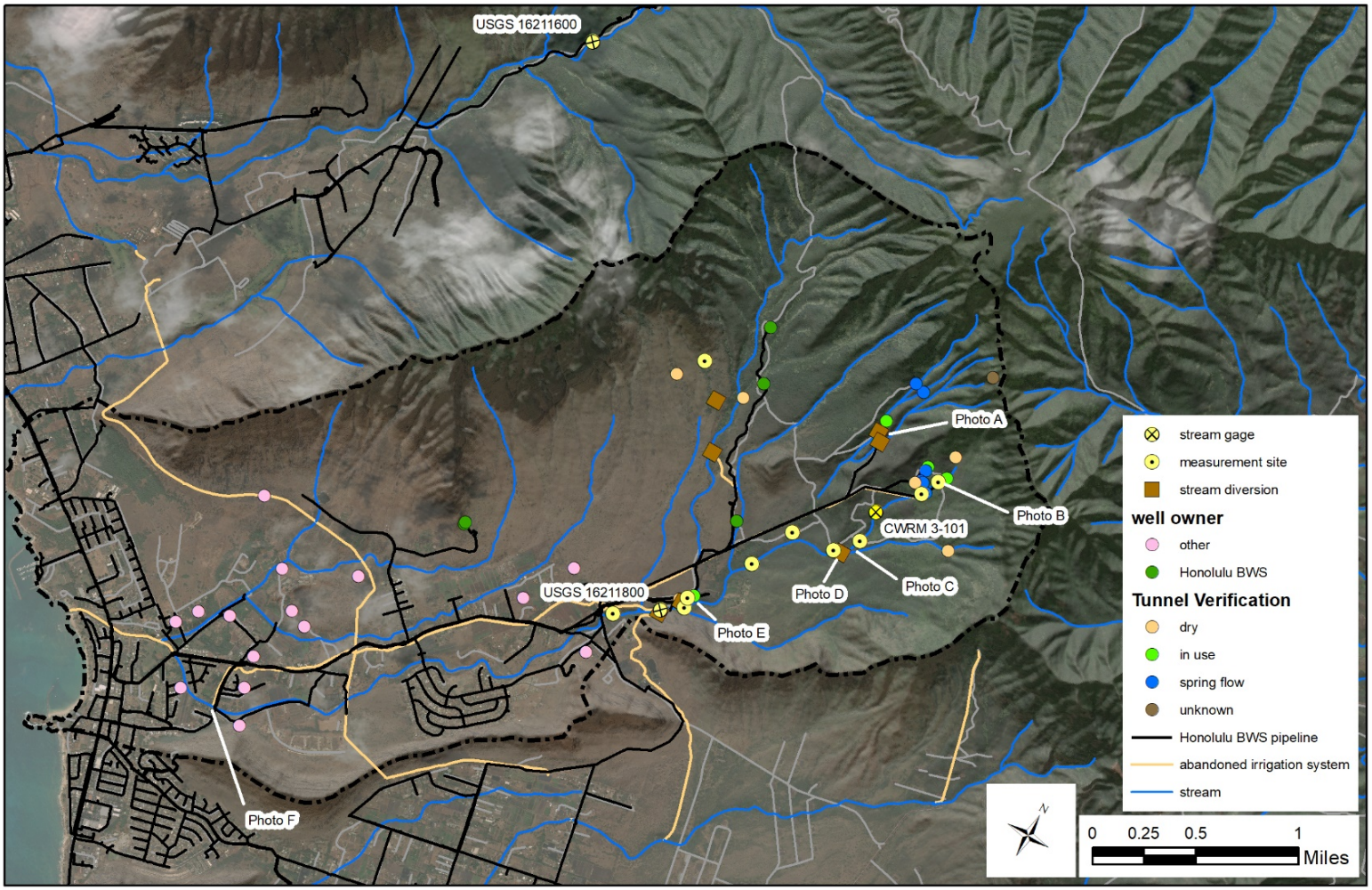
COMMISSION ON WATER RESOURCE MANAGEMENT

Surface Water Monitoring : Wai‘anae Region

Gage ID	Location Name	Operator	Station Type	Period of Record
16211600	Makaha Stream nr Makaha, Oahu	USGS	Real-time Continuous	1959-P
16211800	Kaupuni Stream at alt 374 ft nr Waianae, Oahu	USGS	Real-time Continuous	1960-1972*
3-101	Kanewai Stream at 1000 ft	CWRM	continuous	2016-P

*station to be activated in 2021



A. Pipeline from development tunnel 15 (HBWS tunnel 1) crossing the right branch of Kalalula Stream at the 1600 ft elev.
B. Pipeline from development tunnel 19 (HBWS tunnel 3) discharging 0.47 mgd into Kanewai Stream at the 1450 ft elev.

Development Tunnels In Wai‘anae

CWRM well number	Wai‘anae tunnel number	current use/status	year built	Elevation (ft)	12-year average discharge 1936-1947 (mgd)
3-2908-001	Tunnel 1	ABN	pre- 1924	1425	0.151
3-2908-002	Tunnel 2	ABN	pre- 1924	1426	3.738
3-2908-012	Tunnel 3	UNU	pre- 1924	1545	0.000
3-2908-013	Tunnel 4	UNU	pre- 1924	1575	0.000
3-2908-003	Tunnel 6 (BWS Tunnel 2)	MUNCO	pre- 1924	1525	1.404
3-2908-004	Tunnel 6A	ABN	pre- 1924	1485	0.172
3-2908-005	Tunnel 7	ABN	pre- 1924	1409	0.339
3-2908-006	Tunnel 8	ABN	pre- 1924	1385	1.154
3-2908-007	Tunnel 9	ABN	pre- 1924	1370	0.425
3-2908-008	Tunnel 11	ABN	pre- 1924	1764	0.278
3-2908-009	Tunnel 14	ABN	pre- 1924	1709	0.624
3-2908-010	Tunnel 15 (BWS Tunnel 1)	MUNCO	pre- 1924	1399	2.459
3-2909-001	Tunnel 16	ABN	pre- 1924	1075	0.478*
3-2909-004	Tunnel 17	ABNLOS	pre- 1924	1200	0.165
3-2809-007	Tunnel 18	UNU	pre- 1924		NL
3-2908-011	Tunnel 19 (BWS Tunnel 3)	MUNCO	1933	1515	13.000

ABN = abandoned; UNU = unused; MUNCO = municipal county; ABNLOS = lost; *included 1935 but not 1936 data

Current BWS Production Wells

CWRM well number	well name	year built	pump capacity (gpm)	ground elevation (ft)	2019 12-month moving average pumpage (mgd)	12-year average discharge 1936-1947 (mgd)
3-2712-030	Kamaile 2	1976	600	34	0.023	
3-2712-031	Kamaile 1	1976		51		
3-2809-006	Waianae Tunnel	1950	N/A	418	1.4	
3-2810-002	Waianae III-1	1980	500	416	0.644	
3-2810-003	Waianae III-2	1990	500	416	0	
3-2908-003	Tunnel 6	pre- 1924	N/A	1525	0.16	1.40
3-2908-010	Tunnel 15	pre- 1924	N/A	1399		
3-2908-011	Tunnel 19	1933	N/A	1515		
3-2909-002	Waianae I	1981	200	1152	0.148	
3-2909-003	Waianae II	1985	700	1339	0.381	

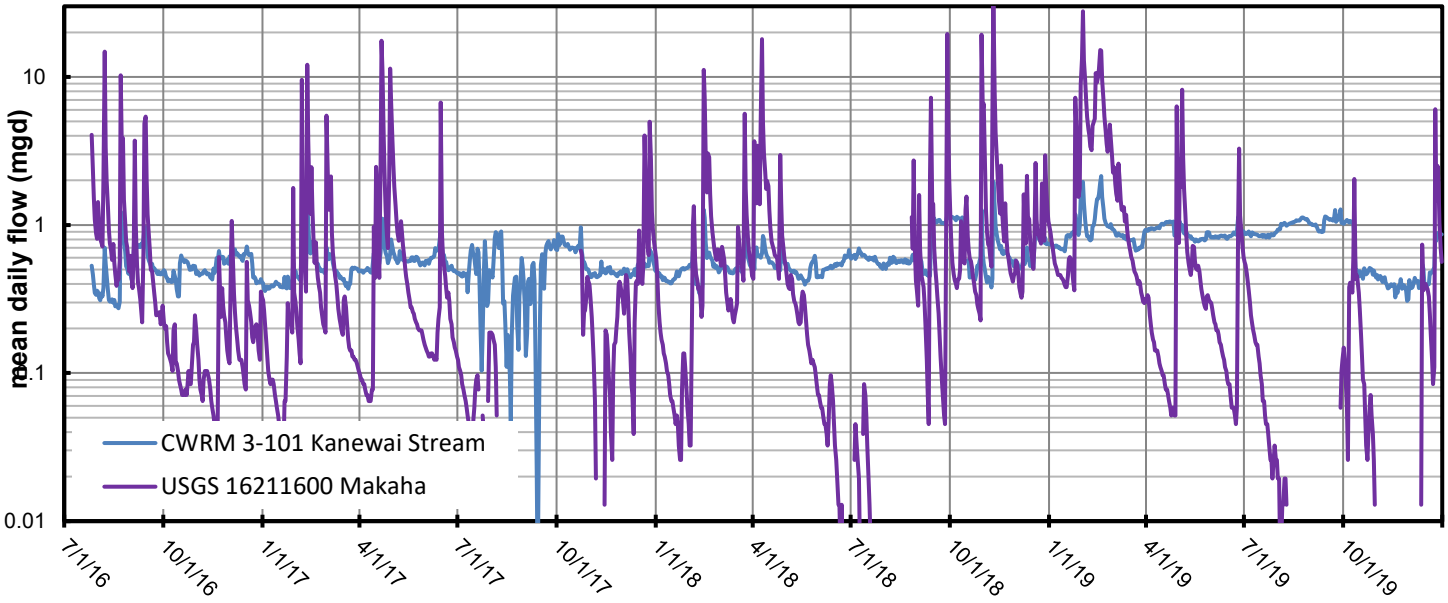
Far Right. HBWS Tunnel 2 (Development Tunnel 6) near Kanewai Stream.
Right. HBWS Tunnel 1 (Development Tunnel 15) near Kalalua Stream

Surface water Resources

Starting in July 2016, CWRM staff have maintained a continuous-record monitoring station on Kanewai Stream (a tributary to Kaupuni Stream) at the 1000ft elevation (see photo below). Surface flow monitored at this elevation represents the spring flow gains from unused development tunnels, leakage and return flow from used HBWS development tunnels, and surface runoff. CWRM staff have measured 16 times since 2016, with a mean flow measured of 1.0 cfs (0.64 mgd). Based on continuous record data, mean daily flow at this station from 2016-present is 1.0 cfs (0.64 mgd), with median and low-flow duration statistics provided in the table below.

CWRM 3-101 Kanewai Stream at 1000ft

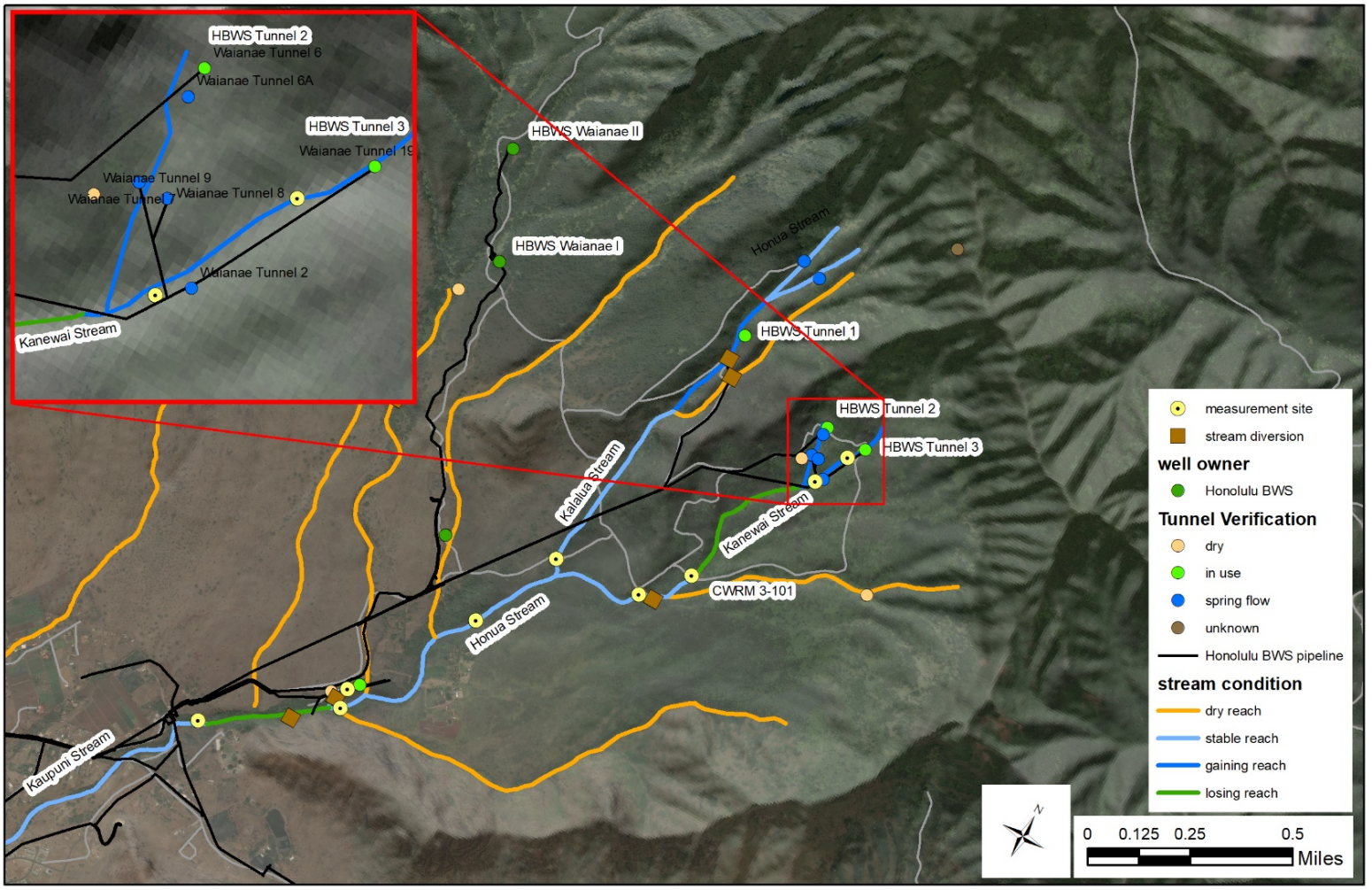
Percentile	Kanewai Stream at 1000ft (mgd)	Kanewai Stream at 1000ft (cfs)
50	0.57	0.88
60	0.53	0.81
70	0.49	0.76
80	0.46	0.70
90	0.40	0.63
95	0.37	0.57



C. Former historic diversion across channel on Honua Stream now used by Ka‘ala Farm.
D. Diversion intake registered and operated by Ka‘ala Farm. The mean amount diverted by Ka‘ala Farm was 0.066 mgd (66,000 gal per day) based on five measurements above and below intake.

Seepage-Run Results

Staff made synoptic measurements during stable flow conditions at site locations indicated below multiple times to quantify the gains and losses in streamflow due to surface water-groundwater interactions. Based on these measurements, stream reaches were classified as “gaining” or “losing”, or “stable” in the case where it was flowing but not clearly either “gaining” or “losing”. Some stream flow gain is due to spring flow provided by unused/abandoned development tunnels, as verified by fieldwork and identified below.



E. Honua Stream below Ka‘ala Farm at 400 ft elevation with 0.71 mgd flowing on December 22, 2016.
F. Kaupuni Stream flowing in channelized reach at Waianae Valley Road on March 24, 2017.

For More Information

Commission on Water Resource Management: https://dlnr.hawaii.gov/cwrm/
Stream Protection and Management Branch: https://dlnr.hawaii.gov/cwrm/surfacewater/
USGS Pacific Islands Water Science Center: https://www.usgs.gov/centers/piwsc