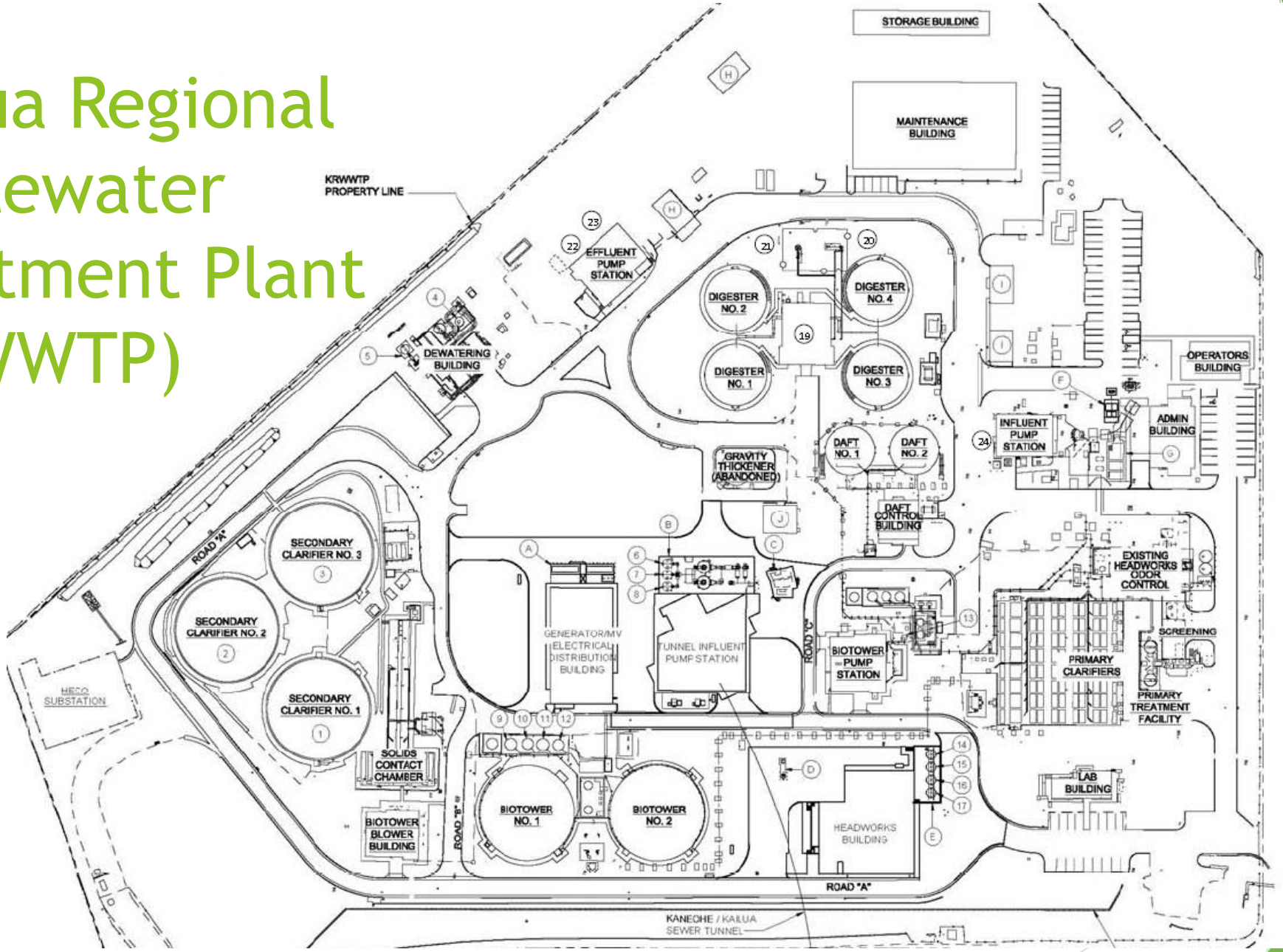
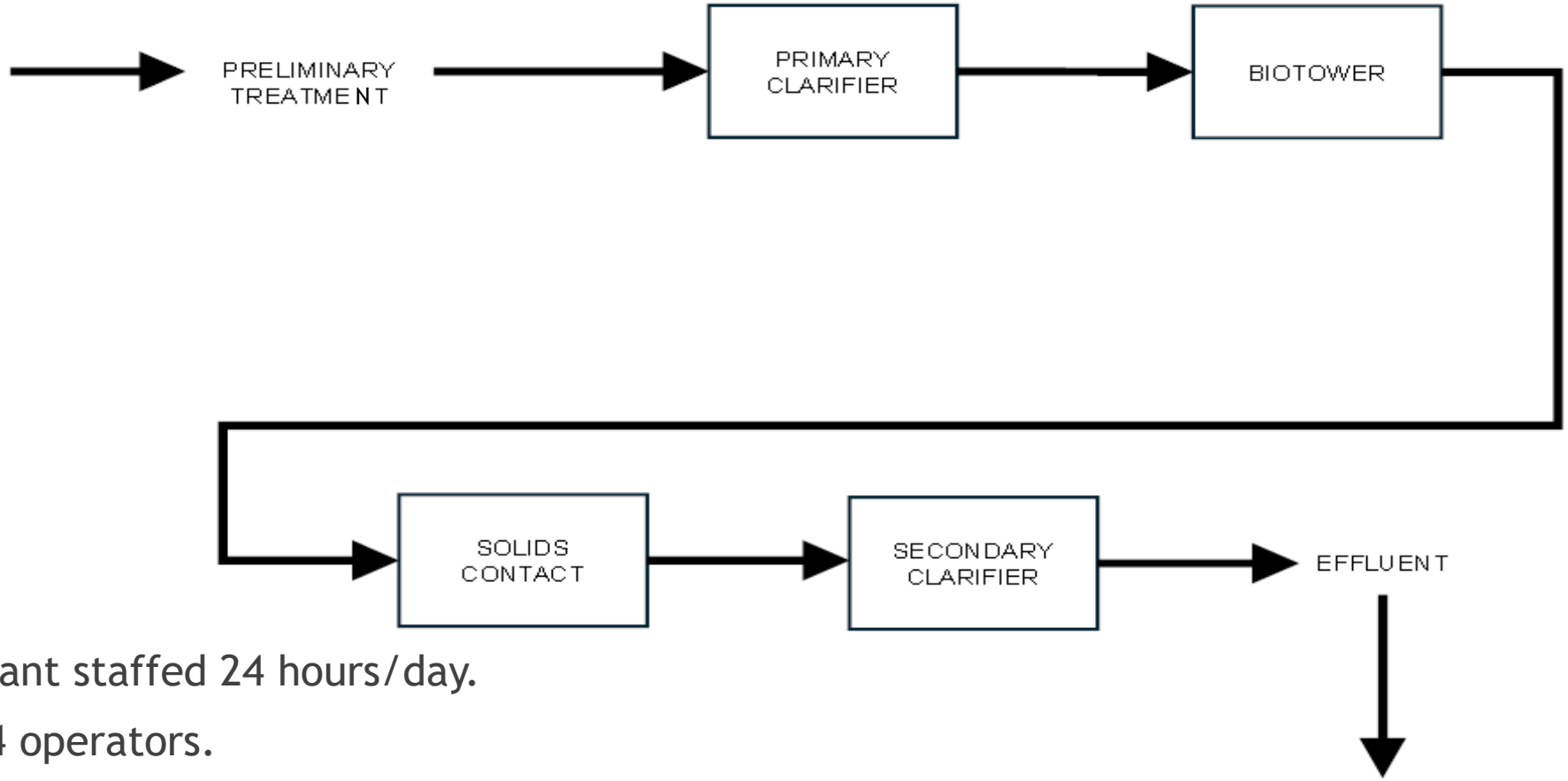
Kailua Regional Wastewater Treatment Plant

ENV - August 14, 2024

Kailua Regional Wastewater Treatment Plant (KRWWTP)



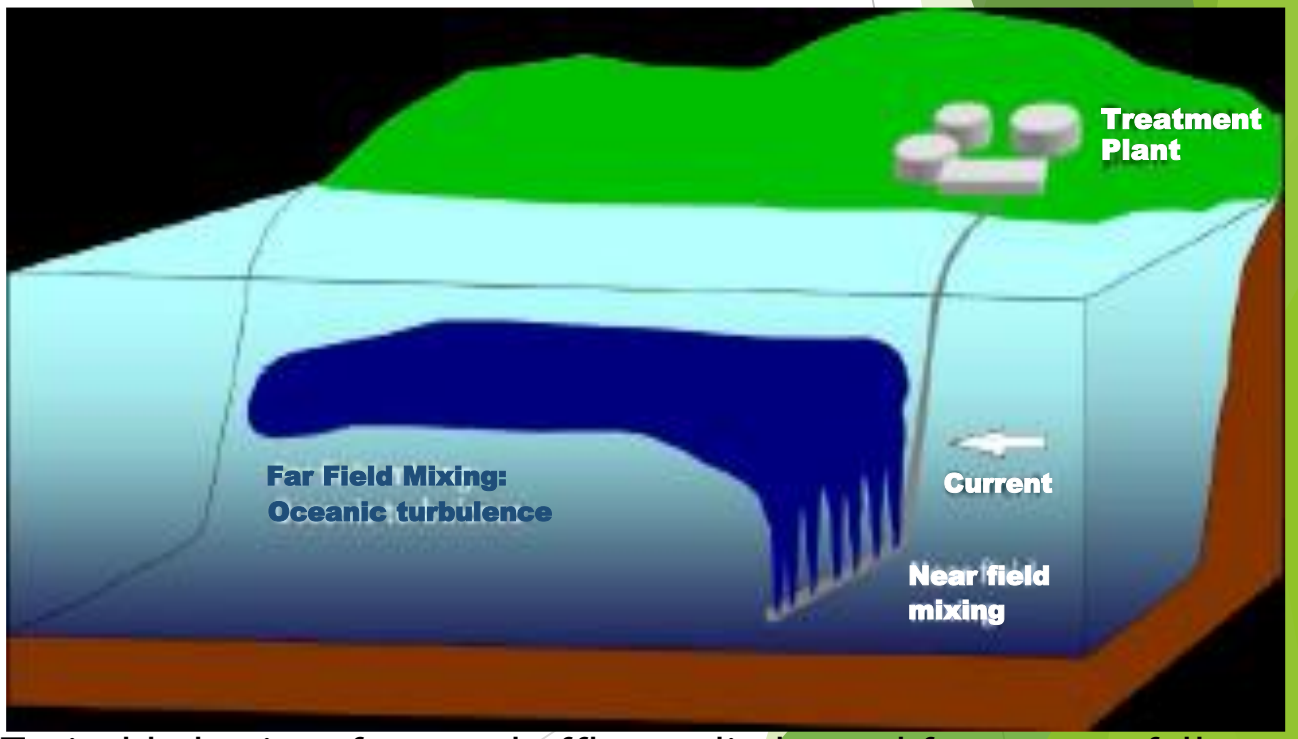
KRWWTP Treatment Process



- Plant staffed 24 hours/day.
- 24 operators.
- 17 maintenance personnel.
- Staffing levels are sufficient for normal plant operations, maintenance, and upkeep.

Treatment and Sampling of Effluent

- Wastewater undergoes secondary treatment and is sampled and tested for various constituents. Operation is regulated by NPDES permit from DOH.
- Enterococcus, a bacteria found in wastewater and all soil, is sampled 4 times per week at the effluent monitoring station within the plant.
- When enterococcus is found above the permit limit in the treated effluent (exceedance), sampling is increased to daily.
- Treated effluent is discharged from the ocean outfall, ~5,000 feet from shore at 105 feet depth. The outfall is inspected every permit cycle (5 years).
- Treated Effluent is rapidly diluted to background levels in the zone of mixing (ZOM).
- Enterococcus analysis takes 24 hours.

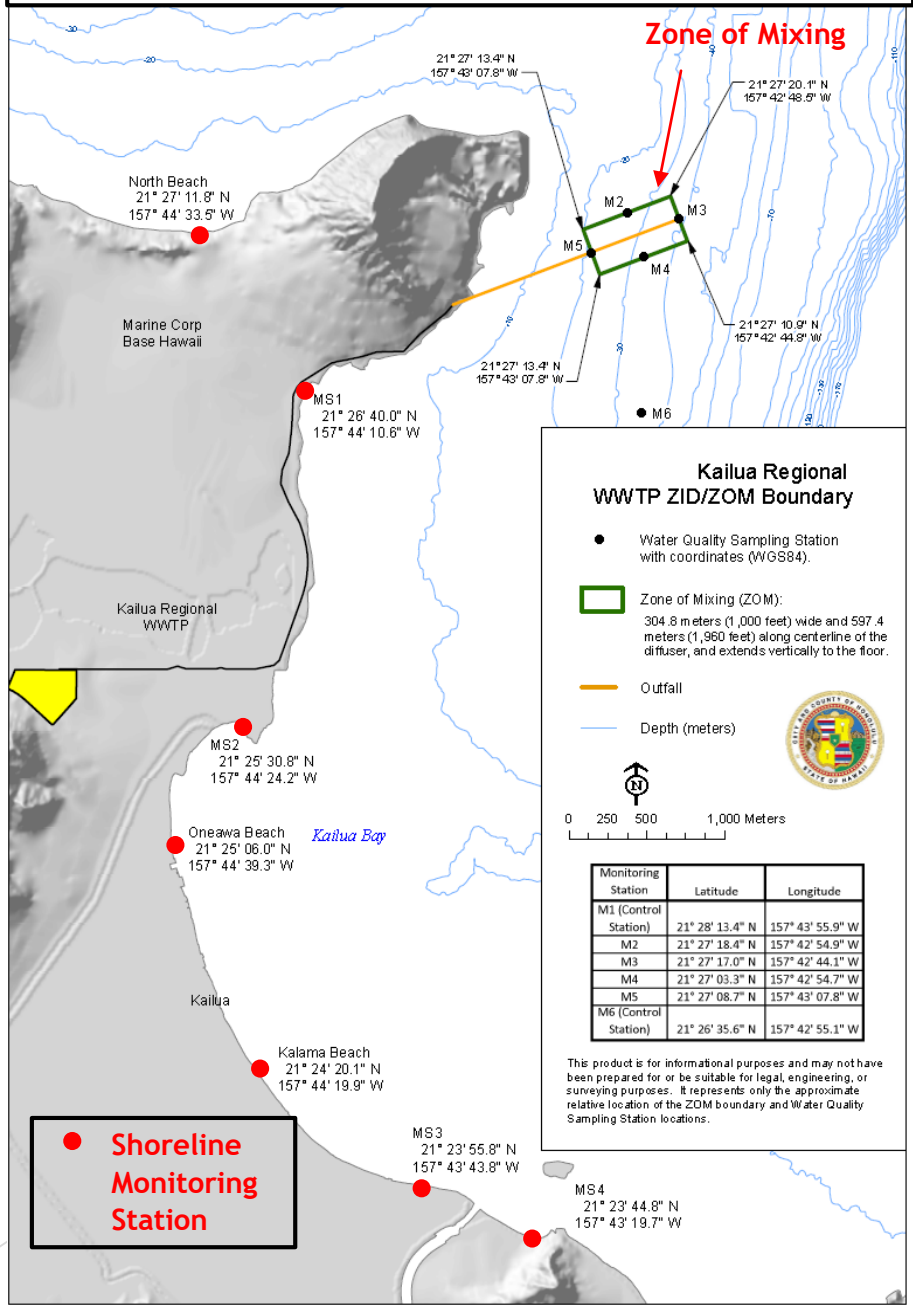


Typical behavior of treated effluent discharged from an outfall into coastal waters.

Shoreline Monitoring

- ENV must sample seven (7) shoreline monitoring stations at least five (5) times per month.
- ENV must sample four (4) Zone of Mixing (ZOM) stations at least monthly if marine conditions are safe.
- After an enterococcus exceedance in the treated effluent, the seven (7) shoreline monitoring stations are sampled daily.
- The four (4) ZOM stations are sampled daily after an enterococcus exceedance if marine conditions are safe.
- Shoreline samples are influenced by runoff that enters the bay at Kaelepulu Canal and Kawainui Canal – whenever flowing, e.g., during storm runoff (brown water).

Kailua Regional Wastewater Treatment Plant
Zone of Mixing and Shoreline Stations



Enterococcus Timeline

- 12/14/2022 – Administrative Order on Consent #1 (AOC-1) issued to ENV by EPA due to enterococcus exceedances that occurred in 2021. AOC-1 requirements:
  - Increase the effluent monitoring frequency for enterococcus from five times per month to a minimum of four times per week.
  - Submit an engineering condition assessment of the treatment plant biotowers by 4/13/2023.
  - Submit a treatment plant enterococcus assessment, which analyzes the conditions when exceedances may occur by 3/14/2023.
  - Submit a supplement to the operations manual that optimizes processes to meet enterococcus permit limits by 4/13/2023.
- Enterococcus Assessment findings:
  - Need to install UV disinfection.
  - Process optimization may/may not help.
    - Technical process parameters, flow control, and chemical addition.

Enterococcus Timeline (continued)

- 5/22/2023 – ENV creates and implements a Kaneohe-Kailua tunnel (K-K tunnel) operation protocol for high flow events due to April and May 2023 exceedances.
- 7/23/2023 – DOH issues Notice of Violation and Order (NOVO) for exceedances that occurred in April and May 2023.
- 9/28/2023 – EPA closes AOC-1 due to successful completion and issues a new AOC #2 (AOC-2). AOC-2 requirements:
  - Continue use of the K-K tunnel protocol during high flow events.
  - Use supplemental O&M manual.
  - Continue enterococcus monitoring a minimum of 4 times per week.
  - Install a continuous turbidity meter for effluent (operational on 12/15/2023).
  - Install ultraviolet disinfection by 12/31/2025.
  - Keep both biotowers in continuous operation until after UV is operational.
  - Refurbish the two biotowers by 1/31/2029 (do not start until after UV).

Enterococcus Timeline (continued)

- 6/19 and 6/28/2024 – Additional equipment was brought online to assist in optimizing plant performance during normal flow conditions.
- Interim Chemical Disinfection – ENV is in the process of bench testing chemical disinfection to study feasibility and effective dosing.
  - Upon successful bench test, procurement for full scale implementation will commence.

Dry Weather Enterococcus Exceedances

- Equipment issues.
- High flow recovery.

Wet Weather High Flow Enterococcus Exceedances

- Influent flows can substantially increase due to inflow and infiltration (I/I) which can affect efficiency of plant performance. All flows are fully treated.
- K-K tunnel used during high flow conditions
  - Wastewater storage in K-K tunnel is controlled by the pumping rate of the tunnel influent pump station (TIPS).
  - K-K tunnel can store up to 9 million gallons. Max pump rate of 60 MGD.
  - Due to capacity constraints over significant and sustained rain events, flows through the WWTP can remain very high for several days.

Inflow & Infiltration (I/I)

- During heavy rains, flows to the plant increase within hours of the event beginning. Rain water percolates into soil above and around sewer pipes which can act like a “French drain”.
  - I/I sources can include cracks in sewer pipes and manholes, missing or damaged cleanout caps, and storm water connections to the sanitary sewer.
  - No evidence of City storm drains connecting to the sewer system.
- After significant storm events end, it may take several days for flows at the plant to return to normal daily flows.
- ENV monitors wastewater pump station flows for signs of I/I issues.
  - Flowmeters within the pump stations record volumes pumped.
  - Significant increase in volumes indicate I/I within the contributory basin.
  - Investigation within the basin collection system looks for locations of I/I.
  - Rehabilitation of pipes via lining or replacement can reduce I/I.
  - I/I originating from private property (laterals) is a major challenge.

I/I (continued)

- Since July of 2020, within the Kaneohe-Kailua basin, ENV has smoke tested approximately 40 miles of sewer mains, and 16 miles of sewer laterals, which included 4,139 parcels.
- 286 violations discovered through these efforts.
  - Residents issued letters of warning.
  - ENV escalates enforcement as necessary until repairs are made.
- I/I tracking cannot occur during storm events (all sewers have high flow). Smoke testing and dry weather observation yield best results.
- Average approximately 15,000 ft of sewers lined annually in Kaneohe-Kailua basin (ongoing).
- Illegal dumping into the storm drain system can be reported to the Department of Facility Maintenance (DFM) Environmental Concern Line 808-768-3300, ext. 3.
- Do not open Sanitary Sewer manholes to drain flooded streets.

Kaimalino Neighborhood Sewer Project

- ENV has a project to install sewers within the Kaimalino neighborhood to eliminate cesspools in the area.
- Currently in Planning. Next is Design, followed by bidding/award/construction.
- The schedule is dependent upon the progress of planning and design phases, and obtaining permits and approvals.
- Construction is estimated to be completed by 2031.

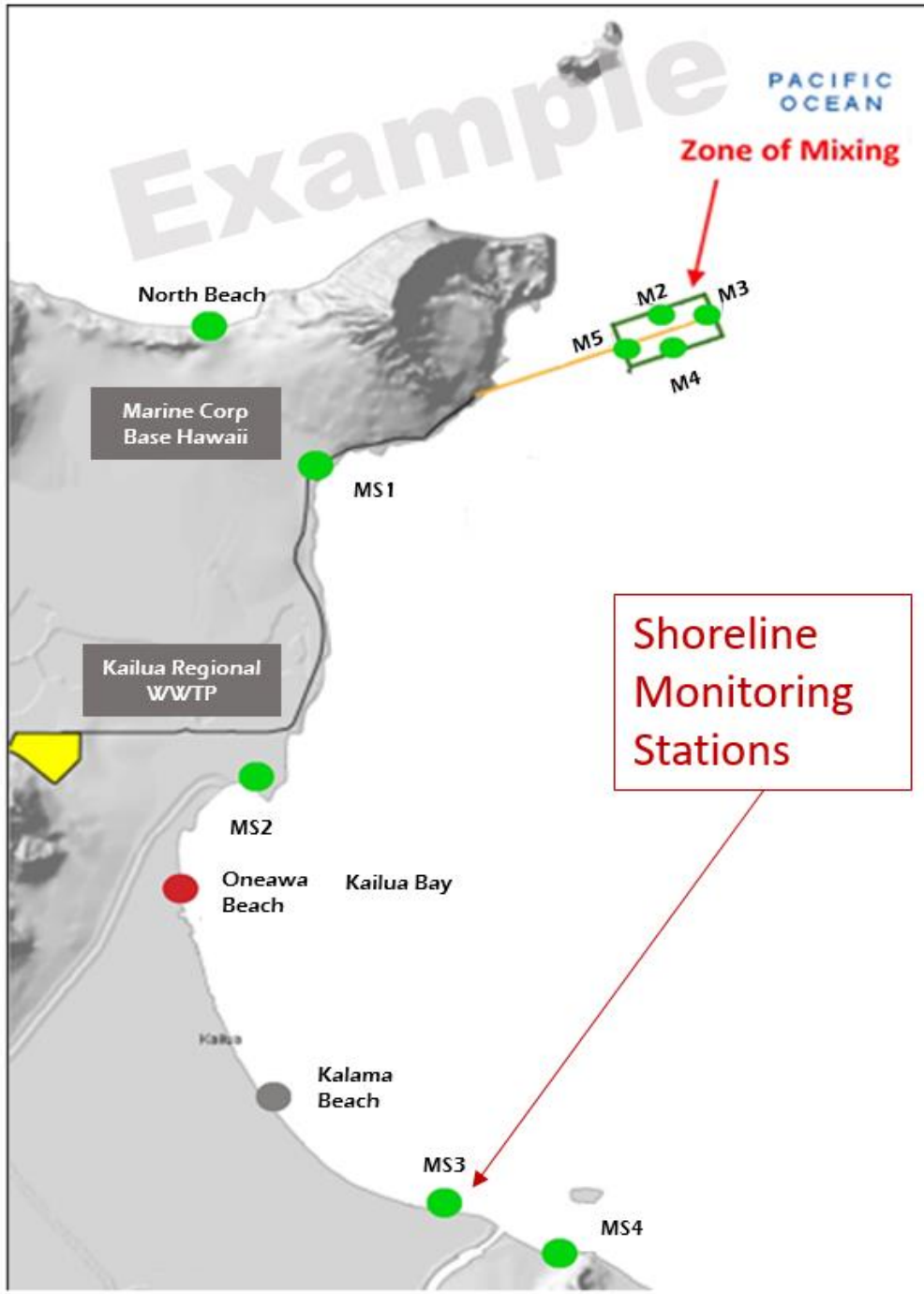
Upcoming ENV Kailua Water Quality Website

- ENV is currently creating a website to share monitoring results for Kailua ZOM and shoreline monitoring stations.
- The website will display recent enterococcus results for the seven (7) shoreline monitoring stations, with an archive of past results. ZOM results will also be displayed when available.
- ENV has increased the shoreline sampling frequency from at least five times per month to three times per week and will post this data as soon as the website is online.

ENV Kailua Water Quality Website

- **Green Dots** = Normal Bacteria (levels of 0-130 per 100mL).
- **Red Dots** = Elevated Bacteria (levels of 131 or above per 100mL).
- **Gray Dots** = No results for the previous day.

DOH threshold for advisory is 130 per 100mL.



Shoreline Data Collected at Time of Effluent Enterococcus Exceedances since 2021

- Shoreline stations would be considered to have elevated bacterial at above 130 per 100mL.
- Days shaded blue indicate that there were rain events which were accompanied by storm runoff.
- Storm runoff flushes sediment into the ocean (brown water) that contains enterococcus.
- Bolded Shoreline data was sampled at the same day the exceeded treated effluent sample was gathered.
- Standard text shoreline was gathered the day after the exceeded treated effluent sample was gathered.

SHORELINE ENTEROCOCCUS DURING EFFLUENT EXCEEDANCES

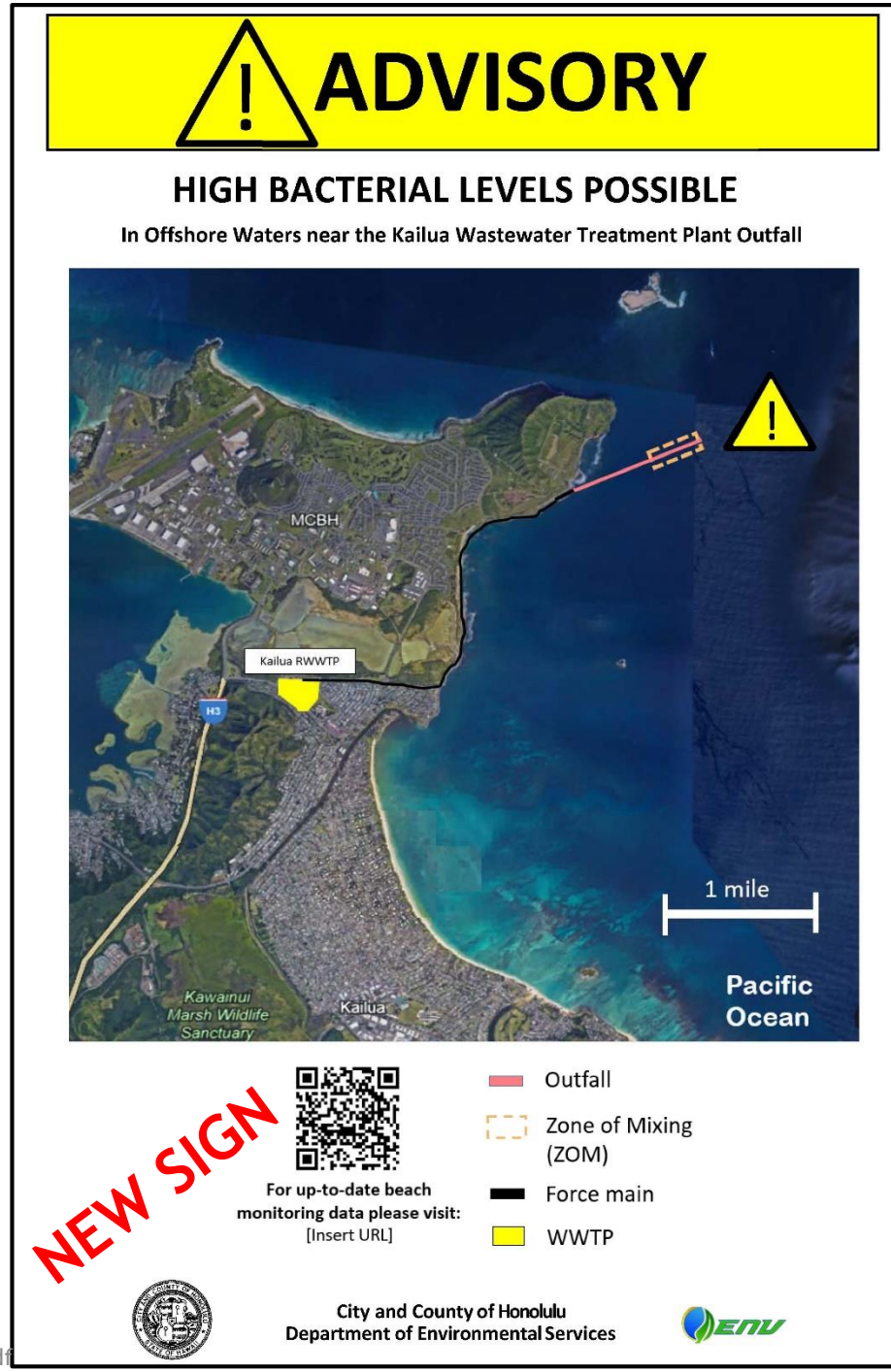
Exceedance Date	Kailua Beach per 100ml	Kalama Beach per 100ml	MS1 Surface per 100ml	MS2 Surface per 100ml	MS4 Surface per 100ml	North Beach per 100ml	Oneawa Beach per 100ml
02/18/21	**7**	**0.9**	**6**	**230**	**3**	**1**	**0.9**
02/23/21	42	69	6	36	38	<0.9	34
02/24/21	**42**	**69**	**6**	**36**	**38**	**<0.9**	**34**
02/25/21	**86**	**9**	**<0.9**	**2**	**8**	**<0.9**	**2**
02/26/21	**63**	**42**	**2**	**8**	**100**	**N/A**	**16**
02/27/21	**49**	**25**	**8**	**4**	**26**	**<0.9**	**6**
02/28/21	**35**	**5**	**<0.9**	**10**	**15**	**<0.9**	**2**
03/01/21	**40**	**3**	**7**	**9**	**46**	**<0.9**	**15**
04/27/21	N/A	N/A	N/A	N/A	N/A	N/A	N/A
12/07/21	N/A	N/A	N/A	N/A	N/A	N/A	N/A
12/08/21	31	840	41	700	540	7	100
12/09/21	**31**	**840**	**41**	**700**	**540**	**7**	**100**
12/10/21	N/A	N/A	N/A	N/A	N/A	N/A	N/A
04/08/22	**4**	**5**	**0.9**	**3**	**5**	**1.45**	**3**
04/08/23	0.9	8	5	20	6	<0.9	14
04/19/23	N/A	N/A	N/A	N/A	N/A	N/A	N/A
04/21/23	**130**	**500**	**31**	**320**	**28**	**15**	**1700**
04/22/23	**4**	**5**	**0.9**	**24**	**2**	**<0.9**	**14**
04/23/23	**0.9**	**10**	**2**	**71**	**22**	**<0.9**	**45**
04/27/23	**12**	**230**	**540**	**2300**	**38**	**18**	**990**
04/28/23	**260**	**92**	**0.9**	**900**	**560**	**<0.9**	**92**
04/29/23	**23**	**20**	**6**	**57**	**5**	**<0.9**	**270**

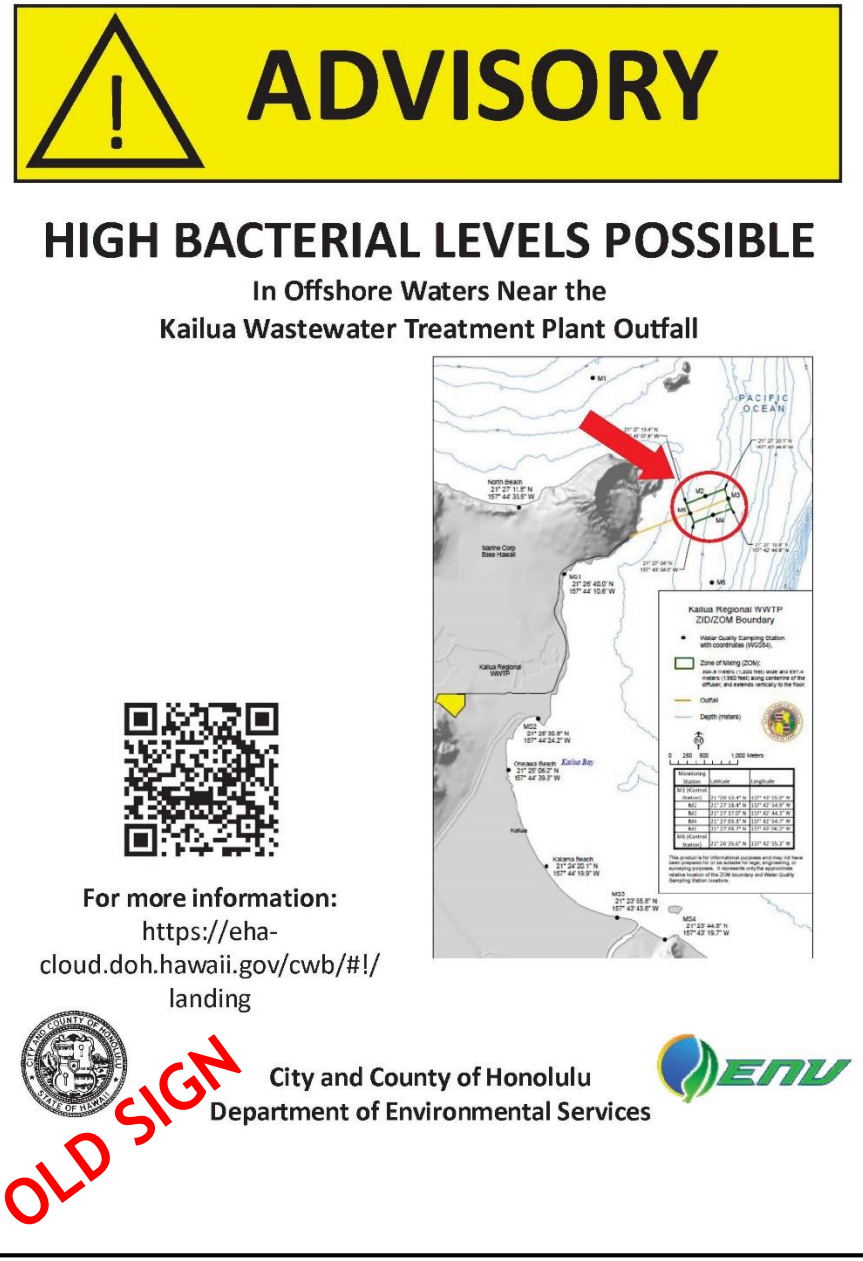
Shoreline Data Collected at Time of Effluent Enterococcus Exceedances since 2021 (continued)

Exceedance Date	Kailua Beach per 100ml	Kalama Beach per 100ml	MS1 Surface per 100ml	MS2 Surface per 100ml	MS4 Surface per 100ml	North Beach per 100ml	Oneawa Beach per 100ml
04/30/23	**7**	**41**	**2**	**64**	**6**	**<0.9**	**39**
05/01/23	**10**	**28**	**<0.9**	**30**	**7**	**<0.9**	**30**
05/02/23	**2**	**4**	**2**	**80**	**10**	**0.9**	**7**
05/03/23	**12**	**2**	**0.9**	**19**	**9**	**<0.9**	**22**
05/04/23	**3**	**0.9**	**4**	**13**	**3**	**2.5**	**16**
12/21/23	5	26	0.9	43	0.9	0.9	38
05/07/24	4	3	<0.9	4	0.9	<0.9	7
05/14/24	**1000**	**1400**	**450**	**10000**	**2900**	**29.5**	**2800**
05/17/24	**840**	**680**	**2000**	**2700**	**2600**	**20.5**	**750**
05/18/24	**20**	**20**	**<0.9**	**470**	**93**	**1.45**	**45**
05/19/24	**22**	**67**	**35**	**230**	**200**	**<0.9**	**37**
05/23/24	**5**	**9**	**<0.9**	**11**	**17**	**<0.9**	**31**
05/31/24	7	7	<0.9	2	11	<0.9	12
06/20/24	**19**	**13**	**8**	**3**	**21**	**2.45**	**24**
07/11/24	8	12	2	21	19	1.45	4
07/14/24	**21**	**6**	**3**	**20**	**6**	**2**	**13**
07/15/24	**15**	**19**	**0.9**	**33**	**10**	**<0.9**	**19**

Advisory Signage Update

- Advisory signage has been updated to include an easy to read color map and scale.
- Signs have been upgraded from 8.5”x11” to 11”x17”.
- QR code will direct user to the new water quality site.





Kailua Ultraviolet (UV) Update

- Notice to Proceed (NTP) to contractor – March 26, 2024.
- Completion Date – December 31, 2025.
- Cost: $7.93 million.
- The contractor has started work on site.
- With UV disinfection the plant will reliably remove 99.9+% of enterococcus prior to discharge.