2021

INTEGRATED PLANNING FOR CLEAN WATER ON O'AHU

Background

A secondary treatment upgrade for the Sand Island Wastewater Treatment Plant is part of a 2010 consent decree between the City and County of Honolulu (CCH), the Justice Department, U.S. Environmental Protection Agency (EPA), Hawai'i Attorney General's Office, Hawai'i Department of Health, the Sierra Club, Hawai'i Thousand Friends, and Our Children's Earth Foundation. The consent decree also required sewer system improvements and other upgrades. In 2019, an Environmental Impact Statement (EIS) was released for the Sand Island secondary upgrade which uses a Membrane Bioreactor (MBR) process. The EIS estimated the upgrade would emit 30,000 metric tons of CO2 equivalent per year, doubling the carbon emissions of the plant.[1] Bids for constructing an initial phase that treats a portion of the wastewater have been submitted to CCH, exceeding $400 million. Studies of the secondary treatment option concluded that there will be no benefit to secondary treatment upgrades for the environment or public health,[2] and that other non-point sources of pollution are the main threats to water quality.[3] There are also other options for secondary treatment that use less energy and cost less than the MBR alternative.

An **Integrated Plan** provides the regulatory framework to evaluate the costs and benefits of the proposed upgrade against other water quality actions

Integrated Planning Alternative

In 2019, an amendment to the Clean Water Act codified Integrated Plans (IPs) as an opportunity for municipalities to request a modification of orders or settlements. An IP identifies efficiencies from separate wastewater and stormwater programs to best prioritize capital investments and achieve human health and water quality objectives. This approach can also lead to more sustainable and comprehensive solutions, such as green infrastructure, that improve water quality and provide multiple benefits.[4] The twenty-seven IPs developed nationwide have led to changes in consent decrees and permit requirements.

Solutions

ALTERNATIVE SECONDARY TREATMENT TECHNOLOGY

There are alternatives to the planned MBR technology that reduces construction and operational costs, while also meeting secondary treatment standards. One example, illustrated in Appendix 1, mainly can be retrofitted into the existing infrastructure. The eight (8) existing primary clarifiers would be retrofitted into two (2) primary filters and six (6) trickling filters. The primary filters will meet or exceed the capacity of all existing clarifiers while eliminating the risk of storm-driven flushing. They will also significantly reduce or eliminate the need for chemical addition while producing more solids for the generation of biogas. The trickling filters can be flooded during rain events for extra holding capacity. The proposed addition of tertiary filters will allow for full control over solids entering the UV treatment which is currently being upgraded, which can in turn operate much more efficiently. All in all, the proposed system will have a lower cost and carbon footprint while producing secondary-level effluent. Other lower-cost options, such as two-stage filtration, would remove microplastic pollution.

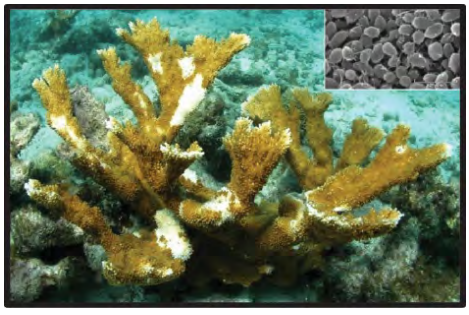
ADDRESSING OAHU'S WATER QUALITY PRIORITIES

Oahu's water quality is threatened by a wide range of pollution sources. The following examples show how Integrated Planning could provide ahupua'a-based solutions by evaluating all options from the top of the mountains to the sea. In addition to these examples, there are many other needs that could be evaluated, such as sewer upgrades, urban stormwater management, and agricultural runoff.

CESSPOOL CONVERSIONS

Hawaii's water quality is threatened by 88,000+ cesspools that discharge over 53 million gallons per day of untreated sewage into the groundwater.[5] The sewage pollution from these cesspools impacts drinking water resources in multiple areas throughout the islands, and the polluted groundwater emerges in streams and nearshore waters. Contaminated water threatens human health. Hawai'i has quadruple the rate of *staphylococcus* infections and double the rate of MRSA infections compared to the rest of the country, and gastrointestinal infections from swimming in polluted water are an additional risk.[6] On coral reefs, sewage pollution can cause coral growth anomalies,[7] allow invasive algae to grow over native corals,[8] and create localized coastal ocean acidification, which causes bioerosion of reefs.[9] It also contains endocrine disruptors such as estrogenic compounds from birth control pills, which alter the behaviors of reef fish and reproductive health of corals and fish.[10]

Replacing cesspools on O'ahu	Cost ($m)	Jobs (FTE)
3,700 high-priority cesspool replacements	$111	360
Workforce development and training program: Work-4-Water	$17	20
Maintenance for new On Site Disposal Systems	-	120
Total	$128	500



FOREST PROTECTION

Turbidity is the leading reason a majority of Oahu's marine waters fail to meet Department of Health Standards.[11] A leading cause of turbidity is runoff from upland areas as forests are replaced by bare soil.[12] Not only do forests hold soil better, they also absorb water into the ground faster, reducing flooding.[13] Native Hawaiian forests are being consumed by introduced hooved animals which trample, uproot, and devour plants. They compact soils, reducing their ability to absorb water.[14] These animals also produce untreated waste and their carcasses foul streams. Pig wastes contain diseases fatal to humans such as non-tuberculous mycobacterial (NTM) lung disease and *leptospirosis*.[15] Hawai'i has the highest prevalence of age-adjusted NTM lung disease mortality in the U.S.[16] Constructing fences that exclude these animals allows barren and uprooted areas to naturally regrow,[17,18] reducing runoff and erosion, and increasing carbon storage.[19] Other threats to forests and water quality are invasive weeds[20] and wildfires.[21]

O'ahu Forest Protection Needs	Cost ($m)	Jobs (FTE)
Fence construction to protect 9,000 acres	$10.0	112
Wildfire prevention	$2.5	28
Planting and other infrastructure	$3.3	37
Invasive Plant Removal	$1.6	18
Total	$17	195

Integrated planning aligns with Hawaii's policies for climate change and water management.

One Climate, One O'ahu	O'ahu Climate Action Plan Recommends reducing the city's energy use, including wastewater facilities.
Directive 18-2	Climate Change and Sea Level Rise Directive Requires city agencies to take action to minimize the negative impacts of climate change while setting mid and end of century climate goals for sea level rise and shoreline management.
Ordinance 20-47	Relating to the Office of Climate Change, Sustainability, and Resiliency Recommends a proactive approach in adapting to impacts as a result of climate change and sea level rise, and to align programs to help protect and prepare infrastructure, assets, and citizens of the city for the physical and economic impacts of climate change.
Resolution 18-221	Resolution Urging the City Administration to Establish Goals for 100 Percent Renewable Energy and a Carbon Neutral Economy to Accelerate the City and County of Honolulu's Implementation of the 2018 Climate Change Action Summit Policies.
Act 32, SLH 2017	Relating to the Climate Change Requires the State to expand strategies and mechanisms to reduce greenhouse gas emissions statewide in alignment with the principles and goals adopted in the Paris Agreement.
Act 125, SLH 2017	Relating to Cesspools Requires the replacement of all cesspools by 2050.

Next Steps

The consent decree has interim deadlines (see Appendix 2) for design and construction milestones of the secondary treatment system. Time is needed to evaluate alternative options, and for the development of an Integrated Plan. To pause the consent decree timeline and evaluate other options, the original litigants of the Consent Decree and key players within the County government are needed to support the exploration of Integrated Planning. CCH can work with the EPA Ombudsman responsible for Integrated Planning to initiate the research and review process. An independent reviewer will then assess and assign value and impact indices to various options for improving coastal water quality, including remediation efforts like cesspool conversions, stormwater management, and sedimentation control. The Plan will provide the collaborative and comprehensive problem-solving process needed to most efficiently and effectively address Oahu's water quality issues.

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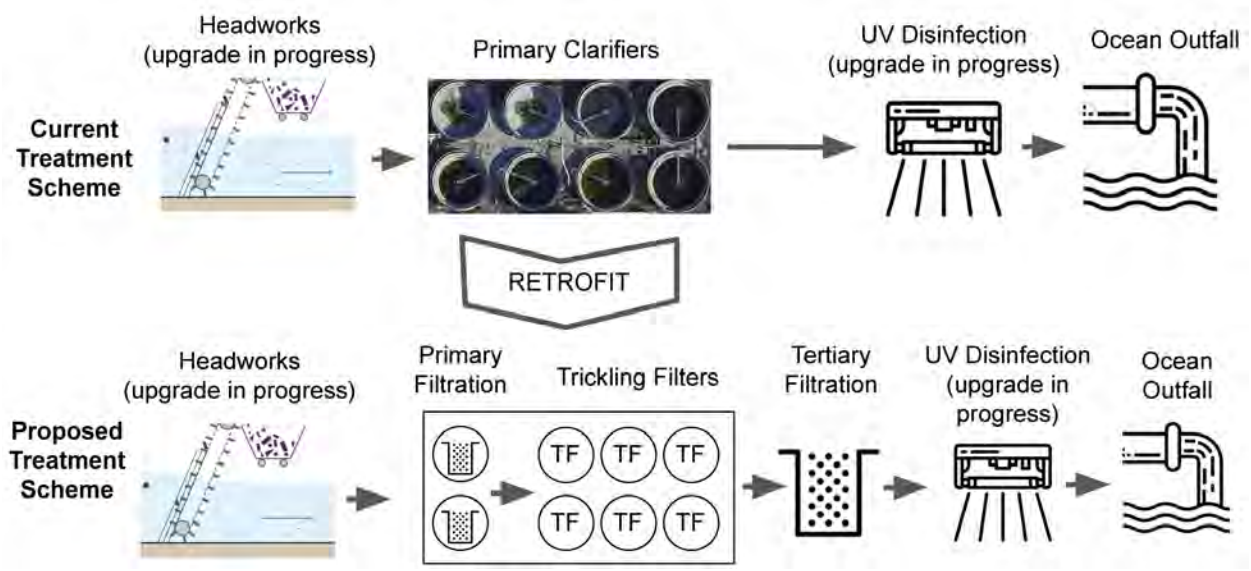
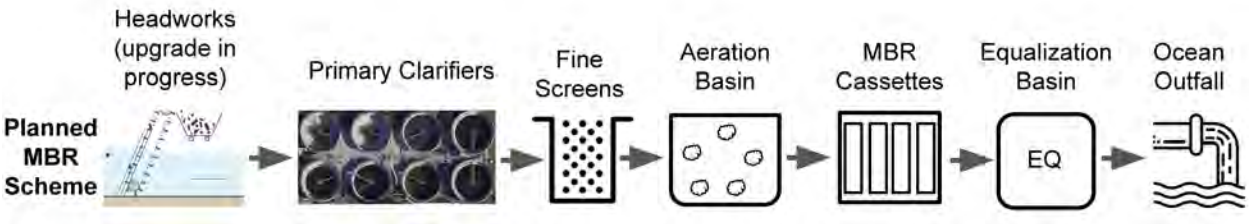
APPENDIX 1: SECONDARY TREATMENT TECHNOLOGY ALTERNATIVES



- Primary filters and trickling filters can be **retrofitted** into existing primary clarifiers
  - Project construction and operational costs can be significantly reduced
- 2 Primary filters **meet or exceed capacity** of 8 primary clarifiers
  - Eliminates storm-driven flushing
  - Significantly reduces or eliminates the need for chemical addition
  - Produces more solids for biogas generation
- Remaining 6 primary clarifiers can be **converted to trickling filters**
  - Can be flooded during rain events for extra holding capacity
  - Classified as "equivalent to secondary" in Clean Water Act



- Phase 1: 20 MGD, Phase 2: 96 MGD
  - Does not retrofit into existing system, high construction effort: Phase 1 has an estimated partial lifecycle cost of $1.2 billion
  - This high level of treatment is used for water reuse situations, but Sand Island has an ocean outfall
  - Emits 30,000 metric tons of CO2 equivalent, doubling the emissions of the facility

APPENDIX 2: EXCERPT OF CONSENT DECREE MILESTONES FOR THE SAND ISLAND WWTP SECONDARY TREATEMENT UPGRADE

- A. As an Interim compliance milestone, by January 1, 2019: CCH shall execute a design contract and issue a notice to proceed with the design of treatment process facilities needed to comply with secondary treatment standards for wastewater discharges from the Sand Island WWTP. The scope and design contract may reflect phasing of necessary upgrades to the Sand Island WWTP, and may not include the detailed designs of all process facilities necessary to comply with secondary treatment standards.
- B. By January 2, 2022, CCH shall execute a construction contract and issue a notice to proceed with construction of facilities that are part of its design to upgrade the Sand Island WWTP, in relation to compliance with secondary treatment standards. The scope of the construction contract may reflect phasing of necessary upgrades to the Sand Island WWTP, and may not include all process facilities necessary to comply with secondary treatment standards.
- C. If the notice to proceed required by subparagraph B. did not authorize construction of all secondary treatment process facilities necessary to comply with secondary treatment standards for wastewater discharges from the Sand Island WWTP, as an interim compliance milestone, by January 1, 2030, CCH shall execute a construction contract (or contracts) and issue a notice (or notices) to proceed with construction of all secondary treatment process facilities necessary to comply with secondary treatment standards for wastewater discharges from the Sand Island WWTP.
- D. No earlier than January 1, 2024, and no later than December 31, 2025, CCH may submit to the Parties a report with a proposal to extend the deadline to Complete Construction of facilities necessary to comply with secondary treatment standards of the Act, as defined by 40 C.F.R. Part 113, for wastewater discharges from the Sand Island WWTP. The proposal shall, In no event, seek to extend this compliance milestone to a date later than December 31, 2038.

Full text available at: https://www.epa.gov/sites/production/files/2013-09/documents/honolulucwa-cd_0.pdf